

# COVID-19 AND FRENCH MEDICAL MARITIME TELECONSULTATION

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## Abstract

**Introduction:** The coronavirus disease 2019 (COVID-19) epidemic has impacted both land and maritime health services. The purpose of this study is to describe the calls received by the Tele-Medical Assistance Service (TMAS) in relation to this epidemic.

**Methods:** From March 1 to 30 April 30, 2020, all records coded by TMAS doctors as “influenza due to an unidentified virus” were extracted. The following data were collected: patients’ age, gender, nationality, role on board, type of ship, area of navigation, reason for the teleconsultation, patient’s symptoms, whether or not a COVID test had been carried out, and treatment given. The data were analyzed in two groups, depending on the reason for the consultation: teleconsultation for suspected COVID patients and teleconsultation for non-COVID patients for whom the call was nevertheless related to the COVID pandemic.

**Results:** Sixty-one records were included—51 for suspected COVID patients and 10 records for COVID-related problems (six patients whose treatment had stopped due to shortage of medication/one patient reporting a psychiatric problem associated with isolation, three patients followed up as contact cases). Forty-five patients presented with fever when the first call was made (88%) and 39 had a cough (76%). On closure of the medical records, 33 were receiving treatment on board (65%), 10 had disembarked (20%), 1 had been rerouted (2%), and 7 had been evacuated (13%).

**Discussion:** TMAS was able to aid professional sailors as well as passengers/recreational sailors in terms of telemedicine (diagnosis and monitoring), logistics (barrier actions and isolation), and operations (evacuation and repatriation).

**Keywords:** telemedicine, COVID-19, maritime, health, coronavirus, telehealth

## Introduction

**O**n March 11, 2020, the World Health Organization declared that the coronavirus disease 2019 (COVID-19) epidemic had reached pandemic proportions, impacting health services and the world’s economy.<sup>1</sup> The maritime sector has not been spared.<sup>2,3</sup> Within the context of its role described in the International Health Regulations,<sup>4</sup> the Tele-Medical Assistance Service (TMAS) has witnessed a sudden surge in maritime medical consultations (65% increase in activity during March 2020 compared with the same month in the previous year). The purpose of this study was to describe the calls handled by the TMAS in relation to the COVID-19 epidemic.

## Methods

### SETTING

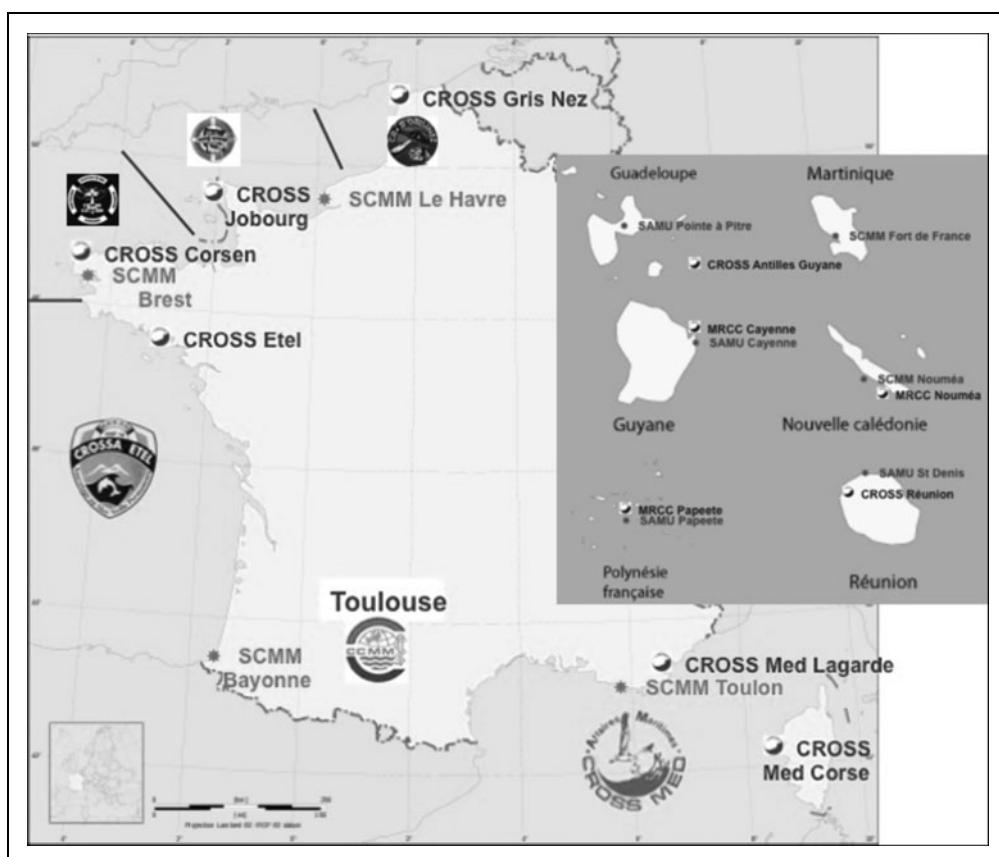
The study was conducted by the French TMAS, a telemedicine center for ships across the globe, listing 4,979 consultations for 2,145 patients in 2019. The TMAS offers a 24-h emergency physician consultation and is part of a teaching hospital affiliated to Toulouse University (Toulouse Purpan Hospital, France).

