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ORIGINAL ARTICLE

Medico-economic analysis of hospital costs related to the management of idiopathic pulmonary fibrosis at the hospital and university establishment of November 1st, 1954 of Oran

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ABSTRACT

Introduction: Idiopathic pulmonary fibrosis (IPF) is a rare disease. Its management requires significant human and material resources, increasing the economic burden on the healthcare system. The aim of this study was to evaluate the direct medical costs of managing IPF and its complications, mainly acute exacerbations, at the Hospital and University Establishment of November 1st, 1954 of Oran (EHUO) in Algeria. **Patients/Materials and Methods:** This was a descriptive, retrospective study conducted over a five-year period involving patients with IPF hospitalized at the EHUO. The analyzed costs included direct medical costs. The time horizon encompassed the entire duration of patient hospitalization. **Results:** The study included 17 IPF patients, predominantly male (15 out of 17, or 88.23%), with a sex ratio (M/F) of 8.5 and a mean age of 68.41 ± 8.63 years. The average cost per patient increased from 394,034.11 DZD for the stable form to 1,185,332.74 DZD for the exacerbated form. The acute exacerbation stage was more costly, averaging 5,710,581.14 DZD per patient. More than three-quarters of expenditure was attributable to hospitalization costs. **Conclusion:** The results of this study suggest that optimal management of IPF could reduce costs associated with hospitalizations during acute exacerbations, thereby limiting the economic burden of the disease.

Keywords: health economics, exacerbation, pharmaco-economics study, cost.

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1. INTRODUCTION

Idiopathic pulmonary fibrosis (IPF) is a chronic, incurable disease characterized by progressive scarring and thickening of lung tissue, leading to reduced respiratory function. (1) At present, the exact cause of IPF is not clearly established, but it is suggested that interactions between the alveolar epithelium and fibroblastic foci play a more decisive role than alveolar inflammation in the development of the disease. A common hypothesis is that lesions to the alveolar epithelium may activate alveolar cells, leading to tissue damage and fibrosis (2, 3).

The incidence and prevalence of IPF vary worldwide. IPF is considered a rare disease, but it is more frequently reported in Western countries, where both incidence and prevalence appear to be increasing. (4) In France, according to the Association Fibroses Pulmonaires France (AFPF), its prevalence is estimated at 8.2 per 100,000, or 5,000 to 6,000 people living with the disease. Its incidence

is 2.8 per 100,000/year. (5) Epidemiological data for Algeria are yet unknown. However, a multicenter survey of the management of diffuse interstitial lung disease (DIP) in Algeria, involving 617 cases, revealed that IPF accounted for 17% of DIP. (6)

To date, there is no definitive cure for IPF, and current treatment goals focus on slowing disease progression, reducing pulmonary exacerbations, relieving chronic disabling symptoms (dyspnea, dry cough, fatigue, muscle and joint pain), and improving quality of life. Complementary treatments include oxygen therapy, pulmonary rehabilitation, opiate use, anti-reflux therapy, low-dose corticosteroids, and palliative care(7,8).

There are few pharmacological treatments available. In the past, triple therapy with prednisone, azathioprine, and N-acetylcysteine was commonly used. However, studies showed that this combination increased the risk of death and serious adverse events, leading to its abandonment in clinical practice (9,10). Currently, the 2021 updated guidelines specify that the only available antifibrotic treatments are pirfenidone and nintedanib, approved in several countries, including Algeria(11).

Considered a rare disease, IPF has a significant impact on public health systems, which mainly shoulder the costs, in addition to the clinical and human burden, resulting in significant budgetary pressures. In order to optimize the management of patients with IPF, which is often underdiagnosed, leading to complications such as exacerbations or decompensations, resulting in significant additional costs, we undertook this work with the aim of evaluating the direct medical costs associated with the management of IPF and its complications at the hospital and university establishment of November 1st 1954 in Oran (EHUO) in Algeria.

2. PATIENTS AND METHODS/MATERIALS

This was a single-center, descriptive retrospective study conducted in the Department of Pulmonology of the 1st November 1954 Hospital and University Establishment of Oran (EHUO), involving patients hospitalized for idiopathic pulmonary fibrosis (IPF) over a five-year period, from January 2017 to December 2022.

A descriptive medico-economic analysis was conducted in parallel in order to assess the direct hospital costs related to the management of IPF and its complications, from the perspective of the hospital establishment.

Study population:

Patients meeting the following criteria were included in the study: adults (>50 years of age), of both sexes, with at least one hospitalization and suffering from IPF, and whose diagnosis was confirmed by chest computed tomography (CT) showing basal subpleural predominance, reticulations, and honeycomb with or without traction bronchiectasis. Patients with pulmonary fibrosis secondary to an identified cause (connective tissue diseases, hypersensitivity pneumonitis, occupational exposure) were excluded.

