Health economic evaluation of outpatient management of fibromyalgia patients and the costs avoided by diagnosing fibromyalgia in France

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ABSTRACT

Objective. *To assess whether the decrease in medical resource use and cost after diagnosing fibromyalgia, observed in a large primary care population in the United Kingdom can be extrapolated to France.*

Methods. *A questionnaire was created based on medical resource use by 2,260 patients diagnosed with fibromyalgia between 01/01/1998 and 31/03/2003 in the General Practice Research Database in the UK. Sixty French experts (general practitioners, rheumatologists) assessed whether the data from that database are in line with their clinical practice and, if not, were asked to provide data reflecting their own experience. The evaluation period went from 4 years before to 4 years after diagnosis using 1-year cross-sections. Evaluated resources were drug use, diagnostics tests, general practitioners and specialist visits, and also paramedical or alternative treatments. Data regarding inpatient care and productivity loss were not collected. Medical resource use if no diagnosis had been established was estimated, so the impact of diagnosis could be evaluated.*

Results. *Whereas costs gradually increase before diagnosis, stagnation in costs occurs in the year after diagnosis, followed by a moderate decrease afterwards. The same trend was observed whether the panel consisted of general practitioners or rheumatologists. The savings made as a result of fibromyalgia diagnosis add up to 126 euros per patient per year for the health care payer. General practitioner visits, diagnostic tests and drug use represent respectively 57%, 23% and 12% of the savings.*

Conclusion. *Also in France, early diagnosis of fibromyalgia leads to a decrease in resource use and health care costs.*

Introduction

Fibromyalgia syndrome (FM) is a chronic pain disorder characterised by widespread musculoskeletal pain and stiffness, soft tissue tenderness, general fatigue, and sleep disturbances. Patients with FM are high consumers of health care services (1-6). FM patients also often retire prematurely from the work force – usually after long periods of absence from work – such that, over and above the costs associated with treatment itself, considerable indirect costs arise in connection with disability pensions and income loss (7-11). From a public payer perspective, given the important prevalence figures of 3.4–4.2% for women and 0.2–0.5% for men (12, 13), FM is expensive (14-21) and the societal burden (productivity loss) (22) associated with increased diagnosis of FM is of particular concern. Differential diagnosis is difficult, especially in the first line setting. In fact, it is estimated that at any time, about 10–12% of the general population complains of muscle or tendon pain, and physicians have difficulties in making the right diagnosis. Hence, patients with FM may repeatedly present at their general practitioner (GP) with various symptoms before a diagnosis of FM is made. The difficulty with diagnosing fibromyalgia lies in the fact that, in most cases, laboratory testing appears normal and that many of the FM symptoms mimic symptoms of other disorders.

Annemans *et al.* (1) conducted research on the medical consumption of patients with FM in the UK where the GPRD UK primary care database (General Practice Research Database) was used to evaluate resource use before, during and after diagnosis of FM. The study evaluated the impact of diagnosing FM on the frequency of visits, the use of drugs, patient referrals

to specialists, diagnostic tests and total cost of medical care. The results of this study revealed that an earlier diagnosis of FM can avoid costs and investigations leading to net savings for the UK health care payer.

To demonstrate whether the results obtained in the UK can be extrapolated to other countries, the current study was conducted in France. However, for France GPRD data are not available and therefore resource use was estimated using an expert questionnaire. This questionnaire was based on the results of the same sample frame as used in the UK study by Annemans *et al*.

The impact of diagnosing FM in France will be measured by using the same forecast analyses as Annemans *et al*. in the UK: comparing the observed resource use and costs *versus* the forecasted trend in case the diagnosis would not have been made. This forecast analyses is common in health services research (23-27), but in the area of fibromyalgia, we are aware of only two studies that use this technique (1, 28).

To the best of our knowledge, no earlier research has been carried out on the cost of fibromyalgia in France.

Materials and methods

Medical resource use

In the UK, the resource and costs were estimated based on data gathered from 2,260 patients diagnosed with FM between January 1998 and March 2003 included in the General Practice Research Database (GPRD). This database contains electronic longitudinal anonymised medical records from patients attending more than 350 general practices in the UK and represents about 4.6% of the UK population. However, this database or something similar does not exist in France. Therefore, based on the UK prescriptions, an expert questionnaire was developed. In this questionnaire 60 French experts (33 GPs and 27 rheumatologists) specialised in the treatment of FM were asked to assess whether the data from the UK GPRD database are in line with their clinical practice and, if not, to provide data reflecting their own experience. The assessment period cover the period from 4 years prior to diagnosis (indicated as negative years) and 4 years (indicated as positive years) after the diagnosis.

