European Commission Recommended Procedures for First Responders in a Terrorist Attack Involving Ionising Radiation

Mariusz Grasza
National Police Headquarters, Warsaw, Poland

Wiktor Wojtas
European Commission, Directorate-General Migration and Home Affairs, Brussels, Belgium

Grzegorz Bugaj
City Headquarters of the State Fire Service, Warsaw, Poland

Krzysztof Wilk
108th Military Hospital, Ełk, Poland

Michał Bijak
University of Łódź, Poland

Aleksandra Kaczmarek
War Studies University in Warsaw, Poland

Abstract. *The use of any of the four types of CBRN weapons in various acts of terrorism could lead to undermining economic stability, public security and the integrity of the European Union. Recent attacks in Europe have shown once again that home-made explosives and firearms remain the weapon of choice for terrorists. Despite the fact that, so far, there has not been any terrorist attack using a dirty bomb, one which combines radioactive material with conventional explosives, according to the European Parliament briefing terrorists from ISIL/Da'esh in their future attacks may use non-conventional weapons, and the most probable of these is the use of an improvised explosive device containing radioactive materials. This type of attack could potentially lead to severe consequences for large number of people. Such consequences can be significantly reduced thanks to properly prepared and exercised emergency response procedures for first responders. The aim of this article is to present first response procedures in the case of terrorist incidents with ionising radiation. These procedures are based on a specially prepared TMT Handbook which contains the collective views of an international group of experts in the radiological and nuclear field. These procedures are also recommended and presented by the European Commission during the training courses it organises in cooperation with experts from Member States. Furthermore, these procedures have been modified and adapted according to our practical experience and the legislative procedures currently in force in Poland.*

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Introduction

Recent attacks in Paris and Brussels have shown once again that home-made explosives and firearms remain the weapons of choice for terrorists. Nevertheless, reports about the usage of chemical weapons during the fight between ISIS and local rebels in Syria, about the ISIS cell in Morocco planning to conduct a biological attack as well as about surveillance of a senior Belgian nuclear official by terrorists

linked to the Paris and Brussels attacks, suggest that terrorists are interested in non-conventional weapons and facilities possessing CBRN materials and agents. The risk of perpetrating an attack with the usage of one of the above-mentioned weapons of mass destruction has evoked an urgent need for undertaking numerous actions to both prevent and combat such forms of terrorism. The use of any of the four types of CBRN weapons in various acts of terrorism could lead to undermining economic stability, public security and the integrity of the European Union. One of the most probable scenarios of a CBRN attack includes the release of materials containing ionising radiation.

Even though so far there has not been any terrorist attack with the usage of a dirty bomb, which combines radioactive material with conventional explosives, the Incident and Trafficking Database of the International Atomic Energy Agency (IAEA) reports — in the period 1993–2014 — almost 450 cases of an unauthorised possession of radioactive or nuclear materials and related criminal activities (IAEA 2014). According to the May 2016 briefing of the European Parliament[1] the terrorists from ISIL/Da'esh may use in their future attacks non-conventional weapons and the most probable is the use of improvised explosive device containing chemical or radioactive materials. This type of attack could potentially lead to severe consequences for large number of people, including radiation injuries and death. Such consequences can be significantly reduced thanks to properly prepared and exercised emergency response procedures for first responders. The aim of our article is to present first response procedures in the case of terrorist incidents with ionising radiation. These procedures are based on the TMT Handbook[2] which contains the collective views of an international group of experts in the radiological and nuclear field. These procedures are also recommended and presented by the European Commission during the training courses it organises in cooperation with experts from Member States (*Training course in the triage, monitoring and treatment of Mass Casualties resulting from a Terrorist Attack involving Ionising Radiation*). Furthermore, these procedures have been modified and adapted according to our practical experience and the legislative procedures currently in force in Poland.

Possible Types of Attack

Radioactive materials can be used by terrorist groups to perpetrate various types of attacks. Terrorists can use a variety of active and passive methods to disseminate or expose people to radioactive material. Some scenarios are — for various reasons such as personal safety or ease of access — more likely to be chosen by terrorists.

[1] Immenkamp B, ISIL/Da'esh and 'non-conventional'weapons of terror. European Parliamentary Research Service, PE 581.996, 2016.

[2] del Rosario P.M, Carr Z, Rojas-Palma C, van der Meer K, Smith K, Rahola T, Muikku M, Liland A, Jaworska A, Jerstad A, A new handbook on triage, monitoring and treatment of people following malevolent use of radiation. *Health Physics,* 2010, 98(6), pp. 898–902. *See also:* Rojas-Palma C, Liland A, Jerstad A, Etherington G, del Rosario Pérez M, Smith K, TMT Handbook. Lobo Media AS, Norway, 2009.

