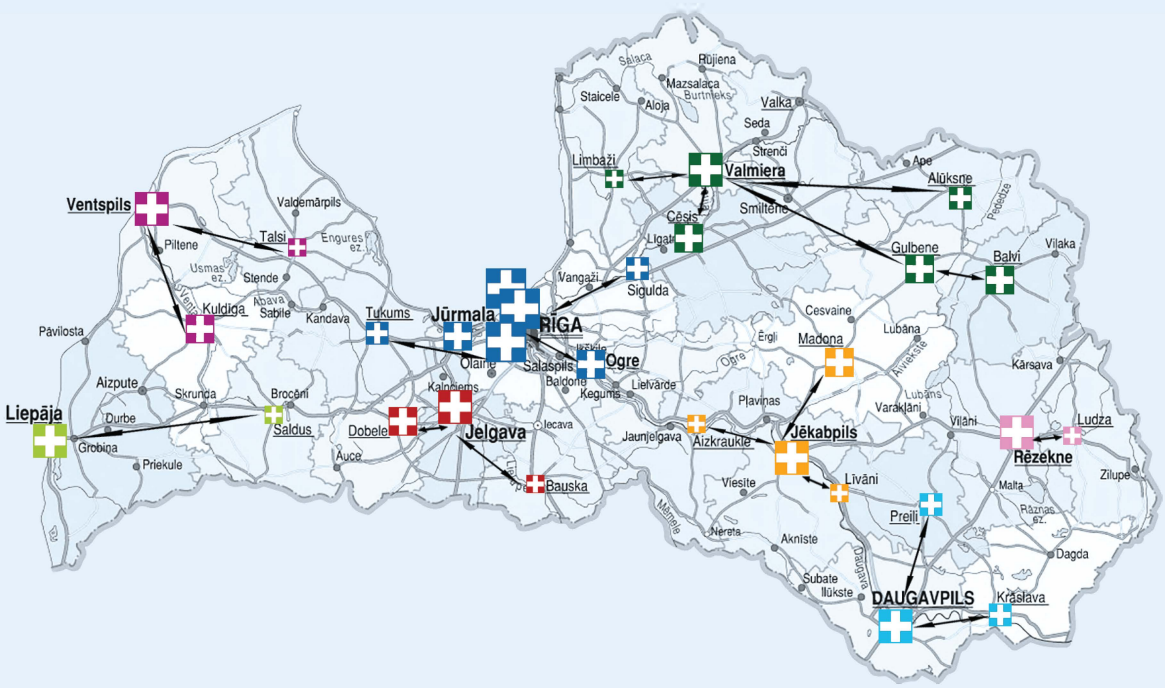
Romualds RAŽUKS, Barbara SEPODES

# READINESS OF LATVIAN HEALTH CARE INSTITUTIONS FOR DISASTER MANAGEMENT

*Monography*




Tartu MAY 2018

BALTIC DEFENCE COLLEGE

Romualds RAŽUKS, Barbara SEPODES

# READINESS OF LATVIAN HEALTH CARE INSTITUTIONS FOR DISASTER MANAGEMENT

*Monography*

Tartu MAY 2018

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**ABSTRACT**

**Objective:** In the last decades, the world assisted to a remarkable increase in the number of disasters of all kinds as well as people affected by it. Due to this, hospitals and physicians are more likely to face this scenario. This study, assess the preparedness of disaster management of Latvian healthcare facilities and medicals doctors.

**Methods:** The material was collected between October 2016 and February 2017. Was given to the hospital administrators or emergency managers of 21 Latvian hospitals and adapted survey of The Hospital Emergency Response Checklist (World Health Organization Regional Office for Europe, 2011), comprising four key components of the checklist: Command and Control; Triage; Continuity of Services and Human Resources. To 305 physicians of the same hospitals, was given an adapted survey of Djalali *et al.* (2004).

**Results:** Only a minority (19,05%) of Latvian healthcare facilities apply basic principles and strategies in respect of incident action plan, as well as training their staff to be Incident Command System (23,81%) , coordinate between neighbouring hospitals and health authorities (23,81%) and ensure availability of essential life lines (23,81%). Just a minority of Latvian physicians (13,77%) are aware of the current emergency management plan of their hospital, do not receive formal training in Incident Command System (11,80%) or disaster medicine (11,80%) but are willing to attend disaster medicine training (71,15%).

**Conclusions:** Latvian hospitals and physicians are not well prepared to face a disaster situation. A collective and standardized strategy planning and preparedness approach, together with the implementation of a disaster medicine course to medical student must be a priority.

# 1. INTRODUCTION

In the last decades, the world assisted to a remarkable increase in the number of disasters of all kinds as well as people affected by it (CRED, 2015; Guha-Sapir, Below & Hoyois, 2009). The outlook for the future is not promising either as conflicts of several order and consequences of climate change are now starting to materialize, suggesting that we will face more natural and human-made disasters than ever. The next generation of medical doctors is more likely to encounter this scenario during their careers than their predecessors and will be demanded to extend the provision of mass-casualty treatments.

In fact, health institutions play a critical role in disaster management, with hospitals and medical teams being often the central point of contact and the first agents to respond to disasters. Despite their primordial role and the fact that appropriate medical infrastructure generally represents a large investment to nations, health institutions, such as hospitals, are often subject to disasters themselves, leading to an economic negative impact and, more importantly, to fail in their main function: to serve the communities.

People, and the impact they suffer, are the important variable in the equation of disasters and it can even be said that what defines a disaster is not its cause, but its result. Thus, during a disaster, medical infrastructures have a challenging task to accomplish, since it is the way they manage the disaster that will determine if the outcome will be negative or positive, that is, the extent to which the impact of the disaster will manifest in society. Hospitals and their staff should, therefore, present an effective disaster preparedness if they are to minimize the impact of disasters. This is in line with the Sendai Framework for Disaster Risk Reduction (United Nations, 2015), which stresses that it is urgent to "enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level" (p.19).

Additionally, studies argue (Scientific Commission of the International Society of Disaster Medicine, 2000; Ragazzoni, Ingrassia, Gugliotta, Tengattini, Franc, Della Corte, 2013) that resilience for this problem can be strengthened by building capabilities of education in disaster risk reduction in communities and by promoting training in disaster medicine, a discipline that is rarely covered in medical universities. In fact, a disaster provokes an impact in the whole system and the doctors, regardless their area of speciality, can be demanded to respond to a situation of disaster, making the case for the introduction of disaster medicine in medicine curricula, particularly relevant for countries which are more prone to be stricken by disasters. Likewise, more collaboration between international organizations is deemed required for the drafting and implementation of international guidelines and regulations.

While the Sendai Framework for Disaster Risk Reduction (United Nations, 2015) highlights the need for prepared medical professionals, able to not just understand disaster risks, but also to implement disaster risk reduction practices and strategies, reality reveals a shocking panorama, with a number of studies (Burkle 2012; Lennquist, 2005) suggesting that, in general, physicians are not prepared in terms of education and training for disasters.

The poor attention devoted to this topic is also visible in the limited literature available, especially because hospitals and physicians are just now being put to the test, given the increased number of disasters worldwide and the recent acknowledgment of the importance of prevention and preparedness. Yet, the topic is of much significance to be neglected.

Although the subject of disaster risk preparedness is pertinent to any country interested in the safety and welfare of their citizens, some countries may find it more relevant than others, depending on their current level of maturity in disaster risk preparedness and reduction and level of hazards to which they are exposed. For EU members, in particular, this topic is of much importance since it involves a solidarity clause by which signatory members of the Treaty of Lisbon (European Union, 2007) and European Union Civil Protection Mechanism (European Union/ECHO, 2016) are demanded to provide mutual assistance in natural and man-made disasters in the territory of the EU or outside.

Being Latvia an EU-member and signatory of the Treaty of Lisbon (European Union, 2007), it is important to evaluate if the country is complying with the criteria of the Treaty and other international organizations, and how it compares against other countries in this subject. Also, it should be noted that Latvia is exposed to various hazards, not to mention the fact that no literature on disaster risk preparedness by medical professionals exists – a risk in itself since the current level of preparedness is, thus, unknown.

Hence, this research project aims to minimize a gap in medical literature and gain an understanding of how prepared are Latvian hospitals and medical teams. By doing so, this study intends to contribute to better disaster risk reduction in practice. In fact, we cannot avoid or predict disasters, but, by knowing how prepared we are, we can better avoid the extension of their impact.

# 2. LITERATURE REVIEW

## 2.1 DEVELOPMENT OF DISASTERS WORLDWIDE

### 2.1.1 History and Present Status

Over the last decades, countries around the world have witnessed thousands of major disasters of all kinds; which represents a significant public health concern due to the devastating impact on human society (Logue, 1996; International Federation of Red Cross and Red Crescent Societies, 2015; Guha-Sapir, Below & Hoyois, 2009; CRED, 2015).

The progression of this occurrence is also possible to observe in terms of people affected by it, accompanying with the total economic damage associated however, the total deaths has decreasing along years (International Federation of Red Cross and Red Crescent Societies, 2015; CRED, 2015; Guha-Sapir, Below & Hoyois, 2009).

The 7056 disasters recorded worldwide from the period from 1996 to 2015, shows that the frequency of geophysical disasters, mainly earthquakes remained widely constant throughout this time, although the accession of the climate and weather related events, such as floods, storms and, particularly, heatwaves assume the majority of disasters in terms of deaths in most years (International Federation of Red Cross and Red Crescent Societies, 2015).

According to the World Disaster Report (International Federation of Red Cross and Red Crescent Societies, 2015), for a disaster to be included into the database, has to fulfilled at least, one of the criteria: 10 or more people reported killed; 100 people or more reported affected; declaration of a state of emergency or call for international assistance.

The total number of deaths in based on “people confirmed as dead and people missing and presumed dead”. The affected people are those who need immediate assistance, such as basic survival needs during the period of emergency. Injured or homeless casualties are included in this number.

In Latvia, the most common crisis are natural disasters, being the extreme temperatures, storms and floods the biggest hazards but other disasters, such as heavy snowfalls, chemical and infrastructures accidents, oil spills, strong winds and wild fires also have been registered (Stern & Dan, 2004; Pollner, Kryspin-Watson & Nieuwejaar, n/d).

For the authors Stern and Dan (2004), the chemical and infrastructures accidents are particularly a risk due to the transit of hazardous chemicals and oil products along the country. Adding to this, a study conducted by Latvian experts suggested that there were many gaps of crisis management order, suggesting some improvements regarding the response coordination

between responsible authorities, the deterioration of crucial infrastructures and resources constrains (Stern & Dan, 2004). It makes this research even more relevant to the country.

### 2.1.2 Increasing importance of the problem

For the health professionals, the probability to be confronted with a disaster and its effects increase. International statistics show that the frequency and/or impact of disasters has increased significantly over the last decades (International Federation of Red Cross and Red Crescent Societies, 2015; CRED, 2015; Guha-Sapir, Below & Hoyois, 2009). The reasons for this increase are multifactorial: overpopulation, urbanization, expanding industrialization, increased traffic, climate change, ongoing threat of terrorism and armed conflicts. Throughout the literature, is possible to identify six reasons:

1. In the last 100 years, the world population increased with disproportionate growth in developing countries (United Nations, 2009). For the first time in world history, the population will be predominantly urban and growing in larger cities (United Nations, 2008). This increase occurs in high-risk areas such as earthquake, flood plains, hurricane areas and areas adjacent to hazardous material plants and is reflected in the increasing number of casualties (Dynes, 1998; Noji, 2005a; WHO, 2007b);
2. The industry of chemicals, involving the production, storage and transportation of toxic and explosive agents is growing, especially through and in densely populated areas and with insufficient safety measures. The concentration of urban slums, especially in less developed countries, are often located near the dirtiest, most labour intensive processing plants which have been moved from developed countries to be near sources of cheap labour (Dynes, 1998; Noji, 2005a; WHO, 2007a);
3. An increased traffic density of people and goods in more rapid and higher capacity modes of transport (Kreps, 1985). Increasing international trade and travel provide myriad opportunities for the emergence or re-emergence of infectious disease threats and other public health risks (WHO, 2007b);
4. Global climate change makes people susceptible to severe weather events, especially coastal communities around the world (Noji, 2005b; IPCC, 2007);
5. A continuous threat of terroristic acts (James, Subbarao & Lanier, 2008; Burkle & Greenough, 2008);
6. The growing of armed conflicts with an extremely vulnerable population to forced migration or displacement heightening the risk of infectious disease epidemics. A collateral impact of armed conflicts is often the destruction or malfunctioning of health systems (Burkle & Greenough, 2008; WHO, 2007a);

The response of a disaster is, most of the times, precarious due to the poor education and training of the personnel involved, an insufficient knowledge of important details that could contribute for a positive outcome, such as the plan of the medical disaster with respect procedures and protocols, and also, due to the low levels of skill and experience (American Medical Association & American Public Health Association, 2007; Bradt & Drummond, 2007; Spranger, Villegas, Kazda, Harris, Mathew & Migala, 2007).

In general, the position adopted about the disaster is a combination of confidence, optimism and luck (Drabek, 1986). This discouraged approach, supports a feeling of indifference to this problematic. The excuses for this attitude is divided among those who think that the complexity of each disaster, their unique characteristics, makes the planning and preparedness impossible (Drabek, 1986) and those who look to a disaster purely as an extension of routine emergency measures (Quarantelli, 1983).

There are differences between disasters and accidents named as "mistakes' or "routine accidents" of the daily work. Contrasting this small events, a disaster plant the chaos and put the system under extreme stress, making the responders experience new and different demands which may generate problems that the ordinary emergency procedures are not well prepared to face (Quarantelli, 1988).

More likely, most of the emergency responders will not be involved in enough disasters in order to gain adequate personal experience, therefore is crucial that the information collected is done in an organized way (James, Subbarao & Lanier, 2008). Moreover, among health professionals who have acquired experience, there is currently no proper way to share this knowledge in the disaster medicine community (Bradt, Abraham & Franks, 2003).

Policies designed to reduce patient treatment time, increase patient throughput, maximize profit margins and merge or close emergency departments, led to a reduction in hospital beds and drastically affected emergency surge capacity (Cherry & Trainer, 2008). The business-systems principle of just-in-time inventory management in hospitals and the shortage of health professionals trained in emergency care further exacerbated the surge capacity (Cherry & Trainer, 2008; Hick, Barbera & Kelen, 2009; Kelen & McCarthy, 2006; Peleg, 2009).

### 2.1.3 Agencies and Institutions for worldwide disasters

There are many agencies and institutions in the world, both at an international and regional level, and in each country in particular, to deal with disasters; conditions and preparations in many parts of the world have improved in recent decades.

The United Nations has paid close attention to disaster reduction through various channels and through the work of various agencies. The adoption of international documents, such as Sendai

Framework for Disaster Risk Reduction (2015 - 2030), is a clearly demonstration of the importance and the effort that countries are making. For the new Framework to be adopted successfully, strong commitment, political involvement and focus on four priorities are needed: “understanding disaster risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience; enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction” (United Nations, 2015, p 14).

The Sendai Framework for Disaster Risk Reduction 2015 - 2030 (United Nations, 2015), refers the importance of integrate at various levels, a disaster risk management so the national health system could increase its resilience, mainly at local level. The agreement also admits that the promotion of training capacities in the field and in the community makes the health system more able to face disasters.

Meanwhile, is crucial to collaborate with different sectors and to implement the International Health Regulations that has, as strategy, “to reduce the health consequences of emergencies, disasters, crises and conflicts, and minimize their social and economic impact” (WHO, 2007a, p. 14).

The European Union Civil Protection Mechanism established in 2001 the cooperation between the national civil protection authorities within European Union. This agreement was to set up a coordinated assistance from signatory states to the victims of any kinds of disaster, in Europe or elsewhere. The headquarter - Emergency Response Coordination Centre (ERCC), monitors emergency around the world and coordinate as well the response in case of crisis (European Union/ECHO, 2016).

## 2.2 DISASTER MEDICINE

Lennquist (2004, 2005) studied the main aims of disaster medicine and defended it as the prevention, reduction and mitigation of effects of disasters, either direct or indirect, on the health of affected populations, in order to restore health conditions to the situation before the disaster and also to preserve or re- establish the community, especially regarding to the health system and facilities.

The management of mass casualties’ situations, cannot be based on altruism and good intentions. Alexander (2005), Arnold (2002), de Boer (2003, 1999), share the idea that is needed a specific medical approach to accomplish the goals of disaster medicine due to: the immediate effects of the disaster on the community and especially on the health care system; the quantity and diversity of casualties; the emergency situation with an initial phase of disorder; the limited

resources and controlled output of medical teams directly after the disaster; the need to work in a plural complementary teams and the multiplicity of duties.

The definition by UNISDR (2007), states that a disaster is "a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts" (para. 15).

Nevertheless, a number of theoretical approaches fail to link successfully to practice, which is vital in light of the ultimate goal of disaster management: reducing or minimizing mortality and morbidity within the affected population (Weichselgartner, 2001; Al-Madhari & Keller,1997). However, it is the health professional who has to interpret definitions, circumstances and information from which to develop disaster relevant strategies, policies, procedures and practices. As Britton (2005) observes, the way that emergency managers perceive the world and define disaster is therefore remarkably relevant.

### 2.2.1 Contents of Disaster Medicine

Disaster medicine earn its professional contents from a diversity of health care and public health disciplines and sciences (Subbarao, Lyznicki, Hsu, Gebbie, Markenson, Barzansky, Armstrong, Cassimatis, Coule, Dallas, King, Rubinson, Sattin, Swienton, Lillibridge, Burkle, Schwartz & James, 2008). Disaster medicine integrates mainly components of military medicine, borrowing the principles of strategy, tactics and logistics but also adopting aspects in the area of emergency medicine, public health and disaster management (Bradt & Drummond, 2007; Dara, Ashton, Farmer & Carlton, 2005; SAEM, 1995; Murray, Clifford, Seynaeve & Fisher, 2006).

Disaster medicine takes also elements from emergency medicine. The principle attribute is a readiness for the full spectrum of somatic and psychic disorders both on the scene as in the hospital but also the technical skills. Emergency physicians are familiar with working under conditions of stress and uncertainty (Macintyre, Barbera & Brewster, 2009; SAEM, 1995).

The public health contributes in strategies of prevention and is population- oriented while medical care concentrates on the process of curing individuals. It includes, among other aspects, hazard and vulnerability analysis, site security, incident coordination, and information management (Macintyre, Barbera & Brewster, 2009; Bradt & Drummond, 2007; Subbarao et al., 2008).

Disaster medicine integrates also elements of many other medical disciplines including epidemiology, occupational medicine, toxicology, psychology, psychiatry, social and forensic medicine. The diversity of disaster medicine bases also has its own features, such as an

operational medicine, a global medicine, a mass medicine, a medicine with extra-medical aspects and a doctrinal medicine (Noto, Huguenard & Larcan, 1987).

### 2.2.2 Research in Disaster Medicine

The discipline of disaster medicine remains in the early stages of development. Formal research and systematic investigation is needed in order to ensure a scientific basis for effective prevention and intervention strategies to minimize the health effects in disaster situations (SAEM, 1995; American Medical Association & American Public Health Association, 2007; Auf der Heide, 2006; Sundnes, Birnbaum & Pretto, 1996; National Research Council of the National Academies, 2006).

There has been a growth in medical disaster literature in the last decades. Until recently, disaster medical response research has been limited to descriptive reports on the incidents that caused the disaster, the numbers of killed, injured or affected people and the adequacy and/or incorrectness of the medical response (Auf der Heide, 2006; Sundnes, Birnbaum & Pretto, 1996; Lennquist, 2003; Markenson & Krug, 2009). In the majority of the cases the disaster medical response is assessed by quantifying the output (e.g., the number of ambulances sent to the disaster scene) rather than evaluating the effectiveness.

A great number of these papers indicate that disaster medical management suffers from many of the same problems experienced in previous disasters but lessons learned are rapidly forgotten (Auf der Heide, 2006; Noji, 2005b; Quarantelli, 1983; Scanlon, 2001). According to Auf der Heide (2006), this problem arise mainly because "disaster medical planning and response is only as good as the assumptions on which it is based" (p. 34).

Evidence-based research on disaster medical response management should critically assess the implementation and effectiveness or outcomes of interventions or activities. The elaboration of a set of measurable indicators (metrics) defining the key factors (descriptors) that have an impact on the disaster medical response and their methods of measurement is required (American Medical Association &American Public Health Association, 2007; Markenson & Krug, 2009; de Boer & Debacker, 2009). Unfortunately, there is a lack of internationally accepted indicators for disaster medical response, and those metrics that exist have not been fully validated (Markenson & Krug, 2009; de Boer & Debacker, 2009; Lazar & Cagliuso & Gebbie, 2009; Bayram, Zuabi & Subbarao, 2010).

In a human sciences discipline like disaster medicine, both qualitative and quantitative research methods are recommended. Although both forms of evidence are beneficial, neither is sufficient to dictate the response that a health professional should make in individual disaster situations. The available database in the area of disaster medical management research are embryonic,

insufficient and imprecise (National Research Council of The National Academies, 2006; Bayram, Zuabi & Subbarao, 2010; Lazar & Cagliuso & Gebbie, 2009).