The data covered in the GPRD database included diagnostic tests, drug use, GP visits and referrals to specialists. About 150 items were retrieved in the database. To make the completion of the questionnaire feasible some resource items were grouped and questioned as one. For example, different lab tests were grouped in larger categories as full blood count, ionogram, liver test, etc. This regrouping resulted in 20 different diagnostic tests (compared to the 62 items in the UK GPRD database). Drug use was questioned per class. The following classes were identified: Non-steroidal anti-inflammatory drugs (NSAIDs), tri-cyclic antidepressants (TCAs), selective serotonin re-uptake inhibitors (SSRIs), and corticosteroids. Patients were referred to 16 types of specialists. Thus, the more than 150 items found in the UK database were reduced to 41 medical resource items in the questionnaire.

Also, information concerning paramedical and alternative treatments (=complementary care), and food supplements was gathered. These data were not available in the GPRD database. Thus, the estimations of the experts were based on their personal experience.

Inpatient care and productivity loss were not considered. The estimates from the expert panels were entered as "number of events per 100 patients per year".

Costs

The cost calculation involved two steps: first, resource use rates per 100 person-years for different types of health care services were collected in 1-year intervals for up to 4 years prior to, and up to 4 years after the diagnosis date. Afterwards, the 1-year intervals were regrouped to prior diagnosis, year of diagnosis and post diagnosis.

For lab tests, visits and referrals, the official website of the French health care insurance was consulted (29). For drugs, the official website for medical products and drugs in France (30) was searched. Where drug categories are considered, the provided unit cost is the cost of the mostly used drug within that category in France. All unit costs are shown in Table I.

Costs were calculated from the public health care payer (PHCP) and modified societal (public payer + patient co-payment, SP) perspective. The number of units of medical resource use consumed was multiplied with the cost per unit from the considered perspective. To calculate the yearly drug cost, the cost of 1 pack was multiplied by 12 assuming that 1 pack per month was needed. For food supplements the pack price was divided by four because the questionnaire collected information about the number of weeks (rather than months) during which a food supplement was given.

Statistical analysis

For the adaptation of the UK model to French rates, more specifically the extrapolation of resource use to 4 years post-diagnosis based on the 4 years pre-diagnosis, the initial UK Poisson log-linear regression models were recalculated. In these new analyses, the models were constructed with the estimated number of patients with a specific event (= resource use) as dependent variable, and the TTE (Time-to-Event, being time pre or post Fibromyalgia diagnosis) as a continuous independent variable. For the 4 years pre-diagnosis, the estimates from the Expert Panels were entered as "number of events per 100 patients per year". The model equation was then used to predict the resource use in the 4 years post-diagnosis, by linearly extrapolating into time. The mean estimated number of events per 100 patients per year and its 95% confidence intervals were calculated with this method, for the specific required events/resources. In summary, this model used the TTE as a linear effect and was only constructed based on the data from 4 years pre-index. Hence, this model extrapolates beyond the time of diagnosis, only using pre-diagnosis data and the year of diagnosis, where an excess of resource use that might be seen was excluded (31).

As offset in the Poisson log-linear model, the ln (natural logarithm) of 100 was used, since the rate per 100 patients needed to be assessed.

As observation weight, we used 2,260,

Table I. Unit costs and reimbursement rate.