These include the use of a Radiological Exposure Device (RED) or a Radiological Dispersal Device (RDD).[3]

A Radiological Exposure Device or Radiological Emitting Device (RED) is a terrorist device composed of a hidden radioactive source. An RED is a radiological weapon obtained by concealing a strong, normally gamma emitting, source with an intention to expose people to significant doses of ionising radiation without their knowledge. This type of device is mostly constructed from partially or fully unshielded radioactive material concealed in a densely populated place in order to deliberately expose large numbers of unaware people to high levels of radiation. The covert character of exposure allows continuing the RED attack until the radioactive source is discovered. Casualties have injuries of variable severity. People exposed to high levels of radiation may even die due to acute radiation syndrome (ARS). In addition to injuries, victims can also develop radiation burns. Long-term health effects such as various forms of cancer may appear several years after the exposure. The number of injured people depends on the exposure duration and population density. Victims of a terrorist attack with the usage of a RED suffer from exposure-related wounds and injuries but are not usually contaminated. The effects of a RED depend on three factors: i) the type and quantity of radioactive material used; ii) the exposure time; iii) parts of the body which were exposed to radiation.[4]

A Radiological Dispersal Device (RDD) is a weapon the main objective of which is to spread radioactive material in order to contaminate a large area and/or a significant number of people. The RDD is created by coupling conventional explosive materials and radioactive sources. Such a type of weapon is commonly called a "dirty bomb". A dirty bomb is not a nuclear weapon. Its construction is much simpler and does not require highly skilled individuals to manufacture it. It is a device designed to spread radioactive material for the purpose of terrorism. There are two main effects of the use of this weapon: firstly — mechanical, including air blast, fragmentation as well as damage to buildings and infrastructures; secondly — radiological which includes external exposition to radioactive material fragments and cloud, internal contamination by inhalation of smoke, wound contamination or ingestion of contaminated material. The main factors which affect the extent of contamination are: the power of the explosive used, activity and proportion (chemical and physical form of the radioisotope) of the radioactive material, distribution and density of population as well as weather parameters (temperature, time of day, relative humidity, wind conditions, precipitation). The use of an RDD may cause various types of injuries. The initial explosion results in a blast which may cause mechanical injuries and burns or even death of people in the immediate vicinity of the explosion. Dispersed radioactive material will contaminate survivors and may cause typical radiological injuries such as radiation burns,

[3] Mettler Jr F.A, Voelz G.L, Major radiation exposure — what to expect and how to respond. *New England Journal of Medicine,* 2002, 346 (20), pp. 1554–1561.

[4] Tofani A, Assessing the radiological impact of radiation exposure devices. *Risk Analysis,* 2011, 31(4), pp. 566–577. *See also*: Tofani A, Bartolozzi M, Ranking nuclear and radiological terrorism scenarios: the Italian case. *Risk Analysis,* 2008, 28 (5), pp. 1431–1444.

ARS as well as long-term health effects, above all, an increased risk of cancer. Some of the victims will suffer from both mechanical and radiological injuries.[5] Another long term effect of an RDD, the one terrorist always strive for, is the psychological impact on the population and contamination of buildings and ground of which reinstatement to normality will cause huge economic costs.[6] Recent terrorist attack at Brussels airport — even though perpetrated with the use of home-made explosives — proved how disruptive for an economy such attacks can be. In this case, the airport was closed for 12 days and regaining full capacity will take months. In case of a dirty bomb attack, the most likely recovery scenario would include complete demolition of the contaminated part of the airport and its subsequent rebuilding. The scale of disruption and costs related to it would be significantly higher.[7]

Organization of Immediate Action in Case of Attack with Ionising Radiation

According to our national rules, the first entities on the action scene is police. Which:

- verifies the event taking into account its safety,
- informs the command officer about the incident,
- based on the available information, establishes an initial hazardous zone,
- defines a preliminary safe place for evacuation,
- conducts emergency evacuation with the support of other ordered services taking into account available resources, possible threat, i.e. according to the rule of minimizing own losses,
- warns and alerts and informs about the rules of behaviour.

Activities for identifying potential threat are made by the State Fire Brigade upon consultation with the police commander. If the radiation is identified, the State Fire Brigade will provide a suggested safe zone to the commanding officer of the Police, and further recommendations on the organization of the action.

Rescue and medical operations are performed in a safe zone within the framework of the State Medical Rescue System with the support of the Medical Team of the Bureau of Counter-terrorist Operations, National Police Headquarters and military unit "GROM".