This retrospective study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Due to the retrospective nature of the study, no direct intervention on patients was performed, and no specific approval from an ethics committee was required. Data were collected and analyzed anonymously, ensuring patient confidentiality and compliance with applicable regulations on personal data protection.

Clinical definitions used in this study

In this study, patients were classified into three clinical categories: stable IPF: hospitalized IPF patients without acute respiratory worsening and without need for intensive respiratory support and not meeting the criteria for acute exacerbation; and exacerbated IPF: acute or subacute respiratory worsening in a patient with IPF, with increased dyspnea and clinical deterioration, not fully explained by other identifiable causes (e.g., documented infection, pulmonary embolism, pneumothorax, or heart failure), in line with the ATS/ERS/JRS/ALAT definition of acute exacerbation of IPF. Decompensated IPF: severe clinical deterioration with acute respiratory failure requiring intensive management (ICU admission, high-flow oxygen therapy, non-invasive or invasive ventilation when indicated). In our cohort, decompensation could occur at presentation or represent progression of an exacerbation episode.

Some patients experienced an exacerbation followed by decompensation during the same hospitalization or during follow-up, which explains the partial overlap between categories.

Data collection

Epidemiological (sex, age, weight), clinical (disease course, history, complications, comorbidities), para-clinical (biological: alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma glutamyltransferase(GGT), alkaline phosphatase (ALP) urea, creatinine, blood sugar, calcium, calciuria, direct bilirubin, total bilirubin, proteinuria, electrolytes, complete blood count (CBC),prothrombintime (PT)/activated partial thromboplastin time (aPTT), DDimer ; antineutrophil cytoplasmic antibodies (ANCA), antinuclear antibodies (ANA); radiological : chest X-ray, computed tomography (CT),angioscan, echocardiography; exploratory

examinations: bronchial fibroscopy, bronchoalveolar lavage (BAL), pulmonary function test (PFT), gasometry, bronchial biopsy) and drug treatment (corticosteroid (CS):Methylprednisolone, immunosuppressant (IS) azathioprine (AZA), antibiotic therapy (ATB): Cefotaxime, Levofloxacin, Amikacin, Imipenem, Cefdinir, anticoagulant: Enoxaparin, vaccination :Others: Spironolactone, Furosemide, Diltiazem, Seritidine, Salbutamol, Budenoside/formoterol, Tiotropin, Terbutalinesulphate, Omeprazole). Patient management data were collected from patient files, using a questionnaire entered into a database to facilitate analysis of the results. (Table 1).

Table 1. Summary of Collected Data Categories.

Category	Collected Data
Demographic Data	Age, sex, weight
Clinical Data	IPF form (stable, exacerbated, decompensated), medical history, comorbidities, complications
Paraclinical Examinations	Biology (ALAT, ASAT, creatinine, blood glucose, etc.), imaging (CT scan, chest X-ray, echocardiography), pulmonary function tests (PFT, blood gas analysis)
Treatments	Corticosteroid therapy, immunosuppressants, antibiotics, oxygen therapy, vaccination

Economic study

The perspective of the study was the hospital establishment (EHUO) over a five-year period. The time horizon included the entire duration of patient care at the EHUO between January 01st, 2019, and December 31st, 2022. Estimated costs included direct costs: the cost of clinical and paraclinical examinations, the cost of hospitalization, and the cost of drug treatment used in the management of each patient at the hospital.

The cost of hospitalization used is that estimated by the establishment from the December 2022 finance office, including common charges and hosting expenses (electricity, maintenance of monitoring equipment, accommodation, restoration, linen laundering, immovable property, and medical and paramedical staff costs). Private sector prices were used, while treatment costs were based on hospital tariffs. Indirect costs such as absenteeism were not estimated in this study. For the purposes of international comparison, all costs initially expressed in US dollars or euros have been converted into Algerian dinars (DZD) using the official exchange rate of the Bank of Algeria as of July 30, 2024.

Analysis of results

Results were analyzed descriptively. The cost of care for each patient was estimated by calculating the total cost of hospitalization, laboratory tests, and treatments. For each cost component, the unit price of the service was multiplied by the number of times it was performed, taking into account the total length of hospital stay. This approach was applied to the three clinical categories of idiopathic pulmonary fibrosis (stable, exacerbated, and decompensated). Cost calculations and data summarization were performed using Microsoft Excel. Qualitative variables were expressed as counts, while quantitative variables were reported as mean ± standard deviation (SD), as well as minimum and maximum values for each category, in order to describe inter-individual cost variability.

3. RESULTS

Demographics data

The study involved 17 patients with IPF. The cohort was predominantly male (15/17), with a sex ratio (M/F) of 8.5. The mean age of patients was 68.41 ± 8.63 years. More than half the patients (52.9%) were between 65 and 77 years of age (Table 2).