	Societal cost	Reimbursement rate
Diagnostic tests		
Red blood cells, platelets, WBC + formula	9.5	60%
Ionogram	5.4	60%
Blood viscosity	9.5	60%
Proteins	2.7	60%
Lipids	13.5	60%
Hormones	27.0	60%
Liver function	56.7	70%
Thyroid function	38.4	70%
Urinary analysis	18.9	60%
Renal function	39.4	70%
Glucose	10.8	60%
Inflammatory tests	2.7	60%
Chest x-ray	21.3	70%
Spine x-ray	21.3	70%
Mammography	37.3	70%
Vaginal swab	8.0	70%
Referrals		
GP	22.0	70%
Dermatologist	25.0	70%
Ear-nose-throat specialist	25.0	70%
Internal medicine	44.6	70%
General surgeon	49.0	70%
Urologist	25.0	70%
Geriatric	25.0	70%
Gynaecologist	25.0	70%
Neurologist	25.0	70%
Obstetrics	25.0	70%
Ophthalmologist	25.0	70%
Orthopaedics	25.0	70%
Paediatrics	25.0	70%
Clinical biologist	25.0	70%
Psychiatrist	37.0	70%
Rheumatologist	25.0	70%
Radiologist	25.0	70%
*Drugs**		
Corticosteroids	3.3	65%
SSRI antidepressants	14.9	65%
Tricyclic antidepressants	5.9	65%
NSAIDs	6.5	65%
Paramedical and alternative care		
Physiotherapy	12.2	60%
Psychoanalysis	48.0	0%
Acupuncture	50.0	0%
Chiropractor	50.0	0%
Hypnotherapy	60.0	0%
Relaxation therapy	45.0	0%
Thermal baths	74.0	70%
Biofeedback	65.0	0%

*Cost per month of most used drug in the class.

i.e. the same number of patients as the initial GPRD analysis. In this way, the model estimated the same resource use with the same sample size as the initial model, leading to a similar precision as the first model, but with the estimates of the Expert Panel. Using this method is like mimicking the initial analyses, with similar precision, but with country-specific entries.

The above was repeated for each of the required country-specific event types (diagnostic tests, drugs, GP and specialist visits). By multiplying the observed and predicted trends in resource use with the unit cost of each resource item, the observed and predicted trends in costs were then calculated.

The impact of making the diagnosis on the costs of a specific item was calculated as the difference between the predicted trend and the observed trend in costs.

Results

French physicians are 74.4% (73.3–75.6) likely to validate the UK-prescriptions in terms of diagnostic tests, 86.0% (84.6–87.2) in terms of consultations and/or referrals of/to GPs and rheumatologists, and 64.7% (61.7–67.7) in terms of medications. The lowest level of agreement was generally reported for the years surrounding the diagnosis.

The study revealed that the corresponding pattern of medical costs for France is also very similar to the situation in the UK: whereas medical costs gradually increase during the period before diagnosis; once the diagnosis has been made, there is a stagnation of the growth in costs and – dependent of the applied perspective – subsequently a decrease in costs. Therefore, at the time of diagnosis, the trend in evolution of total medical costs changes (Tables II and III). Costs related to referrals are highest during the first year after diagnosis with a same trend whether the expert panel consisted of GPs, rheumatologists or both. According to the rheumatologist panel, the costs incurred by diagnostic tests decrease from the second year after diagnosis. According to the GP panel, this is the same as in the third year after diagnosis. According to the rheumatologist panel, there is a very slow decrease of costs for drugs as in the second year after diagnosis whereas the cost for drugs according to the GP panel are the highest in the fourth year after diagnosis.

Paramedical and alternative treatments and food supplements were also studied in France (Table II). The costs associated with these complementary resources show a similar pattern as for the medical costs: increasing the period before diagnosis until the year of diagnosis and where after a slight decrease is observed. No difference was observed on whether the expert panel consisted of GP, rheumatologists or both. The information regarding alternative treatments, paramedical care and food supplements (= complementary care) is

Table II. Total cost per patient per year (€) before, during and after diagnosis from the public health care payer perspective (PHCP) and the societal perspective.

	Cost per patient (€) before diagnosis (years -4 to -1)		Cost per patient (€) during year of diagnosis (year 1)		Cost per patient (€) after diagnosis (years 2 to 4)	
	PHCP	Societal	PHCP	Societal	PHCP	Societal
Lab tests	19.3	49.6	26.7	100.4	28.3	69.7
Drugs	22.9	58.7	39.5	138.6	34.03	111.5
GP/specialist visits	251.9	368.1	337.0	429.8	323.0	424.8
Total medical costs	294.1	476.4	403.2	668.8	385.3	606.0
Food supplements	0.0	3.9	0.0	25.7	0.0	13.9
Alternative treatments	15.1	58.7	28.9	176.9	22.0	106.1
Paramedical treatment	35.3	202.3	80.7	475.1	59.0	332.8
Total complementary care costs	50.5	264.9	109.6	677.5	81.1	452.8
Total costs	344.6	741.3	512.8	1,346	474.3	1,059

Table III. Total average cost (€) per patient per year: 3 perspectives.

