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Disclosure of interest

The authors declare that they have no competing interest.

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The role of infectious disease trainees during the first wave of the COVID-19 pandemic: A national survey



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The COVID-19 pandemic has put tremendous pressure on healthcare systems worldwide and placed significant physiological and psychological strain on Healthcare workers (HCWs). Infectious disease (ID) specialists and trainees were on the first line in treatment of COVID-19 patients and this may have impacted their training.

We conducted a national survey among French ID trainees to assess their role during the first wave (March to May 2020) of the COVID-19 pandemic, and its impact on their medical training.

An online survey was sent by mail on 28 May 2020 to all French ID trainees via the French network of young ID doctors (ReJIF).

We received responses 130 out of the 320 ID trainees contacted by email (response rate 40.6%). All years of training and geographical regions were represented ([Supplementary data](#)).

Around 90% of respondents (117/130) reported having participated in a COVID-19 related activity, of whom 34% had to move to a medical department other than their previous or usual place of work (supplementary data). The roles reported by ID trainees were: management of patients hospitalized for COVID-19 (90/117: 77%), being on call in a COVID-19 ward (73/117: 62%), management of ambulatory COVID-19 patients and carrying out of nasopharyngeal swabs for COVID-19 diagnosis (56/117: 48%), contact tracing by phone (22/117: 19%), follow-up consultation by phone (16/117: 14%) and COVID-19 research activities (38/117: 33%). Among the respondents, only 13 reported being tested positive for SARS-CoV-2 (13/130: 10%) and 8 reported that they continued to work while infected. None of them were hospitalized. Only 20% of respondents were afraid of being infected with SARS-CoV2, whereas 66% (86/130) were afraid of infecting people around them ([Fig. 1](#)).

Three-quarters (94/130) of the ID trainees who responded to the survey considered that the COVID-19 had disrupted their clinical and theoretical training. About 60% (78/130) perceived the COVID-19 crisis as an opportunity for them to increase their infectious disease knowledge and skills as regards: management of a health crisis (34/130: 26%), management of an emerging infectious disease (26/78), research activities (10/78), management of a respiratory infection (10/78), and hygiene measures (4/78).

To the sentence “I felt useful in managing the crisis” (on a six-point Likert scale), the assessment was ‘agree’ and ‘strongly agree’ for three-quarters of respondents (97/130, 75%). About half of the ID trainees answered that they worked more than usual during the crisis and felt more tired than during another internship (67/130, 52%) ([Fig. 1](#)). A majority of respondents (64%) reported that the potential role of trainees in the management of this kind of crisis consisted in management of hospitalized patients, and 10% of the respondents said that this role was research activities and medical training.

Our results show that a vast majority of ID trainees respondents participated in a COVID-19 activity during the first wave of the COVID-19 pandemic in France. Most of them felt useful in managing the crisis, although they sometimes felt stressed, and worked more



Fig. 1. Impact of COVID-19 on infectious disease trainees (Lickert scale).

than usual. The COVID-19 pandemic is likely to have caused psychological distress in ID trainees as well as other healthcare providers [1]. In particular, trainees were concerned that they might contract the illness and expose family members at home who were potentially more vulnerable. Studies from other specialty trainees reported high work-related anxieties linked to inadequate supply of personal protective equipment (PPE) and risk of contaminating oneself and one’s colleagues [2–4]. However, these concerns did not emerge in our study, which could be explained by the fact that the ID trainees’ COVID units experienced no shortage of PPE and also because they were more aware of COVID-19 transmission mechanisms and therefore felt sufficiently protected.

A negative aspect of the crisis was the disruption of their teaching programs. In-person teaching conferences were widely replaced by live or recorded virtual conferences or canceled altogether. Recently published studies from other medical trainee have reported a negative impact on education and training [2–4]. In the case of ID, management of a pandemic could be considered as part of the trainees’ medical training; however and surprisingly enough, only 60% perceived the COVID crisis as a learning opportunity.

COVID research projects emerged quickly in France with about 40 COVID therapeutic clinical trials registered in April 2020 [5]. This enthusiasm for research also had an impact on ID trainees, because 33% of them had COVID-19 research activities and 13% would like to be more involved in research during a future pandemic.

All in all, the first wave of pandemic had a significant impact on ID trainees, who reported significant changes in their clinical responsibilities and course of training. Based on this survey, and in collaboration with the Trainee Association of ESCMID, a similar survey targeting European ID trainees is currently ongoing, the objective being to assess the impact and perception of ID trainees on a European scale.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.idnow.2020.12.010>.

