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INCIDENCE OF SARS-COV-2 AND RISK FACTORS FOR SEVERE OUTCOMES IN PEOPLE WITH CYSTIC FIBROSIS IN EUROPE

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Introduction

Cystic fibrosis (CF) arises from gene mutations in cystic fibrosis transmembrane conductance regulator (CFTR), which lead to chronic CF lung disease and compromised function of multiple other organ systems [1]. Repeated cycles of respiratory infection and chronic inflammation cause progressive lung function decline. Viral infection can trigger pulmonary exacerbations and can contribute to increased mortality in CF. Therefore, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic deserved great attention in the CF community.

Aims

This observational study aims to estimate the incidence of SARS-CoV-2 infection in people with Cystic Fibrosis (pwCF) in 2020 in Europe, to characterize morbidity of CF patients infected by SARS-CoV-2 and to identify risk factors associated with more severe symptoms and poorer outcomes.

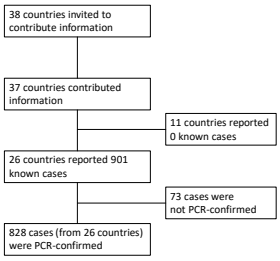

Figure 1. Data collection for people with cystic fibrosis and SARS-CoV-2 infection

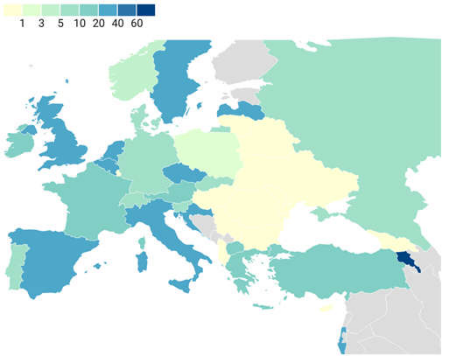

Figure 2. SARS-CoV-2 incidence per 1000 people with cystic fibrosis in 2020, by country.

Materials and methods

This study included pwCF with a diagnosis of SARS-CoV-2 infection confirmed by polymerase chain reaction (PCR) between February and December 2020, from 38 countries taking part to the European Cystic Fibrosis Society Patient Registry (ECFSPR).

To compute incidence, the total number of pwCF in the different countries was retrieved from the most recent ECFSPR annual report (2018 data for the majority of countries, 2017 for France) [2].

To evaluate the association of demographic and pre-infection clinical characteristics of pwCF with symptoms and outcomes of SARS-CoV-2 infection, two multiple logistic regression models were fitted. To account for the effect of health system within the same country, generalized estimation equations models including the country of residence have been used to obtain the model estimates.

Results

In 2020, 26 countries reported information on 828 pwCF and SARS-CoV-2 infection confirmed by PCR test.

The overall incidence was estimated as 17.2 per 1000 pwCF (95% CI: 16.0-18.4).

Of the 828 cases, 48.4% were male and median age was 24 years. 57% had at least one F508del mutation. Most patients had normal body mass index (BMI) (90.6%), pancreatic insufficiency (80.6%), and mild lung disease (59.9%). 26.1% had CF-related diabetes (CFRD) and 26.6% had chronic liver disease. 57.7% were colonized by Staphylococcus aureus and 43.4% by Pseudomonas aeruginosa.

Three quarters of pwCF had symptoms, in particular general symptoms (64.8%) and pulmonary symptoms (54.0%). The most common were fever (43.6%), increased cough (43.2%), fatigue (34.2%).

195 patients (23.7%) were admitted to hospital

21 patients (2.5%) were admitted to intensive care

11 patients (1.4%) died

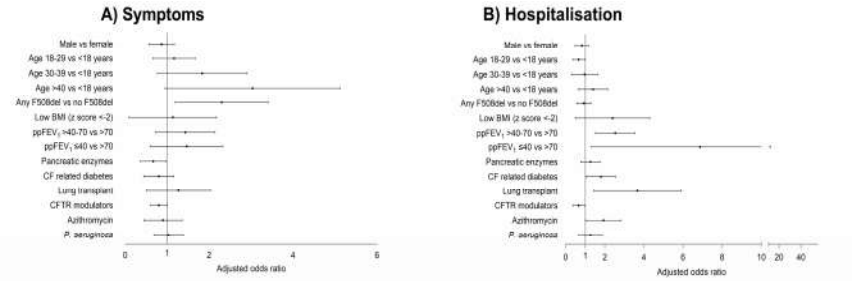

Figure 3. Forest plot of factors associated with symptoms and outcomes of SARS-CoV-2 infection in people with cystic fibrosis.

Conclusions

This is the first prospective study in a large cohort of pwCF infected with SARS-CoV-2 in Europe during the pandemic until the end of 2020.

- Incidence of SARS-CoV-2 in pwCF was estimated as 17.2 per 1000 and it was higher in lung-transplanted and in older patients.
- Accounting for the age distribution, the incidence of SARS-CoV-2 in pwCF was higher than in the general population [3]. Moreover, the real incidence could be even higher because of difficulties of clinicians and healthcare staff to collect information during pandemic.
- SARS-CoV-2 infection yielded high morbidity in pwCF, with 75.7% of patients having symptomatic illness and older individuals (>40 years) with at least one F508del mutation being more prone to become symptomatic.
- Severe outcomes as hospitalization were quite common, with higher risk for pwCF with lung transplant, moderate or severe lung disease, CFRD and long-term azithromycin (often considered a surrogate for worse lung disease).

Future work includes long term follow-up of lung function in pwCF with SARS-CoV-2, and follow-up of incidence and severity following vaccination.

References

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