

NO - FEAR

Network Of practitioners For
Emergency medical systems
and critical care



**NO-FEAR's summary of main
findings, gaps and lessons
learned from M1 to M6**

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1. Executive Summary

NO-FEAR project will bring together a pan-European network of practitioners, decision and policy makers in the medical and security fields. They will collaborate to achieve a common understanding of needs, as well as - in collaboration with academia and industries – increase the EU innovation potential that could better fill the operational gaps and recommend areas for future innovations.

This document is part of the new reporting strategy of the project coupling progress deliverable (namely, the first progress report of NO-FEAR project that has been submitted to the Commission the 29th of December 2018) with a more agile report.

It includes the findings collected during the first 6 months of the project regarding:

- Research and innovation monitor with a view to recommending uptake;
- Common requirements to fill in capability gaps,
- Indicate priorities as regards standardization.

The structure of the report is a breakdown of the results of the core three pillars, work packages 3,4,5 plus work package 1 that operates as horizontal stream trough the whole project. WP 6 has not included in the present document because the main activity delivered in the period was the Foresight Exercise to which is devoted an entire section of D6.1.

The concept of the document is not to substitute official deliverables but to ease a full overview of the project progresses in order to be accountable towards EU authorities, policy-makers and the whole NO-FEAR building network of practitioners, academia and suppliers.

Moreover, it provides an iterative format to ensure continuity in the formatting and the reporting approach on a sixth months basis.

2. Table of contents

1. Executive Summary	3
2. Table of contents	4
3. Abbreviations	4
4. Summary of the findings in project's lines of action from M1 to M6	5
Work Package 1 – Ethics Requirements, Human, Social and Legal Issues	5
Work Package 3 - Acute Care of the Patient	6
Work Package 4 - Acute Care Operations in the Security-Related Incidents	8
The gaps below were raised by the members of the Network of Practitioners, and we intend to test and validate them with other practitioners in the WP activities.	9
Work Package 5 - Education and Training of Personnel and Volunteers	10

3. Abbreviations

CA = Consortium Agreement
DoA = Description of the Action
EC = European Commission
EMS = Emergency Medical Service
GA = General Assembly
PC = Project Coordinator
PM = Project Manager
PO = Project Officer
NMB = NO-FEAR Management Board
WP = Work Package

4. Summary of the findings in project's lines of action from M1 to M6

Work Package 1 – Ethics Requirements, Human, Social and Legal Issues

Research and Innovation Monitoring

As agreed during the Kick-Off meeting in Novara, Italy, WP1 members started a desktop research on current issues and debates concerning the “duty to help” in emergencies. Until the end of M6:

- ALU reviewed 30 scientific documents addressing the different legal regimes in a) the UK/US and b) continental Europe regarding a legal “duty to rescue”;
- MDA identified and classified lessons learned and formal operational procedures from recent security related incidents in London, Paris, Nice, Las-Vegas and Israel.
- MDA analysed the gathered data using a bottom-up approach to identify Commonalities in the lessons learned and actual data from the events mentioned above were divided to subgroups that correlate to the stage and characteristics of the event (plus pre/post event). This data is meant to serve the work of WP4 and WP1;
- NorCross collected reports in which the duty to help and self-protection concerns of professional helpers did conflict with each other. Particularly such reports were collected in which cultural beliefs affected these conflicts;
- UIBK got an overview on relevant guidelines, research and (best) practice and relevant experiences regarding psychosocial aspects in security related incidents;
- UIBK compiled findings from these areas in a report that develops and evolves in an on-going form;
- Where ethical aspects of research and innovation monitoring are concerned, UCSC has performed ethics review of deliverables from the selected deliverables list available at the time of writing. A Protection of Personal Data Checklist was administered with the scope of checking on compliance with POPD requirements set forth in the Grant Agreement conditional to ethics clearance. Follow-up is still under way for those cases, which required recommendations.