Medical Assistance at Sea was set up in France in 1983 in accordance to a government decision, updated in 2011.<sup>5</sup> The French protocol involves three partners: (1) French TMAS, (2) Maritime Rescue Coordination Centre (MRCC), and (3) Medical Maritime Coordination Service (SCMM) (Fig. 1). The captain is officially “responsible for medical care on board,” and as such he must examine the patient, collect any symptom, and medical data before calling French TMAS and transmit the results to the physician.

In our institution, in 75% of the calls, the patient is supported, treated, and observed aboard thanks to repeated calls. In case the teleconsultation suggests that maintaining the patient on board is inappropriate, the French TMAS physician will give the captain the advice to organize the patient evacuation. Following the French TMAS advice, MRCC will organize evacuation together with the associated SCMM. The mission of SCMM is to provide the medical team involved in the evacuation, and to organize land rescue and reception of the patient in the appropriate hospital.

### STUDY DESIGN

Patient data were analyzed retrospectively during March and April 2020 by the TMAS of Toulouse University Hospital. Sixty-one medical records were collated.



**Fig. 1.** Map of French Medical Assistance at Sea. CROSS = MRCC; SCMM = Medical Maritime Coordination Service; CCMM = French TMAS to Toulouse City. MRCC, Maritime Rescue Coordination Centre; TMAS, Tele-Medical Assistance Service.

In accordance with French Medical Ethics, patients were told that their encrypted data would be used for the study. According to French Ethics and Regulatory Legislation (Public Health Code), retrospective studies based on the exploitation of standard treatment data should not be submitted to an Ethics Committee but declared or covered by the reference methodology of the French National Commission for Informatics and Liberties (CNIL) (French Data Protection Agency). Personal and medical data were collected and processed electronically to analyze research results. Toulouse University Hospital agreed to comply with reference methodology MR-004 of the French National Commission for Informatics and Liberties (CNIL). After evaluation and validation by the Data Protection Officer and pursuant to the General Data Protection Regulation\*, this study satisfies all of the relevant criteria, and is included in the Retrospective Study Register of Toulouse University Hospital and covered by MR-004 (CNIL number: 2206723 v 0).

This study was approved by local committee of Toulouse University Hospital under the RnIPH number 2020-116, stating that ethical requirement were met in full in the aforementioned report.

\*Regulation (EU) 2016/679 of the European Parliament and of the Council of April 27, 2016.

## DATA COLLECTION

All calls to the French TMAS are logged in a specific dedicated database (AppliCCMM®). During the epidemic, between March and April 2020, in particular, TMAS doctors coded all records linked to COVID as “influenza due to an unidentified virus.”

The data were extracted using this diagnostic coding. Anonymized records containing data relating to the patients’ age, gender, nationality, role on board, type of ship, navigation zone, reason for the teleconsultation, patient’s symptoms, whether or not a COVID test had been conducted (CRP: C-reactive protein) and treatment. The data were analyzed in two groups depending on the reason for the teleconsultation: teleconsultation for suspected COVID patients (i.e., presenting compatible symptoms), teleconsultation for non-

COVID patients but the call for whom was nevertheless linked to the COVID epidemic (contact case, no backup, shortage of treatment, barrier measures, etc.).