Activities in the danger zone are carried out by specially prepared entities with the consent of the police commander.

[5] Bushberg J.T, Kroger L.A, Hartman M.B, Leidholdt E.M,. Miller K.L Jr, Derlet R, Wraa C, Nuclear/radiological terrorism: emergency department management of radiation casualties. *Journal of Emergency Medicine* 2007, 32(1), pp. 71–85. *See also:* Leikin J.B, McFee R.B, Walter F.G, Edsall K, A primer for nuclear terrorism. *Disease-a-Month* 2003, 49(8), pp. 485–516.

[6] Kuna P, Hon Z, Patodka J, How serious is threat of radiological terrorism? *Acta Medica (Hradec Kralove),* 2009, 52 (3), pp. 85–89.

[7] Zimmerman P, Loeb C, Dirty Bombs: The Threat Revisited. *Defense horizons,* 2004, 38, pp. 1–11.

Response to Use of Ionising Radiation

The first responders' actions in the initial stages of response at the attack scene should be implemented automatically without developing a specific plan related to the incident. The main assumptions of the Action Plan should be based on the following points:

1) Preserve and protect life;
2) Reduce the impact of the ionising radiation;
3) Carry out an investigation;
4) Recover the scene of the action to its previous state (del Rosario et al. 2010; Rojas-Palma et al. 2009).[8]

Dispersion of radiological material and possible contamination of first responders is a significant factor which has to be taken into account during the response. All rescue actions at the scene must be performed only by first responders wearing relevant Personal Protective Equipment (PPE). Protective clothes must protect against possible transfer of radioactive materials into the body through the skin, eye, mouth and nose. Female responders who may be pregnant must be excluded from the operations.

The PPE of first responders entering the Red Zone should be composed of:

- Full face respirator
- Waterproof clothing (complete skin and hair must be covered) — a one-piece coverall with a hood is recommended;
- Waterproof gloves (must be abrasion resistant) — recommended minimum 1 nitrile gloves directly on hand and rubber gloves over these;
- Waterproof shoes or boots;
- Personal dosimeter (measuring instantaneous dose rate as well as cumulative dose, additionally it should have an alarm function.[9]

The typical PPE of first responders is presented in figure 1.

First responders must also take into consideration their own health and need to follow the safety procedures. The main rules are: a ban on touching/holding any suspected radioactive items as well as minimising the time spent within 10 metres of suspected radioactive materials. Additionally, first responders should not proceed into an area with an ambient dose rate of more than 1000 mSv/h. Operations in this area should only be performed by volunteers and be primarily focused on saving lives.

The operation at the attack scene requires multiple actions. Moreover, some of them should be performed simultaneously. Actions required include isolating the incident scene and defining the hazard areas, evacuation of injured persons and victims' triage, decontamination as well as medical treatment. Additionally, a Tactical Control Point (TCP) should be established outside the endangered area. A TCP is responsible for management of the incident. Located within the TCP should

[8] del Rosario P.M, Carr Z, Rojas-Palma C, van der Meer K, Smith K, Rahola T, Muikku M, Liland A, Jaworska A, Jerstad A, *op. cit. See also:* Rojas-Palma C, Liland A, Jerstad A, Etherington G, del Rosario Pérez M, Smith K, *op. cit.*

[9] *Ibidem.*

be the Tactical Incident Commander (TIC) who has overall responsibility for the local incident response.[10]

Figure 1. Typical first responders' PPE. Photo taken by Maj. K. Wilk during the "Training course in the triage, monitoring and treatment of Mass Casualties resulting from a Terrorist Attack involving Ionising Radiation" organised by the European Commission in Campus Vesta, Belgium

The first stage of an operation should be dedicated to confirmation of the presence of ionising radiation at the scene. It should start with measurement of the background radiation level. The normal background radiation level is in the range of 0.05 μSv/h — 10 μSv/h. Radiological contamination can be confirmed when the radiation level is > 100 μSv/h at 1 m above the ground. A medium level of radiation, 100 μSv/h — 1 mSv/h, and a high level, 1 mSv/h — 10 Sv/h, can

[10] *Ibidem.*

also be differentiated. If first responders only have equipment to measure gamma dose rate, units with equipment for alpha, beta and neutron dose rate monitoring should be brought in.[11]

After conformation of radiation, two major priority actions should be carried out at the same time:

1) definition and isolation of the major hazard area — Red Zone;
2) evacuation of people injured in the attack (Fig. 2). All actions in the Red Zone should be carried out by first responder groups composed of two persons each.