Areas of Main R&D Gaps

Several gaps were identified in the analysis of the lesson learned of the London, Paris, Nice, Las-Vegas and Israel security incidents:

- Managing information arriving from the scene to the general population/ media.
- The "safety first?" dilemma – should the responders enter an unsafe scene (perpetrator not neutralized) to treat the casualties or should they wait until the scene is declared safe.
- Mental/emotional resilience programs to the effected responders and as a routine practice during the preparedness phase.
- Treating the perpetrator – health personnel are expected to prioritize the casualties according to their medical urgency. Does this principle apply to a situation in which the means are limited (not enough teams/equipment) and one of the casualties is the perpetrator.
- Situations in which several family members are injured but not always evacuated to the same hospital – may also lead to lack of data regarding missing patients.

- A need for psychological intervention to the victims/ relatives and bystanders.
- Widespread uncertainty whether and when to start help
 - special uncertainty among professionals about legal obligations (when they have to start help in their leisure)
- Missing clarification of roles and responsibilities of volunteers, including the perspective of the affected population into disaster plans
- Caring for and training of emergency first responders (especially with regard to security issues)
- Needs and gaps identified after the 2005 London subway bombings: a 'lack of consideration of individuals caught up in major or catastrophic incidents', the focus being on incidents rather than individuals, process rather than people. It was suggested that plans should be recast from the perspective of the people involved rather than the emergency services.

Common Requirements to Fill Capability Gaps

- The knowledge of best practices and standards relevant for ethics is one of the most efficient instruments. It is important to understand that correct compliance with ethics standards and best practices is not only necessary to be in line with obligations, but is also a "good investment" in terms of market because of a greater sensitivity of stakeholders to these issues.
- A need for a better understanding of the difference between research activities (the research and its outcomes in their essence) and research environment (research policies and organization) where ethics is concerned (both need to be in line with given "parameters" and inter-relate)

Indicate Priorities with Regards to Standardization

- Not processed from M1 to M6. A full and effective integration of ethics issues in standardization policies would contribute to enhance the level of perception and good results in this context: a way of putting ethics and research on one only track instead of on two parallel roads which at given intersections have the chance of converging (ethics by design).

Best Practices and Lessons Learned

- The state is too early to identify best practices emerging in this project-specific context. Lessons learned are shaping up. As said, we are learning that integration of ethics in research practices is the best way forwards. A lesson learned is that where ethics are concerned, it is important to overcome the approach of many pieces of the puzzle being put together but, instead, to be at the starting line all together hand in hand.

Work Package 3 - Acute Care of the Patient

In the Acute Care of the patient pillar, four macro steps have been identified (Operation/On site, Operation/Transport, Operation/In-Hospital, Governance) and 26 steps of the emergency were

recognized. WP3 has set the Emergency Process Framework, a living document where gaps, steps and professionals are connected.

Research and Innovation Monitoring:

For few of the gaps identified there are solutions that can cover, even partially, these gaps. This suggested that all the practitioners and policy makers do not know these solutions. The innovative solutions that can cover the gaps are identified as Quick Wins:

- **Stop the bleed**
This is a recognized and standardized training method on basic techniques of bleeding control that can be taught to all stakeholders: doctors, nurses, paramedics, volunteers and bystanders. The course is an initiative of the American College of Surgeons and the Hartford Consensus and it is already present in some of the European countries.
- **Pre-printed disposable gloves on which patients' parameters can be written**
These gloves are like disposable ones that are used in the pre-hospital and hospital settings; in addition they have icons printed, suggesting the parameters that should be written on. The parameters are: Glasgow Coma Scale, Heart Rate, Blood Pressure, Respiratory rate, SpO₂, Body Temperature and the drugs administrated.
- **Serious game on hospital staff reaction after a CBRN event**
The serious game is developed and used by AP-HP in France. It provides a fast and reliable retraining to the hospital staff that will deal with the CBRN patients. Hospital procedures, as the Hospital Disaster Plan, can be added in the serious game.
- **Organizational software for hospital CBRN preparedness**
The organizational software developed by AP-HP is designed for hospital decision makers that deal with the preparedness to CBRN events. It is adaptable to each hospital size and structure and it provides an organizational analysis of the Hospital Disaster Plan.

In the first six months seven EU suppliers were contacted (*sedidodici, comftech, ascom, ambu, neuronguard, BD, radio6ense*) because their tools fit with the WP3 objectives while one supplier was suggested to WP5.