## DATA ANALYSIS

Data were automatically downloaded in a Microsoft Excel 2007 Spreadsheet (Microsoft Corporation, Redmond, WA). Statistical analysis was carried out using the Microsoft Excel 2007 Spreadsheet. Numerical data were expressed in terms of frequency and percentage. Measured data were expressed in terms of mean plus standard deviation and median with interquartile ranges.

## Results

Between March and April 2020, the TMAS registered 378 records, taking all diseases into account (215 records in March and 163 records in April). Of these 378 records, 61 (16%) were COVID related (45 in March and 16 in April). Fifty-one of these records involved suspected COVID patients and 10 records were epidemic-related problems with

no suspected cases. There were between 1 and 13 calls for each record, averaging  $4 \pm 4$  calls.

#### SOCIODEMOGRAPHIC DATA

Of the 61 medical records, 54 (89%) were for men and 7 (11%) for women. Their average age was  $41 \pm 13$  years (*Table 1*). The population comprised 15 nationalities (*Table 2*). Most patients were French ( $n=34$ ; 56%) followed by Filipinos ( $n=7$ ; 11%). Twenty-five patients (41%) were on board passenger ships (ferries and ocean liners), 23 patients (37%) were on merchant ships, 7 patients (12%) were on fishing boats, and 6 patients (10%) were on pleasure boats. There were 49 professional sailors (80%) and 12 passengers or recreational sailors (20%).

#### DESCRIPTION OF CALLS FOR SUSPECTED CASES OF COVID-19

Of the 51 suspected COVID-19 patients, 45 presented fever at the time of the initial call (88%) and 39 cough (76%). The other symptoms are described in *Table 3*.

TMAS doctors prescribed paracetamol for 24 patients (47%), antibiotics (amoxicillin and clavulanic acid) for 5 patients (10%) due to suspected bronchial superinfection, and

**Table 1. Participant Demographics**

CHARACTERISTICS	VALUES (n=61)
Mean age (SD)	41 (13)
Gender	
Male, n (%)	54 (89)
Function	
Sailors, n (%)	26 (43)
Officers, n (%)	12 (20)
Others professional seaman, n (%)	11 (18)
Recreational sailors, n (%)	7 (11)
Passengers, n (%)	5 (8)
Type of ship	
Passenger ships, n (%)	25 (41)
Ferries	11 (18)
Ocean liners	14 (23)
Merchant ships, n (%)	23 (37)
Fishing vessels, n (%)	7 (12)
Pleasure craft, n (%)	6 (10)
SD, standard deviation.	

**Table 2. Patients' Nationalities**

NATIONALITY	VALUES (n=61)
French, n (%)	34 (56)
Filipino, n (%)	7 (11)
Swedish, n (%)	2 (3)
Polish, n (%)	2 (3)
American, n (%)	2 (3)
English, n (%)	2 (3)
Portuguese, n (%)	1 (1)
Nigerian, n (%)	1 (1)
Romanian, n (%)	1 (1)
South African, n (%)	1 (1)
Togolese, n (%)	1 (1)
Belgian, n (%)	1 (1)
Honduran, n (%)	1 (1)
Colombian, n (%)	1 (1)
Indian, n (%)	1 (1)
Ukrainian, n (%)	1 (1)
Australian, n (%)	1 (1)
Indonesian, n (%)	1 (1)

antitussive agents for 1 patient (2%). Twenty-three patients (45%) were not given a prescription by the TMAS doctor, but 13 of them (25%) were attended to by a physician on board.

The vessels were within French territorial waters in 20 cases (40%) and outside in 31 cases (60%). On close-out, 33 patients were being treated on board (65%), 10 patients had disembarked

**Table 3. Symptoms**

SYMPTOMS	VALUES
Fever, n (%)	45 (88)
Cough, n (%)	39 (76)
Respiratory distress, n (%)	9 (15)
Headaches, n (%)	8 (13)
Diarrhea, n (%)	1 (2)
Loss of smell, n (%)	1 (2)
Loss of taste, n (%)	1 (2)

(20%), 1 patient had disembarked after being rerouted (2%), and 7 had been evacuated (13%).