Figure. 2. This figure shows three different teams of the first responders which operate in the Red Zone. One of them has defined the Red Zone area and two teams are evacuating injured victims. Photo was taken by Maj. K. Wilk during the "Training course in the triage, monitoring and treatment of Mass Casualties resulting from a Terrorist Attack involving Ionising Radiation" organized by the European Commission in Campus Vesta, Belgium

Zones are established around the site of the incident and their major role is identification of the affected population, protection and control of both the public and members of the emergency services and facilitation of the operations of all services. The Red Zone is the danger area where extreme caution and safety measures

[11] Cuttler J, Commentary on the appropriate radiation level for evacuations. *Dose Response,* 2012,10, pp. 473–479.

are required. The Yellow Zone surrounds the Red Zone and is supposed to provide a safety environment for personnel along with serving as an area where members of the public are processed for clearance from the incident.

The Red Zone should be defined with a minimum radius in the range of 100–300 metres depending on the seriousness of the incident. If there is risk of a secondary explosion or there is a confirmed presence of a radioactive source with unknown activity, the Red Zone hazard area should be established with a minimum radius of 300 m. In cases where none of these types of dangerous materials have been identified, first responders should check whether the source is surrounded by smoke or fire. In that case the Red Zone should have a minimum radius of 100 m and additional groups of first responders should start the extinguishing procedure. Where these types of threats are not observed, first responders should re-measure background radiation level and confirm that it is higher than > 100 μSv/h. In cases where no additional hazards are identified, the Red Zone should be designated appropriate to the threat posed by the material and taking into consideration the topography and natural shielding. The minimum radius of the Red Zone area in this case should be 50 m. Moreover, the Red Zone should in any case cover the area where the dose rate exceeds 100 μSv/h.[12]

In the Red Zone area all activities should only be performed by first responders with full PPE. Additionally, an operation control point (OCP) should be created on the border of the Red Zone. Access to the Red Zone should be protected by physical barriers with well defined "gateways" and security personnel.

Besides the Red Zone, a Yellow Zone should be determined. Dose rates in this area should be below 100 μSv/h. Responders entering the Yellow Zone should also have protective equipment but it can be simpler than the PPE of the Red Zone first responders. This equipment should include:

- Simple respirators/dust masks;
- Hair cover (e.g. surgical cap);
- Nitrile gloves;
- Coveralls;
- Plastic shoe covers;
- A personal dosimeter.[13]

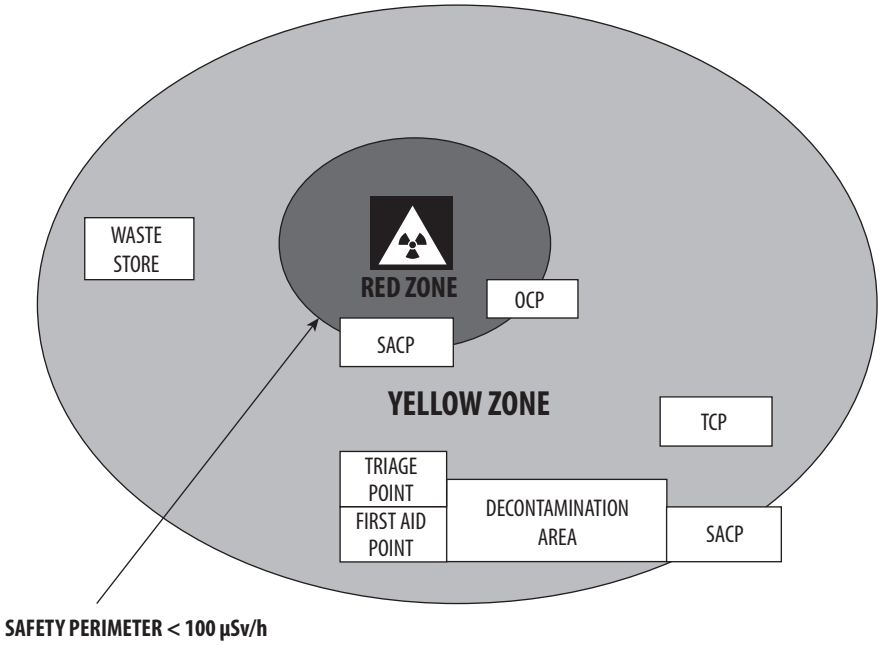
The tactical command point (TCP), decontamination points as well as first aid points should be organised in the Yellow Zone. All procedures with the exposed population, such as triage, first aid, decontamination and evacuation procedures should be performed in the Yellow Zone. The radius of this Zone should be defined according to the space required by all services to perform their duties.