Areas Of Main R&D Gaps

The research conducted by the WP3 in the first six months of the project identified three areas of main R&D gaps:

- Communication and data exchange between EMS and hospital.
- Adapting or develop tools for diagnosis and treatment that can fit in ambulances.
- Tools that can be used by ambulance and hospital staff during a CBRN event.

These areas will be further explored by identification of new gaps and possible solutions.

Common Requirements to Fill Capability Gaps

The analysis of the gaps in the Emergency Process Framework suggested two main common requirements to fill capability gaps:

- Interoperability of tools, especially regarding data exchange
This issue is utmost present in EMS-hospital information handover; frequently ambulances and hospitals use different software for collecting patients' data and this can lead to an impossibility to transfer patients' information.
- Individual resistance to technological innovations
Innovative solutions should be known, adopted and used by all the staff involved in the emergency. In literature is well documented¹ the possibility that individual resistances can represent a real barrier for the implementation and the usage of the solution(s).

Indicate Priorities with Regards to Standardization

WP3 identified two main issues that need standardization as follows:

- Possibility to carry and use blood and blood products in the pre-hospital setting.
- Clear and shared definition of the staff involved in the emergencies that can be applied to all the emergency management systems that are present in Europe.

Best Practices and Lessons Learned

The lesson learned was identified thanks to the retrospective review made by Goolsby et al.². It suggests that bleeding-control supplies should be available in public spaces, because of their demonstrated benefit, low cost and a long shelf life. Without the appropriate knowledge the solutions identified are useless, for this reason WP3 indicates the adoption of the Stop The Bleed course as a best practice.

Work Package 4 - Acute Care Operations in the Security-Related Incidents

Research and Innovation Monitoring:

- H2020 Projects under review with initial contact made for collaboration:
 - IN-PREP (<https://www.in-prep.eu/>)- primarily focuses on the Preparedness stage of disaster response.
 - INGENIOUS (new project – no website as yet) - a healthcare project in the disaster response arena.
- New technologies in simulation training for security and preparedness (links with WP5).
- Technologies looking into cross-border networking and communication (command centers, apps etc. For example: <http://www.havelsan.com.tr/> Havelsvan in Turkey)

¹ Safi, S., Thiessen, T., & Schmailzl, K. J. (2018). Acceptance and Resistance of New Digital Technologies in Medicine: Qualitative Study. *JMIR research protocols*, 7(12).

² Goolsby, C., Strauss-Riggs, K., Rozenfeld, M., Charlton, N., Goralnick, E., Peleg, K., ... & Hurst, N. (2019). Equipping public spaces to facilitate rapid point-of-injury hemorrhage control after mass casualty. *American journal of public health*, 109(2), 236-241.

- Shared knowledge on existing logistics and transportation across agencies and countries. In particular: equipment, communications devices and logistical planning/dispatching in relation to first responder vehicles (www.beia.ro).
- There are currently a few numbers of project on scene security going on with the European Commission. The main topics these projects are dealing with is CBRNE and bioagents. There are also a couple of projects for security and preparedness and situational awareness systems.
- On specifics like “stabbing” and “run-over” incidents there are no ongoing research within the EC, but there is a closed research that investigated in protective gear (PPE).
- There are virtual trainings for emergency first responders that seek to improve the acquisition of emotional management, analytical thinking, problem solving and decision making skills.

Areas of Main R&D Gaps:

The gaps below were raised by the members of the Network of Practitioners, and we intend to test and validate them with other practitioners in the WP activities.

- Cross-agency communication Tools (Police, Fire Service, Ambulance, NGO's etc.)
- Communications Infrastructure during crisis events:
 - Large scale e.g. earthquakes in underdeveloped areas.
 - Cyber attacks.
 - Need for direct phone lines between the fire services and EMS.
- EMS personnel working in an "active" scene, where the threat still exist
- PPE for EMS
- The "safety first?" dilemma –should the responders enter an unsafe scene (perpetrator not neutralized) to treat the casualties or should they wait until the scene is declared safe.
- Communication and identification means for responding organizations, and a collaboration between the organization in a security related incident.
- Communication and information sharing between EMS and receiving hospitals
- Psychosocial support programs for effected responders.

