

Implementation of Emergency Medical Service Support System

To reduce traffic crashes and casualties, it is crucial to identify where, when, and under what kind of circumstances they tend to occur. In addition, to improve the quality of trauma care, injury type and treatment statistics/data need to be reviewed but these data are not fully recorded in Laos at the present time. Furthermore, what information about prehospital activity that does exist has been partially kept on paper-based record sheets but needs digitization before analysis. Given these problematic situations, we will develop and introduce the Emergency Medical Service Support System (ESS) which enables digital collection/analysis of crash and patient data (including postcrash response) as well as data sharing with hospitals and related sectors.

Rescue teams enter information about injured patients and transmit the data en route to emergency hospitals by using a smartphone application designed for easy use by a generation already proficient in smartphone usage. This allows medical professionals at recipient hospitals to prepare for specific injuries and treatment in advance to reduce delays in patient intake and action. We also plan to share analysis data with road safety authorities and utilize the results to craft policies regarding road safety promotion, including identification of inadequate road structures, reinforcement of traffic legislation, and education.

Function 1: Monitoring and Management of Ambulance Locations

Ambulance locations can be monitored in real-time by utilizing the GPS function of smartphones set up within the ambulances (Fig. 1). Based on this location information, dispatchers can send ambulances from the closest station to the crash site. All monitors at the CCC in Mittaphab Hospital are equipped with this function so that the centralized management operation of all ambulances in Vientiane can be conducted in a speedy and effective manner.

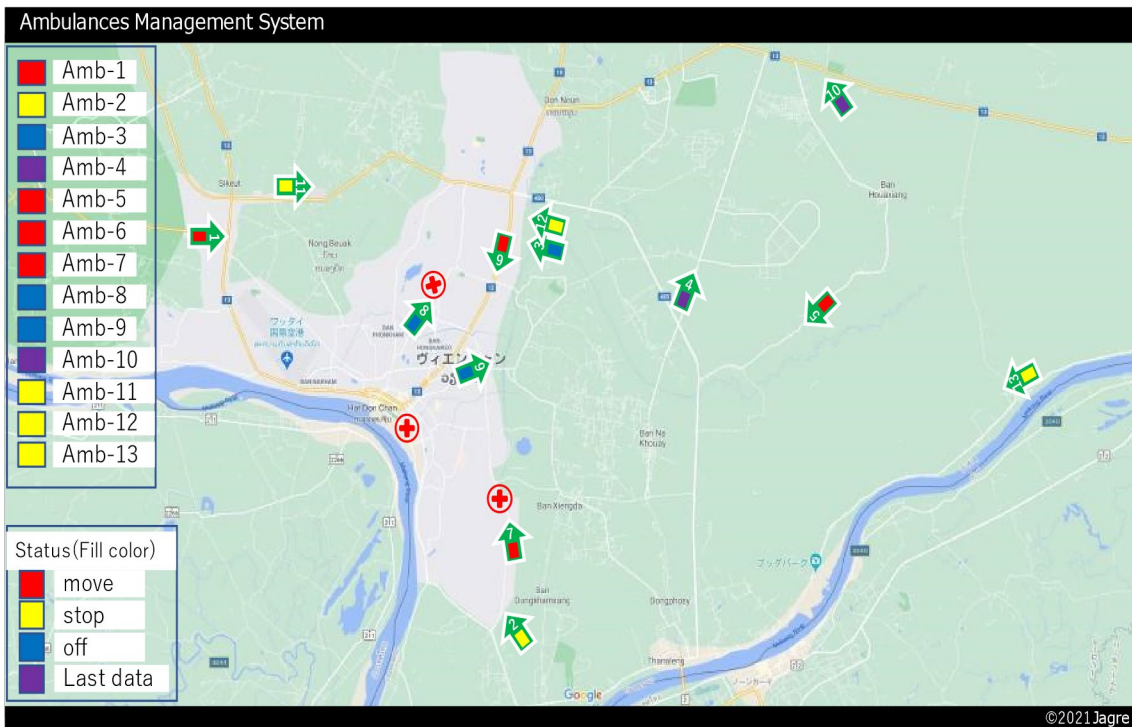


Fig. 1: Display image mapping locations of ambulances

Function 2: Transmission of Patient Data to Hospitals Prior to Arrival

As rescue members send patient data using the smartphone application from the ambulance, it is shown on the monitors at the emergency department entrance in receiving hospitals (Fig. 2-1, 2-2). Medical professionals will be able to check information on each patient and then prepare human resources and equipment before arrival. This system will help to save lives with limited resources in emergency departments as it enables emergency doctors and nurses to enact custom treatment planning and preparation, especially when many severely injured patients are carried to the hospital at the same time.