Clinical data

Of the 17 patients, 7 had stable IPF without acute exacerbation or decompensation, and 9 patients developed an acute exacerbation, 5 of whom progressed to decompensation. Only one patient was enrolled in a decompensation state (Table 3). Regarding medical history, 10/17 of patients were smokers, only one was occupationally exposed to metal dust, and one had a history of familial fibrosis (Table 3).

Table 2. Demographic characteristics of IPF patients.

Features	n/17 (%)
- Patients n=17	
- Gender	
• Male	15 (88,23%)
• Female	2 (11,77%)
• Sex ratio M/F	8.5
- Average age (years)	68.41± 8.63
• Men	77.53 ±10.44
• Women	65.5±0.47
- Age range (years)	50 à 79
- Age groups (years)	
• < 65	5 (29,4%) 57,8 ± 5,2
• 65-75	9 (52,9%) 70,2 ± 3,3
• 75-85	3 (17,6%) 78,7 ± 1,5
- Average weight (Kg)	66,35 ±11,75

Table 3. Clinical characteristics of patients with IPF.

Features	n/17 (%)
- Patients n=17	
- On inclusion	
• Decompensated IPF on admission	1 (5.88%)
• Stable IPF	16 (94.11%)
- Ongoing development of the study	
• Stable IPF	7 (43.75%)
• Exacerbated IPF	9 (56.25%)
• Of which decompensated IPF	5 (55.55%)
- Past history	
• Tobacco	10 (62.5%)
• Occupational exposure (Metal dust)	1 (6.25%)
• Familial pulmonary fibrosis	1 (6.25%)
- Complications	
• Chronic respiratory insufficiency	7 (41.17%)
• Respiratory infection	4 (23.52%)
• Chronic pulmonary heart disease	3 (17.64%)
• Bronchial cancer	1 (5.88%)
- Respiratory comorbidities	
• Infection with COVID 19	5 (29.41%)
• asthma	2 (11.76%)
• COPD	1 (5.88%)
• PAH	2 (11.76%)
• Emphysema	1 (5.88%)
• Laryngeal neoplasia	1 (5.88%)
• Tuberculosis sequelae	1 (5.88%)

Among the complications identified, chronic respiratory failure was the most frequent, n = 7, followed by respiratory infections, n = 4. Chronic pulmonary heart disease was also notable with 3 cases, while bronchial cancer was observed in one patient. As for comorbidities, COVID-19 infection was the most common (n = 5), followed by asthma(n = 2) and pulmonary arterial hypertension (PAH) (n = 2), as well as isolated cases of chronic obstructive pulmonary disease (COPD), emphysema, laryngeal neoplasia, and tuberculosis sequelae, each representing one case (Table 3).

With regard to the treatment of IPF, 7/17 of patients received corticosteroids (methylprednisolone) in combination with antibiotics such as cefotaxime and levofloxacin. All patients with an exacerbation or decompensation of IPF were systematically treated with corticosteroids and antibiotics. Oxygen therapy was the treatment of choice in severe forms (exacerbation and decompensation 100%

for each stage, 9/9 and 6/6, respectively). Only 4/17 of patients were on azathioprine (AZA). Almost all patients received pneumococcal and influenza vaccinations as soon as the disease was diagnosed (Table 4).

Table 4. Treatment of patients with IPF.

	Types of IPFs		
	Stable IPF n=7	**Exacerbated IPF n=9**	**Decompensated IPF n=6**
- Corticosteroid: Methylprednisolone	7 (42.85%)	9 (100%)	6 (100%)
- Immunosuppressants: AZA	4(23.52%)	9(100%)	6 (100%)
- Mucomodifier :Nacetyl-cysteine	0	0	0
- Antibiotics: cefotaxime and levofloxacin	5 (31.25%)	9 (100%)	6 (100%)
- Oxygen therapy	6 (37.5%)	9 (100%)	6 (100%)
- Vaccinations: influenza and pneumococcal	7 (100%)	9 (100%)	6 (100%)

Pharmaco-economic study

Hospitalization costs increased considerably with the severity of the disease. Total costs were estimated at an average of 217,425.95 DZD per patient, for an average stay of 10 days. In the event of exacerbation, the length of hospital stay was prolonged, resulting in a total cost of 1 011 320.43 DZD per patient. Decompensated IPF requires patients to be transferred to the intensive care unit, resulting in exponentially higher hospitalization costs: 5,519,539.45 DZD per patient. Analysis of drug costs highlighted the major impact on healthcare expenditure. For patients with stable IPF, drug costs averaged 17,171.64 DZD per patient. The main costs were corticosteroids (methylprednisolone): 11,440.80 DZD and anticoagulants (Enoxaparin): 28,283.50 DZD.