A central databank will enable comparative analyses of disasters, refinement of research methodology, research results to be translated and disseminated into the disaster medicine communities, so that medical disaster plans and response will be based on evidence and experience, and disaster medicine education and training will have a scientific foundation. Research and generation of new knowledge has traditionally been undertaken by the academic community. There is a concern that currently generated research is not readily transferred across into practice, leading to what is often referred to as the "evidence-practice"gap (Hay, Weisner, Subramanian, Duan, Niedzinski & Kravitz, 2008). Ideally, research should be a collaborative alliance, one which is supported with the expertise, skills and resources of both academic and practice communities (American Medical Association & American Public Health Association, 2007; McNeill, 2006).

## 2.3 EDUCATION AND TRAINING IN DISASTER MEDICINE

Several initiatives in defining professional competencies required in disaster medicine and in developing education and training programs took place in the last decade (Lennquist, 2005; , Bradt & Drummond, 2007; Subbarao *et al.,* 2008; Waeckerle, Seamans, Whiteside, Pons, White, Burstein, Murray & Task Force of Health Care and Emergency Services Professionals on Preparedness for Nuclear, Biological, and Chemical Incidents, 2001; Hodgetts, 2003; Lennquist, 2003; Debacker, Delooz & Dellacorte, 2003; Markenson, DiMaggio & Redlener, 2005; Hsu, Thomas, Bass, Whyne, Kelen & Green, 2006; MacFarlane, Joffe & Naidoo, 2006). Adequate education and training in disaster medicine is one of the most important components of disaster preparedness, and disaster medicine, therefore, should be established as an academic discipline (James et al., 2008; Lennquist, 2005). Interaction between students, academics and experts from all over the world in the context of a multicultural and highly collaborative learning environment, can contribute in important ways to a worldwide "culture" of disaster medicine (Ragazzoni, Ingrassia, Gugliotta, Tengattii, Franc & Della Corte, 2013).

In Latvia, the conduction of a scientific research in the field of security and also emergency management is taken together with Universities, Civil Protection and Fire Safety. Some education activities that take place to involve civil society, heads of institutions stakeholders but also local governments, are most of the times, established by the Minister of Interior, throughout exercised and simulations with possible scenarios (Spassov & Petkov, 2015; Eloisa & Halonen, 2007).

Supplementing this activities, the Latvian Minister of Affairs, collaborates with European Union in order to establish and coordinate the policy that regulates external security. Thus, the Baltic region even with different programs, share some basic features, allowing that a basic and advance education can be taught in a standardized way, through certificates in order to develop a training and educational curricula (Elomma & Halonen, 2007)

Following this philosophy, the Baltic States provide specialized schools and colleges that carry out education in the field of civil protection and rescue, a proposal that meets the Civil Protection and Disaster Management Law (Saeima, 2016), in force since 1st October 2016, in which the government provide to higher institutions and to vocational secondary institutions, mandatory trainings in the area as well as recommends scientific research in the area, aligned with the law regulated by European Council and European Commission on this discipline, regarding the Union Civil Protection Mechanism agreement (European Parliament, 2013).

Under this mechanism, the European Medical Corps was implemented, in 2016. These teams, with a variety of medical experts, can be mobilized in a short notice for any type of assistance, including preparedness or response operations and are available either within EU or be deployed to a crisis region (European Union/ECHO, 2016b). For this reason, Latvia is seen as a interested partner to European Union crisis management structures and currently forces are being made in order to enhance this cooperation so a unified system can be created (Spassov & Petkov, 2015; Eloisa & Halonen, 2007).

## 2.4 ESSENTIALS OF HOSPITAL DISASTER PLANNING

### 2.4.1 Challenges for Hospital Disaster Planners

Competing daily priorities in hospital operations make it difficult to focus planning resources on an event that may or may not happen, the so-called “what if” scenario. Unless a disaster is an imminent threat or one has recently occurred, senior leaders will likely focus on normal operations and it will be difficult for disaster planners to get their attention and support. In addition, staff are much less interested in taking time and other resources to participate in training if they have not experienced a recent disaster, known as the apathy factor (Eryilmaz, Bilgitekin, Biyikli & Altintas, 2011).

Funding and reimbursement for disaster planning are general limited, especially for healthcare facilities. Furthermore, just-in-time supplies and equipment, shorter patient lengths of stay, and outsourcing are cost-containment measures that are effective during daily operations, but limit the ability for hospital planners to prepare for a large influx of casualties. In many cases, the hospital emergency manager may be assigned responsibility, but lack opportunities for training

or the authority to implement necessary policies and procedures (Murray, Clifford, Seynaeve & Fisher, 2006).

An all-hazard planning is a key concept in emergency management that denotes planning for any type of threat to hospital operations. Hazards can range from earthquakes and hurricanes to terrorism or even an event such as a nursing strike. Planners need to implement a basic framework so that the facility is able to manage any type of disaster. There may be additional specific preparedness activities required for some types of disasters (e.g., storage of specialized equipment like large quantities of surgical masks for a pandemic influenza event) and these can be address by including annexes to the basic all-hazard disaster plan (Kaiser Foundation Health Plan, 2001; Cutter, 2001; Smith & Petley, 2008).

In order to implement an "all-hazard" approach, planners must first perform a risk analysis to determine the threats the hospital faces. This systematic method to identify all threats should include a determination of risks that could cause an interruption or loss of critical services, damage to the hospital's physical plant, or large numbers of casualties. This activity is called a Hazard Vulnerability Analysis (HVA). After assessing the probabilities of and likely consequences from each community hazard, the HVA process continues by creating a prioritized comparison of vulnerabilities, their effects on organizational function and the likely service requirements produced by each hazard (Kaiser Foundation Health Plan, 2001).

### 2.4.2 Community Partnerships and Resilience

Traditionally hospitals have been in competition with each other due to economic pressures and therefore reluctant to share information and resources. However, in a disaster, community-wide planning and inter-organizational coordination is essential. For example, if hospital A depends on the same back-up source for water as hospital B, the company providing the water may not be able to provide it to both hospitals simultaneously. Furthermore, many events will require involvement and resources from more than one healthcare entity in the community, e.g. the hospital plus the public health department. It is essential that hospitals do not plan in a vacuum; instead planners must engage all partners within the community. People need to get to know each other and understand their respective capabilities and resources before an event occurs (Koenig & Schultz, 2009; Auf der Heide, 1989).

Community resilience is a recent concept that denotes a measure of the ability to use available resources to respond to and recover from disasters. While hospitals are only one part of the community, they have a role in assisting the public and other entities to be prepared for disasters (Seynaeve, Archer, Fisher, Lueger-Schuster, Rowlands, Sellwood, Vandevelde, Zigoura,

Education Committee Working Group & World Association for Disaster and Emergency Medicine, 2004).

### 2.4.3 Hospital Disaster Planning - Common Elements

As mentioned above, common features of hospital disaster planning include use of an "all-hazard" approach including performing a "Hazard Vulnerability Analysis" and applying the principles of "Comprehensive Emergency Management" (including the four phases: mitigation, preparedness, response and recovery) (Malcom, 2010). Each hospital should form an emergency management committee (EMC). Knowledge of and adherence to local, state and national legislative and regulatory standards is essential. The EMC should have broad participation and must be multi-disciplinary. Participants should include representatives from hospital administration, the medical staff, nursing staff, emergency department, security team, environmental services, plant operations, materials management, pharmacy, laboratory, radiology, ancillary services, food services, volunteer services and all other departments of the facility (Koenig & Schultz, 2009).

An incident management system depends on command, control and leadership. This system represents a flexible process for ongoing assessment that uses incident action planning. A Unified Command is used for multi-jurisdictional events. In the U.S., the National Incident Management System (NIMS) is used at the federal level and provides the infrastructure to connect each entity's individual Incident Command System, both between different federal partners and with State and local agencies (Bigley & Roberts, 2001).

At the hospital level, the Hospital Incident Command System (HICS) is commonly used. Hospitals are in the business of caring for patients; thus the HICS is essentially a tool to ensure Continuity of Business Operations Planning. It meets responsibilities to employees, patients and the community. Further, having HICS in place may reduce insurance/workers compensation costs, protect capital investments, and ensure regulatory compliance. The ultimate goal is to reduce morbidity and mortality by maintaining adequate patient care capacity (The Joint Commission, 2015).

HICS can be implemented for incidents without warning or those that can be anticipated. In sudden onset incidents, leadership and direction are initially provided by any employee who first recognizes the danger. This compares with incidents with warning for which the hospital director or designee provides the initial leadership and direction (Bigley & Robert, 2001).

There are six essential functions or elements that must be in place in order for hospitals to maintain continuity of business operations, such as capability and capacity to provide patient care. These are: physical plant, supervision, personnel , equipment, supplies, communication,

and transportation. If any of these elements is missing or inadequate, it must be reconstituted or obtained from external sources (Bigley & Robert, 2001).

The media are experts in communication. It is not uncommon in today's world of social networking that the media are the first to have information about a disaster. By developing relationships with media before the event, they can be used to assist with information gathering and dissemination such as in the form of public service announcements. One technique used by some hospitals is to include the media in disaster drills (Pradeep, 2010).

Well meaning volunteers self-report to the scene of an incident or to the hospital and may not be properly trained or credentialed. These responders can become victims if they do not have appropriate training, personal protective equipment, or knowledge of safety procedures. Emergency managers should anticipate this convergence behavior and have a system in place to manage volunteers or they will likely drain needed resources (Argothy, 2003; Whittaker, McLennan & Handmer, 2015; Henning, 2006).

## 2.5 SURGE CAPACITY FOR HEALTHCARE FACILITIES

### 2.5.1 Essential Elements of Surge Capacity

In medical care, surge capacity is defined as "a sizable increase in demand of medical and public health resources at a given point in time and not in the absolute number of patients" (McCarth, Aronsky & Kelen, 2006, p. 1138); it could be dependent on the volume of needs required (influx), the type of the event and the required resources as both needs and consumption.

In disasters, the term surge capacity describes the maximum ability of a health care system to quickly expand capacity, above the normal, in order to meet the increased demand and, at the same time, providing a competent team and services during the event (Kaji, Koenig & Bey, 2006; Barbisch, Koenig, 2006).

While use of the terminology "standard(s) of care" is controversial (Koenig, 2012), surge capacity as a sequence with three different stages, namely:

1. Conventional capacity: The care is prolonging in a traditional way, where the needs meet the goals.
2. Contingency capacity: The care suffers small adaptations but does not result in major consequences to its standards (McCarthy, Aronsky & Kelen, 2006)
3. Crisis capacity: A crucial, methodical change in the system that results in notably alterations in the standards of care (Hick, Barbera & Kele, 2009).

The goal is to augment patient treatment capacity and improve population outcomes saving as many lives as possible in a situation when the needs exceed the resources, in other words, shifting individual care to population care, while doing the best for the most people (Koenig, 2006). The 3S System of Surge Capacity is defined by Staff (personnel), Stuff (supplies and equipment), and Structure (physical structure/location plus management structure) (Barbisch & Koenig, 2006).

The Staff maintains adequate numbers of personnel with appropriate expertise is challenging even under baseline conditions and becomes even more so during a disaster. A certain percentage of regular staff may be unable (due to injury, death or transportation infrastructure disruptions) or unwilling (due to caring for family members, attending to other personal needs or because of fear) to report to work. A system for emergency credentialing of volunteers should be in place (Barbisch & Koenig, 2006; Schultz, 2012; Henning, 2006).

The stuff, is a variety of supplies and equipment are needed to support surge capacity. These include cots/litters, bedding, medical-surgical supplies, oxygen, pharmaceuticals and sanitation supplies. For McCarthy, Aronsky & Kelen (2006), pre-event planning to acquire and store these items is necessary whether it be on the hospital grounds or held on standby by a vendor. Some hospitals have acquired excess inventory by slowly buying the supplies over time and then rotating them into normal hospital operations. Other hospitals have stored supplies in trailers or cargo containers (Schultz, 2012; Barbisch & Koenig, 2006).

While a catastrophic event will certainly cause shortages in staff and supplies, in many cases it is a lack of coordination and communication that hinders effective disaster response. Therefore structure includes two components: a physical structure of location to care for patients (either within hospital grounds or at an alternate care site) and the incident management structure (HICS) to organize and manage the overall event (Schultz, 2012; Auf der Heide, 1989).

According with Kaji, Koenig & Lewis (2007), it is clear that the hospital represents a key role in the surge even if other institutions have a role in the community but in case of major crisis, various communities need to provide staff, stuff and structure for surge capacity and there must be a bridge between these activities in order to form a extensive surge system.

### 2.5.2 Evaluation of hospital capacity to respond to a surge

The real central point of evaluation of hospital capacity is to focus on “patient care capacity”. In any case this is difficult to be achieved with standardized methods. There are minimum requirements that should be available in all hospitals, ready to be shared in real time or on demand with other entities, such as: number of inhabitants of the referral region, hospitals, emergency departments and hospital beds; number of emergency department visits; number of

intensive care beds; total number of occupied and available intensive care unit beds; number of physicians, nurses, pharmacists, porters; total number of occupied and available non–intensive care unit beds; number of ED nurses; number of emergency physicians; mean/median overall length of stay (for patients in licensed and overflow beds); mean/median waiting room times and boarding times (WHO, 2007a; Peleg, 2009; Hodgetts, 2003; Hick, Barbera & Kelen, 2009; Bayram, Zuabi & Subbarao, 2010).

As regards the stuff and the structures, we should have an approximate evaluation of our hospital resources considering that the ones which will be likely to be limited during a disaster event in a care facility that justify and need a individual plan and track, such as: ventilators and components; oxygen and its delivery devices; intensive care unit patient care capacity; particular services like critical care, emergency medicine, burn, and surgical/anesthesia staff; hospitals and related health care facilities (because of infrastructure damage or compromise); specialty medications, intravenous fluids, sedatives/analgesics, specific antibiotics, antivirals, and vaccines and also medical transportation (Markenson, Di Maggio, & Redlener, 2005; Hick, Koenig, Barbisch & Bey, 2008). The total number of operating rooms and the surgical beds are specific points to take in consideration (Koenig, Cone, Burstein & Camargo, 2006).

### 2.5.3 Hospital Actions to Augment Surge Capacity

Regarding the hospital actions to amplify the surge capacity should be considered and implemented for planning and preparedness for a surge. For Kelen & McCarthy (2006), the implementation of a well designed chain of Command, Control and Coordination and the preparation to face with possible unusual behaviors (loss of control, decrease of safety level, overreaction, etc) are one of the most important points but the education and training of the whole staff that would be probably called to use protocols of treatment and response with which they could be unfamiliar should not be ignore. This needs a continuous process of education particularly for who are not usually involved in emergencies. The use of action cards and standard operating procedures will improve the response and reduce the stress (Auf der Heide, 1989; Bayram, Zuabi & Subbarao, 2010).

After a surge appeared, within a hospital, several actions can be taken to augment Surge Capacity. These can be divided into immediate and delayed interventions (Kelen & McCarthy, 2006). Examples of immediate actions include: emptying patients out of the emergency department, including allowing patients to be transferred to “hallway” beds within the hospital; cancelling elective procedures and admissions; and converting private rooms into multiple occupancy rooms. Delayed interventions include: using closed wards to house patients; early discharge of stable patients; and the use of temporary external shelters such as tents or trailers

and alternate care sites either on hospital grounds or at distant locations (Koenig & Schultz, 2009; Bayram, Zuabi & Subbarao, 2010).

### 2.5.4 Crisis Standard of Care

While there are no widely accepted terms, there is general agreement that in a scarce resource environment, the goal of care shifts from optimizing individual medical and health outcomes to maximizing population outcomes. This is very much in line with public health philosophy as opposed to medical strategy for management of individual patients. Thus the goal of care changes, but the standard remains the same. This is because "standard of care" is a legal and not a medical definition. There is no "altered", "lower" or "diminished" standard. While those who use terms such as "altered standard of care" may mean a shift to population health outcomes, their terminology connotes a philosophy that would likely be unacceptable to the public and many health care providers and have a good chance of being misrepresented by the media (Koenig, 2012; de Boer, 2003).

A review of existing literature found several recurrent themes in describing a "Crisis Standard of Care" environment (Koenig, Lim & Tsai, 2011). These include the need to designate a "Crisis Triage Officer" who can make systems decisions without the chance of being based by a relationship with an individual patient. Additionally, there should be the inclusion of palliative care protocols for patients triaged to "no resuscitation" status. Another important concept is that, despite inadequate resources, the ethical principles of beneficence, non-malfeasance, individual rights, privacy and justice/equity (Bayram, Zuabi & Subbarao, 2010)

## 2.6 CURRENT SITUATION

On the basis of the authors' knowledge, there is no similar published research on disaster preparedness of Latvian health system and medical professionals.

However, a study (Djalali, Della Corte, Foletti, Ragazzoni, Gallardo, Lupescu, Arculeu, Arnim, Friedl, Ashkenazi, Fischer, Hreckovski, Khorram - Manesh, Komadina, Lechner, Patru, Burkle Jr. & Ingrassia, 2014a) with some limitations, as their authors reported, was conduct at European Union level and ranks Latvia in sixth for the highest level of preparedness.

This study, recognizes that hospitals of European Union countries are not well prepared for disasters and also points the lack of training and education toward this problematic, meeting the idea of other studies (Ingrassia, Foletti, Djalali, Scarone, Ragazzoni, Della Corte, Kaptan, Lupescu, Arculeo, Arnim, Friedl, Ashkenazi, Heselmann, Hreckovski, Khorram - Manesh, Komadina, Lechner, Patru, Burkle & Fisher, 2014; Djalali, Ingrassia, Della Corte, Foletti, Gallardo, Ragazzoni, kaptan, Lupescu, Arculeo, Arnim, Friedl, Ashkenazi, Heselmann,

Hreckovski, Khorram-Manesh, Komadina, Lechner, Patru, Burkle, Fisher & Scientific Committee of DITAC Project, 2014b), also claiming that the resilience and competences, has to be a collective and strategic plan based on international guidelines.

In conclusion, manage a disaster and its effect is a task that requires a particular knowledge. This assignment must be executed by medical personnel in a manner that the quality of the service do not decrease in terms or quality, even facing an adverse and unfavorable environment. The education and training of disaster medicine is crucial, considering that physicians are the weak aspect of the chain in terms of relief operation, not because of their medical and scientifically knowledge but, mainly due to the poor capacity to manage and command this kind of situations (Della Corte & Ingrassia, 2010; )

## 3. METHODS AND MATERIALS

The research material was collected between October 2016 and February 2017, composed of two samples: 21 Latvian hospitals and 305 medical doctors.

First sample consisted of 21 Latvian hospital: one mono and 20 multidisciplinary hospitals. Multidisciplinary hospitals included three University, five regional and 12 local hospitals. Sample included 67,74% (21 out of 31) of Latvian hospitals certified to provide 24/7 urgent medical aid. In order to reach the proposed objectives of the second sample, qualitative cross-sectional study was carried out with the purpose of evaluating non-random convenience sample. As criteria for inclusion, were considered all subjects of legal age, preferably Latvian citizens. All the participants were doctors from those Latvian hospitals.

The second sample consisted of 305 professionals, of whom 145 (47.5%) were men and 160 (52.5%) were women. The position of the team of professionals is distributed by 141 (46.2%) physicians, 47 (15.4%) head of departments and 117 (38.4%) residents. Regarding the years of service, 102 (33.4%) work between 2-5 years, followed by 95 (31.1%) working between 6-10 years. It is observed that 203 (66.6%) of the respondents work in a public hospital and 102 (33.4%) in a university hospital.

In this study, the sample as mentioned above, obtained a Cronbach's alpha of 0.808, which expresses that the scales have high reliability and internal consistency (Pestana & Gageiro, 2008).

### 3.1 MEASURES

The first survey (Appendix #9.1) - Assessment of preparedness of Latvian Healthcare Facilities in Disaster Management - based on The Hospital Emergency Response Checklist (World Health Organization Regional Office for Europe, 2011), was comprised, adapted and assessed four out of nine key components of the checklist: Command and Control; Triage; Continuity of Services and Human Resources. This checklist was directed to hospital administrators and/or emergency managers of Latvian hospitals.

The format of answer was constituted by a Likert's Scale of four possibilities that ranges between "Yes" and "Don't Know". An extra question was added to the scale, aiming the assessment of the medical supplies in the strategic reserve of the hospitals.

The second survey (Appendix #9.2) - Assessment of Preparedness of Latvian Physicians in Disaster Management, was conducted online, in order to evaluate the previous experience, preparedness (education, training and exercise) and willingness of Latvian medical doctors. This survey, was an adaptation on Art on Disaster Preparedness in European Union: A Survey on the Health Systems (Djalali, Della Corte, Foletti, Ragazzoni, Galardo, Lupescus, Arculeo,

Arnim, Friedl, Ashenazi, Fischer, Areckovski, Khorram-Manesh, Komadina, Lechner, Patru, Burkle & Ingrassia, 2014a), utilized a similar model from that comprised the preparedness; training and education and willingness.

The format of answer was constituted by a Likert's Scale of 4 possibilities that ranges between "Yes" and "Don't Know".

