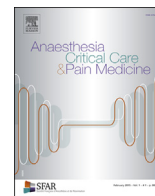




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Letter to the Editor

French ICUs fight back: An example of regional ICU organisation to tackle the SARS-CoV-2 outbreak



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1. Introduction

Since the beginning of the SARS-CoV-2 (also called COVID-19) outbreak in the Hubei province in China, half a million people have been infected and more than 25,000 died worldwide by the end of March 2020 [1]. In Europe, the third most infected country is France (after Italy and Spain) with more than 26,000 cases and about 1500 deaths by the end of the last week of March [1]. One of the first French regions hit by the outbreak was Picardy, located at the northeast of the country. The first case in Picardy was diagnosed on February 26th, 2020 in the Cardiac Thoracic and Respiratory ICU of the Amiens-Picardy University Hospital. The number of patients admitted to the region's ICUs rapidly increased after that first case. To tackle this surge, an organisation was set in order to coordinate and facilitate the admission of critically ill COVID-19 infected patients, and to avoid or at least delay the overrun of ICU capacities in the region. The organisation has been based on a centralised on-call dispatch ICU consultant and efficient bed manager software.

2. ICU bed management in Picardy

The Picardy sub-region is situated in the northern part of France. Picardy has about 2 million inhabitants on 19,399 km². There are about 26 public hospitals and 19 private hospitals, for a total number of 128 ICU beds and 154 post ICU beds [2]. There is only one tertiary teaching hospital: the Amiens-Picardy University hospital (CHU Amiens-Picardie). To tackle the outbreak, the number of ICU beds doubled in less than two weeks in these public and private hospitals.

3. French anaesthesiologists are also intensivists

In France, all anaesthesiologists are at the same time intensivists. Indeed, anaesthesia residents receive ICU training for at least one and a half year, and the majority of French ICUs are managed by anaesthesiologists. After the start of the COVID-19

outbreak, all non-urgent surgery operations were delayed. Hence, anaesthesiologists and anaesthesia residents of Picardy who worked in operating theatres were made available for ICUs. Specially trained staff was immediately ready for the regional increase of ICU capacity.

4. 24-h on-call regional ICU dispatcher

An ICU consultant from the Amiens University hospital was designated to centralise all calls from emergency departments, wards, and remote ICUs of the region. A unique phone number was created and sent to all public and private hospitals. The on-call intensivist dispatcher was available 24 h a day, 7 days a week. This on-call intensivist dispatcher answers to phone calls, gives advices for patient management and finds an available ICU bed if required. During the first two weeks of the outbreak, the on-call intensivist dispatcher answered 12 to 15 calls daily.

5. Online ICU bed availability software

In order to accurately and timely dispatch patients on a regional level, the on-call regional intensivist dispatcher needs to know precisely and timely the number of available beds. For this purpose, a responsive web application based on Spring Framework [3] 2.2.2 for the backend API (Application Program Interface) and React [4] 16.12.0 for the frontend UI (User Interface) named COORD-REA[®] was created by a consultant (EA). It has been packaged in a Docker image and secured using Keycloak[®]. The software was hosted by Amiens-Picardy University Hospital. Hence, the on-call regional intensivist dispatcher can access in real time to a synthesis of beds availability (Fig. 1) using a web browser or a smartphone. The software was shared online by all ICUs in Picardy. It was asked for all ICUs to timely update the number of available beds. All ICUs are divided in two areas, for COVID-19 infected and non-infected patients, respectively. Hence, the on-call regional intensivist dispatcher was immediately able to find an available ICU bed for every patient in the region.

6. Dedicated regional mobile extracorporeal membrane oxygenation (ECMO) team

The cardiac thoracic and respiratory ICU of Amiens University hospital, a 30-bed facility, is the only ICU in Picardy with the ability to initiate ECMO therapy. Since the beginning of the outbreak, a regional mobile ECMO team was created in the Amiens University medical centre. This team is composed by an intensivist, a thoracic surgeon and an ECMO specialised nurse. The team is 24/7 available for all emergency departments and ICUs of the region. The team is able to reach in less than 1 h all hospitals in the region. ECMO is initiated on site and patients are retrieved by helicopter or by road to the cardiac thoracic and respiratory ICU of Amiens University