Drug costs increased significantly in exacerbated IPF, reaching 91,151.19 ± 13,967.34 DZD per patient, as a result of increased doses and duration of corticosteroid treatment: 44,128.80 DZD. Use of antibiotics (cefotaxime, levofloxacin, amikacin, imipenem, and cefdinir): 153,648.70 DZD in addition to intensification of oxygen requirements. In the decompensated form, drug costs were high at 104,808.36 DZD per patient but remained lower than in exacerbated IPF.

The total cost of diagnostic examinations for a patient with stable IPF was estimated at 80,378.57 ± 23,076.92 DZD. Computed tomography (CT)is a crucial radiological examination for establishing the initial diagnosis and early detection of worsening lesions in the event of exacerbation. Its cost was 63,000 DZD for all patients with stable IPF (n = 7 patients), 45,000 DZD for the 5 patients with exacerbated IPF, and 27,000 DZD for the 3 decompensated patients.

Immunological tests for antineutrophil cytoplasmic antibodies (ANCA) and antinuclear antibodies (ANA) cost 11,400 DZD per patient. Exploratory examinations such as bronchial fibroscopy were carried out on 6 patients at a cost of 21,000 DZD, and bronchoalveolar lavage (BAL) cost 42,000 DA for 7 patients. In the case of stable IPF, patients are monitored mainly by biological and radiological examinations. In the event of exacerbation or decompensation, monitoring is reinforced by frequent checkups and appropriate imaging, as in the case of 8 patients where a chest X-ray was carried out at a cost of 14,400 DZD.

In the case of exacerbated or decompensated IPF, the cost of gasometry increased due to the need to monitor patients' oxygenation and ventilation status (21,000 DZD for 7 exacerbated patients) (12,000 for 4 decompensated patients). In addition, other examinations may be necessary, such as echocardiography to look for complications like chronic pulmonary heart disease, performed on 6 patients in decompensationand 6 in exacerbation, adding further costs. The cost of monitoring increased as the disease progressed, with an average cost of 35,377.78 ± 20,944.44 DZD in exacerbated IPF and 54,608.33 ± 23,411.76 DZD in decompensated IPF.

Overall, total costs rose from 394,034.11 DZD for the stable form to 1,185,332.74 DZD for the exacerbated form and reached 5,710,581.15 DZD for the decompensated form. Patients with exacerbations had higher overall costs, both for hospitalization and medication. Indeed, stable patients had an average drug cost of 17,171.64 DA per patient. This cost increased significantly to an average of 91,151.19 DA per patient. In the case of IPF with exacerbation, this cost was higher when treatment for severe complications was required (104,808.36 DA per patient), as shown in Figure 1.

Cost analysis

In all types of IPF, hospitalization represented the main cost, which was directly proportional to the severity of the disease, presenting 71% in stable IPF 85% in IPF with exacerbation, and in the case of decompensation, hospitalization accounted for almost the entire cost (97%). In stable IPF, drug costs accounted for a relatively small proportion (4.36%) of total management costs, compared with

24.71% for examinations, underlining the importance of the latter in the regular follow-up of patients to monitor disease progression. In exacerbated IPF, drug costs rose slightly (7.69%) as a result of the use of more intensive treatments. In the event of decompensation, these costs were reduced even further, as hospitalization and intensive care expenses became predominant (Figure 2).

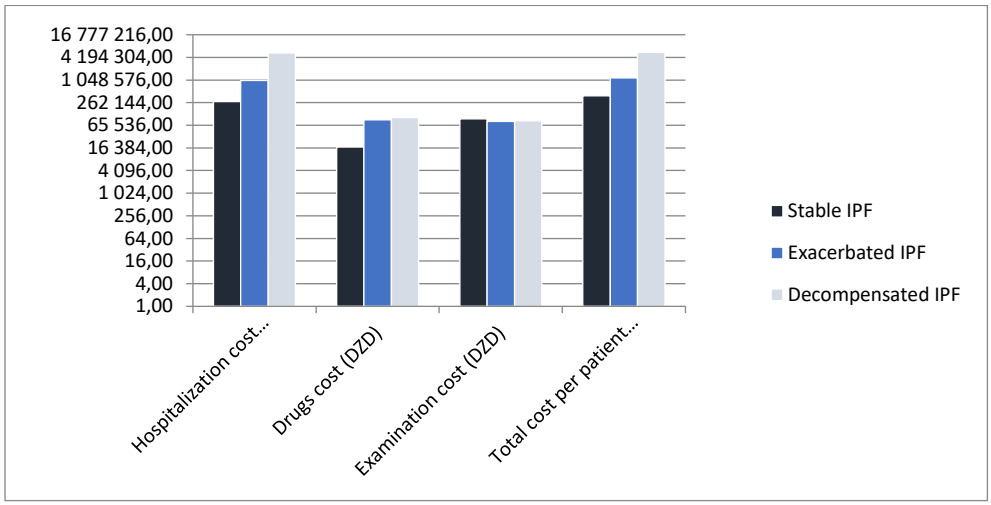

Figure 1. Direct medical costs per person for all forms of IPF.