With regard to the CRP-COVID test, all 13 patients were tested (25%) in France, with 12 positive tests (24%) and 1 negative test (1%) being recorded.

TMAS doctors were confronted with six operational difficulties when treating these patients (five evacuations were refused by the land authorities, one COVID classification not recognized by the land authorities).

#### **DESCRIPTION OF EPIDEMIC-RELATED CALLS WITH NO SUSPECTED CASES**

The 10 epidemic-related calls with no suspected cases involved 6 patients who had stopped treatment due to a shortage of medication, 1 patient reporting a psychiatric problem relating to isolation and 3 cases followed up as contact cases.

#### **Discussion**

Within the scope of the COVID-19 epidemic, telemedicine is a key factor in slowing down viral transmission through compliance with "social distancing" rules.<sup>6</sup> It reduces person-to-person contact. For COVID-19 patients or those who think they may be infected, telemedicine assists in remote evaluations and prescriptions. For those who are not infected with COVID-19, telemedicine ensures practical access to routine treatment without any risk of exposure in a hospital or medical waiting room setting. It has also been stepped up in community medicine during the pandemic, with teleconsultations in France increasing from 40,000 in February 2020 to 1 million during the first week of April 2020.<sup>7</sup>

By definition, the TMAS is a tried and tested telemedicine service (in existence for 35 years), which has been contacted extensively by sailors during this difficult period. Teleconsultations have allowed suspected COVID patients to be treated and monitored long term on board ship to identify any complications. Thanks to teleconsultations, conditions traditionally treated on land have been managed on board as the conventional option proved impossible when disembarking was not authorized in some countries around the globe (mandatory quarantine).<sup>8</sup>

Telemedicine nevertheless has its limitations. Some consultations require physical examinations that are difficult to conduct remotely or several days' medication and oxygen therapy, which are not available on board. Similarly, scans or COVID tests cannot be carried out remotely. This is precisely where it becomes difficult to quarantine sailors in isolation<sup>9</sup> or without backup.<sup>10</sup>

To respond to calls about suspect COVID-19 patients, TMAS doctors have relied on their telemedicine experience and of-

ficial guidelines for diagnosing suspected cases on board ship. This information gradually became more detailed as the epidemic intensified.<sup>11,12</sup> Doctors have been constantly adapting. At the same time, they have been involved in drafting French procedures<sup>12</sup> in line with the Ebola epidemic.<sup>13</sup>

If we look at the symptoms presented by the patients, they match those described in the literature with most patients experiencing fever and cough.<sup>14,15</sup> The distribution of nationalities is the same as in previous publications, with French and Filipino patients dominating the scene.<sup>16</sup>

In contrast, teleconsultations have allowed doctors to explain isolation and barrier measures to sailors. Some studies have shown that isolation can have negative psychological repercussions and impact sleeping disorders.<sup>17</sup> As far as the TMAS is concerned, doctors have only encountered a few psychological complications (only 1 in the 2 months studied). They were assisted in the management of this case by the Psychological Assistance Resource Centre based at Saint Nazaire.<sup>18</sup>

Another specific feature of this epidemic from a maritime perspective has been the management of suspected COVID patients on cruise ships. Several publications have highlighted the difficulties in deciding whether to disembark patients or treat them on board. The evacuation of seriously ill patients to countries with already saturated intensive care units has been very complex.<sup>19</sup>

#### **LIMITATIONS**

It may not be feasible to generally extrapolate the study results to other teleconsultation services. Nevertheless, this is the first study to be published in this particular setting and we believe it may add valuable information to the literature.

#### **Conclusions**

As a French reference center, the French TMAS has been affected by the COVID-19 epidemic in the same way as all health departments. However, it has been able to contribute to telemedicine *per se* and to logistical and operational strategies.

#### **Authors' Contributions**

B.F., S.A., and R.P. helped to draft the article and to critically review its intellectual content. They have approved the final version to be submitted.

#### **Disclosure Statement**

No competing financial interests exist.