### 3.2 PROCEDURES

The various instruments, previously mentioned, constituted a battery of scales composed of self-answering instruments with the objective of collecting information regarding the theme inserted in the study. To the battery of scales was added cover sheet, with brief and succinct explanation of the objectives of the study. A second sheet was attached for collecting a short sociodemographic data.

The study sample was collected in Latvia. Proceeding in accordance with ethical principles and requirements, authorization for the use of those scales didn't require permission from the authors, as they were published for international use in the area of Disaster Medicine.

Participants were pointed out that their collaboration was voluntary, confidential responses, anonymous and used solely and exclusively in the context of the research. The oral explanation of the battery of scales was performed, emphasizing the importance of responding to all items in order to reduce the percentage of invalid questionnaires. The convenience sample of the general medical population included male and female subjects. About half of the sample was delivered inverted version of the questionnaires, in order to safeguard possible biases. Each protocol was assigned a sequential number, allowing its subsequent identification and correction, in the database, if necessary.

### 3.3 METHODS OF DATA ANALYSES

The results obtained in the present study were obtained from statistical procedures using the software Statistical Package for Social Science (IBM SPSS, 2015), for the treatment and analysis of the statistical data. The results were submitted to a descriptive quantitative analysis of the Items. The level of Statistical significance values (p) were less than or equal to 0.05 (Howell, 2006). For the statistical analyses the adopted methodology fulfilled three crucial phases in order to achieve the study goal:

Phase 1 - Characterizing the sample, initially by quantitative analysis of a descriptive nature.

Phase 2 - Use of the Cronbach Alpha coefficient, a method used to analyse reliability through internal consistency or homogeneity of items.

Phase 3 - Analysis and study of hypotheses.

# 4. RESULTS

## 4.1 ANALYZE OF HEALTHCARE FACILITIES PARTICIPANTS

This study aims to analyse the preparedness of Latvian hospitals in case of mass casualty and disasters situations.

**Application of basic principles and strategies - An incident action plan**

The result suggest that 19,05% (4) (Chart #1; Appendix #9.3) of the participating hospitals, in which 4,76% (1) is a Local and 14,29% (3) are Regional (Chart #2), do consult documents, following accepted and principles about implementation of a incident action plan. A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 8,33% and Regional by 50% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed that there is no statistically significant association between the variables [$\chi^2 = 10{,}588$, $p = 0{,}102$].

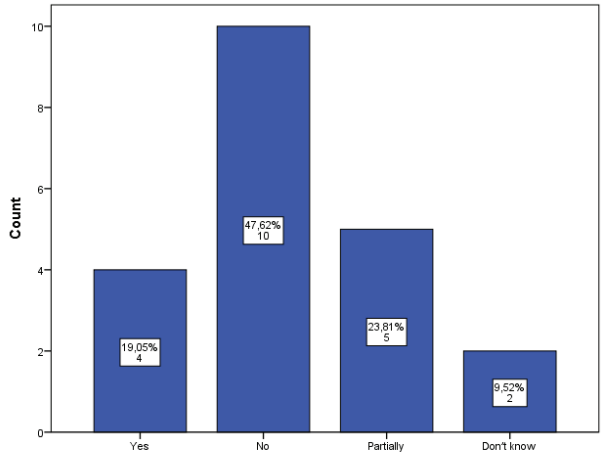



Chart #1: Total % Regardless of Position

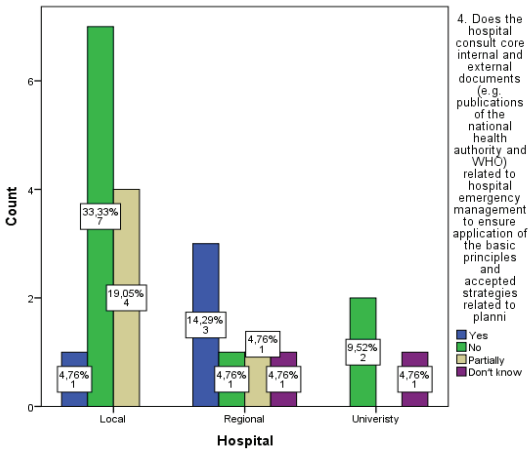



Chart #2: Total % by Hospital Type

**Training of Incident Command System**

From the hospitals that replied to the survey, just 23,8% (5) of the participant hospitals fully assure that all staff receives training of Incitement Command System (Chart #3; Appendix #9.3), from which 19,05% (4) are Local hospitals and 4,76% (1) Regional Hospital (Chart #4). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 33.33% and Regional Hospitals by 16,67% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed an inexistent of statistically significant association between the variables [$\chi^2 = 9{,}800$, $p = 0{,}133$].

Chart #3: Total % Regardless of Position

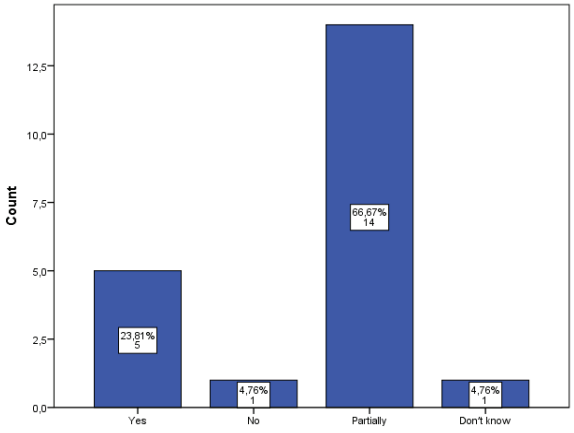
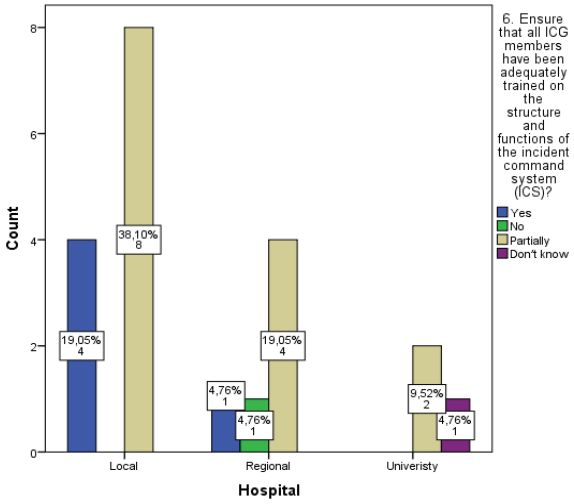



Chart #4: Total % by Hospital Type



**Mass casualty triage protocol according to international guidelines**

Regarding the settling of a mass-casualty triage protocol, that adopt international accepted guidelines and principles, results show that 28,57% (6) of the participant hospitals assume to follow in a effectively way (Chart #5; Appendix #9.3). In terms of hospital type results shown that 9,52% (2) are Local hospitals, 14,29% (3) are Regional hospitals and 4,76% is represented by 1 University hospital (Chart #6). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 16,67%, Regional Hospitals by 50% and University Hospitals by 33,33% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed there is no presence of statistically significant association between the variables [$\chi^2 = 2{,}427$, $p = 0{,}658$].

Chart #5: Total % Regardless of Position

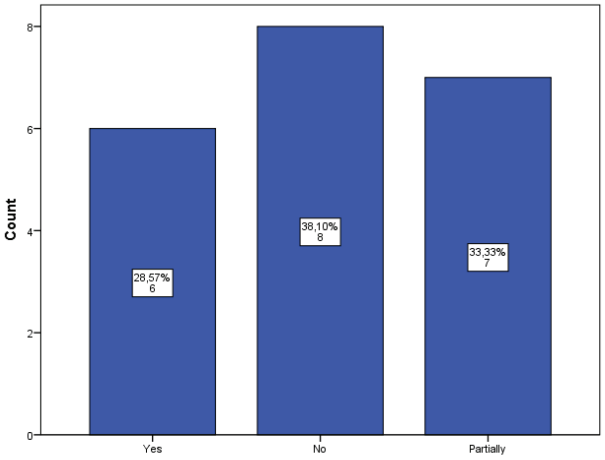
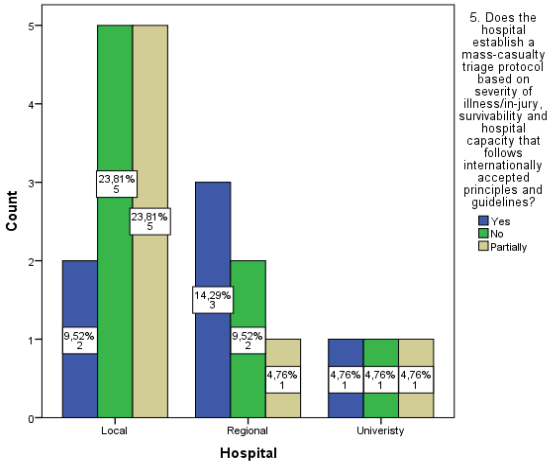



Chart #6: Total % by Hospital Type



**Coordination between hospitals and health authorities**

Results have shown that respecting the coordination with hospital, health authorities and private physicians, 23,8% (5) of the participant hospitals (Chart #7; Appendix #9.3), entirely confirm the coordination between those parties, allowing to provide the continuity of services in case of disaster. Regarding hospital types that result is justified by 14,29% (3) being Local hospitals, 4,76% represented by 1 Regional hospital and 4,76% represented by 1 University hospital (Chart #8). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 25%, Regional Hospitals by 16,67% and University Hospitals by 33,33% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed an absence of existence of statistically significant association between the variables [$\chi^2 = 1{,}145$, $p = 0{,}887$].

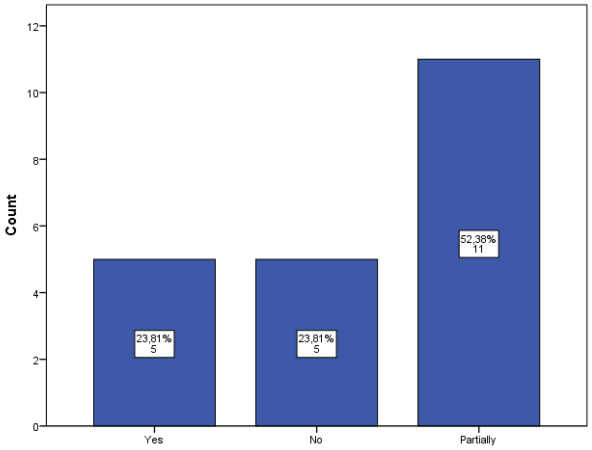



Chart #7: Total % Regardless of Position

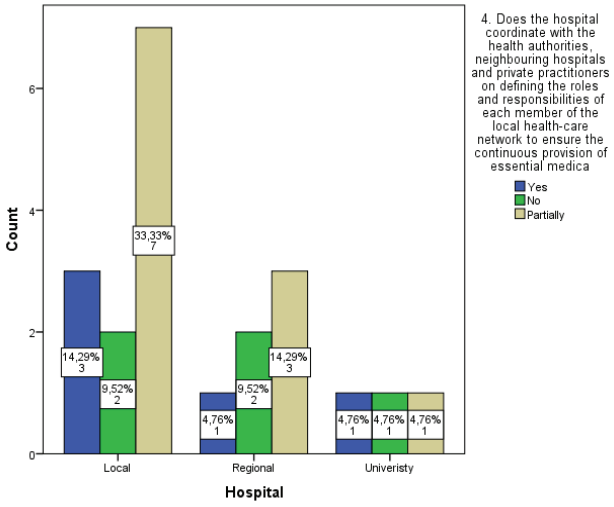



Chart #8: Total % by Hospital Type

In relation to the availability of suitable alternatives plans indispensable for life, only 23,8% (5) of the healthcare facilities, declare to fully have it (Chart #9; Appendix #9.3), in which 14,29% (3) are Local hospitals, 4,76% (1) is a Regional Hospital and 4,76% (1) is a University hospital (Chart #10). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 25%, Regional Hospitals by 16,67% and University Hospitals by 33,33% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed there is no presence of a statistically significant association between the variables [$\chi^2 = 1{,}604$, $p = 0{,}808$].

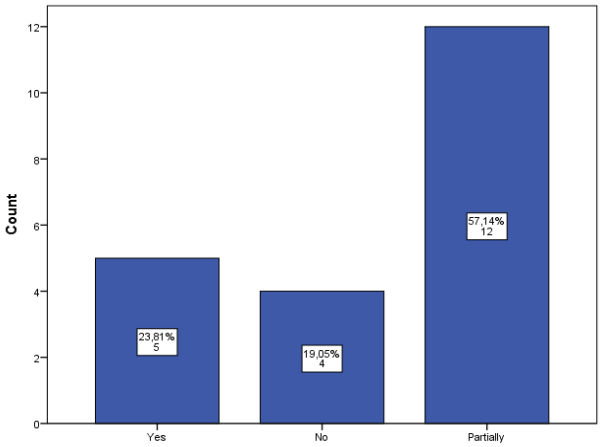



Chart #9: Total % Regardless of Position

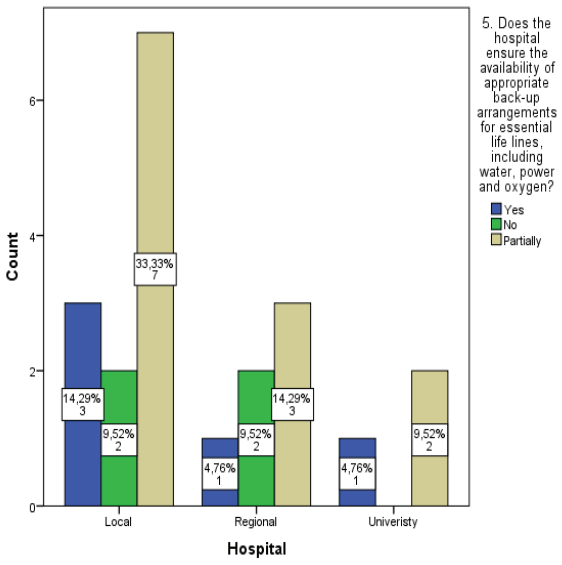



Chart #10: Total % by Hospital Type

**Reserve of medical supplies**

Results show that 38,10% (8) of the participant hospitals advocate to have a complete strategic reservoir of medical supplies (Chart #11; Appendix #10.3), considering that in terms of hospital type 19,05% (4) are Local hospitals, 14,29% (3) are Regional Hospitals and University Hospitals by 4,76% (1) (Chart #12). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 33,33% and Regional Hospitals by 50% and University Hospitals by 33,33%(Appendix #10.4). The *Pearson Chi Square* test (Appendix #10.5) showed there is no statistically significant association between the variables [$\chi^2 = 5{,}347$, $p = 0{,}253$]

Chart #11: Total % Regardless of Position

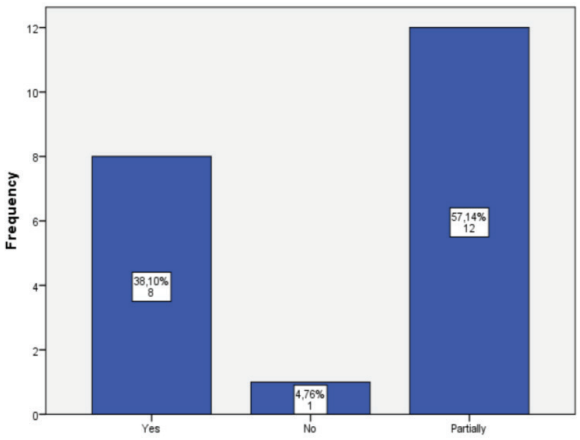
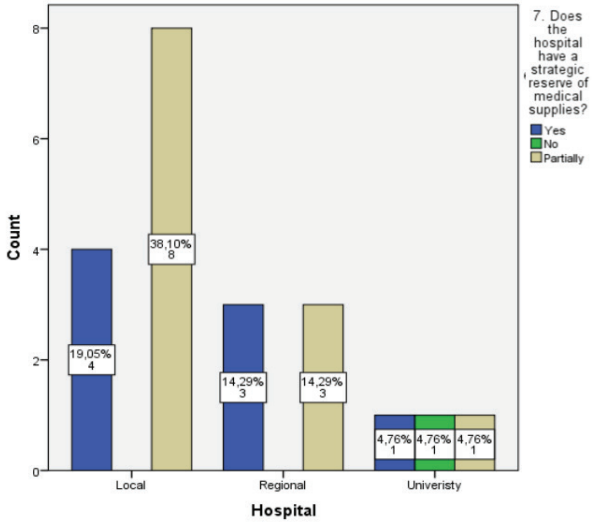



Chart #12: Total % by Hospital Type



**Training and exercises to critical areas**

Statistic shows that 23,81% (5) of the hospitals, claim to provide fully train and exercise in their critical areas of demand in case of disaster (Chart #13; Appendix #9.3), from which 19,05% (4) and 4,76% (1) is a Local hospital (Chart #14). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 33,33% and Regional Hospitals by 16,67% (Appendix #9.4). Refer to *The Pearson Chi Square* test (Appendix #9.5), the *p* value showed there is no statistically significant association between the variables [$\chi^2 = 2{,}689$, $p = 0{,}611$].

Chart #13: Total % Regardless of Position

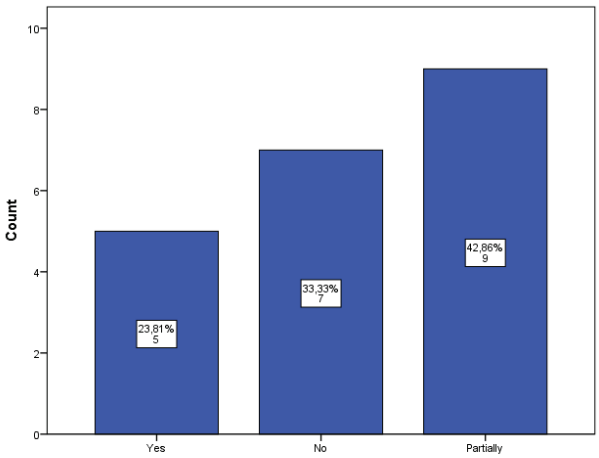
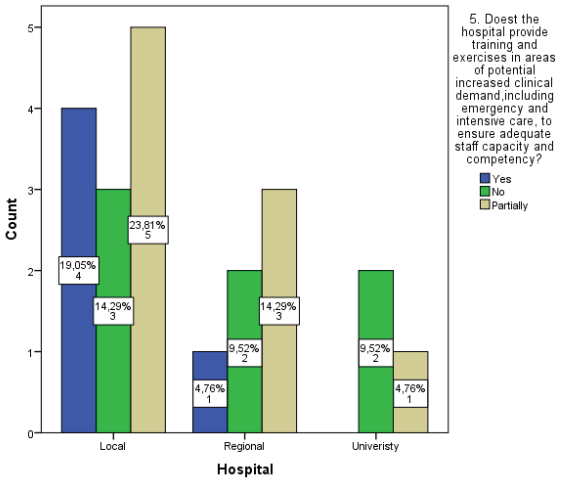



Chart #14: Total % by Hospital Type



**Mechanism to provide hospitals with more accredited healthcare workers**

A promptly mechanism that allows to gather accredited professionals for an emergent situation in case of need was just confirmed by 4,8% (1) of the participating hospitals (Chart #15; Appendix #9.3). In terms of hospital types these numbers are explained by 4,76% (1) of the Local hospitals (Chart #16). A further statistical analyse to the three groups, as independent groups and who have answered positively, results show Local Hospitals are represented by 8,33% (Appendix #9.4). The *Pearson Chi Square* test (Appendix #9.5) showed none existence of statistically significant association between the variables [$\chi^2 = 4{,}181$ $p = 0{,}382$].

Chart #15: Total % Regardless of Position

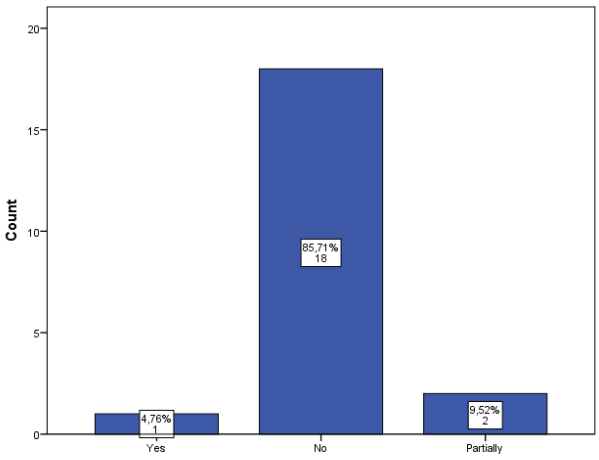
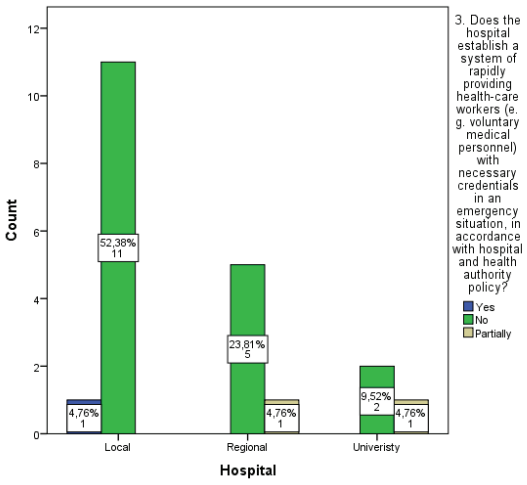



Chart #16: Total % by Hospital Type



## 4.2 ANALIZE OF MEDICAL STAFF PARTICIPANTS

### Previous experience in disasters

The results demonstrate that 84.59% (258) of the participants have been already involved in a mass casualty or disaster situations (!) (Chart #1), in which 39.02% (119) were Doctors, 15.41% (47) were Chief of Department and 30.16% (92) were Residents (Chart #2; Appendix #9.6 - Table #9). A further statistical analyse, to the three groups, as independent groups and who have answered positively, results show that Doctors are represented by 84,40%, Chief of Departments by 100% and Residents by 78,63% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), shows a statistically significant association between the groups [$\chi^{2\,(305)} = 39{,}288$, $p = 0{,}000$].