Access to both the Red and the Yellow Zones should be controlled by secure access control points (SACP). Public Information correlated with the TCP should be available outside the Yellow Zone. Its main role is to support media briefings. A typical schematic diagram of the Zones according to TMT Handbook (del Rosario et al. 2010; Rojas-Palma et al. 2009) is presented in figure 3.

[12] del Rosario P.M, Carr Z, Rojas-Palma C, van der Meer K, Smith K, Rahola T, Muikku M, Liland A, Jaworska A, Jerstad A, *op. cit. See also:* Rojas-Palma C, Liland A, Jerstad A, Etherington G, del Rosario Pérez M, Smith K, *op. cit.*

[13] *Ibidem.*

Figure 3. Schematic diagram of the composition of typical Red and Yellow Zones. This schematic diagram was created according to information contained in the TMT Handbook (del Rosario et al. 2010; Rojas-Palma et al. 2009)



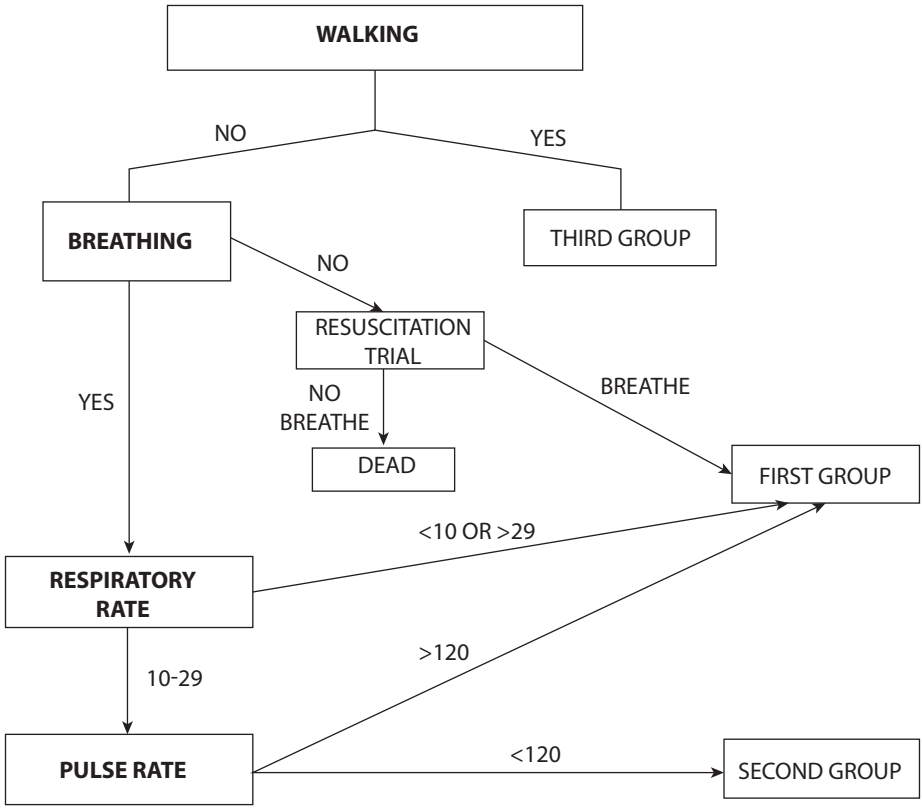
Simultaneously with the designation of the Zones, the other group/groups of adequately protected first responders should perform the evacuation of the injured at the scene. People whose evacuation can be rapid should be evacuated first. This means that the main criteria for evacuation selection should be time needed for this procedure. This selection procedure will reduce the exposure to radiation of others injured. Additionally, if it is possible, the injured who can walk should be instructed by first responders to leave the Red Zone independently. During the evacuation process the injured should be transferred to another group of responders in the SACP located in border of Red Zone. Subsequently, they should be moved to a triage point for triage. During triage, evacuated people should be divided in three groups. The first group should include injured in a critical condition where a direct risk of live can be observed. The second group should include people with serious injuries. The third group should include those slightly injured. A rapid triage schematic diagram is presented in figure 4.

After triage the injured should be subject to radiometric control and decontamination corresponding to their injuries. One of the solutions would be to transport the first group of injured to hospitals without decontamination. However, this depends on regulations in each country, for example in Poland all the injured must be decontaminated before they can be transported to the hospital.

The next stage of activities should include mass decontamination of people potentially contaminated as a result of the radiological material dispersion. This

procedure should be also performed in Yellow Zone area. Subsequently, first responders participating in rescue actions should undergo decontamination.