	PHCP* Perspective			Societal Perspective			Patient Perspective		
	Medical treatment	Complementary care	Total	Medical treatment	Complementary care	Total	Medical treatment	Complementary care	Total
GP	342.2	65.9	408.1	499.7	405.8	905.5	157.5	339.9	497.4
Rheumatologists	348.1	73.6	421.8	504.4	364.0	868.4	156.2	290.4	446.6
All experts	344.9	69.3	414.2	501.8	387.0	888.8	156.9	317.6	474.5

*PHCP: Public Health Care Payer.

not available for the UK and as a consequence could not be compared.

On average, the total medical cost per patient and per year was estimated at 345 euros (Table III, *i.e.* 84% referrals, 9% drugs, 7% diagnostic tests) and 502 euros per patient and per year from the public health care payer (PHCP) perspective and societal perspective (SP) respectively, thus an important patient contribution of 157 euros.

When the costs of complementary care are taken into account, the total cost per patient per year was 414 euros from the public health care payer perspective and 889 euros from the societal perspective.

The complementary care costs represent 16.7% (69 euros, Table III) of total costs from the PHCP perspective and 43.5% of total costs from the societal perspective (of which 75% for paramedical acts, 20% alternative treatment, 5% food supplements). The annual patient co-payment is estimated at 475 euros.

The outcomes of the economic model, which compared the observed medical resource use post FM-diagnosis with the predicted resource use (assuming diagnosis was not established), are shown in Figure 1. As previously mentioned, all 41 resources were grouped into 4 categories: diagnostic tests, drugs, referrals and GP visits.

Comparing the predicted *versus* the observed trend shows that, as from the first year after diagnosis on, the use of diagnostic tests decreases if diagnosis is made. This leads to increasing savings over the following years (Table IV). By the end of the fourth year the cumulative predicted savings for diagnostic tests per year become 53.4 euros per patient. The average predicted savings over the four years analysed are 28.0 euros per year per patient. For drugs, during the first year, the observed costs were similar to the predicted values. From the second year on, there is a decrease in the observed costs compared to the predicted values. In year 4 there is a net saving of 31.4 euros per patient compared to the predicted values. By the end of the fourth year, the predicted average savings are 14.6 euros per period year per patient. The costs per patient of observed specialist visits are lower than the predicted values. This leads to a predicted average saving at the end of the fourth year of 10.1 euros per year per patient for specialist visits and 73.8 euros for GP visits.

From the PHCP perspective, the total observed cost per patient and per year after its diagnosis, all physician specialties taken into account, is 388 euros, whereas the total predicted yearly cost – if the diagnosis was not made – is estimated at 514 euros: earlier diagnosis may result in 126 euros savings per patient and per year. From a societal point of view, the cost savings are estimated at 184 euros per patient.

Referrals to specialists, diagnostic tests, drugs and GP consultations represent 58.4%, 22.1%, 11.6% and 8.0% of these savings respectively from the PHCP and 57.3%, 22.7%, 12.2% and 7.8% from the societal perspective (Table V).

Discussion

Our study builds upon the results of the Annemans *et al*. paper (1) by translating the observed reduction on resource use into monetary values, based on a detailed assessment of all medical re-