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Jaundice in a patient treated with Anakinra in a context of Covid-19



1. Introduction

Anakinra, IL-1 receptor antagonist, is being used in the treatment of acute severe distress syndrome due to SARS-Cov-2 [1]. Although this drug is associated with moderate elevation in transaminases, increased bilirubin is not documented as one of its adverse effects. We report a case of 87 years old woman with moderate COVID-19 infection treated by Anakinra. She had an elevation of the conjugated bilirubin 5 days after Anakinra treatment with clinical improvement and symptoms resolution one week after drug withdrawal. The pathophysiology behind Anakinra and an elevation of conjugated bilirubin is still not fully understood.

2. Case presentation

An 87 year old female patient presented on April 2 to our hospital and was evaluated for a period of two weeks with upper respiratory symptoms, myalgia, headache, and worsening dyspnea over 3 days. Medical history is significant for longstanding hyperlipidemia treated with Fenofibrate and hypertension treated with

indapamide and propranolol. She had no history of alcohol abuse or chronic liver disease.

On presentation, the patient was afebrile and severely hypoxicemic (oxygen saturation was 80% on room air). Her physical exam was notable only for basilar crackles with no signs of cardiac decompensation. Initial laboratory evaluation showed elevated CRP (280 mg/L). No abnormalities were shown on liver, kidney, and hematological biological tests.

Hepatitis B virus surface antigen was not detected. Serology for hepatitis C virus (HCV), and human immunodeficiency virus (HIV) were negative. She had HAV-specific IgG positive antibody in the serum. Autoimmune antibodies were negative especially ANA, anti-smooth muscle antibody (SMA), anti-liver kidney microsomal antibodies (LKM-1, LKM-2, LKM-3), and anti-mitochondrial antibody (AMA).

Chest CT without contrast was compatible with COVID-19 infection with extensive involvement estimated at 45%.

The patient's hypoxemia resolved with 15L/min oxygen therapy reaching 95% saturation. Initial regimen treatment was composed of lopinavir/ritonavir (10 days), Dexamethasone (6 days), and Ceftriaxone (total course of 7 days). Anakinra (Interleukin 1 receptor antagonist) was added to the initial regimen on April 4 for a total of 5 days.

Since April 5, the patient had been clinically improving. Her oxygen requirements decreased and the inflammatory marker (CRP) was trending down to 16 mg/L on April 7.

On April 8, the patient became suddenly icteric with elevated total and direct bilirubin (179 and 150 μmol/L respectively) on lab test of April 9. Her liver function tests were normal except for elevated GGT (481 U/L) as shown in the Table 1.

A repeat chest CT on April 8 showed a right proximal pulmonary embolism and stability of the pulmonary lesions typical of COVID-19 with no dilation of the biliary tract.

Over a week, total bilirubin rapidly declined to reach 22 μmol/L on April 16. On the other hand, the patient's condition was clinically and gradually re-deteriorating. She had a recurrence of fever and an increase in oxygen requirements. Laboratory evaluation showed leukocytosis (WBC 16500/mm³ with PMN 14300/mm³ and Lymphocyte 660/mm³) and an increase in inflammatory markers (CRP 175 mg/L and ferritin 1711 μg/L). Liver tests showed a gradual increase in GGT (645 U/L) (Table 1).

In the light of her clinical deterioration, a repeat CT on April 16 showed an increase in pulmonary condensations of COVID-19, no dilation of the biliary tract, and no abdominal abnormalities.

Table 1
Liver tests of case report.

Date	AST (U/L)	ALT (U/L)	GGT (U/L)	ALP (U/L)	Total bilirubin (μmol/L)	Direct bilirubin (μmol/L)	INR	CRP (mg/L)
02/04: before 51 Anakinra		31	30	52	8		1.18	280
09/04: 5 days 61 after starting Anakinra		46	481	51	179	150	1.05	16
16/04: 8 days 51 after the end of Anakinra		80	645	174	22		NA	175
22/04	22	38	467	173	18		1.36	260
29/04	37	26	654	297	10		NA	111
04/05	21	35	548	221	7		NA	91

ALP: alkaline phosphatase; ALT: alanine aminotransferase; AST: aspartate aminotransferase; CRP: C-Reactive protein; DBIL: direct bilirubin; GGT: gamma-glutamyl transpeptidase; INR: International Normalized Ratio; NA: not available; TBIL: total bilirubin