Figure 4. Brief schematic of the triage procedure which should be performed in the Yellow Zone after injured evacuation. This schematic diagram was created according to information contained in the TMT Handbook (del Rosario et al. 2010; Rojas-Palma et al. 2009)

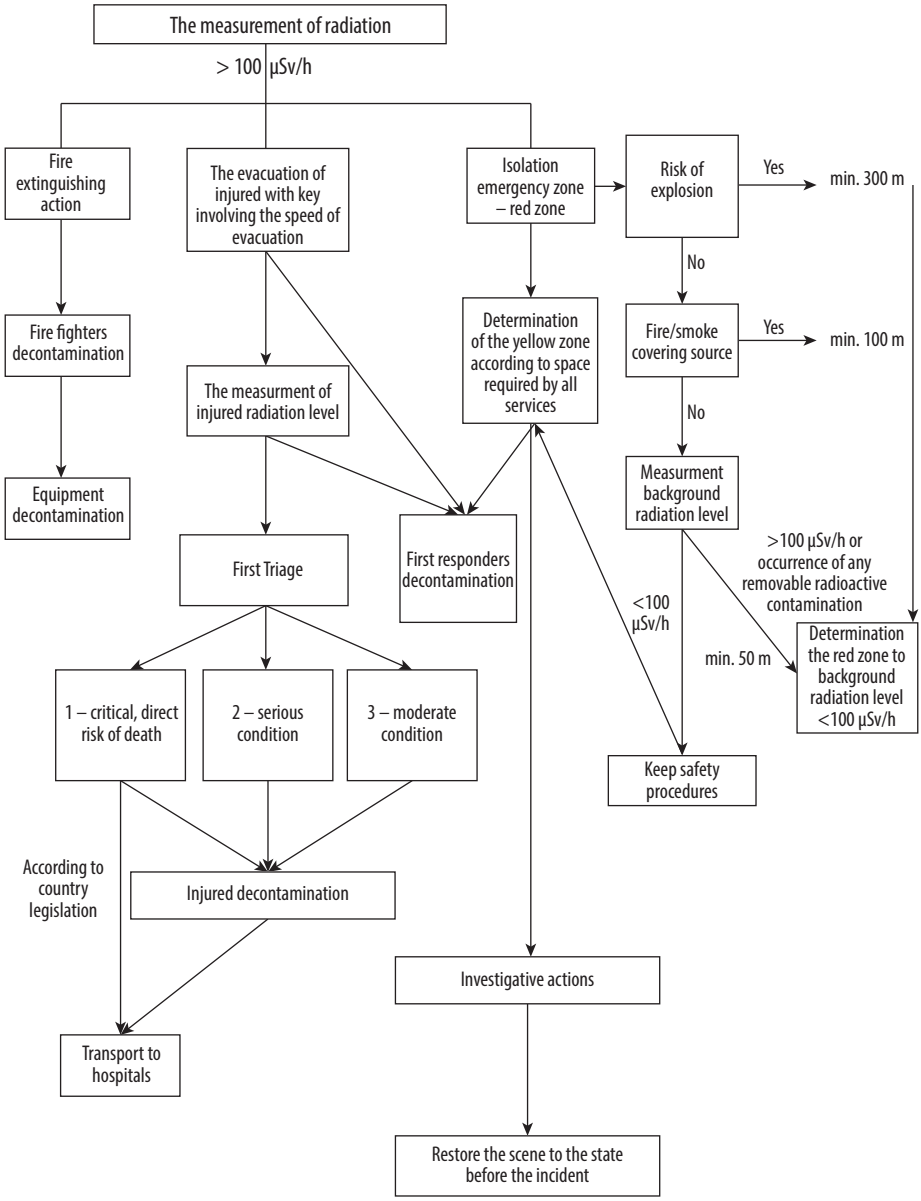


Once the rescue procedures are over, the next action should involve collection of material evidence by a group of properly protected forensic technicians. Once all procedural actions are over, the next stage in the activities should be an attempt to restore the scene to the state before the incident. This procedure is usually described in the framework of a crisis management plan and is performed by specialised units. In Poland, this type of action falls under the responsibility of the Radioactive Waste Management Plant (ZUOP) which is the only Polish institution responsible for securing, handling and disposing of radioactive wastes.

Procedures presented in this article should help in performing appropriate rescue operations in cases of a terrorist attack using ionising radiation. They are based on solutions recommended by the European Commission and trained during the "Training course in the triage, monitoring and treatment of Mass Casualties resulting from a Terrorist Attack involving Ionising Radiation" organised

by the Directorate-General for Migration and Home Affairs of the European Commission. Moreover, the above-mentioned procedures have been adapted by the Authors according to their professional experience and adjusted to the Polish institutional arrangements. The brief schematic diagram presented below (Fig. 5) describes the subsequent stages of the activities and should serve as a useful guidance for all first responders.