Common Requirements to fill capability Gaps

Not processed from M1 to M6.

Indicate Priorities with Regards to Standardization

Not processed from M1 to M6.

Best Practices and Lessons Learned

We found that there are several topics that came up repeatedly in the incidents we collected, including:

- EMS safety

- First ambulance on scene in some incidents within 2 minutes (before the perpetrator is stopped).
- An increased police presence at the hospitals to ensure security and safety.
- Safety procedures are a major concern.
- The staff working on the field needs the use PPE (protective vests and helmets).
- Communications between responding organizations, and between them to the receiving hospitals:
 - Assistance from other services in coping with the over burden.
 - Common language is key for a successful operation.
 - Identification of commanders of the different organizations is crucial.
 - Managers in charge of the incident should be easily identified by means of vests and helmets in different color. They need to be coordinated with the managers from other security agencies.
 - Many casualties auto evacuated to the nearest hospitals.
 - Communication should be established before transport to avoid that many casualties go to the nearest hospital, regardless the nature of injuries.
 - It was very difficult for the hospital to understand the situation and receive reliable information.
- Mental distress:
 - 4 months of constant incidents had an emotional impact on the responders.
 - Impact on health providers was important. Nurses left the emergency department.
 - The numbers of broken families and the emotionally drained friends all looking for answers took significant time to deal with appropriately.

These finding correlate with the lessons learned that were raised in the WP meeting during the foresight event.

Work Package 5 - Education and Training of Personnel and Volunteers

Research and Innovation Monitoring:

An internal research was conducted to understand if WP5 contributors and the overall NO-FEAR consortium are already using innovative solutions for the training and education of personnel and volunteers. Four solutions were identified as innovative:

- ISEE Hospital
 - ISEE Hospital simulation software is specially designed for the training of disaster response in hospitals. ISEE concentrates mainly on the training and education of logistics and triage during mass casualty events and in security related incidents. In addition, ISEE Hospital can be used to test new or changed logistic processes (such as evacuation procedures).
 - The ISEE simulator has a flexible structure allowing adjustments in departments, personnel, equipment and patients to be easily achieved. In the scenario module, you can easily build your own scenarios based on departments, personnel, materials and patients. Scenarios can be used both individual and multidisciplinary.
- XVR

The XVR is virtual reality simulation software to train operational and tactical level emergency responders. XVR provides the trainee with an interactive and immersive 3D view of the incident scenario. The scenario is completely adaptable to different local situation. XVR is a powerful tool to help trainees understand procedures by experience, acquire practical knowledge in a relatively short timeframe, practice decision making skills and have them experience situations that rarely occur in real life while in a safe environment.

- DSS
The Disaster Simulation Suite (DSS) is a web-based, multi-dimensional tool, for planning, implementation and evaluating a drill, performing multi-user real time data collection and showing the results in real time. One of the main advantages of the system is that it does not need to be installed but it's always available on the Internet, and it is accessible from a wide variety of devices including smartphones and tablets. The DSS allows the quantitative and qualitative evaluation of full-scale exercises. The advantage of the suite is that it allows the creation of events realistic and subsequent collection, aggregation and analysis of performance indicators in dynamic environments and extensive as major emergencies.
- High-fidelity mannequins
New simulators set a global standard for medical human patient simulation offering an array of physiological features capable of simulating lifelike cases in nearly all clinical settings, including prehospital, ED, OR, ICU, PACU, and general nursing. New High-fidelity mannequins allow real monitoring and medical care using native equipment such as real 12-Lead ECG monitors, capnometers, oximeters, BP cuffs, defibrillators, and mechanical ventilators just like a real patient. No adapters, adjuncts, or special configuration required. Tetherless and wireless design allows for point-of-injury care, transport, and patient handoff training.

Furthermore, a systematic literature review was conducted on the use of **Serious Games** in emergency and disaster management. There have been quite a large number of games developed for emergency management purposes (113), targeting both professionals and non-professionals, with a slight tilt towards professionals (57% of target audience). The United States and European countries have been on the forefront of game development, with minimal contributions from Southeast Asian countries. Serious games are mainly focused on providing training on emergency response operations for professionals, and emergency preparedness and awareness for the community. The field continues to grow rapidly, but unfortunately, there are difficulties in finding information about serious game solutions. In addition, many of the games developed are not validated, which undermines their usefulness and limits their uptake by institutions and the public alike. Game developers and research institutions interested in serious games should be aware of these challenges and make considerable efforts to counter them in order to succeed in a very promising field.