On the display, the position of en route ambulances and incoming patient information are shown. Basic patient information, vital signs, data on injured parts and severity level (a red label is shown if the patient's condition is severe) will be indicated.



Fig. 2-1: Monitor placed at the entrance of Fig. 2-2: The display monitor

Function 3: Computerization of Crashes, Patient Data, and Data Analysis

As rescue members enter information into the application en route to the hospital, detailed information and time at each stage are recorded (Fig. 3). The computerized data set makes it easy to analyze the challenges and risks involved in responding to and treating injuries from crashes. This database and its analysis will be fundamental information to push forward policies to reduce traffic crashes as well as improve the EMS.

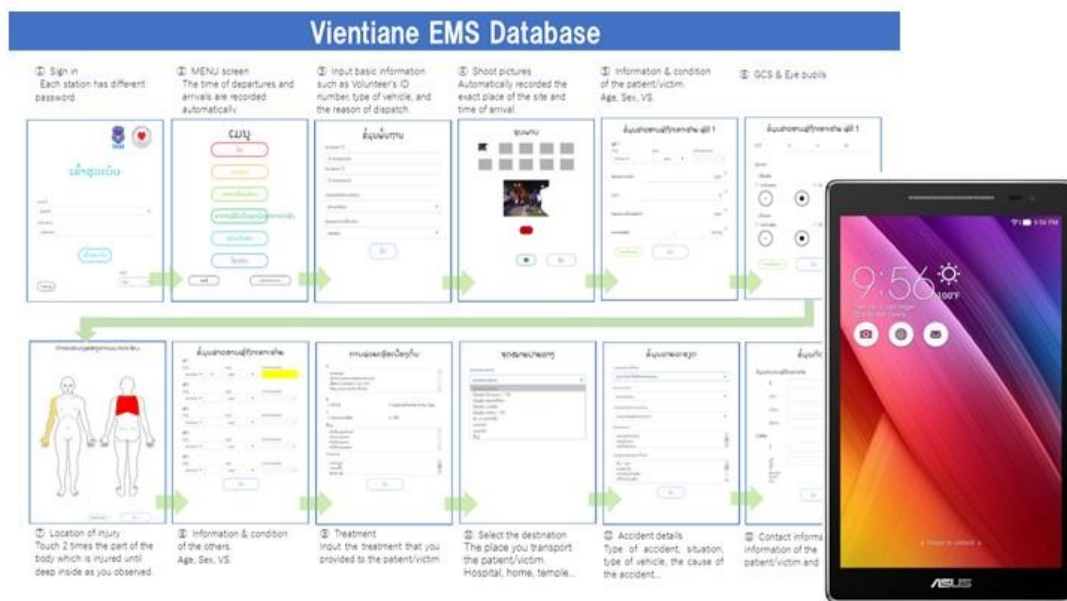


Fig. 3: Flowchart of patient data transmission

Function 4: Monitoring the Readiness of Ambulances and Hospitals

Information for ambulance dispatch and hospital readiness to receive patients will be aggregated so that limited emergency care resources can be allocated more effectively. This information is updated by rescue teams and hospital sides regularly so that the CCC always has the most current list of ambulances and hospitals which are ready to dispatch and receive patients. This information can be also shared and browsed by the rescue teams' smartphones. When an injured patient calls for an ambulance, a dispatcher identifies the appropriate ambulance and issues the command for dispatch (Fig. 4-1).