High percentage of the medical staff declaring involvement in mass casualty situation, though disasters are quite rear in Latvia, can be explained their experience in admitting several injured patients simultaneously from car accidents which cannot be compared with major disaster consequences. Anyway, medical staff considered this experience as significant.

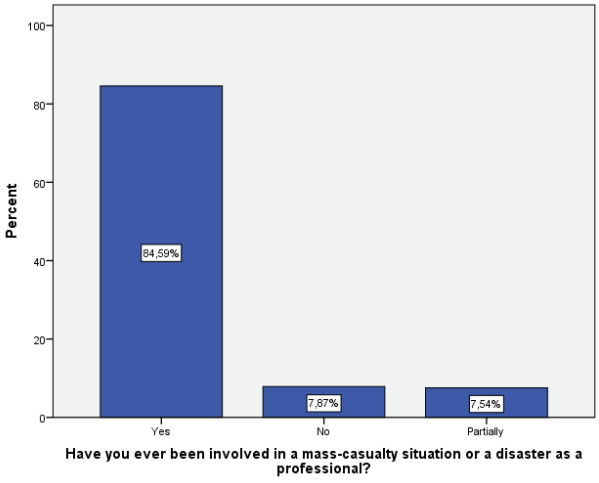



Chart #1: Total % Regardless of Position

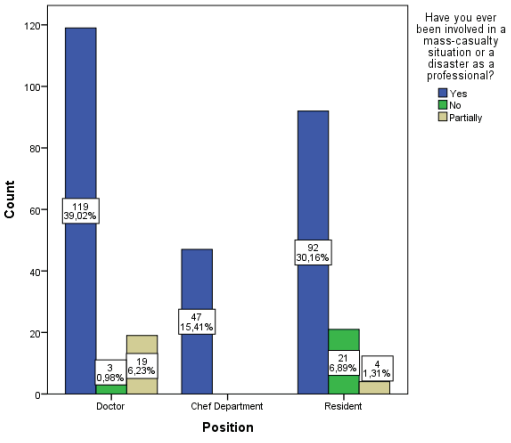



Chart #2: Total % by Group Position

**Coordination assessment regarding the level of previous disaster operations:**

The results show that in regard to the coordination of that/those disaster event(s), 7,04% (20) do not point any mistake (Chart #3), affirming that the situation was completely well managed, in which 3.87% (11) were Doctors, 1.76% (5) were Chiefs of Departments and 1.41% (4) were Residents (Chart #4; Appendix #9.6 - Table #10). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 7,80%, Chiefs of Department by 10,64% and Residents by 4,17% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), concludes that there are statistically significant association among the study groups [$\chi^{2\,(284)} = 42{,}081$, $p = 0{,}000$].

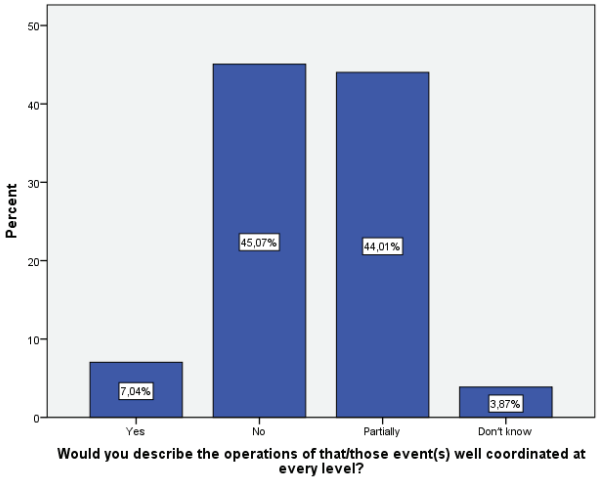



Chart #3: Total % Regardless of Position

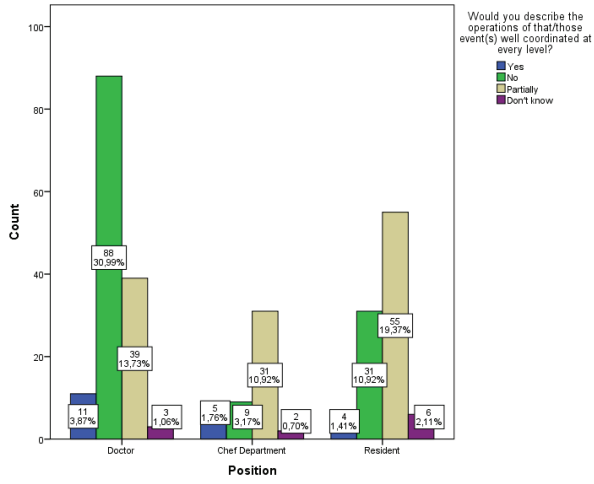



Chart #4: Total % by Group Position

**Assessment of preparedness of previous disaster operations**

When reported to the previous experience, 14,44% (41) of the participants who had been in a situation of disaster (Chart #5), claimed to feel fully trained and prepared to face the event, in which 8,80% (25) were Doctors, 1,41% (4) were Chiefs of Department and 4,23% (12) were Residents (Chart #6; Appendix #9.6 - Table #11). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 17,73%, Chiefs of Department by 8,51% and Residents by 12,50% (Appendix #9.7). The applied *Pearson Chi Square* test, for the study sample (Appendix #9.8), demonstrates that the three groups of participants, share a significant association between their answers regarding this question [$\chi^{2\,(284)} = 50{,}037$, $p = 0{,}000$].

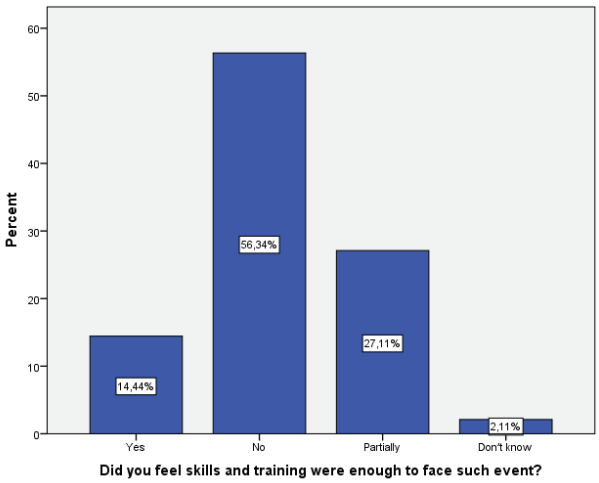



Chart #5: Total % Regardless of Position

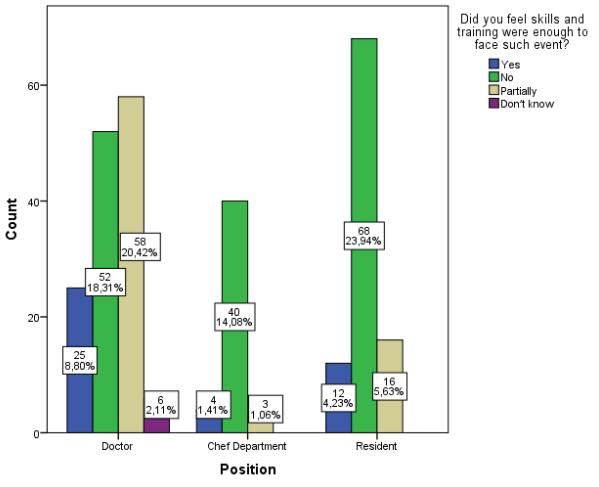



Chart #6: Total % by Group Position

**Evaluation of medical staff role in case of disaster/mass casualty situation**

When asked about their currently role in case of a mass-casualty or disaster, 15,74% (48) of participants declared to know it (Chart #7), in which 6,56% (20) were Doctors, 1,97% (6) were Chiefs of Department and 7,21% (22) were Residents (Chart #8; Appendix #9.6 - Table #12). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 14,18%, the Chiefs of Department by 12,77% and Residents by 18,80% (Appendix #9.7). With the application of *Pearson Chi Square* test, for the study sample (Appendix #9.8), expresses a statistically significant association between the three different groups of this part of the study is observed [$\chi^{2\,(305)} = 22{,}831$, $p = 0{,}000$].

Chart #7: Total % Regardless of Position

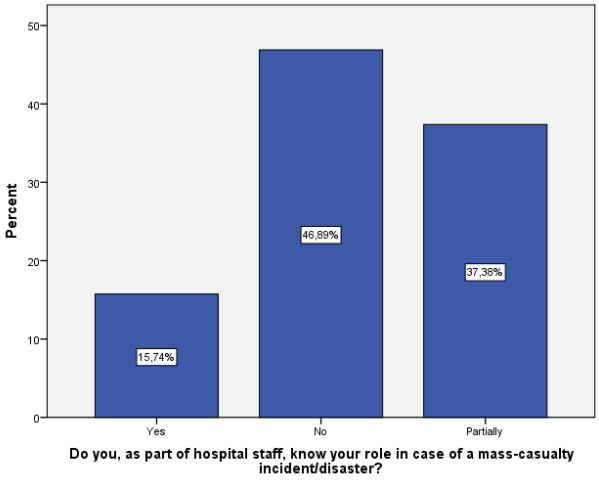
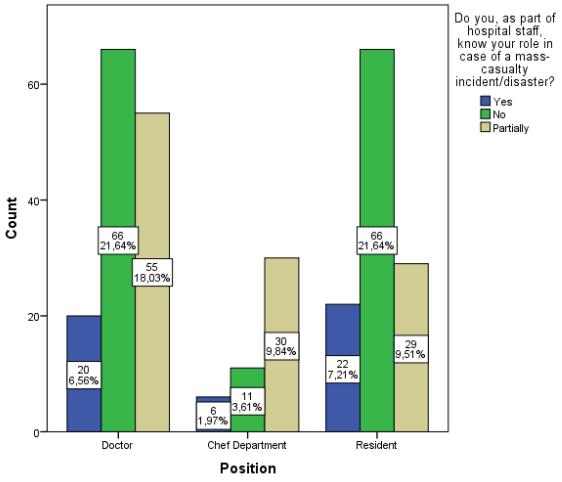



Chart #8: Total % by Group Position



**Awareness of medical management plan**

From the results, is possible to observe that 13,77% (42) of participants know entirely the formal emergency management plan where they currently work (Chart #9), in which 5,90% (18) were Doctors, 2,30% (7) were Chiefs of Departments and 5,57% (17) were Residents (Chart #10; Appendix #9.6 - Table #13). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 12,77%, the Chiefs of Department by 14,89% and the Residents by 14,53% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), exhibits a statistically significant association among the three different groups studied, namely Doctors, Chief of Department and Residents [$\chi^{2\,(305)} = 40{,}152$, $p = 0{,}000$].

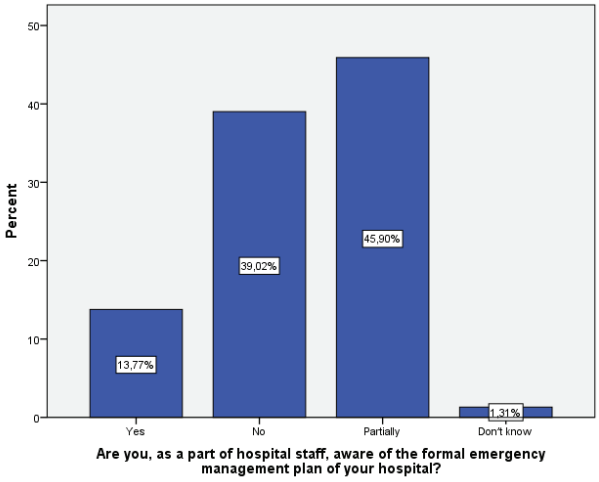



Chart #9: Total % Regardless of Position

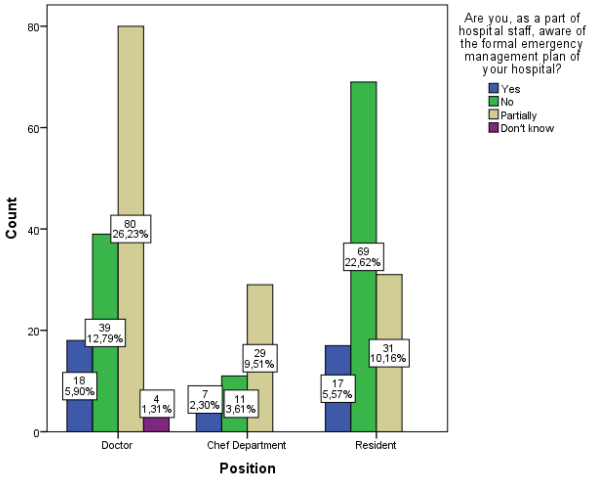



Chart #10: Total % by Group Position

**Formal training in Incident Command System**

From the 305 participants, 11,80% (36) know how to settle in a proper way a formal Incident Command System (Chart #11), in which 6,23% (19) were Doctors, 2,30% (7) were Chief of Departments and 3,28% (10) were Residents (Chart #12; Appendix #9.6 - Table #14). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 13,48%, the Chiefs of Department by 14,89% and the Residents by 8,55%(Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), indicates a statistically significant association between the three different groups studied [$\chi^{2\,(305)} = 32{,}690$, $p = 0{,}000$].

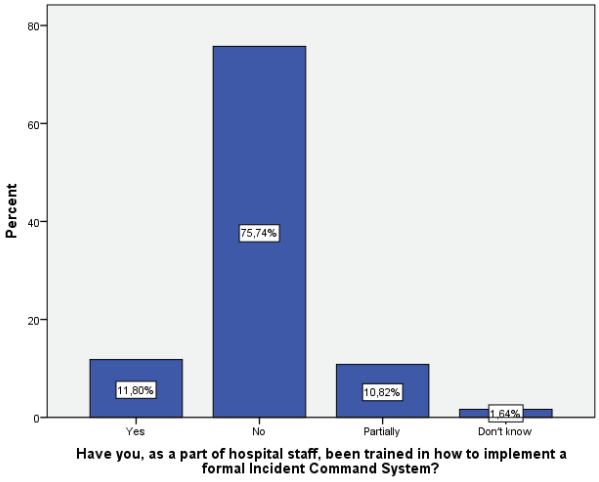



Chart #11: Total % Regardless of Position

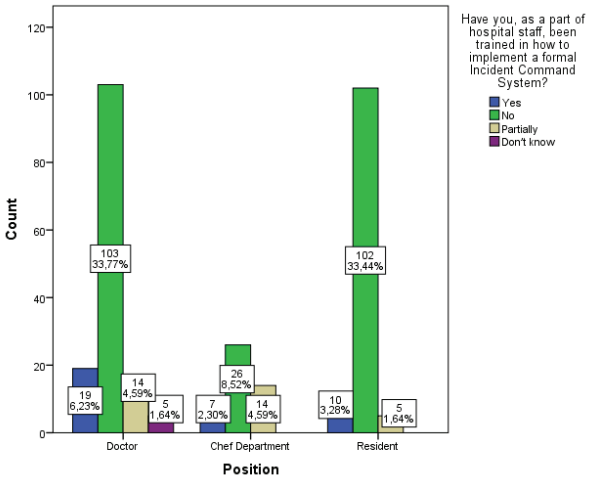



Chart #12: Total % by Group Position

Results demonstrates that 11,8% (36) of participants affirmed to have received a complete formal training in the field of Disaster Medicine (Chart #13). In which, 4,92% were Doctors (15), 2,62% (8) were Chiefs of Department and 4,26% (13) were Residents (Chart #14; Appendix #9.6 - Table #15). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 10,64%, the Chiefs of Department by 17,02% and the Residents by 11,11% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), reveals a statistically significant association among the three different groups studied [$\chi^{2\,(305)} = 14{,}236$, $p = 0{,}007$].

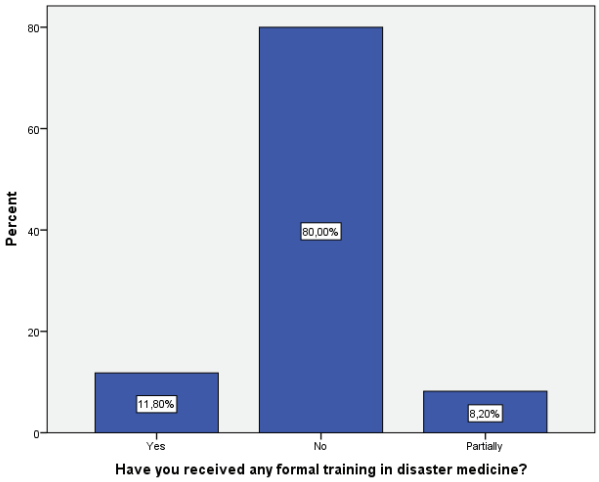



Chart #13: Total % Regardless of Position

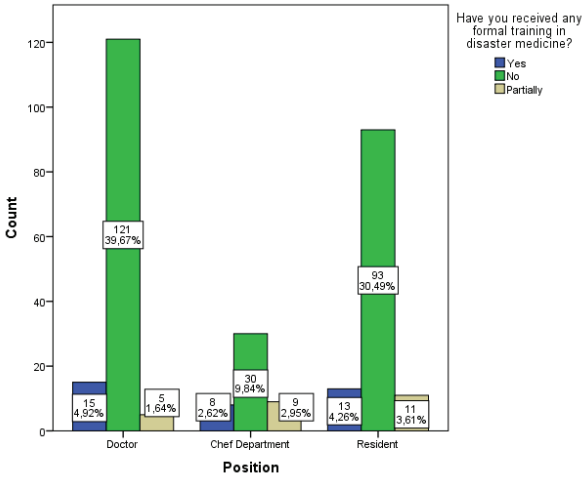



Chart #14: Total % by Group Position

**Self-assessment of knowledge regarding disaster**

Regarding a self-assessment made, 7,54% (23) of the participants, declared to feel to have enough knowledge in the area of Disaster Medicine (Chart# 15), in which 2,30% (7) were Doctors, 1,64% (5) were Chief of Department and 3,61% (11) were Residents (Chart #16; Appendix #9.6 - Table #16). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 4,96%, the Chiefs of Department by 10,64% and Residents by 9,40% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), expresses a statistically significant association between the three different groups studied, namely Doctors, Chief of Department and Residents [$\chi^{2\,(305)} = 32{,}089$, $p = 0{,}000$].

Chart #15: Total % Regardless of Position

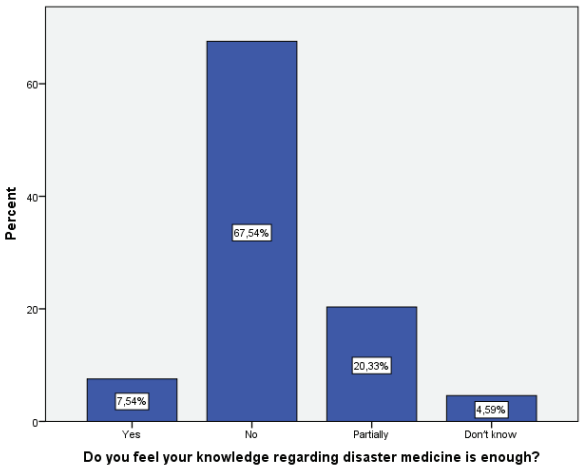
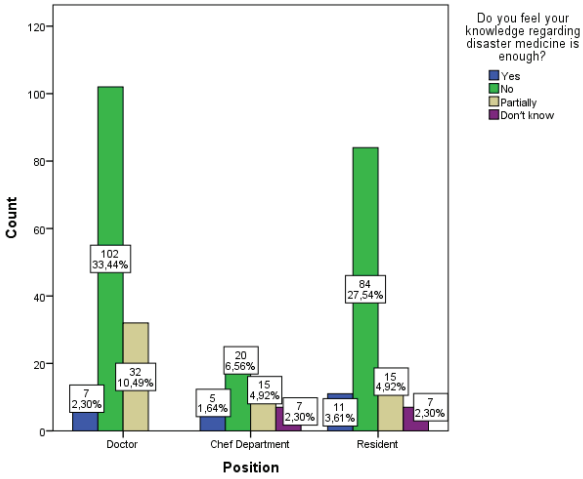



Chart #16: Total % by Group Position



**Willingness to attend disaster medicine trainings**

The willingness to attend Disaster Medicine trainings represents 71,15% (217) (Chart #17), in which 39,34% (120) were Doctors, 3,28% (10) were Chiefs of Department and 28,52% (87) were Residents (Chart #18; Appendix #9.6 - Table #17). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 85,11%, the Chief of Departments by 21,28% and the Residents by 74,36% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), displays a statistically significant association between the three different groups studied, namely Doctors, Chief of Department and Residents [$\chi^{2\ (305)} = 130{,}514$, $p = 0{,}000$].