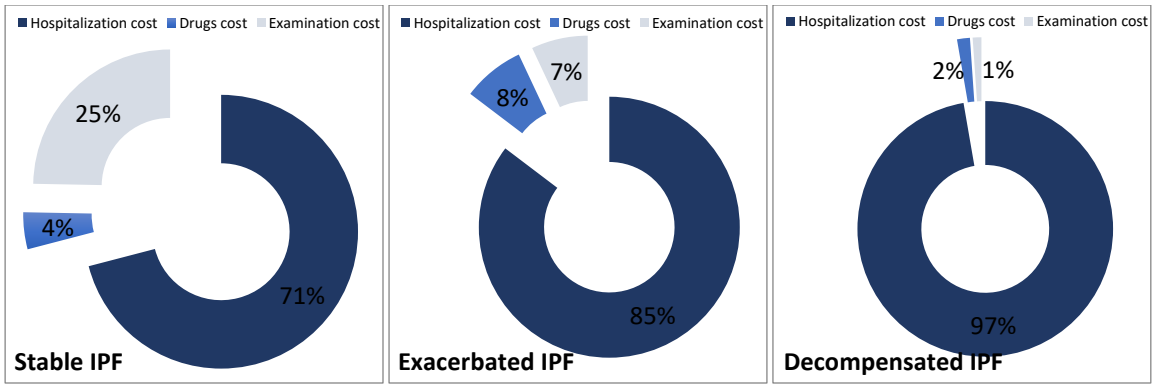

Figure 2. Analysis of IPF costs according to disease progression.

Figures 3 illustrate the analysis of total costs by type of IPF showing a significant increase as the disease worsened. Indeed, total costs for patients with exacerbating IPF were around three times higher than those for patients with stable IPF, amounting to 1,185,332.74 DZD versus 394,034.11 DZD. In addition, total costs for decompensating patients were around 14 times higher, reaching 1,579,366.85 DZD versus 394,034.11 DZD for stable IPF. This increase in costs was mainly due to higher hospitalization costs.

Drug costs were 5.31 times higher for patients with exacerbation compared with those with stable IPF (17,171.64 DZD vs. 91,151.19 DZD). Drug costs were 6.11 times higher for patients with decompensation than for those with stable IPF (17,171.64 DZD vs. 104,808.35 DZD). Only examination costs remained stable, with a slight difference between 97,315 DZD for stable IPF, 82,861 DZD for exacerbated IPF, and 86,233 DZD for decompensated IPF (Figures 3).

4. DISCUSSION

This retrospective study evaluated the costs associated with the therapeutic management of a cohort of adult patients with IPF. The results showed that males were most affected by IPF (15/17), with a sex ratio (M/F) of 8.5 and a mean patient age of between 50 and 79 years (Table 2). These results are consistent with epidemiological data showing that IPF is generally more common in men, often appearing after the fifth or sixth decade of life, mainly affecting the elderly (1,4,5).