Areas of Main R&D Gaps:

- Scattered research done in different European countries focused on the willingness and the degree of education and training in disaster management for nurses, doctors and ambulance personnel (including volunteers) reveals that:

- There is a high willingness to respond in disasters including CBRN, “terror incidents”, infectious diseases outbreaks (ex. Ebola).
- All responders indicate a serious gap in their knowledge on how to respond as result of a lack in education and training (basic as well as advanced disaster management).
- There exist large differences in training methodology amongst different responders (ex. military doctors versus civilian doctors, paediatricians, etc...)
- After the terror incidents in Europe several local and regional educational initiatives were undertaken by medical and nursing schools, professional and scientific societies (doctors, nurses, EMS personnel) and other stakeholder associations but no standardised or uniform program (including safety on scene, CBRN procedures, treatment of gunshot and blast injuries) were systematically developed.
- The availability of new (innovative) technologies made that within the above-mentioned initiatives Serious Games, Virtual Reality, Augmented Reality and Computer Simulation are widely introduced but there is no proof of validation of these technologies as a trainings tool.
- Even though different types of simulation-based methodologies are currently used, little is known about how to evaluate the performance of the teams involved in drills and exercises.

Common Requirements to Fill Capability Gaps

In order to fill capability gaps in the areas mentioned above, the following actions have been identified:

- Development of training curricula for nurses, doctors, first responders and volunteers that can be adapted to needs of the learners.
- Integration of different training curricula (ex TCCC in courses for civilian responders)
- Validation of Serious Games, Virtual Reality, Augmented Reality and Computer Simulation programs as training tools.
- Definition of performance indicators for all types of exercises.

Indicate Priorities with Regards to Standardization

As stated in the WHO Simulation Exercise Manual³ is necessary to harmonize the definitions of the following types of exercises: Table-Top Exercise, Drill, Functional Exercise and Full/Field Scale Exercise.

It is also necessary to standardize the training curricula among all the different professionals and volunteers.

This should be the first steps for the harmonization of the jargon in education and training for this project.

Best Practices and Lessons Learned

³ World Health Organization. (2017). *WHO simulation exercise manual: a practical guide and tool for planning, conducting and evaluating simulation exercises for outbreaks and public health emergency preparedness and response* (No. WHO/WHE/CPI/2017.10). World Health Organization.

WP5 identified four Best Practices as follows:

- Include disaster medicine principles in the standard undergraduate curriculum of the medical schools and nursing schools, and in the post-graduate residency programs for medical doctors and nurses.
- Perform at least one exercise in each hospital and prehospital system using a validated training tool with a standardized evaluation method. This should be done together with fire-brigades, police and other key stakeholders. Standardized evaluation, debriefing and identification of the lessons identified should follow.
- Implement Just-in-Time training in the disaster response procedures. The concept of just-in-time training is to provide training at the time it is most needed. In emergency management, just-in-time training incorporates information specific to the type and magnitude of the incident. Just-in-time training for first responders immediately after deployment to issue assignments and equipment necessary for their role in the incident. This technique could be refresh responders to standard operating procedures that will be utilized during the response, technical guidance to operate equipment or other aspects specific to the first-responders team. All modalities of education can be incorporated to include live didactic instruction, job specific hand-outs with reminder action cards, video, high-fidelity simulation, table-top or other means using individual smartphones, lap tops or shared if time or other resources limited.
- Disseminate and adopt the WHO simulation exercise manual, a practical guide and tool for planning, conducting and evaluating simulation exercises.¹

WP5 identified three Lessons Learned:

- In selected trainings, virtual reality and live simulation can be interchangeable because they have similar impact on the learners.
- The use of technology to reduce the cost of the training and to replicate learning modules in different settings with different stakeholders.
Medical students should be used as mock victims. Because of their background they are prepared to simulate different type of patients, knowing how the patient should react.

The Consortium