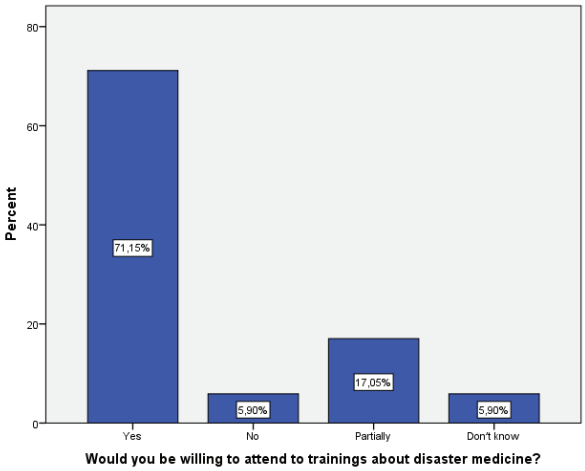



Chart #17: Total % Regardless of Position

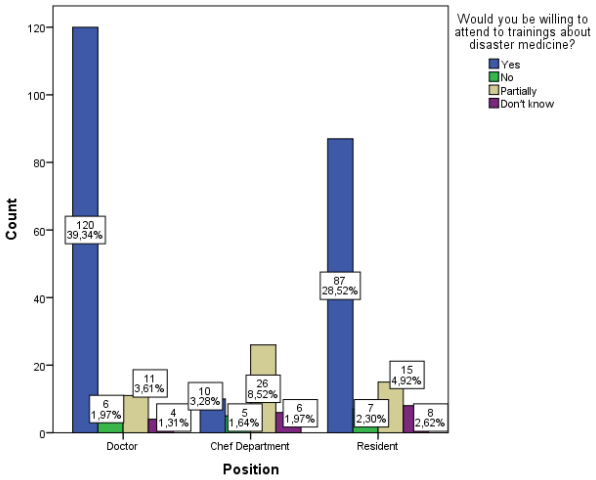



Chart #18: Total % by Group Position

**Importance of acquisition of competences in disaster medicine**

The results demonstrate that 76,39% (233) expressed as important the acquirement of skills and competences (Chart #19), in the field of Disaster Medicine, for their practice and the community, in which 40,98% (125) were Doctors, 2,62% (8) were Chiefs of Departments and 32,79% (100) were Residents (Chart #20; Appendix #9.6 - Table #18). A further statistical analyse, to the three groups, as independent groups and who have answered positively, shows that Doctors are represented by 88,65%, the Chiefs of Department by 17,02% and the Residents by 85,47% (Appendix #9.7). The *Pearson Chi Square* test, for the study sample (Appendix #9.8), presents a statistically significant association between the three different groups studied, namely Doctors, Chief of Department and Residents [$\chi^{2\,(305)} = 127{,}939$, $p = 0{,}000$].

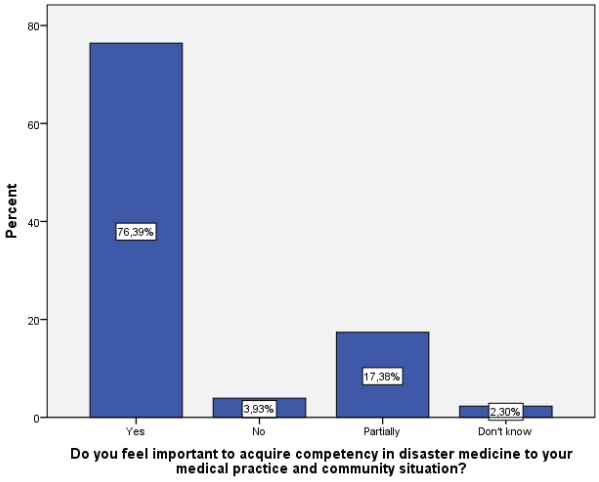



Chart #19: Total % Regardless of Position

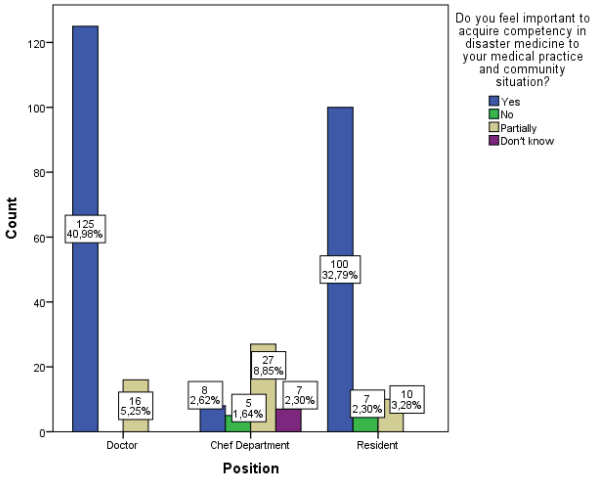



Chart #20: Total % by Group Position

Detailed statistical material describing preparedness of Latvian healthcare institutions for disaster management is presented in the APPENDIX of this monography.

# 5. DISCUSSION

The main purpose of this study was to assess the preparedness of Latvian healthcare facilities and physicians regarding disaster management.

Several researches have been assessing the impact and preparedness of all kind of disasters over hospitals around the world (Djalali *et al*, 2014a; Giacomet, Tarallo, DeMarco, Giannattasio, Barbarino & Guarino, 2007; Fusco, Schilling, De Iaco, Brodt, Brouqui, Maltezou, Bannister, Gottschalk, Thomson, Puro, Ippolito & EuroNHID, 2012; Murphy & Foot, 2011).

The Latvian health care system, concerning the disaster preparedness, has been already studied as part of European research conducted by Djalali *et al.* (2014a). This study was based on interviews with three experts of each European Union member, such as the president of the countries' emergency medicine society, a health system stakeholder and an expert in emergency management, all with 5 years of professional experience and tertiary level of education and has ranked Latvia in 6th position.

Globally, Djalali *et al.* (2014a) conclude that European Union health systems were within the acceptable levels but 2 out of 7 elements evaluated - hospitals and education and training - obtain a score bellow the acceptable levels. Doing so, the authors suggested, "the preparedness of disaster management system would not be able to operate effectively during and after a disaster. Interventional measures are needed" (p. 4).

## 5.1 DISCUSSION REGARDING HOSPITALS

Despite that our hospital sample consists of twenty-one Latvian hospitals, which might seem a small number, it should be considered that there are only thirty-one hospitals in Latvian that provide 24/7 medical care. Doing so, our sample is representative as it is 67,7% of the total hospitals.

The results from WHO checklist, suggest that Latvian hospital are, generally, not completely prepared for disasters.

Most of Latvian hospitals that participated in our study, affirmed not to apply the basic principle and strategies related to planning and implementing a hospital incident action plan. This means that these hospitals ignore either internal or external recommendations or guidelines, such as National Health Authority and WHO. Aligned with this idea, hospital do not ensure to their medical staff a specific training about Incident Command System. This result is in conformity with results obtained by the medical doctors assessed in our research.

At internal level, concerning the mass-casualty triage protocol, results from hospitals suggested that they do not follow international principles and guidelines. The coordination at external level, revealed to be poor, since most of hospitals are not able to ensure continuous provision

of essential medical services throughout the community. Having no protocols, it might explain the reason why medical staff claimed not to know their role in case of mass-casualty event or disaster.

Our research, also suggest that most hospitals do not have suitable alternative plans indispensable for life, reserve of medical supplies as well as training and exercises provided to the critical areas in case of disasters.

Moreover, only one out of twenty-one hospitals declared to have a promptly mechanism that allows to gather accredited professionals for an emergent situation. This means when the medical is out of availability, the hospital is not capable anymore to provide continuity of services, which is crucial in case of disaster.

Although Latvian healthcare facilities are not prepared to face a disaster, the overall picture shows that among the 3 categories of Latvian hospitals, regional and local hospitals scored the best level of preparedness, while university hospitals the scored the lowest level.

This discrepancy between the highest and lowest scores might be explained by the level of administration and first responders' perception of readiness fails due to some main reasons, such as the distance between administrators and frontline caregivers. In addition, the lack of expertise in disaster medicine at administrators' level creates a gap between hospital administration and health care professionals, because the bigger is the hospital more difficult is to deliver and prepare the care in a disaster setting.

Knowing that a disaster can strike anywhere and anytime with no chance to select what kind of hospital will be affected, the reasons why regional and local hospital scored better regarding preparedness level are not so relevant, as all hospitals, no matter which type, must follow an emergency action plan.

In fact, it is the lack of a formal assessment, which could allow the improvement of the preparedness level, could be the main reason for the low scores within Latvian healthcare facilities.

There are no similar published article that assessed only disaster preparedness of Latvian hospitals or elsewhere. However, our results are corroborated by the study conducted by Djalali *et al.* (2014a), which confirmed that hospitals, within the European Union health system, are not at an acceptable level.

## 5.2 DISCUSSION REGARDING PHYSICIANS

Based on possessed knowledge, there is no similar published article on disaster preparedness of Latvian medical doctors that either support or deny this survey study conclusions, making this research an innovative one. Although the lack of previous research in Latvia, within

preparedness of physicians in this area, some studies have been conducted abroad to assess the education and training of medical doctors. The results of Djalali *et al.* (2014a) has shown a lack of education and training in health system within European Union members. In this line of thinking, researches from Burkle (2012) and Lennquist (2005) already highlighted the need for better education and training of surgeons and other else professionals.

Concerning the previous experience of the physicians, the majority of medical staff stated that they have been professionally involved in a mass-casualty or disaster event. Such high number of positive answers, concerning disaster experience could be explained by the formulation of the question: "Have you ever been involved in mass casualty or disaster event?". Though disasters are not frequent in Latvia, numerous casualties simultaneously admitted to the hospital could have happened in the professional experience of almost every physician. However, just a minority described the level of coordination as well prepared. In the same way, only a minority of the participants, declared to feel having skills and training enough to face such event they have experienced.

Nevertheless and surprisingly, in the current evaluation of medical staff role, in case of disaster, over 3/4 of participants still claim not to know completely their role in case of mass-casualty incident, explained by the low scores regarding the knowledge of the formal emergency plan of their hospitals, as well as the implementation of an Incident Command System - a result that is confirmed by the assessed hospitals. Moreover, results also shown that hospitals do not follow international accepted protocols nor guidelines, which might explain what medical staff claimed.

Doing so, if the majority claimed to be involved in disasters situations and currently declare not to know completely their role, the formal emergency management plan and implementation of Incident Comment System, indicate at least a lack in the system, which means a deficiency of education and training.

Considering the three categories of physicians, as well as the three levels of assessment, regarding previous experience the doctor's group scored the highest level. Referring to preparedness, education and training, a majority of doctors have answered positively, except the evaluation of medical staff role pointed on the highest by residents. The willingness component was highly scored by doctors, except self-assessment of knowledge regarding disaster that was highly grade by residents.

Although Chiefs of Departments showed, overall, the lowest number in terms of previous experiences and preparedness, these results should be considered as the most reliable and valuable, as we have to take in consideration that this group is the most experienced and playing the most important role in the hospital during a disaster and its preparedness.

Despite that Chief of Departments also account with the lowest percentages, about willingness component, these results are easily understandable. Taking into account the increasing number of disasters worldwide, along with new policies and strategies of disaster risk reduction education, Residents and Doctors are probably more aware and willing to be involved due to the importance of skills and competences acquisition about the topic.

However and aligned with the hospital outcome, the key point is not to find which group is more or less prepared. Facing a disaster event, there is no time or chance to select the better group to respond to the situation, as disasters are unpredictable in time and space. Moreover, having a medical staff only partially prepared and not working with a standardized protocol and properly trained, may lead to an unsatisfactory and irreversible outcome.

To support the previous data and discussion, the majority of participants declared not to have any formal training in Disaster Medicine and recognize that their knowledge regarding disaster is not enough. Following this idea, results show that majority of medical staff is willing to attend Disaster Medicine trainings, an opinion that may be supported by the fact that, most of the participants admitted the importance to acquire competences in the discipline of Disaster Medicine for medical practice and community.

There are no similar published articles that assessed only disaster preparedness of Latvian medical staff or elsewhere. However, our results regarding the elements of education and training are in conformity with the research of Djalali *et al.* (2014a), which has scored European Union member's level below the acceptable.

## 5.3 LIMITATIONS

The study has some limitations that must be considered when interpreting its results. The online survey used to assess physician's preparedness, may create unequal possibilities to respond to it and makes it theoretically possible that an individual could have responded more than once to the survey. Although, all the participants were part of the hospitals this study assessed, the proportion of its number was not stipulated beforehand, creating a limitation in terms of ratio physicians/hospital.

The checklist used to assess hospitals preparedness represents one more limitation, since it was applied only four key components out of nine. Even if general conclusions cannot be made, the information collected with the four key components is already a strong indication about the overall level of preparedness.

One can assume that these results are conservative and the actual preparedness may be higher but author believe that it may be assumed that the physicians and hospitals who accepted to

participate were also those more likely to have a pre-existing interest in the field of Disaster Medicine, making the general level of preparedness actually lower.

Even considering this limitation, the findings are encouraging to build better planning to the healthcare facilities and educate medical doctors, creating opportunities to train and exercise their knowledge.

# CONCLUSION

1. Latvian healthcare facilities are not yet prepared to respond to a disaster as they do not follow any of the defined international principles or guidelines on disaster medicine and do not have in place suitable alternative plans, which are indispensable for life-saving in case of disaster.

2. Latvian healthcare facilities do not ensure explicit training about the implementation of an Incident Command System to their staff and, as a result, the majority of medical professionals are not fully aware of their role and responsibilities in a mass-casualty incident or disaster event, failing to act as a competent team. Hospitals' emergency plans must be considered imperative and indispensable.

3. Given the poor readiness of healthcare facilities to handle a potential disaster, Latvian medical doctors are not adequately prepared to address a disaster as individual professionals either.

4. As the majority of medical doctors interviewed claims to have been involved in disaster situations while, at the same time, not being fully aware of their role in the formal emergency plan and implementation of Incident Command System, this suggests a flaw in the system, which can only be improved by means of education, training and medical awareness.

5. Latvian medical physicians interviewed acknowledged that they do not have sufficient education and training to handle a disaster but they would be willing to receive disaster medicine training in order to close the competencies gap.

## 6.1 RECOMMENDATIONS

1. According to Sendai Framework for Disaster Risk Reduction principles (2015), is crucial to prepare medical professionals to understand disaster risks and implement disaster risk reduction practices and strategies as well. In addition, the Latvian Law of Civil Defence and Handling of Disasters (2016), states the need of mandatory trainings in the area.

2. Since these are recent laws and professionals that currently work in the hospitals were not covered by these legal reforms, we recommend that a new study should be replicable some

years later. Moreover, the replication of our study with appropriate adjustments, if necessary (e.g. new measures if disclosed in the near future), would also show the improvements at the level of preparedness about Latvian medical staff.

3. The education of medical students regarding disaster risk reduction play a valuable role and should be seen as a priority that must start to be implemented at national educational level in medical curricula, in order to raise awareness and provide a better understanding of disaster management for future doctors.

4. Adoption of standardized protocols, formal trainings and exercises, done in the framework of state Civil defines system, engaging neighbouring hospitals, police, firefighters, health authorities and the hospital staff could allow a better response to disasters events.

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# APPENDIX A

## A.1 ASSESSMENT OF PREPAREDNESS OF LATVIAN HEALTHCARE FACILITIES

**Consent Form**

You are invited to take part in the research study "Assessment of preparedness about disaster medicine of medical institutions and staff in Latvia".

Taking part in this survey is completely voluntary; information provided will be safeguarded and reputational issues managed.

Due to ethical reasons, the participating hospital's name and exact location will be treated as confidential information and not discussed with outside parties.

**Statement of Consent:**

I have read the above information, and have received answers to any questions. I affirm that I am 18 years of age or older.

□ I consent

□ I don't consent to take part in the research study "Title".

**GLOSSARY**

**Command and control:** The decision-making system responsible for activating, coordinating, implementing, adapting and terminating a pre-established response plan

**Critical event:** Any event in connection with which a hospital finds itself unable to deliver care in the customary fashion or to an accepted standard, event resulting in a mismatch of supply (capacity, resources, infrastructure) and demand (patients), and requiring the hospital to activate contingency measures to meet demand

**Disaster:** Any event or series of events causing a serious disruption of a community's infrastructure – often associated with widespread human, material, economic, or environmental loss and impact, the extent of which exceeds the ability of the affected community to mitigate using existing resources.

**Emergency:** A sudden and usually unforeseen event that calls for immediate measures to mitigate impact.

**Emergency response plan:** A set of written procedures that guide emergency actions, facilitate recovery efforts and reduce the impact of an emergency event.

**Incident action plan:** A document that guides operational activities of the Incident Command System during the response phase to a particular incident. The document contains the overall incident objectives and strategy, general tactical actions, and supporting information to enable successful completion of objectives.

**Incident command group (ICG):** A multidisciplinary body of the incident command system, which provides the overall technical leadership and over-sight for all aspects of crisis management, coordinates the overall response, approves all action, response and mitigation plans, and serves as an authority on all activities and decisions.

**Incident command system (ICS):** The designated system of command and control, which includes a combination of facilities, equipment, personnel, procedures, and means of communication, operating within a common organizational structure designed to aid in the management of resources for emergency incidents.

**Preparedness:** The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent, or cur-rent hazardous events or conditions.

**Recovery:** Restoring or improving the functions of a facility affected by a critical event or disaster through decisions and action taken after the event.

**Resources:** The personnel, finances, facilities and major equipment and supply items available or potentially available for assignment to incident operations.

**Response:** The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected.

**Risk assessment:** A methodology for determining the nature and extent of risk, which involves analysing potential hazards and evaluating their impact in the context of existing conditions of vulnerability that, together, could harm exposed people, property, services, livelihoods, and the environment on which they depend.

**Standard operating procedure:** A complete reference document or operations manual that describes the purpose of a preferred method of performing a single function or a number of interrelated functions in a uniform manner and provides information about the duration of the operation, the authorities of those involved and other relevant details.

**Surge capacity:** The ability of a health service to expand beyond normal capacity to meet an increased demand for clinical care.

**Triage:** The process of categorizing and prioritizing patients with the aim of providing the best care to as many patients as possible with the available resources.

**KEY COMPONENT 1. COMMAND AND CONTROL**

Please, answer the following questions, about your hospital.

In case of a disaster/emergency/critical event:

**1. Does the hospital have a designated command center? (i.e. a specific location prepared to convene and coordinate hospital-wide emergency response activities and equipped with effective means of communication)**

☐ Yes □ No □ Partially □ Don't know

**2. Does the hospital designate an individual for each of the nine key components of emergency response, to ensure the appropriate management and coordination of related response activities? (Command and control, communication, safety and security, triage, surge capacity, continuity of essential services, human resources, logistics and supply management, post-disaster recovery)**

□ Yes □ No □ Partially □ Don't know

**3. Does the hospital designate replacements for directors and focal points to guarantee continuity of the command-and-control structure and function?**

□ Yes □ No □ Partially □ Don't know

**4. Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planning and implementing a hospital incident action plan?**

□ Yes □ No □ Partially □ Don't know

**5. Does the hospital implement or develop job action sheets that briefly list the essential qualifications, duties and resources required of ICG members, hospital managers and staff for emergency-response activities?**

□ Yes □ No □ Partially □ Don't know

**6. Ensure that all ICG members have been adequately trained on the structure and functions of the incident command system (ICS)?**

□ Yes □ No □ Partially □ Don't know

**KEY COMPONENT 4. TRIAGE**

Please, answer the following questions, about your hospital. In case of a disaster/emergency/critical event:

**1. Does the hospital designate an experienced triage officer to oversee all triage operations? (e.g. a trauma or emergency physician or a well-trained emergency nurse in a supervisory position).**

□ Yes □ No □ Partially □ Don't know

**2. Does the hospital ensure that areas for receiving patients, as well as waiting areas, are effectively covered, secure from potential environmental hazards and provided with adequate work space, lighting and access to auxiliary power?**

□ Yes □ No □ Partially □ Don't know

3. **Does the hospital ensure that the triage area is in close proximity to essential personnel, medical supplies and key care services? (e.g. the emergency department, operative suites, the intensive care unit)**

□ Yes □ No □ Partially □ Don't know

4. **Ensure that entrance and exit routes to/from the triage area are clearly identified?**

□ Yes □ No □ Partially □ Don't know

**5. Does the hospital establish a mass-casualty triage protocol based on severity of illness/in-jury, survivability and hospital capacity that follows internationally accepted principles and guidelines?**

□ Yes □ No □ Partially □ Don't know

**6. Establish a clear method of patient triage identification?**

□ Yes □ No □ Partially □ Don't know

**KEY COMPONENT 6. CONTINUITY OF ESSENTIAL SERVICES**

Please, answer the following questions, about your hospital. In case of a disaster/emergency/critical event:

**1. Does the hospital have a list all hospital services, ranking them in order of priority?**

□ Yes □ No □ Partially □ Don't know

**2. Does the hospital identify and maintain the essential hospital services? (i.e. those that need to be available at all times in any circumstances.)**

□ Yes □ No □ Partially □ Don't know

**3. Does the hospital ensure the existence of a systematic and deployable evacuation plan that seeks to safeguard the continuity of critical care? (including, for example, access to mechanical ventilation and life-sustaining medications)**

□ Yes □ No □ Partially □ Don't know

**4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medical services throughout the community?**

□ Yes □ No □ Partially □ Don't know

**5. Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen?**

□ Yes □ No □ Partially □ Don't know

**6. Does the hospital anticipate the impact of the most likely disaster events on hospital supplies of food and water. Take action to ensure the availability of adequate supplies?**

□ Yes □ No □ Partially □ Don't know

**7. Has the hospital created a strategic reserve of medicines and medical devices?**

□ Yes □ No □ Partially □ Don't know

**KEY COMPONENT 8. HUMAN RESOURCES**

Please, answer the following questions, about your hospital. In case of a disaster/emergency/critical event:

**1. Does the hospital have an updated the hospital staff contact list?**

□ Yes □ No □ Partially □ Don't know

**2. Does the hospital recruit and train additional staff (e.g. retired staff, reserve military personnel, university affiliates/students and volunteers) according to the anticipated need?**

□ Yes □ No □ Partially □ Don't know

**3. Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy?**

□ Yes □ No □ Partially □ Don't know

**4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medical services throughout the community?**

□ Yes □ No □ Partially □ Don't know

**5. Does the hospital provide training and exercises in areas of potential increased clinical demand, including emergency and intensive care, to ensure adequate staff capacity and competency?**

□ Yes □ No □ Partially □ Don't know

**6. Does the hospital ensure the availability of multidisciplinary psychosocial support teams that include social workers, counsellors, interpreters and clergy for the families of staff and patients?**

☐ Yes □ No □ Partially □ Don't know

## A.2 ASSESSMENT OF PREPAREDNESS OF LATVIAN MEDICAL STAFF

**Consent Form**

You are invited to take part in the research study "Assessment of preparedness about disaster medicine of medical institutions and staff in Latvia".