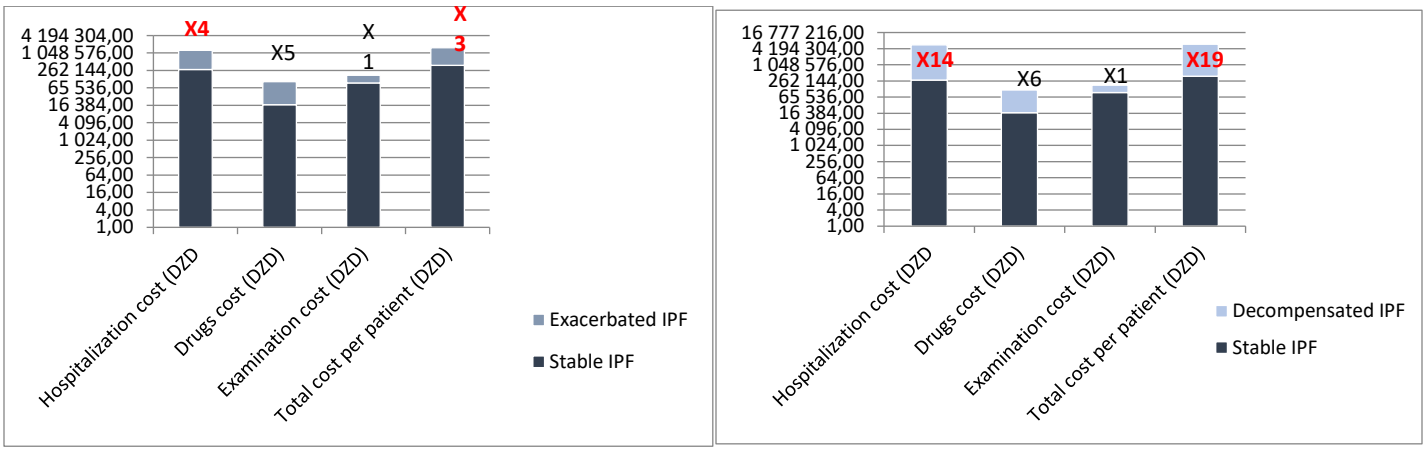

Figure 3. Cost differential between stable IPF and IPF with exacerbation or decompensation.

In terms of IPF history, smoking (10/17) was the main risk factor, followed by metal dust exposure and family history (each 1/17). These results are in line with current knowledge of the disease, suggesting that the interaction between environmental (tobacco, dust) and genetic factors plays a central role in the development of IPF. A better understanding of these mechanisms would enable a thorough and personalized assessment of each patient (Table 3). (1,3,12). The comorbidities observed in the present study are similar to those frequently associated with IPF in the literature, notably COPD, respiratory infections, cancer, pulmonary embolism, emphysema, sleep dyspnea, and cardiovascular disease (Table 3). (1,13)

Evaluation of the treatments used in the management of patients with IPF showed that all patients benefited from systematic vaccine prophylaxis against pneumococcal and influenza infections, in line with current recommendations. (11) While corticosteroids, azathioprine, and N-acetylcysteine used to be the therapeutic strategy of choice, the results of the PANTHER study showed an increase in mortality and hospitalization in patients treated with this triple therapy. (9,10) These data led to a reassessment of therapeutic practices, justifying the reduction in the prescription of immunosuppressants (AZA) and mucolytics(N-acetylcysteine) observed in this cohort of patients (Table 4). Furthermore, none of the patients received antifibrotic therapy (pirfenidone or nintedanib), as their use was not yet implemented in our institution during the study period, particularly due to their late national registration in 2021.

The results of the pharmaco-economic study revealed that the costs associated with the management of IPF at the EHUO were on average 394,034.11 DZD per patient for stable IPF, 1,185,332.74 DZD for exacerbated IPF, and 5 710 581,15 DZD for decompensated IPF, showing an increase in costs that follows proportionally the progression of the disease. These results corroborate those of the Morell et al. study, whose costs were €11,484 (1,674,194.8 DZD), €20,978 (3,058,278.6 DZD) and €57,759 (8,404,206.3 DZD) for stable, exacerbated, and decompensated IPF, respectively.(14) However, direct comparisons of absolute costs between countries should be interpreted with caution, given major differences in healthcare systems, reimbursement policies, unit pricing, and resource allocation. Therefore, the main value of these comparisons lies in the overall cost pattern, highlighting the major economic impact of acute events and hospitalization.

In Algeria, a national study based on a cross-sectional expert survey and a budget impact model estimated the incidence and prevalence of IPF at 0.73 and 1.79 per 100,000, respectively, and reported an average annual cost per patient of 181,587 DZD in the first year for uncomplicated IPF. The cost per acute event was estimated at 47,437 DZD for exacerbations and 37,592 DZD for decompensations, with a marked increase in annual costs when these events occurred. Although this approach relies on expert-based modeling rather than real-world hospital costing, it supports our findings by emphasizing the substantial economic burden associated with acute clinical deterioration and related hospital care (15).

In European countries and the United States, a substantial proportion of healthcare expenditure is covered by insurance systems or advanced medical coverage schemes, whereas in Algeria the reimbursement structure and access pathways differ. In addition, drug pricing and hospitalization costs vary across settings depending on national policies and available resources. These factors should be considered when interpreting the differences observed between our study and those conducted in other countries.

The average diagnostic cost estimated in this study was 57,478.57 DZD, lower than those found by Mooney et al. ($2,099 = 282,741.18DZD), Morell et al. (€4,736 = 690,223.10 DZD). (14,16) This variability in diagnostic costs can be explained by the complexity of cases, the availability of tests, and local practices. In general, an accurate diagnosis requires multidisciplinary mobilization and greater resources.

The evolution of IPF is variable and unpredictable. (17) According to the literature, acute exacerbations are a major event in the evolution of IPF and a major cause of hospitalization. They are characterized by slow or rapid deterioration in respiratory function, leading to acute respiratory failure or death(17–19).