## Funding Information

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## REFERENCES

1. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 11 March 2020. Available at <https://www.who.int/news-room/detail/27-04-2020-who-timeline--covid-19> (last accessed June 10, 2020).
2. Sikorska K. Coronavirus disease 2019 as a challenge for maritime medicine. *Int Marit Health* 2020;1:4.
3. Dahl E. Coronavirus (Covid-19) outbreak on the cruise ship diamond princess. *Int Marit Health* 2020;71:5-8.
4. International Health Regulation adopted by the fifty-eighth World Health Assembly on 23 May 2005 and published by decree No. 2007-1073 of 4 July 2007. Available at <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000467563&categorieLien=id> (last accessed June 10, 2020).
5. Prime Minister's Circular. Instruction on the organisation of medical assistance at sea, 29 August 2011. Available at [http://circulaires.legifrance.gouv.fr/pdf/2011/11/cir\\_34077.pdf](http://circulaires.legifrance.gouv.fr/pdf/2011/11/cir_34077.pdf) (last accessed July 28, 2020).
6. Public Health England. Coronavirus (COVID-19): What is social distancing? Available at <https://publichealthmatters.blog.gov.uk/2020/03/04/coronavirus-covid-19-what-is-social-distancing> (last accessed June 10, 2020).
7. Commission for Social Affairs. Presentation by Mr. Nicolas Revel, Director General of French National Health Insurance Fund, 15 April 2020. Available at [www.senat.fr/compte-rendu-commissions/20200413/soc.html](http://www.senat.fr/compte-rendu-commissions/20200413/soc.html) (last accessed June 22, 2020).
8. CDC. Interim Guidance for Ships on Managing Suspected Coronavirus Disease 2019. Available at <https://www.cdc.gov/quarantine/maritime/recommendations-for-ships.html> (last accessed June 10, 2020).
9. Yoshihiro Y, Ayako S. Preparation for quarantine on the cruise ship diamond princess in Japan due to COVID-19. *JMIR Public Health Surveill* 2020;6:e18821.
10. RIF. Crew changes. Available at [www.rif.mer.developpement-durable.gouv.fr/crew-changes-r195.html](http://www.rif.mer.developpement-durable.gouv.fr/crew-changes-r195.html) (last accessed June 10, 2020)
11. World Health Organisation. Operational consideration for managing COVID-19 cases and outbreaks on board ships. Interim guidance. Available at <https://apps.who.int/iris/handle/10665/331164> (last accessed June 10, 2020).
12. French Ministry of Ecological and Solidarity Transition. Coronavirus Covid-19: recommendations and approach to adopt on board French ships. Available at <https://www.ecologique-solidaire.gouv.fr/coronavirus-covid-19-recommandations-et-conduite-tenir-bord-navires-sous-pavillon-francais> (last accessed June 10, 2020)
13. Dehours E, Roux P, Tabary J, Saccavini A, Roucolle P, Pujos M. French maritime procedures concerning the Ebola infection, experience of the French Tele-Medical Assistance Service (TMAS). *Int Marit Health* 2015;66:184-185.
14. Guan W, Ni Z, Hu Y, Liang W, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020;382:1708-1720.
15. Sasmita Poudel A, Sha M, Yu-Ju W, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: A scoping review. *Infect Dis Poverty* 2020;9:29.
16. Binasse P, Dehours E, Bodré C, Chevalier V, Le Fur Bonnabesse A. Dental emergencies at sea: A study in the French maritime TeleMedical Assistance Service. *J Telemed Telecare* 2020;26:285-293.
17. Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, Cuesta-Vargas A, Mayoral-Cleries F. Telehealth home support during COVID-19 confinement for community-dwelling older adults with mild cognitive impairment or mild dementia: Survey study. *J Med Internet Res* 2020;22:e19434.
18. CRAPEM. Available at <https://www.ecologique-solidaire.gouv.fr/sites/default/files/Informations%20concernant%20le%20Centre%20ressource%20d%27aide%20psychologique%20en%20mer.pdf> (last accessed June 10, 2020).
19. Moriarty L, Plucinski M, Marston B, et al. Public health responses to COVID-19 outbreaks on cruise ships—worldwide, February–March 2020. *Morb Mortal Wkly Rep* 2020;69:347-352.

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