Taking part in this survey is completely voluntary; information provided will be safeguarded and reputational issues managed.

Due to ethical reasons, the participating hospital's name and exact location will be treated as confidential information and not discussed with outside parties.

**Statement of Consent:**

I have read the above information, and have received answers to any questions. I affirm that I am 18 years of age or older.

□ I consent

□ I don't consent to take part in the research study "Title".

**Position**:

Chef of Department □ Doctor □ Resident □

**Gender**:

Female □ Male □

**Years of Service:**

< 1 year □ 2 - 5 years □ 6 - 10 years □ > 10 years □

**Type of Hospital:**

Private □ Public □ University Hospital □

## GLOSSARY

**Command and control:** The decision-making system responsible for activating, coordinating, implementing, adapting and terminating a pre-established response plan

**Critical event:** Any event in connection with which a hospital finds itself unable to deliver care in the customary fashion or to an accepted standard, event resulting in a mismatch of supply (capacity, resources, infrastructure) and demand (patients), and requiring the hospital to activate contingency measures to meet demand

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**Emergency:** A sudden and usually unforeseen event that calls for immediate measures to mitigate impact.

**Emergency response plan:** A set of written procedures that guide emergency actions, facilitate recovery efforts and reduce the impact of an emergency event.

**Incident command system (ICS):** The designated system of command and control, which includes a combination of facilities, equipment, personnel, procedures, and means of communication, operating within a common organizational structure designed to aid in the management of resources for emergency incidents.

**Preparedness:** The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent, or cur-rent hazardous events or conditions.

**Response:** The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected.

**Triage:** The process of categorizing and prioritizing patients with the aim of providing the best care to as many patients as possible with the available resources.

**1. Previous experience**

Please, answer the following questions, regarding your previous experience about disasters

**1. Have you ever been involved in a mass-casualty situation or a disaster as a professional?**

☐ Yes □ No □ Partially □ Don't know

If no, skip to part 2. Preparedness (education, training and exercise)

**2. Have your current (or previous) hospital ever experienced a mass-casualty situation or a disaster?**

☐ Yes □ No □ Partially □ Don't know

**3. Would you describe the operations of that/those event(s) well coordinate at every level?**

☐ Yes □ No □ Partially □ Don't know

**4. Were you aware of the formal emergency management plan of the hospital?**

☐ Yes □ No □ Partially □ Don't know

**5. Did you, as a part of a hospital staff, know your role in such event?**

☐ Yes □ No □ Partially □ Don't know

**6. Did you feel skills and training were enough to face such event?**

☐ Yes □ No □ Partially □ Don't know

**2. Preparedness**

Please, answer the following questions, regarding your own preparedness about disasters.

**1. Do you, as part of hospital staff, know your role in case of a mass-casualty incident/disaster?**

☐ Yes □ No □ Partially □ Don't know

**2. Do you, as a part of hospital staff, are aware of the formal emergency management plan of your hospital?**

☐ Yes □ No □ Partially □ Don't know

**3. Do you, as a part of hospital staff, have been trained in how to implement a formal Incident Command System**

☐ Yes □ No □ Partially □ Don't know

**4. Have you ever participate any internal simulation/exercise in response to a mass-casualty incidence/disaster in the past year?**

☐ Yes □ No □ Partially □ Don't know

**5. Have you received any formal training in disaster medicine?**

☐ Yes □ No □ Partially □ Don't know

**6. Do you feel your knowledge regarding disaster medicine is enough?**

☐ Yes □ No □ Partially □ Don't know

**3. WILLINGNESS**

Please, answer the following questions, regarding your willingness about disasters.

**1. Would you be willing to attend to trainings about disaster medicine?**

☐ Yes □ No □ Partially □ Don't know

**2. Do you feel important to acquire competency in disaster medicine to your medical practice and community situation?**

☐ Yes □ No □ Partially □ Don't know

**3. Do you think disaster medicine is neglected?**

☐ Yes □ No □ Partially □ Don't know

**4. Would you be willing to promote awareness of emergency procedures among your colleagues?**

☐ Yes □ No □ Partially □ Don't know

**5. Would you be willing to engage in a disaster event?**

☐ Yes □ No □ Partially □ Don't know

**6. Would you be willing to be deployed to respond a disaster?**

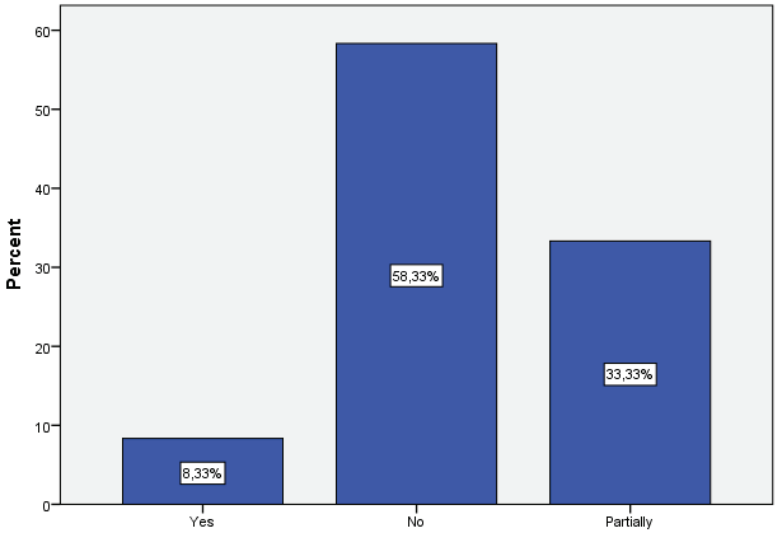
☐ Yes □ No □ Partially □ Don't know

## A.3 TABLE REGARDING TOTALS BY HEALTHCARE FACILITIES REGARDLESS ITS TYPE

| | | Count | Column N % |
|---|---|---|---|
| 1. Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planning and implementing a hospital incident action plan ? | Yes | 4 | 19,0 |
| | No | 10 | 47,6 |
| | Partially | 5 | 23,8 |
| | Don't know | 2 | 9,5 |
| 2. Ensure that all ICG members have been adequately trained on the structure and functions of the incident command system (ICS)? | Yes | 5 | 23,8 |
| | No | 1 | 4,8 |
| | Partially | 14 | 66,7 |
| | Don´t Know | 1 | 4,8 |
| 3. Does the hospital establish a mass-casualty triage protocol based on severity of illness/in-jury, survivability and hospital capacity that follows internationally accepted principles and guidelines? | Yes | 6 | 28,6 |
| | No | 8 | 38,1 |
| | Partially | 7 | 33,3 |
| 4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medical services throughout the community? | Yes | 5 | 23,8 |
| | No | 5 | 23,8 |
| | Partially | 11 | 52,4 |
| 5. Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen? | Yes | 5 | 23,8 |
| | No | 4 | 19,0 |
| | Partially | 12 | 57,1 |
| 6. Does the hospital have a strategic reserve of medical supplies? | Yes | 8 | 38,10 |
| | No | 1 | 4,76 |
| | Partially | 12 | 57,14 |
| 7. Does the hospital provide training and exercises in areas of potential increased clinical demand, including emergency and intensive care, to ensure adequate staff capacity and competency? | Yes | 5 | 23,8 |
| | No | 7 | 33,3 |
| | Partially | 9 | 42,9 |
| 8. Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy? | Yes | 1 | 4,8 |
| | No | 18 | 85,7 |
| | Partially | 2 | 9,5 |

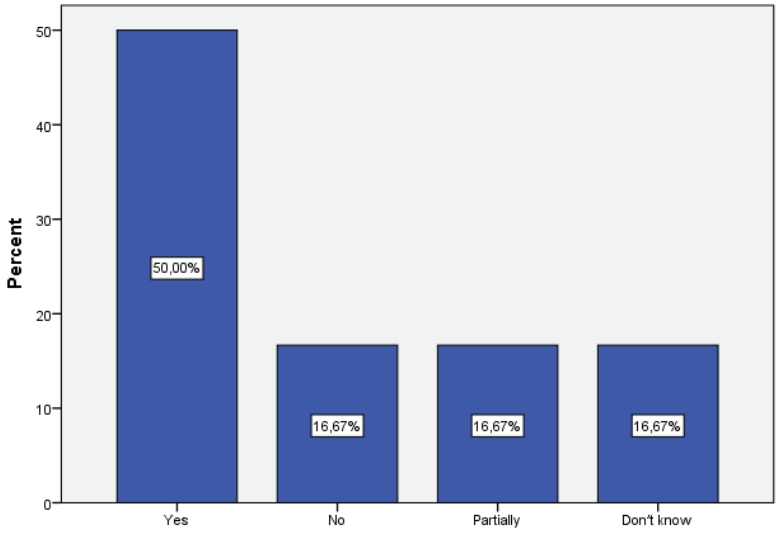
## A.4 HEALTHCARE RESULTS BY INDEPENDENT GROUPS

### Local



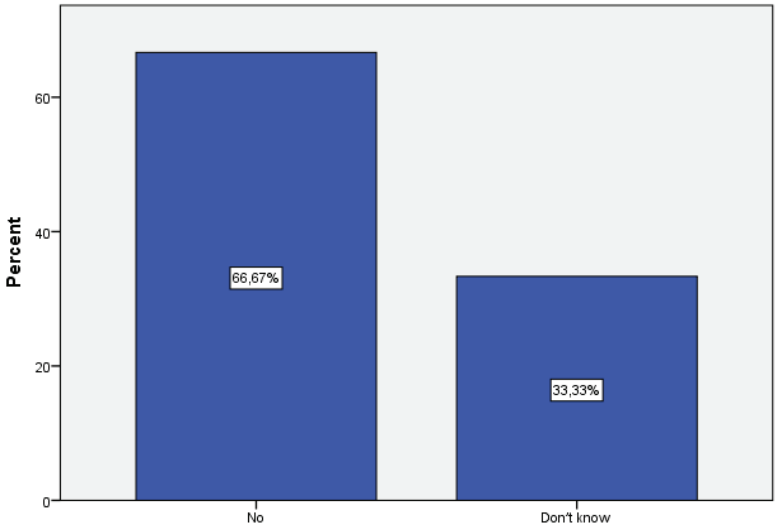

**4. Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planni**

### Regional



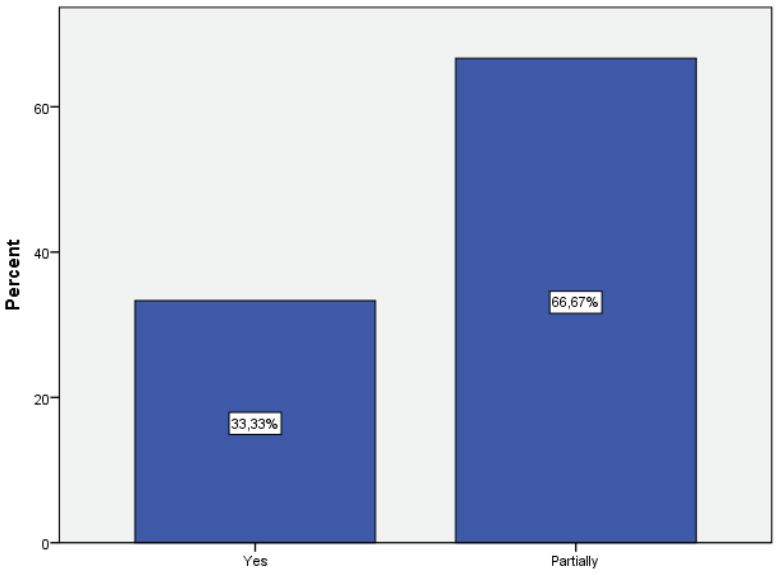

**4. Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planni**

**University**



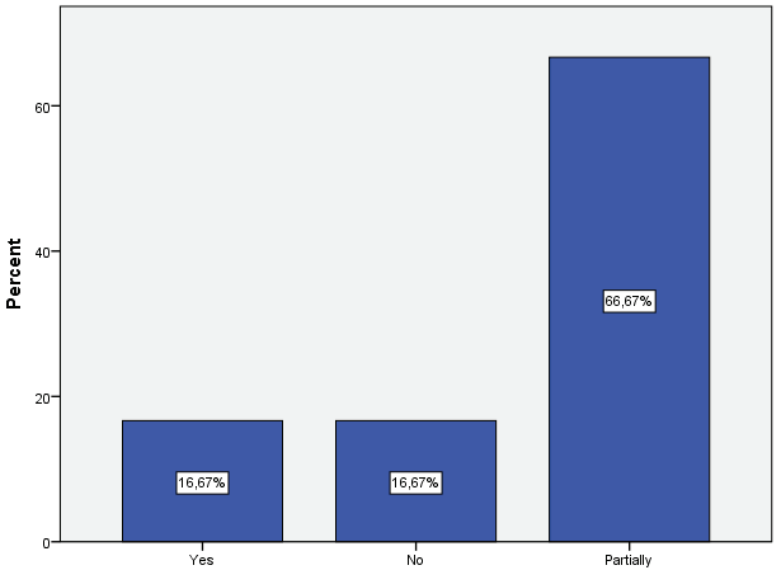

**4. Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planni**

**Local**



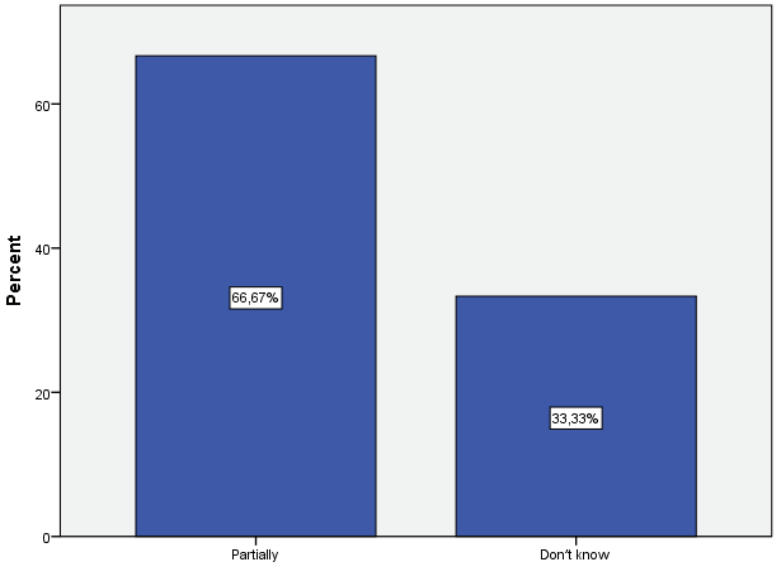

**6. Ensure that all ICG members have been adequately trained on the structure and functions of the incident command system (ICS)?**

**Regional**



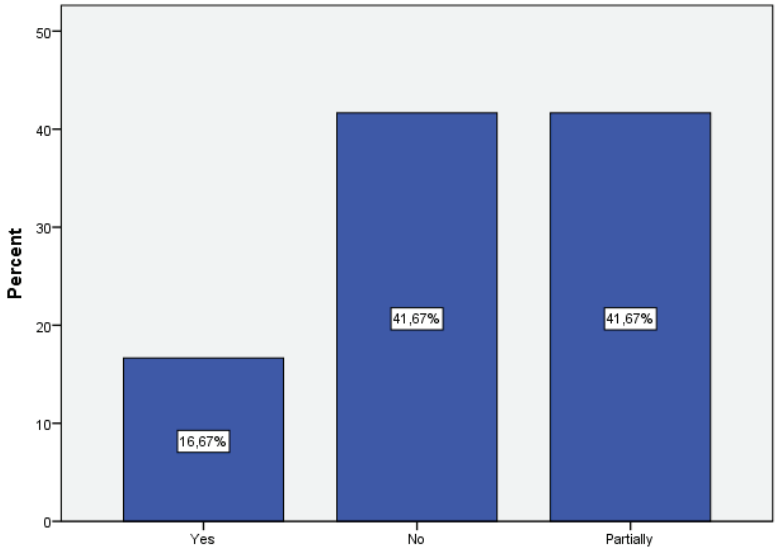

**6. Ensure that all ICG members have been adequately trained on the structure and functions of the incident command system (ICS)?**

**University**



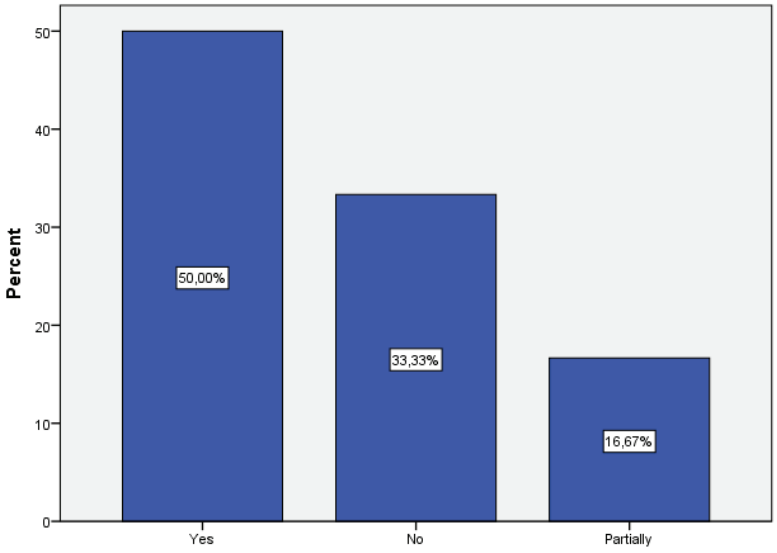

**6. Ensure that all ICG members have been adequately trained on the structure and functions of the incident command system (ICS)?**

**Local**



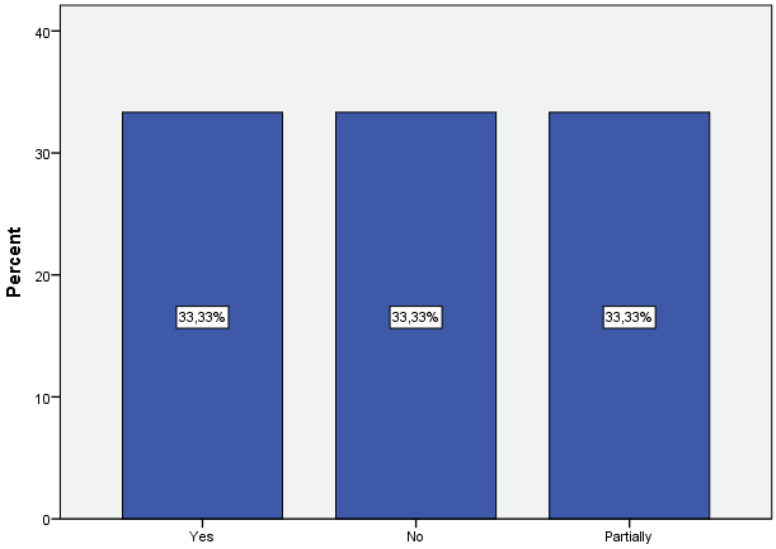

**5. Does the hospital establish a mass-casualty triage protocol based on severity of illness/in-jury, survivability and hospital capacity that follows internationally accepted principles and guidelines?**