The cost of managing an episode of IPF exacerbation at the EHUO was 1,185,332.74 DZD per patient, 85% of which related to hospitalization, which averaged 30±12 days. This result is similar to that found in the study by Collard et al. in terms of the preponderance of hospitalization costs, which accounted for three-quarters of total expenditure in exacerbated IPF(20). Our results showed lower exacerbation costs than those reported by Yu et al., Mooney et al. and Kim et al., despite shorter lengths of hospital stay. (16,21,22) This disparity could be explained by several factors: either by the severity of exacerbations, requiring more intensive and prolonged management in this study, or by exacerbation management protocols that may vary from one institution to another, in addition to the high comorbidity present in these patients.

Similarly, this study showed that the cost of hospitalization for an exacerbation was four times that of hospitalization for stable IPF (Figure 3). It should be noted that exacerbations of IPF considerably increase the economic burden of this pathology, on the one hand by increasing the duration of hospitalization and, on the other, by intensifying oxygen requirements, underlining the need to adopt new healthcare technologies in both prevention and therapeutic management in order to delay disease progression while avoiding serious adverse effects.

The escalation of costs inherent in the worsening of the disease was particularly marked in the decompensated state: the average cost of decompensation per patient was 5 710 581,15 DZD, with extremes of 5,700,743.7 DZD and 10,674,925.3 DZD. (Figure 1) This cost was almost 20 times the level observed in a stable state for a length of stay of 40 days. (Figure 3) Compared with the costs of examinations and treatment, the colossal expenses were almost entirely related to hospitalization (97%). (Figure 3) This figure differs significantly from those reported by the Delphi panel study, whose cost of decompensation (slow evolution) was estimated at €57,759 (DZD 8,404,206.3). (14)

Decompensations generally lead to a rapid deterioration in the patient's state of health, causing further complications and often necessitating transfer to an intensive care unit (ICU) or medical intensive care unit (MICU), as well as prolonging the overall length of hospital stay. These episodes mobilize numerous procedures, monitoring examinations, and human resources, and health technologies add to the total cost of care.

Finally, this study highlighted the nature of the direct costs generated in the management of IPF patients at EHUO. It revealed an enormous rise in expenditure as the pathology progresses from a stable to decompensated state. However, the emergence of new therapies such as pirfenidone and nintedanib introduces a new dimension in the management of IPF(11,14). These agents are currently available in Algeria, and their progressive integration into therapeutic protocols offers promising clinical prospects, notably by improving patients' quality of life and prolonging their life expectancy. (23) Despite their high initial cost, these treatments could ultimately generate savings by reducing the number and severity of exacerbations, thus cutting costs associated with long-term hospitalization, intensive care, and complementary treatments. Their high cost, however, calls for in-depth economic studies to assess their long-term impact on overall healthcare costs.

Study limitations

This study has several limitations, including its retrospective design, the small sample size, and the variable quality of the available data. The lack of standardized methods for accurate disease staging led to patient stratification based on subjective clinical criteria. In addition, cost estimation was based on private sector tariffs, which may result in an overestimation of actual expenses. Indirect costs were not included, and the lack of national data limits comparisons at the national level in Algeria.

5. CONCLUSION

This study demonstrated that patients experiencing exacerbations or decompensations incur significantly higher expenses due to prolonged hospitalization and multiple complications. The adoption of new technologies for accurate early diagnosis and innovative therapeutics could optimize disease management both clinically and economically.

