iProcureSecurity
SOLUTIONS FOR EMERGENCY MEDICAL SERVICES

Innovator
Recommendations

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Introduction

Fostering the response capacities and increasing the cooperation of the European Emergency Medical Services Systems (EMSS) is of decisive importance for strengthening the resilience of European societies in the light of multiple hazards, calling for close cooperation of public safety and health authorities on an international level.

iProcureSecurity responds to this challenge by identifying the major issues the diversity of the Emergency Medical Services (EMS) ecosystem poses to the capability of working together, stimulating R&I uptake with a focus on increasing harmonisation of operations across Europe, while delivering requirements for R&I activities to boost the development of more homogeneous EMS systems.

To enhance the response capabilities of the EMS organisations across Europe and facilitate a clear needs assessment of a major innovation procurement action, the project seeks to:

MOBILISE practitioners of emergency medical services, researchers and experts from the field to build synergies among existing actor constellations and initiate knowledge exchange.

ANALYSE the European medical emergency services ecosystem, its capability gaps, challenges, and needs, and monitor R&D initiatives to create a catalogue of innovative solutions.

ADDRESS legal issues, ethical and societal aspects that should be taken into account by the design, development, and deployment of new solutions in the emergency medical field.

PROVIDE specifications about common requirements and technical tender documents for the procurement of R&D, ready-to-use by the upcoming PCP action and external procurers.

This document provides an overview of recommendations for **INNOVATORS** against ten main areas of the EMS Ecosystem which were identified during the iProcureSecurity project. In the following each area is briefly described.

Recommendations

The Scene

The scene presents many challenges to emergency medical services to provide high quality medical care in emergency situations and it strongly differs from relatively controlled working environment of hospital emergency rooms. Accident environments can be dynamic, chaotic, unpredictable, uncontrolled, sometimes dangerous and there is a significant time pressure; so, it is difficult for EMS providers to oversee all aspects of the scene and make right decisions. In addition, the intervention of bystanders is essential as they are in many cases the first ones at the scene providing important information on the patient and the environment and can if properly trained can start first aid until EMS practitioners arrive.

Recommendations

- Research and development of interoperability of platforms and applications holding patients' data and medical history with special focus on geriatric patients, people with disabilities and people with chronic illnesses.
- Research and development of a Socio-technical Concept of operations for EMS technologies to support needs analysis, requirements gathering and system visualisations.
- Conventionalization of new trainings/simulation methods for bystanders.
- Research on and development of evidence-based solutions meeting the every-day needs of EMS practitioners.
- Make use of precision medicine to prevent critical situations like heart strokes.
- Increased awareness on and acceptability to volunteers' networks.
- Foster international exchange and collect best practice models of how to reach socially disadvantaged persons and achieve more equality in the health system.

Ambulances

An ambulance is a medically equipped vehicle which transports patients to treatment facilities, such as hospitals. In some instances, out-of-hospital medical care is provided to the patient during the transport. Ambulances can be categorized in three main areas which are ground, air and marine ambulances. Following three different types of divided road ambulances are used in prehospital care to different degrees in EU Member States.

Ambulance Type A: Patient transport ambulance. Ground ambulance which is designed and equipped for the transportation of the patients who are not expected to develop a critical condition.

Ambulance Type B: Emergency ambulance. Ground ambulance which designed and equipped for the transportation, basic treatment and monitoring of patients. (Basic life support ambulance).

Ambulance Type C: Mobile intensive care unit. Ground ambulance which is designed and equipped for the transportation, advanced treatment and monitoring of patients. (Advanced Life Support ambulance).

Recommendations

- Development of new air mask filters as well as filters for the ambulance cabin.
- Reduction of size and weight of equipment for ambulances.
- New design of ambulances allowing a faster, easier and safer manoeuvrability.
- Development of drone networks to provide camera/fast first impression and supplies to point of incident.
- Cooperative Evaluation research into decision support technologies
- Develop telemedicine applications for EMS and scan devices for vital parameters on M2M base.
- Socio-technical Systems analysis of the implementation of new ambulances and equipment.
- Design of smart tools such as stretchers that can get into narrow lifts etc.
- Development of special ambulances for the transport and treatment of patients with infectious diseases.