**Regional**



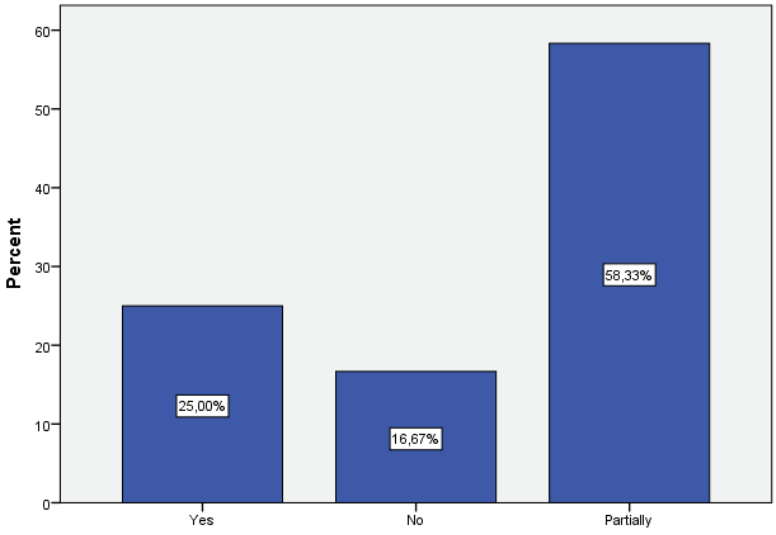

**5. Does the hospital establish a mass-casualty triage protocol based on severity of illness/in-jury, survivability and hospital capacity that follows internationally accepted principles and guidelines?**

**University**



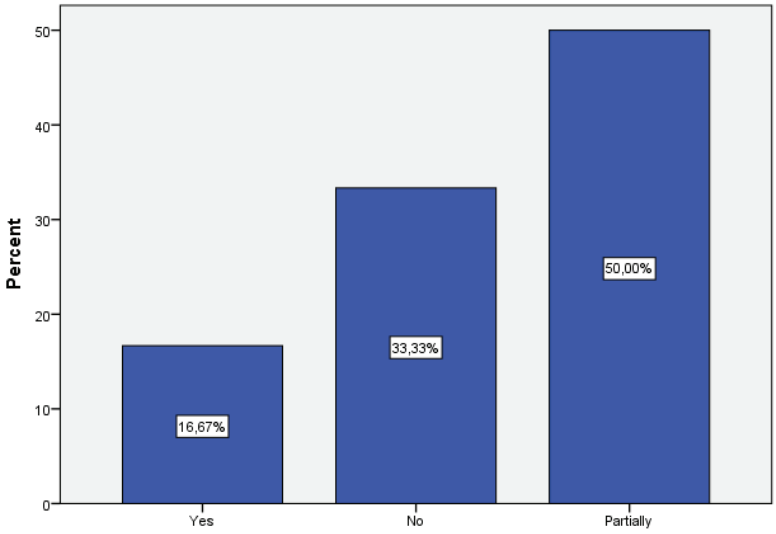

**5. Does the hospital establish a mass-casualty triage protocol based on severity of illness/in-jury, survivability and hospital capacity that follows internationally accepted principles and guidelines?**

**Local**



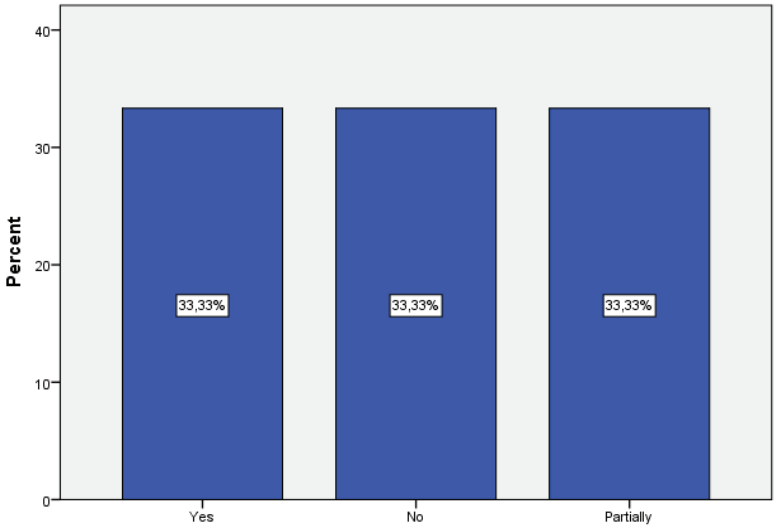

**4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medica**

**Regional**



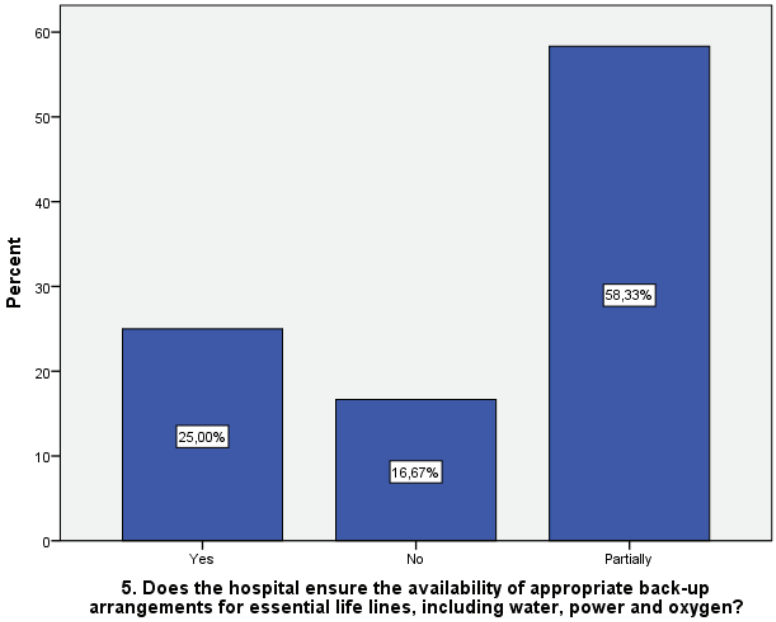

**4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medica**

**University**



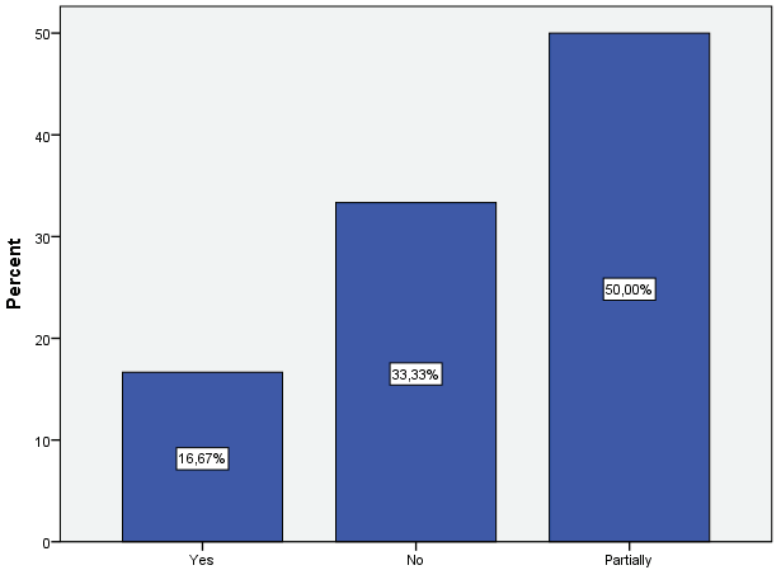

**4. Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medica**

**Local**



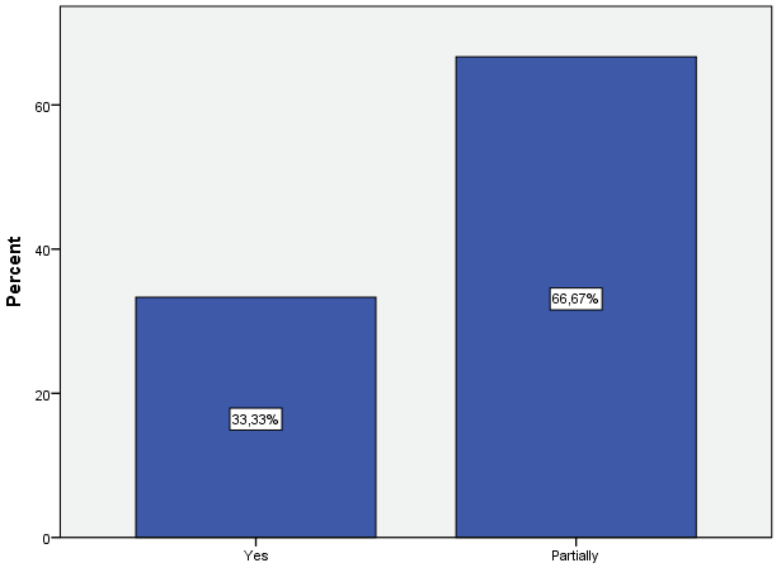

**5. Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen?**

**Regional**



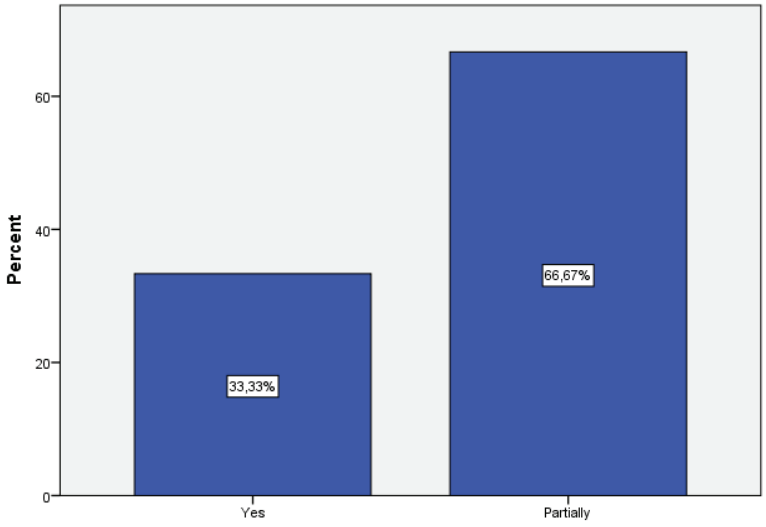

**5. Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen?**

**University**



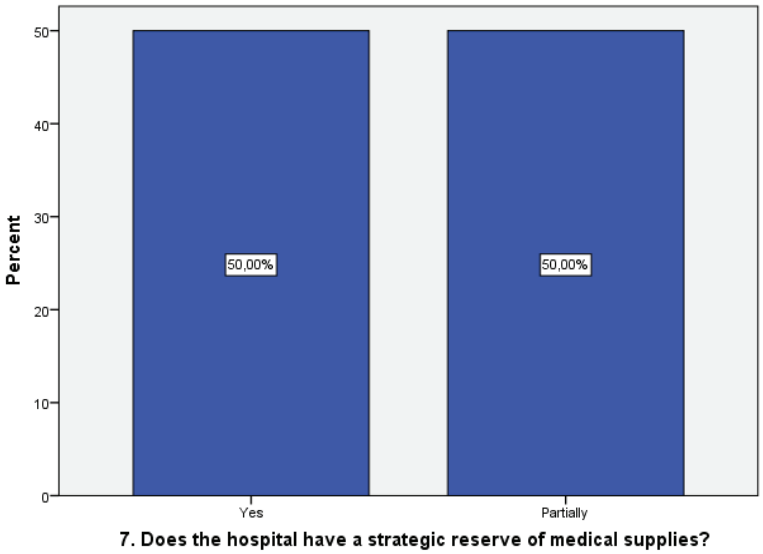

**5. Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen?**

**Local**

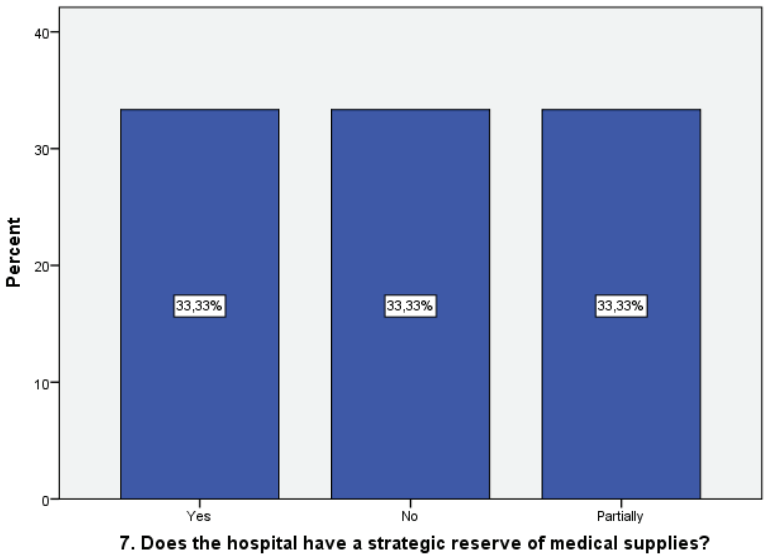



**7. Does the hospital have a strategic reserve of medical supplies?**

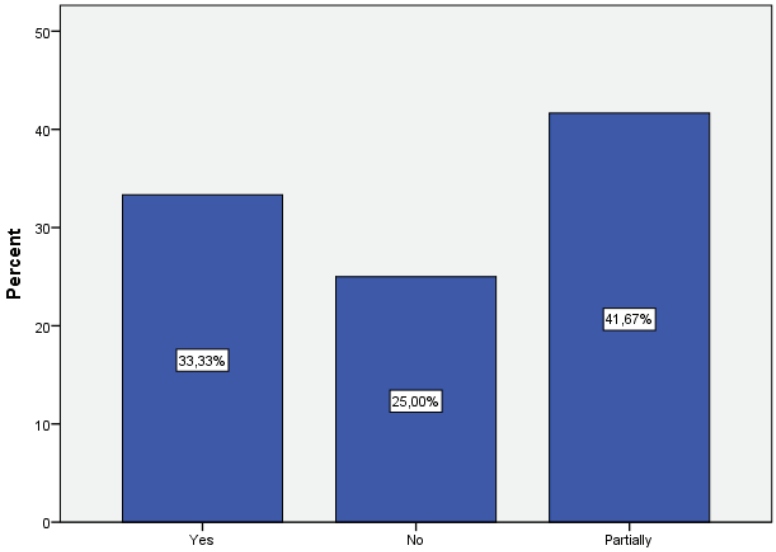
**Regional**




**University**

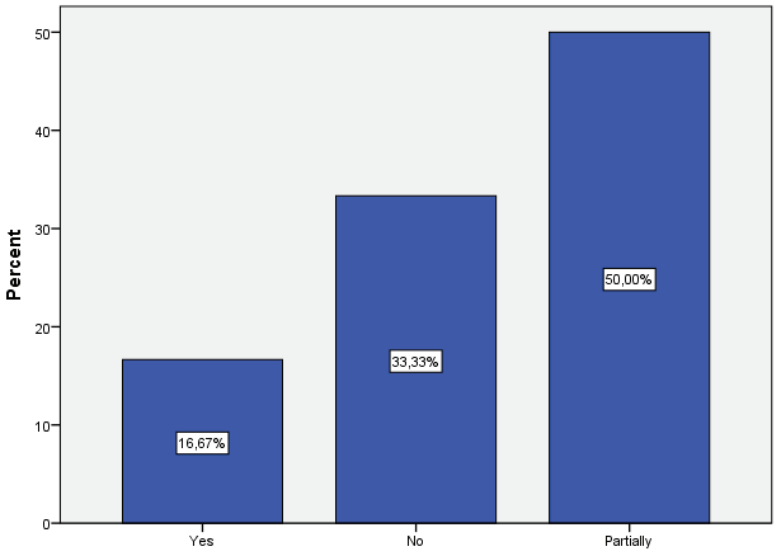


**Local**



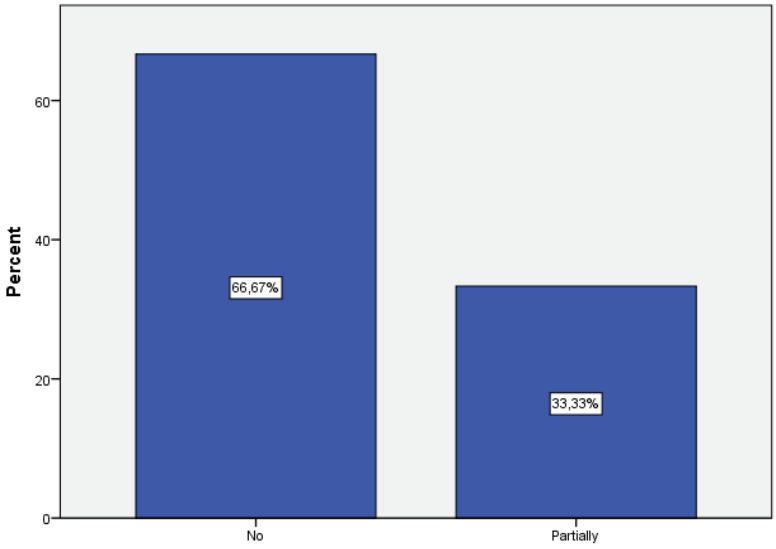

**5. Doest the hospital provide training and exercises in areas of potential increased clinical demand,including emergency and intensive care, to ensure adequate staff capacity and competency?**

**Regional**



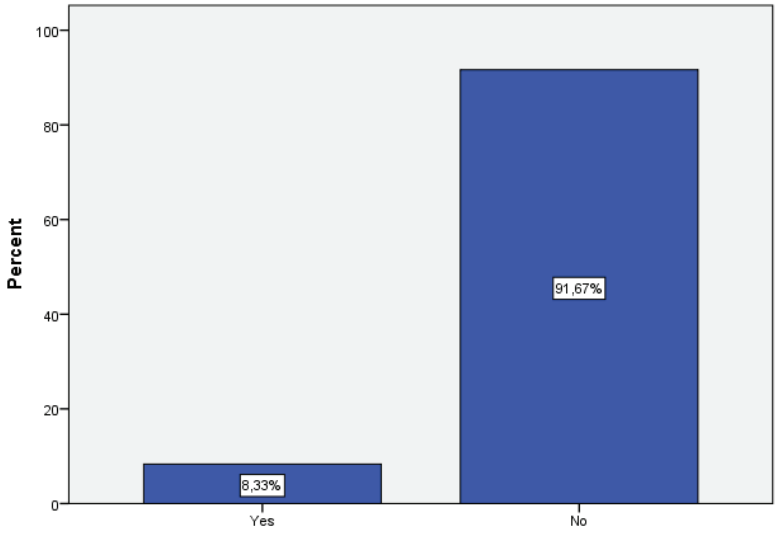

**5. Doest the hospital provide training and exercises in areas of potential increased clinical demand,including emergency and intensive care, to ensure adequate staff capacity and competency?**

**University**



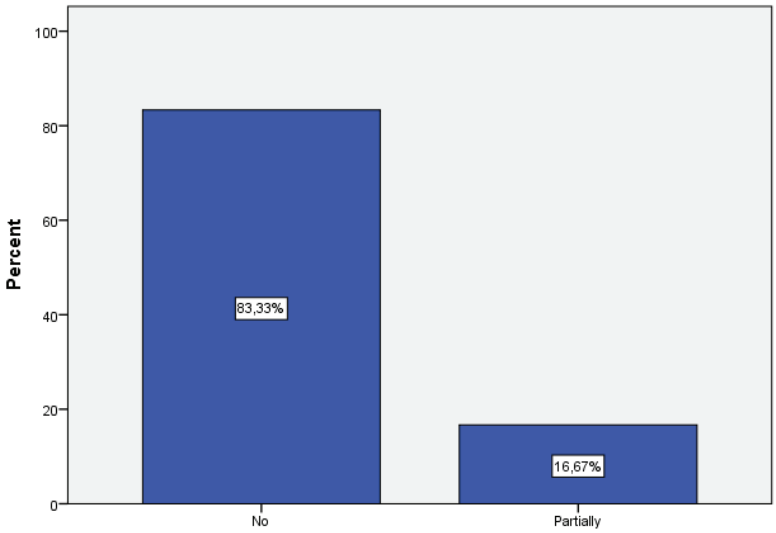

**5. Doest the hospital provide training and exercises in areas of potential increased clinical demand,including emergency and intensive care, to ensure adequate staff capacity and competency?**