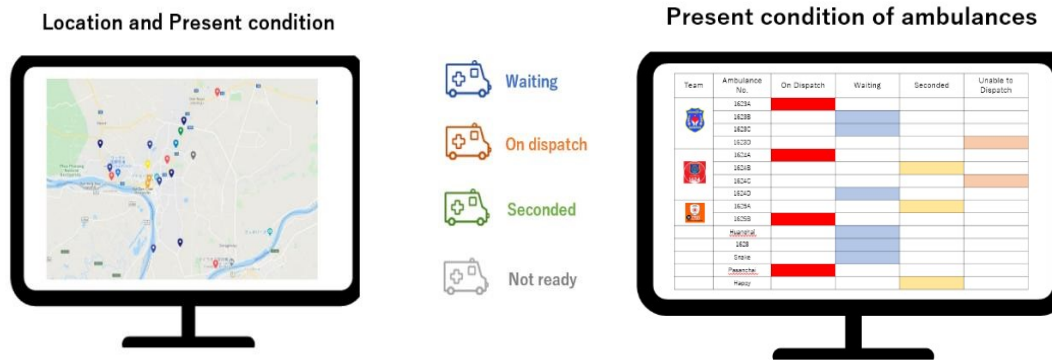


Fig. 4-1: Monitoring ambulance readiness

At the crash site, rescue members identify the appropriate hospital for transport based on constantly updated information (Fig. 4-2). This function is expected to reduce the number of unnecessary transfers after patient pickup.

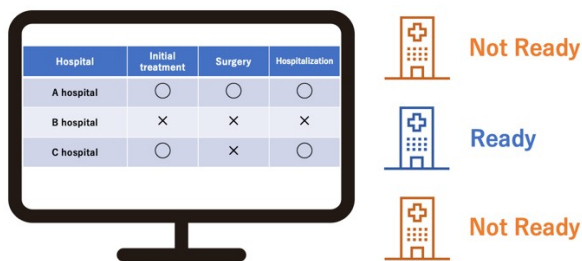


Fig. 4-2: Monitoring ambulance readiness

Function 5: Infection Risk Screening for COVID-19

The CCC screens infection risk in order to protect ambulance and hospital staff from infection. When dispatcher receives an emergency call, the dispatcher asks questions and determines the risk from infectious diseases (especially COVID-19), e.g., asking whether they have high fever, shortness of breathing, etc. Right after receiving a dispatch order, the rescue members prepare themselves with appropriate personal protective equipment (PPE) based on the screening results provided by the dispatcher and go to pick up the patient.

When rescue teams arrive at the crash location, the members will once again screen for risk of infectious diseases and share the update on the system. The emergency doctors and nurses at the emergency hospitals can then prepare PPE based the screening results updated by the rescue teams (Fig. 5).

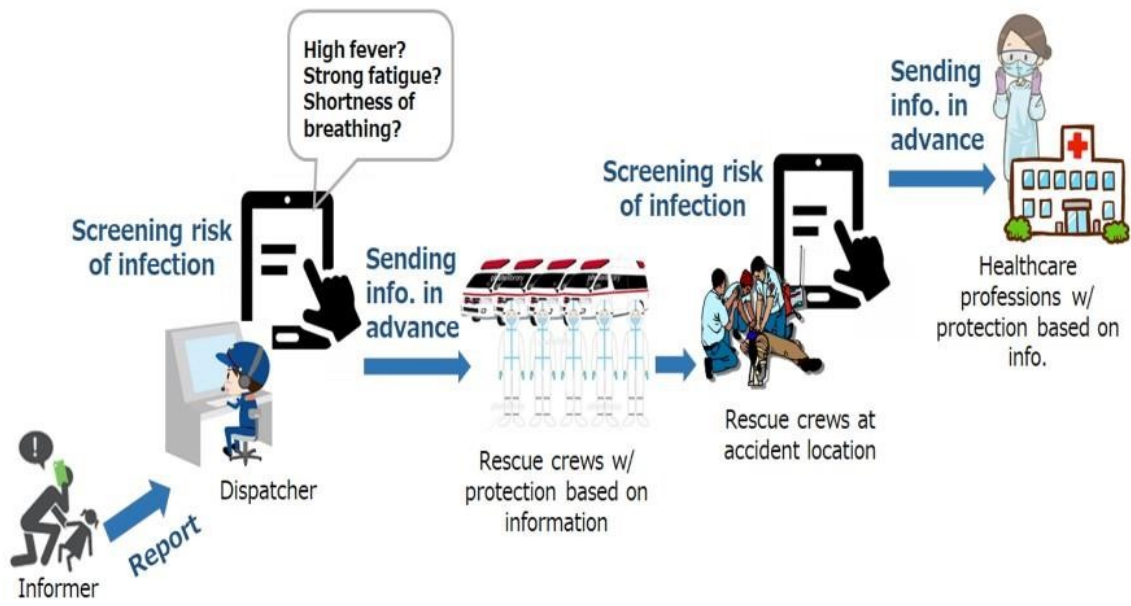


Fig. 5: Screening procedures of infection risk