Safety and Situational Awareness

Emergency response is dynamic by nature - in every step from taking the call to responding on the scene. Upon dispatch to an incident, responders immediately get in a search of their most valuable commodity: information. Initially, responders are provided with the key information from the person reporting the incident and upon arrival, they obtain more information about the surrounding situation at hand. While treating the patient, additional information about the situation becomes relevant. During these initial phases of information gathering, it is of utmost importance to ensure the EMS teams' safety and taking care of the patient. Situational awareness can be explained as that responders: **Understand their environment / Can determine what's happening around them / Are able to predict what can/could occur / Can respond to or withdraw from it.**

Recommendations

- External cameras for ambulances and corresponding operating software accessible for and handled by the coordination center.
- Portable individual communication devices activated by the user's voice or fingerprint.
- Apps for tablets or mobiles phones that will give details of the current situation at the point of event.
- Extremely robust and self-sustainable data transfer between the different EMS organisations.
- Improve materials to make Personal Protective Equipment (PPE) lighter and more comfortable.
- Development of comfortable PPE designs under realistic conditions.
- Open data portals for volunteers to support and increase the situational awareness.
- Research and development of factors that affect situational awareness in EMS operations.

Medical Treatment

Medical treatment means the management and care of a patient to combat disease or disorder. Before transporting the patient to the hospital, the diagnosis and medical treatment at the scene is one of the most relevant EMS tasks in the field. The European Resuscitation Council has identified five conditions in which EMS play a most crucial role. These are: cardiac arrest, severe respiratory difficulties, severe trauma, chest pain including acute coronary syndrome and stroke.

Recommendations

- Develop a comprehensive and reliable Pan-European Mobile Emergency application.
- Self-operational AEDs with theft protection.
- Advanced studies to evaluate the impact of the application of telemedicine and ICT on early diagnosing and connected benefits.

Emergency Medical Communication Centre

Dedicated facility to answer emergency calls immediately, to identify callers' needs and to dispatch the necessary resources wherever and whenever an emergency need occurs. Incoming calls can use audio, video or text messages. The first aid instructions must be given from the EMCC. The appropriate ambulance type with right equipment must be dispatched to the scene. The data from patients, professionals and personnel are to be sent to the relevant experts and health institutions. All data must be recorded. There are regional and city-level EMCC that cover the necessary personnel, infrastructure and technology. There is no Europe wide harmonization for EMCCs. EMCCs can be differently handled even within one country. The needs are different for islands, main lands, rural and urban areas.

Recommendations

- New models of training and simulation focused on EMCC staff with complex scenarios.
- Requirement analysis of technology that fully meets the needs and supports disabled persons (with different disabilities) but also the medical dispatcher in their communication.
- Development of advanced interoperable technologies for health-related data exchange.
- Analysis of information processing capabilities of EMCC using moderating decision support technologies.

In Hospital EMS

In Hospital EMS refers to all subsets of medical institutions and hospitals that have the capacity to deliver uninterrupted emergency care 24/7. Emergency Department demands continue to rise in almost all high-income countries, including those with universal coverage and a strong primary treatment network. Many of these countries have been experimenting with innovative methods to reduce the demand of acute care, while at the same time providing highly needed services that can prevent emergency department attendance and later hospital admissions. A large proportion of patients in emergency departments have minor illnesses that could potentially be handled by a health care provider in a primary care setting. The increasing number of visits to emergency departments causes not only delays in urgent care provision but it also increases the overall costs.

Recommendations

- Research on new chronic disease management programs and behavioural change to reduce acute events.
- Develop a new Patient Flow Management system in order to prevent overcrowding in EDs.
- Support automatic and real time data transfer between the scene and the ED.
- Patient centred care research to ensure coordinated response to complex cases (e.g. co-morbidities, poly-pharmaceuticals / medicines management, etc.).