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REFERENCES

1. European Lung Foundation [Internet]. Fibrose pulmonaire idiopathique. Available from: https://europeanlung.org/fr/information-hub/lung-conditions/fibrose-pulmonaire-idiopathique/
2. Centre de Référence des Maladies Pulmonaires Rares [Internet]. Available from: http://www.maladies-pulmonaires-rares.fr/index.asp
3. Martinez FJ, Collard HR, Pardo A, Raghu G, Richeldi L, Selman M, et al. Idiopathic pulmonary fibrosis. Nat Rev Dis Primers. 2017 Oct 20;3:17074. doi:10.1038/nrdp.2017.74
4. Maher TM, Bendstrup E, Dron L, Langley J, Smith G, Khalid JM, et al. Global incidence and prevalence of idiopathic pulmonary fibrosis. Respir Res. 2021 Dec;22(1):197. doi:10.1186/s12931-021-01791-z
5. Duchemann B, Annesi-Maesano I, Jacobe de Naurois C, Sanyal S, Brillet PY, Brauner M, et al. Prevalence and incidence of interstitial lung diseases in a multi-ethnic county of Greater Paris. Eur Respir J. 2017 Aug;50(2):1602419. doi:10.1183/13993003.02419-2016
6. Mekideche D, Khelloufi F, Abdelaziz R, Souilah S, Snouber A, Taright-Mahi S. Enquête multicentrique: prise en charge des PID en Algérie. Rev Mal Respir Actual. 2025 Jan 1;17(1):294.
7. Petitpierre N, Beigelman C, Letovanec I, Nicod LP, Lazor R. Fibrose pulmonaire idiopathique: nouveautés diagnostiques et thérapeutiques. Rev Med Suisse. 2014;10(451):2208-13.
8. Sankari A, Chapman K, Ullah S. Idiopathic Pulmonary Fibrosis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. Available from: http://www.ncbi.nlm.nih.gov/books/NBK448162/
9. Idiopathic Pulmonary Fibrosis Clinical Research Network, Raghu G, Anstrom KJ, King TE Jr, Lasky JA, Martinez FJ. Prednisone, azathioprine, and N-acetylcysteine for pulmonary fibrosis. N Engl J Med. 2012 May 24;366(21):1968-77. doi:10.1056/NEJMoa1113354
10. Demedts M, Behr J, Buhl R, Costabel U, Dekhuijzen R, Jansen HM, et al. High-dose acetylcysteine in idiopathic pulmonary fibrosis. N Engl J Med. 2005 Nov 24;353(21):2229-42. doi:10.1056/NEJMoa042976
11. Cottin V, Bonniaud P, Cadranel J, Crestani B, Jouneau S, Marchand-Adam S, et al. Recommandations pratiques pour le diagnostic et la prise en charge de la fibrose pulmonaire idiopathique – Actualisation 2021. Version courte. Rev Mal Respir. 2022 Mar 1;39(3):275-312. doi:10.1016/j.rmr.2021.11.006
12. Borie R, Kannengiesser C, Nathan N, Tabèze L, Pradère P, Crestani B. Familial pulmonary fibrosis. Rev Mal Respir. 2015 Apr;32(4):413-34. doi:10.1016/j.rmr.2014.10.010
13. Dacosta-Noble P, Valeyre D. Fibrose pulmonaire idiopathique: les comorbidités. Rev Mal Respir Actual. 2016 Jun 1;8(2):136-8.
14. Morell F, Esser D, Lim J, Stowasser S, Villacampa A, Nieves D, et al. Treatment patterns, resource use and costs of idiopathic pulmonary fibrosis in Spain--results of a Delphi Panel. BMC Pulm Med. 2016 Jan 12;16:7. doi:10.1186/s12890-016-0171-5
15. Soualmi R, Ali MS, Tabbi I, Gharnaout M, Kadi A, Yildiz L, et al. PRS33 - The clinical and economic burden of idiopathic pulmonary fibrosis in Algeria. Value Health. 2018 Oct 1;21:S409. doi:10.1016/j.jval.2018.09.2430
16. Mooney JJ, Raimundo K, Chang E, Broder MS. Hospital cost and length of stay in idiopathic pulmonary fibrosis. J Med Econ. 2017 May;20(5):518-24. doi:10.1080/13696998.2017.1287933
17. Ley B, Collard HR, King TE Jr. Clinical course and prediction of survival in idiopathic pulmonary fibrosis. Am J Respir Crit Care Med. 2011 Feb 15;183(4):431-40. doi:10.1164/rccm.201006-0894CI
18. The International Network of Agencies for Health Technology Assessment [Internet]. Available from: https://www.inahta.org/
19. World Health Organization. Health products policy and standards [Internet]. Available from: https://www.who.int/teams/health-product-policy-and-standards/assistive-and-medical-technology/medical-devices/assessment
20. Collard HR, Moore BB, Flaherty KR, Brown KK, Kaner RJ, King TE Jr, et al. Acute exacerbations of idiopathic pulmonary fibrosis. Am J Respir Crit Care Med. 2007 Oct 1;176(7):636-43. doi:10.1164/rccm.200703-463PP
21. Yu YF, Wu N, Chuang CC, Wang R, Pan X, Benjamin NN, et al. Patterns and economic burden of hospitalizations and exacerbations among patients diagnosed with idiopathic pulmonary fibrosis. J Manag Care Spec Pharm. 2016 Apr;22(4):414-23. doi:10.18553/jmcp.2016.22.4.414
22. Kim SW, Myong JP, Yoon HK, Koo JW, Kwon SS, Kim YH. Health care burden and medical resource utilisation of idiopathic pulmonary fibrosis in Korea. Int J Tuberc Lung Dis. 2017 Feb 1;21(2):230-5. doi:10.5588/ijtld.16.0392
23. Collard HR, Chen SY, Yeh WS, Li Q, Lee YC, Wang A, et al. Health care utilization and costs of idiopathic pulmonary fibrosis in U.S. Medicare beneficiaries aged 65 years and older. Ann Am Thorac Soc. 2015 Jul;12(7):981-7. doi:10.1513/AnnalsATS.201412-553OC