Figure 5. Schematic diagram presenting a brief proposition for response activities at the scene of terrorist attack involving ionising radiation



Additionally, it should be noted that the model presented in this article has been adopted to the Polish internal security system and had been implementing during the safeguarding of the World Youth Day in Cracow. The solution has been rated as very good, but we must be aware that it was implemented in a planned manner. If we would like to take a look at ad hoc to the CBRN hazards, the proper reaction time and action of proper prepared entities in the area may be extended. The ideal solution in the authors' assessment is to create a national CBRN organizational unit supporting the anti-terrorist system of Poland, which will be responsible for action in CBRN environment as well as for creation CBRN training curriculum and first responders procedure. The proposed organizational and staffing solution directly defines the national authority responsible for the CBRN-E security policy in Poland which will streamline processes of information flow, preparation, response of Poland for CBRN threats.

References

1. Bushberg J.T, Kroger L.A, Hartman M.B, Leidholdt E.M,, Miller K.L Jr, Derlet R, Wraa C, Nuclear/radiological terrorism: emergency department management of radiation casualties. *Journal of Emergency Medicine,* 2007, 32 (1).
2. Cuttler J. Commentary on the appropriate radiation level for evacuations. *Dose Response,* 2012, 10.
3. Immenkamp B, ISIL/Da'esh and 'non-conventional'weapons of terror. *European Parliamentary Research Service* PE 581.996, 2016.
4. International Atomic Energy Agency, Incidents of nuclear and other radioactive material out of regulatory control. Fact Sheet, 2015. *Electronic source:* https://www-ns.iaea.org/downloads/security/itdb-fact-sheet.pdf, *accessed*: 12.05.2016.
5. Kuna P, Hon Z, Patodka J, How serious is threat of radiological terrorism? *Acta Medica (Hradec Kralove)* 2009, 52 (3).
6. Leikin J.B, McFee R.B, Walter F.G, Edsall K, A primer for nuclear terrorism. *Disease-a-Month,* 2003, 49 (8).
7. Mettler F.A Jr, Voelz G.L, Major radiation exposure — what to expect and how to respond. *New England Journal of Medicine,* 2002, 346 (20).
8. Rojas-Palma C, Liland A, Jerstad A, Etherington G, del Rosario Pérez M, Smith K, TMT Handbook. Lobo Media AS, Norway, 2009.
9. del Rosario P.M, Carr Z, Rojas-Palma C, van der Meer K, Smith K, Rahola T, Muikku M, Liland A, Jaworska A, Jerstad A, A new handbook on triage, monitoring and treatment of people following malevolent use of radiation. *Health Physics,* 2010, 98 (6).
10. Tofani A, Assessing the radiological impact of radiation exposure devices. *Risk Analysis* 2011, 31 (4).
11. Tofani A, Bartolozzi M, Ranking nuclear and radiological terrorism scenarios: the Italian case. *Risk Analysis* 2008, 28 (5), pp. 1431–1444.
12. Zimmerman P, Loeb C, Dirty Bombs: The Threat Revisited. *Defense horizons* 2004, 38, pp. 1–11.

About the authors

***Mariusz Grasza**, Lieutenant. Master of Administration. Coordinator of CBRN threats in Bureau of Counter-terrorist Operations, National Police Headquarters. Expert in international CBRN security projects. Coordinator of CBRN training conducted under the Funds "Polish Aid".* Correspondence*: Bureau of Counter-terrorist Operations, National Police Headquarters, Pulawska 148/150, 02-624 Warsaw, Poland. E-mail: mariusz.grasza@policja.gov.pl*

***Wiktor Wojtas**, Policy Analyst in European Commission — DG Migration and Home Affairs, responsible for the overall coordination of the Commission's policy regarding the CBRN (chemical, biological, radiological, nuclear) terrorist threats.* Correspondence*: European Commission, Directorate-General Migration and Home Affairs, Rue du Luxembourg 46, Brussels, Belgium*

***Grzegorz Bugaj**, Lieutenant Colonel. Commander of Rescue and firefighting unit No. 6 in Warsaw. Coordinator of international action module CBRNDet "Mazowsze".* Correspondence*: City Headquarters of the State Fire Service, Rescue and firefighting unit No. 6, Marymoncka 89/91, 01-813 Warsaw, Poland*