EMS Work Force and Training

Emergency medical services (EMS) vary across Europe, with two predominant models: the Anglo-American model which uses mainly paramedics in a prehospital setting, where 'the patient goes to the doctor'; and the Franco-German model which uses mainly physicians in a prehospital setting, where 'the doctor goes to the patient'. No perfect model exists, and each country has an EMS model based upon the needs of the community and the available economic resources. The number, the types and the level of training of ambulance personnel and teams are not harmonized in European countries.

Recommendations

- Design of adequate training path for each type of EMS practitioner addressing various real-life scenarios such as mass casualty incidents.
- Development of on-line education programmes from undergraduate to postgraduate levels along with specific specialised modular courses offering ECTs.
- Drawing up concepts for funded international exchange programs for EMS practitioners.
- Conventionalization of new trainings/simulation methods for shared learning among EMS practitioners with different backgrounds and expertise.
- Development of new models for training of health care staff with an approach/attitude to flexibility.
- Proceed and increase research and development of intuitive training systems in constant exchange with the EMS practitioners to adapt and optimise the methods.
- Research on systems that meet the needs of the practitioners and makes it possible to make ways of how the working conditions can be designed more flexible and visible to the society.

Medical Equipment

Medical equipment is used for the specific purposes of diagnosis and treatment of disease or rehabilitation following disease or injury. It can be used either alone or in combination with any accessory, consumable or other piece of medical equipment.

Recommendations

- Design of new equipment for ambulances with reduced size and weight.
- Establishment of strategy for re- and upcycling of outdated medical equipment and facilities.
- Socio-technical systems and ergonomics research into the usability of EMS medical equipment innovations.
- Development of connected devices for giving an overview of available medical supplies. This should be done in close and frequent collaboration with the EMS practitioners for improving not only the technological standards but the efficiency of the everyday practice.

Triage Systems

Triage can be defined as “the sorting of patients into priority groups according to their needs and the available resources”. It must ensure the efficient use of available resources e.g. personnel, supplies, equipment, means of transportation and medical facilities.

Recommendations

- Research and development of reliable decision-support and documentation tools.
- Research on suitable technology to support the decision-making process in the field of paediatric triage.
- Development of a framework for evaluating the advantages and disadvantages of the existing triage protocols and form new ways for the different scenarios in international and interdisciplinary teamwork.
- Create a system that gathers all relevant data to provide a full operational picture.
- Establish reliable sensors to keep track of patients and their status during the event.
- Develop a system that automatically documents patient treatment and improved hand over procedures.
- Increase technical interoperability between new and available systems of all first responders.
- Research into decision assist, record tools and patient wearables that are legally and ethically sound in line with GDPR.

Other

This area subsumes all additional aspects which are horizontally relevant for all areas of the emergency medical service ecosystem including financial, legal, political and administrative issues.

Recommendations

- Create decision support software (including standard operation plans) for cases where more than one first response team works together (emergency and crises) in order to improve incident management and clarify responsibilities of the teams.
- In context of technological innovation ethical consequences have always to be considered and evaluated for every target group.
- Use community channels to inform EMS of incidents in a more efficient way.
- Develop better cybersecurity tools for exchange of clinical data among different and mobile endpoints in emergency situations.
- Improve drones based on realistic EMS scenarios
- Develop more robust communications in case of disruption of 5G and other means of transmission.
- Develop protocols of rapid response among EMS and patient's associations for certain diseases.
- Use new technologies to achieve a better engagement of volunteers in the management of medical emergencies.
- Research on EMS resilience at EU level for wide area and prolonged emergency events (e.g. pandemic) that enable a more rapid and comparable response, mitigation and recovery from significant disruptions.

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and become a main driver of Innovation in the field of Emergency Medical Services and join the iProcureSecurity EMS Network.

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