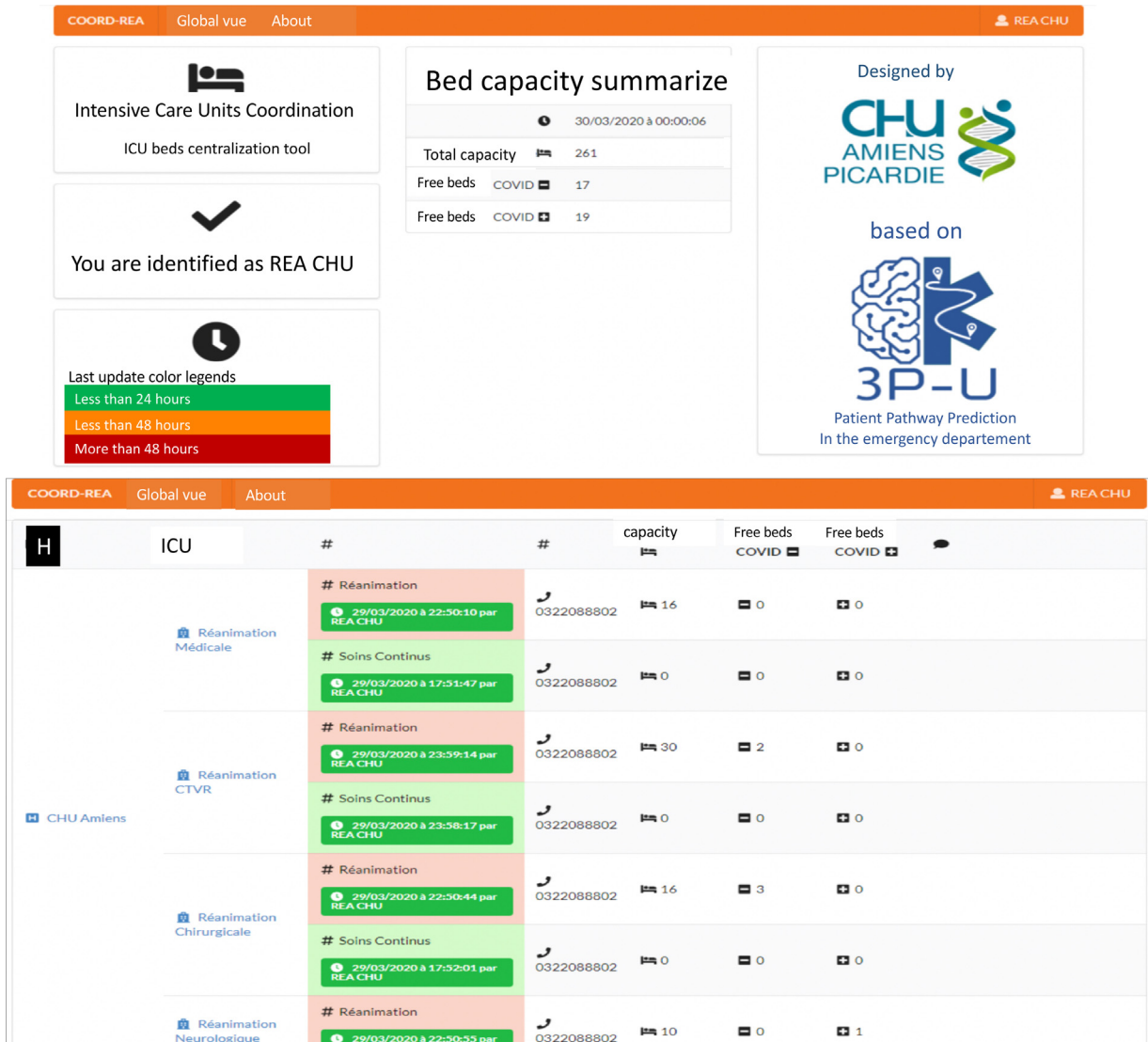


Fig. 1. Front page of COORDREA[®] Software displaying total bed availability and details of each ICU showing the number of beds available for COVID-19 infected and non-infected patients (English translation).

hospital. Since the beginning of the outbreak, the team received between one and three calls every day for ECMO. In two weeks, seven ECMO therapies were initiated for patients with COVID-19 related ARDS.

7. COVID-19 patient's management free app

With the help of a local private company (Come-Scape[®], Amiens, France) a free app named "COVID-19 practical Sheets" (COVID-19 Fiches pratiques) has been designed [5]. After creating a website on Wordpress[®], an extension was added in order to build a Progressive Web App (WPA). This kind of application allows a web page to appear as a mobile application combining functionalities of a modern web browser and usefulness of mobile phones. An ICU consultant (BT) was dedicated to daily update all information given on the app. The app was initially designed for anaesthesiologists and intensivists from Picardy. However, 72 h after its launch, more

than 100 000 connections were registered, not only from France but also from several French-speaking countries in Europe, North Africa and North America.

8. Conclusion

This letter describes an example of regional organisation settled to tackle the COVID-19 outbreak. We advise our colleagues from all over the world to adapt this organisation to their area. Nevertheless, the increase of patients with COVID-19 related ARDS may overrun ICU capacity whatever the organisation. We are confident that the commitment and seriousness of ICU staff will prevail.

Disclosure of interest

Benjamin Terrasi is an active member of Come-Scape[®]. The other authors declare that they have no competing interest.

Acknowledgment

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