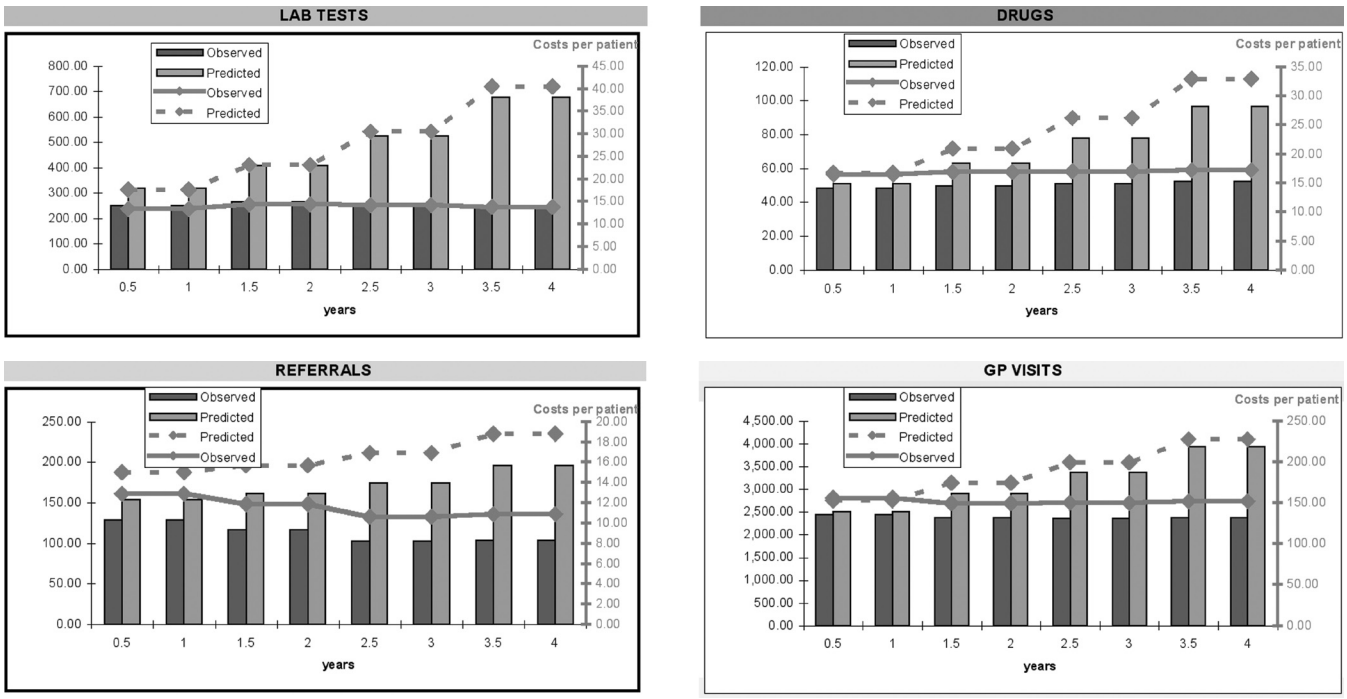

Fig. 1. Economic impact of making the FM diagnosis from the public health care payer (PHCP) perspective

Table IV. Medical costs avoided per patient per year (€) by diagnosing fibromyalgia from the public health care payer perspective (PHCP).

	Lab tests			Medications			Specialists Visits			GP visits		
After diagnosis	OC*	PC§	Dif¶	OC	PC	Diff	OC	PC	Diff	OC	PC	Diff
1st	26.6	35.2	8.6	33.0	33.4	0.4	25.8	30.0	4.2	311.2	305.8	-5.4
2nd	28.8	46.2	17.4	33.8	41.8	8.0	23.8	31.4	7.6	299.2	349.2	50.0
3rd	28.4	61.0	32.6	34.0	52.4	18.4	21.2	33.8	12.6	299.8	398.6	98.8
4th	27.6	81.0	53.4	34.4	65.8	31.4	21.8	37.6	15.8	303.4	455.2	151.6
Mean	27.9	55.9	28.0	33.8	48.4	14.6	23.2	33.2	10.1	303.4	377.2	73.8

*OC: Observed costs after diagnosis (€) (year 1 to 4); §PC: Predicted costs if the diagnosis was not made (€); ¶Diff: Savings per patient (€).

source use and applying unit costs to each of the 41 identified resource items.

The resource use in the UK that was extracted from the GPRD database was validated by French experts.

Comparing the observed resource use from the UK (GPRD) with the estimates of the French experts shows that there is not a big difference between the two countries in the management of FM. Some resources in France are more present whereas others are less present, resulting in an overall similar approach. Resource use in France showed an increasing trend towards diagnosis followed by a decrease or stabilisation, the same trend as was observed in the UK. No important differences were observed between the GP or rheumatologist answers. In general, the GP panel in France reported somewhat higher levels of resource use than the specialist panel did.

As was the case in the UK, also in France, it was shown that the act of diagnosis alters the steadily increasing resource use trend as observed during the years before diagnosis. The outcomes of the economic model, which compared the observed medical resource use post FM-diagnosis with the predicted resource use (assuming diagnosis was not established), also confirms previously published results for the UK: whereas the predicted costs gradually increase over time, a stagnation in the observed cost increase occurs in the year after diagnosis, subsequently followed by a moderate decrease afterwards. Hence, the act of diagnosis does lead to cost savings.