***Krzysztof Wilk**, Major in the Polish army. Medical doctor, specialist anesthetist. Coordinator of the operating theatre in 108th Military Hospital in ELK. Specialist in Department of Anaesthesiology and Intensive Care.* Correspondence*: 108th Military Hospital, Kosciuszki 30, 19-305 Elk, Poland*

***Michał Bijak**, International expert in the field of CBRN. PhD degree in biological sciences with biochemistry as a specialty. Adjunct at the Department of General Biochemistry of the University of Łódź.* Correspondence*: Department of General Biochemistry, Faculty of Biology and Environmental Protection, University of Łódź, Pomorska 141/143, 90-236 Łódź, Poland*

***Aleksandra Kaczmarek**, PhD — she works at War Studies University in Warsaw, at Faculty of Management and Command. Her main fields of scientific interests are social sciences in particular psychological determinants of decision making process, especially under stressful conditions. Within scientific work she deals with phenomenon of occupational (organizational) stress.* Correspondence*: ul. E. Gierczak 7/51, 00-910 Warszawa, Poland. E-mail: a.kaczmarek@akademia.mil.pl*

***Streszczenie.** Użycie któregokolwiek ze środków CBRN podczas aktu terrorystycznego może prowadzić do zaburzenia stabilności ekonomicznej, bezpieczeństwa publicznego oraz wewnętrznej integralności Unii Europejskiej. Przeprowadzone ostatnio na terenie Europy ataki pokazały po raz kolejny, że wytwarzane własnoręcznie urządzenia wybuchowe są głównym wyborem terrorystów. Jak do tej pory nie odnotowano ataku z użyciem tzw. „brudnej bomby", która jest połączeniem materiałów radioaktywnych z konwencjonalnym ładunkiem wybuchowym. Jednak ostatnio wydany raport Parlamentu Europejskiego wskazuje, że tzw. Państwo Islamskie może w swoich kolejnych atakach na terenie Europy użyć broni nie konwencjonalne, a użycie brudnej bomby jest najbardziej prawdopodobne. Ten typ ataku może potencjalnie powodować liczne konsekwencje zdrowotne u dużej liczby osób. Skutki takiego ataku mogą być znacząco zredukowane dzięki odpowiednio przygotowanym procedurom ratowniczym dla służb przybywających na miejsce zdarzenia. Celem niniejszego artykułu jest przedstawienie specjalnie opracowanych procedur ratowniczych dla służb przybywających na miejsce zdarzenia terrorystycznego podczas, którego użyto materiałów emitujących promieniowanie jonizujące. Procedury te zostały oparte na projekcie TMT Handbook, który zestawił wiedzę międzynarodowej grupy ekspertów w zakresie zagrożeń radiologicznych i nuklearnych. Dodatkowo procedury te są rekomendowane i prezentowane przez Komisję Europejską podczas specjalnie przygotowanego programu szkoleniowego. Wszystkie te informacje i opracowania zostały zmodyfikowane i zaadaptowane zgodnie z doświadczeniem praktycznym i aspektami legislacyjnymi obowiązującymi w Polsce.*

Резюме. *Использование каких-либо химических, биологических, радиологических, ядерных материалов (CBRN) во время теракта может привести к нарушению экономической стабильности, общественной безопасности и внутренней целостности ЕС. В последнее время атаки, которые имели место на территории Европы, снова показали, что самостоятельно изготовленные взрывные устройства террористы используют чаще всего. До сих пор не зафиксировано атаки с использованием тн. „грязной бомбы", которая состоит из радиоактивных материалов с обычным взрывчатым веществом. Однако, опубликованный недавно рапорт Европейского парламента указывает, что тн. Исламское государство может в будущем, во время своих атак на территории Европы, использовать нетрадиционное оружие, а использование „грязной бомбы" является самым вероятным. Такой тип атаки может привести к последствиям связанным со здоровьем многих людей. Последствия такой атаки могут быть значительно сокращены, благодаря спасательным действиям служб, которые прибывают на место происшествия. Целью данной статьи является указание специальных действий для спасательных служб, которые прибывают на место теракта, во время которго были использованы материалы, способные эмитировать ионизирующее излучение. Источником этих действий является проект TMT Handbook, благодаря которому оформлены знания международной группы экспертов в области радиологических и нуклеарных угроз. Дополнительно, эти процедуры рекомендует и показывает Европейский парламент в специальной подготовительной программе обучения. Все эти данные были модифицированы и приспособлены согласно практическому опыту и законодательству, действующему в Польше.*

Translation: *Mirona Urbanik-Gołota (резюме)*