The largest contribution comes from the decrease in GP visits post diagnosis, followed by, in order of importance, the savings in diagnostic tests, drugs and referrals to specialists. The trend for GP visits is somewhat different compared to the UK, such as the first two periods of the observed number of GP visits being slightly higher (negative savings) than the predicted costs if the diagnosis was not made.

What we are observing is the considerable burden of investigations and/or referrals that occur prior to diagnosis, presumably investigated at doctor and

Table V. Medical costs avoided per patient per year (€) from the public health care payer (PHCP) and societal perspective (SP).

	Observed costs after diagnosis (year 1 to 4)		Predicted costs if the diagnosis was not made		Savings	
	PHCP*	SP¶	PHCP	SP	PHCP	SP
Tests	27.9	42.3	55.8	84.0	27.9	41.7
Medications	33.8	51.9	48.3	74.3	14.6	22.4
Specialist visits	23.1	33.0	33.2	47.4	10.1	14.4
GP visits	303.4	433.5	377.2	538.9	73.8	105.4
Mean	388.1	560.7	514.5	744.6	126.4	183.9

*PHCP Public Health Care Perspective, SP Societal Perspective

patient continue to search for answers. However, the act of putting the diagnosis reduces this, although it does not immediately reduce GP attendance. This is perhaps not surprising – one would expect a confident diagnosis to reduce further diagnostic tests and referrals, but not of itself to reduce symptoms and/or disability and hence the need for medical care (1).

As was also the case in the study of Annemans, the use of a control group was virtually impossible for this study since the goal was to forecast the expected expenditures in France for the FM patients if they had not received the diagnosis.

The main limitations of our study are related to the limited number of observation periods both before and after the point of diagnosis. For comparison, Twine *et al*. (23), in an analysis of GP referrals to breast cancer specialists, applied monthly data over a 6-year time horizon. Miller and Martin (24) applied monthly data as well, over a period of 8 years to predict the use of health care services in schizophrenia. Ocana-Riola *et al*. (26) used data from an earlier publication with 90 time points to predict cancer rates in Spain. Someya *et al*. (25) used 30 yearly data points to predict inpatient care for schizophrenia. Unfortunately, only 6 month data points were available for the UK based on GPRD, and in our French study we used 1 year observations to reduce the evaluation work of the experts.

Thereby, we looked at a period before diagnosis up to 4 years. This 4-year pre-index timing was chosen based on the fact that most event rates started increasing at or beyond that time period in the UK GPRD database. Taking a longer period before index would put too much emphasis on the earlier periods and hence on the 'flat-line' (steady, low event rate at earlier stages), which would lead to underestimating the extrapolated event rate post-diagnosis. Moreover, the usually large peak of events at the diagnosis date period (1-year pre-diagnosis to diagnosis date), which would not have been witnessed if the diagnosis had not been made, was excluded from the trend analysis. Indeed, including these would inflate the extrapolated event rates beyond the index date, and hence would lead to overestimated event rates. A longer period of observation after the point of diagnosis could help to better understand the long-term consequences of the diagnosis.

Another complexity in this regard is that current management guidelines in FM are not based on high quality evidence (12), and the cost-effectiveness of care is not well established.

The collected information on the medication use in the database is limited to drugs prescribed by GP's or specialists (depending on the country). This could be an underestimation of the drug therapies due to the fact that patients self-medicate with non-prescription drugs. The same problem occurs with complementary care. Patients may seek help in those complementary therapies without these being prescribed by or discussed with his or her doctor. This probably has led to an underestimation of the costs in our study.

Caution should be observed before generalising results obtained in one country to other countries due to the different organisation of the health care systems which makes comparison between different countries difficult. Research is going on in other countries to demonstrate whether the results in France and the UK can also be extrapolated to other countries.

Some experts expressed the difficulties that they experienced completing the questionnaire. The main points of discussion were related to the long period in time that the experts had to go back to. Also, for feasibility reasons, the complexity of FM had to be turned into a structured and therefore simplified questionnaire.

Finally, it is important to state that in this study in-patient costs and indirect costs were not included. This may result in an important underestimation of the total cost of a FM patient. According to recent studies, patients with FM are not only high consumers of health care services (1-6, 13), but cause also important productivity related costs or losses.

In conclusion, our findings offer support for the hypothesis that an earlier diagnosis of FM can avoid resource use and lead to a net saving for the health care sector in France.

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