**Local**



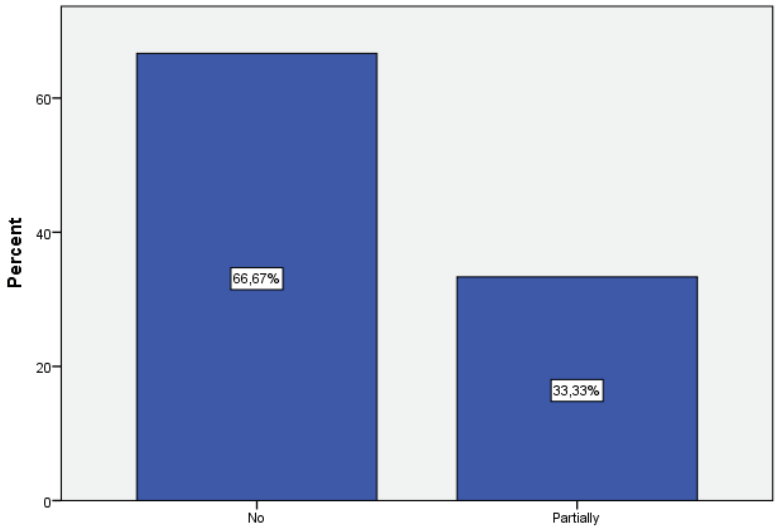

**3. Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy?**

**Regional**




**3. Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy?**

**University**




**3. Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy?**

## A.5 PERSON CHI-SQUARE TEST REGARDING LATVIAN HEALTHCARE FACILITIES

**Pearson Chi-Square Tests**

| | | Hospital |
|---|---|---|
| Does the hospital consult core internal and external documents (e.g. publications of the national health authority and WHO) related to hospital emergency management to ensure application of the basic principles and accepted strategies related to planning and implementing a hospital incident action plan? | Chi-square | 10,588 |
| | df | 6 |
| | Sig. | 0,102 |
| Does the hospital ensure that all Incident Command Groups (ICG) members have been adequately trained on the structure and functions of the incident command system (ICS)? | Chi-square | 9,800 |
| | df | 6 |
| | Sig. | 0,133 |
| Does the hospital establish a mass-casualty triage protocol based on severity of illness/injury, survivability and hospital capacity that follows internationally accepted principles and guidelines? | Chi-square | 2,427 |
| | df | 4 |
| | Sig. | 0,658 |
| Does the hospital coordinate with the health authorities, neighbouring hospitals and private practitioners on defining the roles and responsibilities of each member of the local health-care network to ensure the continuous provision of essential medical services throughout the community? | Chi-square | 1,145 |
| | df | 4 |
| | Sig. | 0,887 |
| Does the hospital ensure the availability of appropriate back-up arrangements for essential life lines, including water, power and oxygen? | Chi-square | 1,604 |
| | df | 4 |
| | Sig. | 0,808 |
| Does the hospital have a strategic reserve of medical supplies? | Chi-square | 5,347 |
| | df | 4 |
| | Sig. | 0,253 |
| Does the hospital provide training and exercises in areas of potential increased clinical demand, including emergency and intensive care, to ensure adequate staff capacity and competency? | Chi-square | 2,689 |
| | df | 4 |
| | Sig. | 0,611 |

| | | |
|---|---|---|
| Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy? | Chi-square | 4,181 |
| | df | 4 |
| | Sig. | 0,382 |
| Does the hospital provide training and exercises in areas of potential increased clinical demand, including emergency and intensive care, to ensure adequate staff capacity and competency? | Chi-square | 2,689 |
| | df | 4 |
| | Sig. | 0,611 |
| Does the hospital establish a system of rapidly providing health-care workers (e.g. voluntary medical personnel) with necessary credentials in an emergency situation, in accordance with hospital and health authority policy? | Chi-square | 4,181 |
| | df | 4 |
| | Sig. | 0,382 |

## A.6 TABLES FROM LATVIAN MEDICAL STAFF STATISTICAL ANALYSES

### Table #9

*Have you ever been involved in a mass-casualty situation or a disaster as a professional?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 119 | 39,02% | 47 | 15,41% | 92 | 30,16% | 258 | 84,59% |
| No | 3 | 0,98% | 0 | 0,00% | 21 | 6,89% | 24 | 7,87% |
| Partially | 19 | 6,23% | 0 | 0,00% | 4 | 1,31% | 23 | 7,54% |
| Don't know | 0 | 0,00% | 0 | 0,00% | 0 | 0,00% | 0 | 0,00% |

### Table #10

*Would you describe the operations of that/those event(s) well coordinated at every level?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 11 | 3,87% | 5 | 1,76% | 4 | 1,41% | 20 | 7,04% |
| No | 88 | 30,99% | 9 | 3,17% | 31 | 10,92% | 128 | 45,07% |
| Partially | 39 | 13,73% | 31 | 10,92% | 55 | 19,37% | 125 | 44,01% |
| Don't know | 3 | 1,06% | 2 | 0,70% | 6 | 2,11% | 11 | 3,87% |

### Table #11

*Did you feel skills and training were enough to face such event?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 25 | 8,80% | 4 | 1,41% | 12 | 4,23% | 41 | 14,44% |
| No | 52 | 18,31% | 40 | 14,08% | 68 | 23,94% | 160 | 52,46% |
| Partially | 58 | 20,42% | 3 | 1,06% | 16 | 5,63% | 77 | 25,25% |
| Don't know | 6 | 2,11% | 0 | 0,00% | 0 | 0,00% | 6 | 1,97% |

**Table #12**

*Do you, as part of hospital staff, know your role in case of a mass-casualty incident/disaster?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 20 | 6,56% | 6 | 1,97% | 22 | 7,21% | 48 | 15,74% |
| No | 66 | 21,64% | 11 | 3,61% | 66 | 21,64% | 143 | 46,89% |
| Partially | 55 | 18,03% | 30 | 9,84% | 29 | 9,51% | 114 | 37,38% |
| Don't know | 0 | 0,00% | 0 | 0,00% | 0 | 0,00% | 0 | 0,00% |

**Table #13**

*Are you, as a part of hospital staff, aware of the formal emergency management plan of your hospital?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 18 | 5,90% | 7 | 2,30% | 17 | 5,57% | 42 | 13,77% |
| No | 39 | 12,79% | 11 | 3,61% | 69 | 22,62% | 119 | 39,02% |
| Partially | 80 | 26,23% | 29 | 9,51% | 31 | 10,16% | 140 | 45,90% |
| Don't know | 4 | 1,31% | 0 | 0,00% | 0 | 0,00% | 4 | 1,31% |

**Table #14**

*Have you, as a part of hospital staff, been trained in how to implement a formal Incident Command System?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 19 | 6,23% | 7 | 2,30% | 10 | 3,28% | 36 | 11,80% |
| No | 103 | 33,77% | 26 | 8,52% | 102 | 33,44% | 231 | 75,74% |
| Partially | 14 | 4,59% | 14 | 4,59% | 5 | 1,64% | 33 | 10,82% |
| Don't know | 5 | 1,64% | 0 | 0,00% | 0 | 0,00% | 5 | 1,64% |

**Table #15**

*Have you received any formal training in disaster medicine?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 15 | 4,92% | 8 | 2,62% | 13 | 4,26% | 36 | 11,8% |
| No | 121 | 39,67% | 30 | 9,84% | 93 | 30,49% | 244 | 80,0% |
| Partially | 5 | 1,64% | 9 | 2,95% | 11 | 3,61% | 25 | 8,2% |
| Don't know | 0 | 0,00% | 0 | 0,00% | 0 | 0,00% | 0 | 0,0% |

**Table #16**

*Do you feel your knowledge regarding disaster medicine is enough?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 7 | 2,30% | 5 | 1,64% | 11 | 3,61% | 23 | 7,54% |
| No | 102 | 33,44% | 20 | 6,56% | 84 | 27,54% | 206 | 67,54% |
| Partially | 32 | 10,49% | 15 | 4,92% | 15 | 4,92% | 62 | 20,33% |
| Don't know | 0 | 0,00% | 7 | 2,30% | 7 | 2,30% | 14 | 4,59% |

**Table #17**

*Would you be willing to attend to trainings about disaster medicine?*

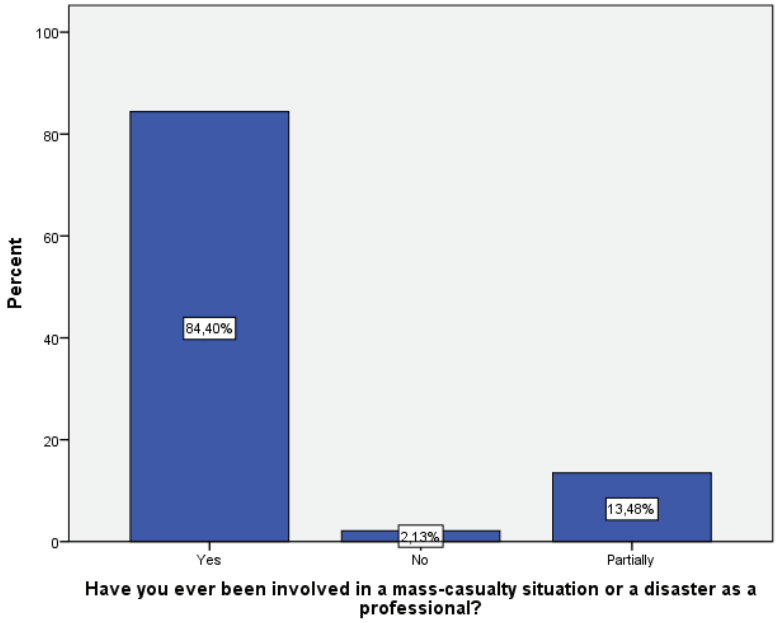
| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 120 | 39,34% | 10 | 3,28% | 87 | 28,52% | 217 | 71,15% |
| No | 6 | 1,97% | 5 | 1,64% | 7 | 2,30% | 18 | 5,90% |
| Partially | 11 | 3,61% | 26 | 8,52% | 15 | 4,92% | 52 | 17,05% |
| Don't know | 4 | 1,31% | 6 | 1,97% | 8 | 2,62% | 18 | 5,90% |

**Table #18**

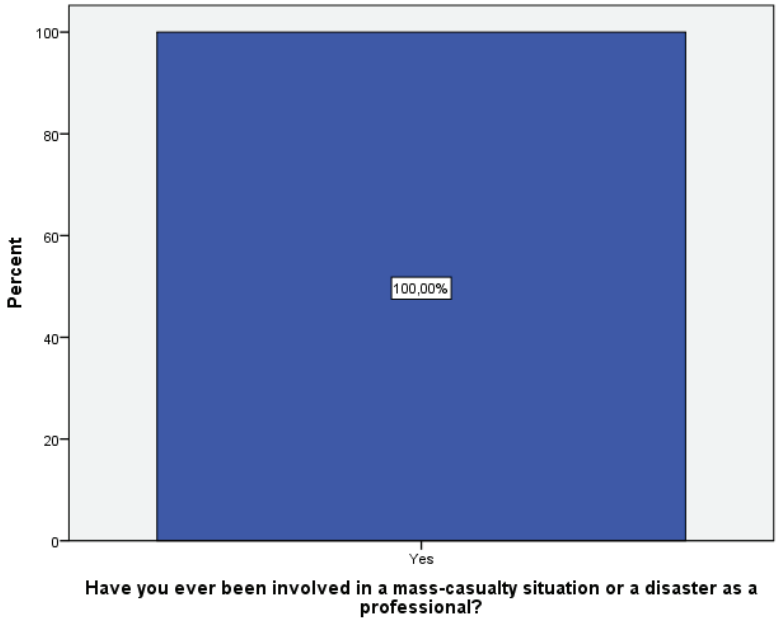
*Do you feel important to acquire competency in disaster medicine to your medical practice and community situation?*

| | Position | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Doctor | | Chef Department | | Resident | | Total | |
| | Count | Row N % | Count | Row N % | Count | Row N % | Count | % |
| Yes | 125 | 40,98% | 8 | 2,62% | 100 | 32,79% | 233 | 76,39% |
| No | 0 | 0,00% | 5 | 1,64% | 7 | 2,30% | 12 | 3,93% |
| Partially | 16 | 5,25% | 27 | 8,85% | 10 | 328% | 53 | 17,38% |
| Don't know | 0 | 0,00% | 7 | 2,30% | 0 | 0,00% | 7 | 2,30% |

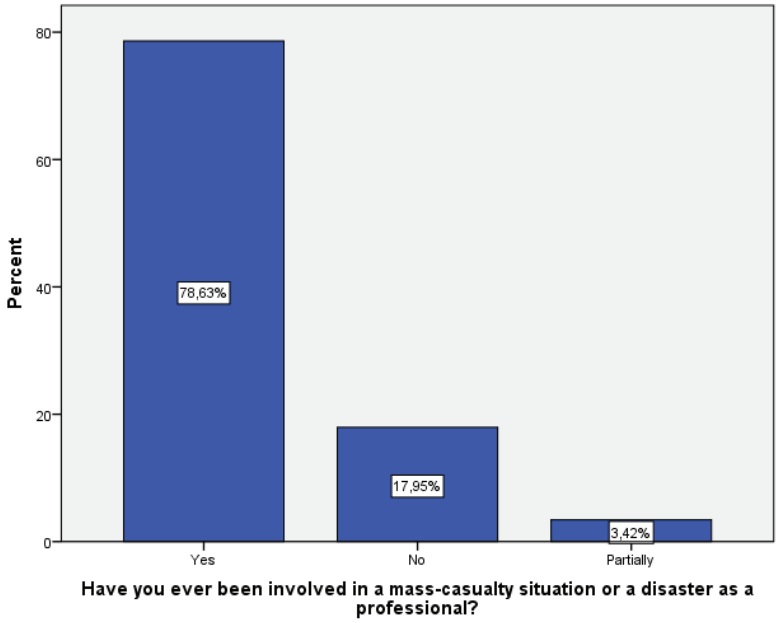
## A.7 RESULTS BY LATVIAN MEDICAL STAFF AS AN INDEPENDENT GROUP



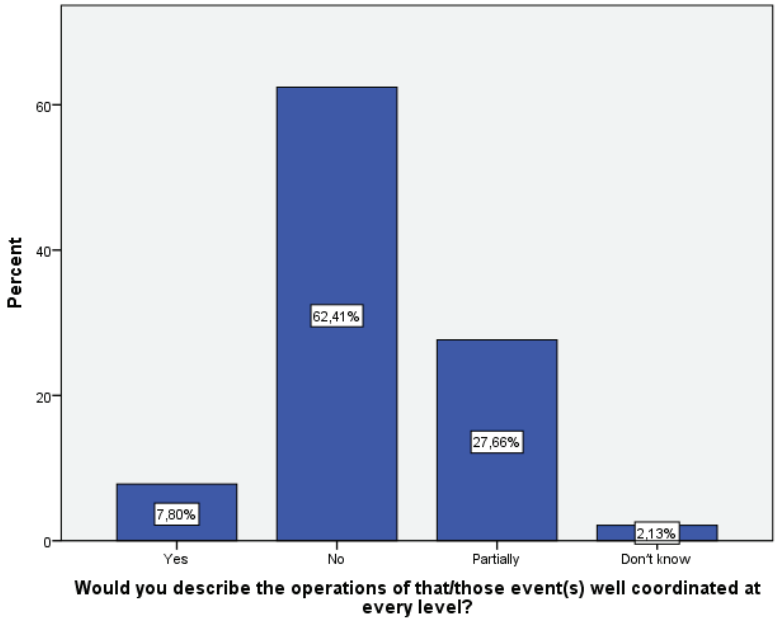

### Results by Chiefs of Department as an Independent Group



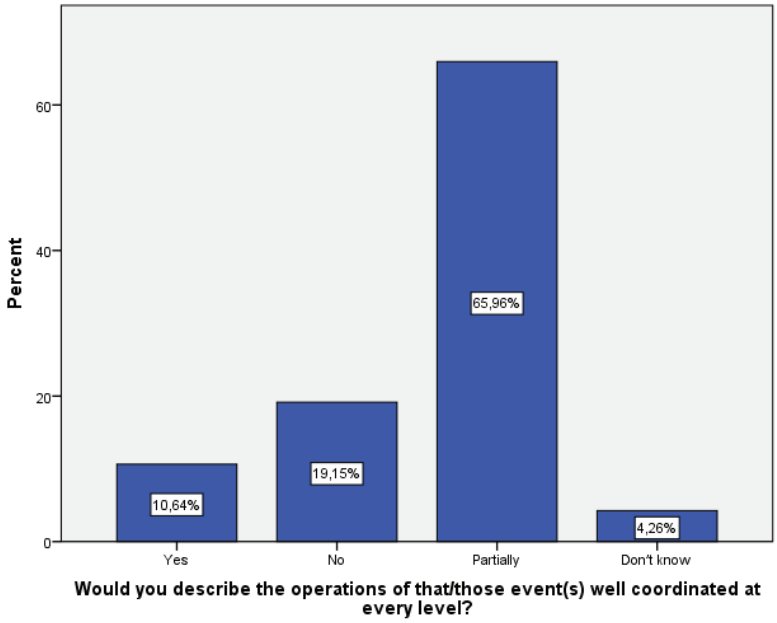
## Results by Residents as an Independent Group



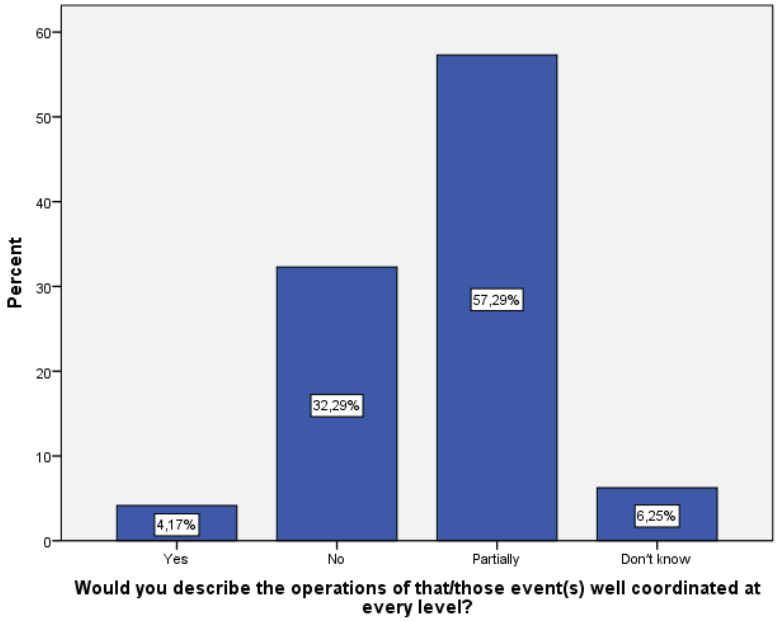

## Results by Doctors as an Independent Group



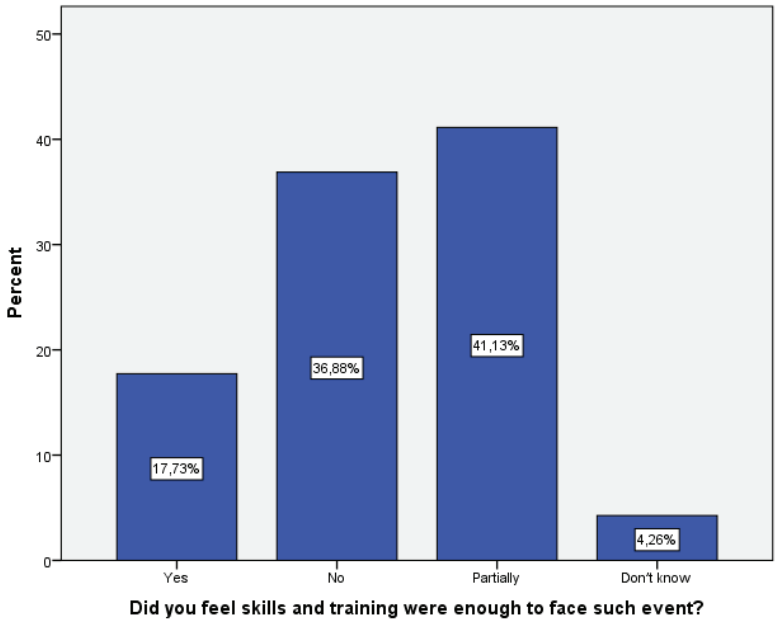
**Results by Chiefs of Department as an Independent Group**



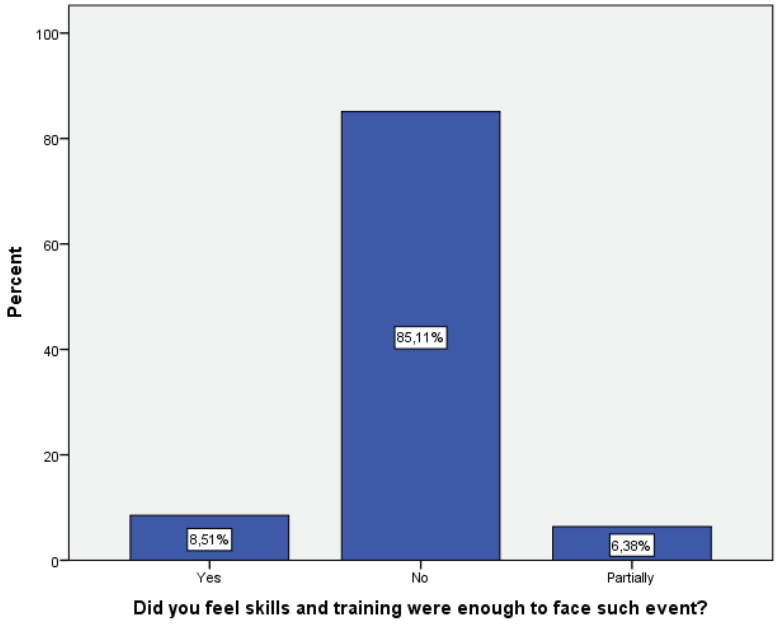

**Results by Residents as an Independent Group**



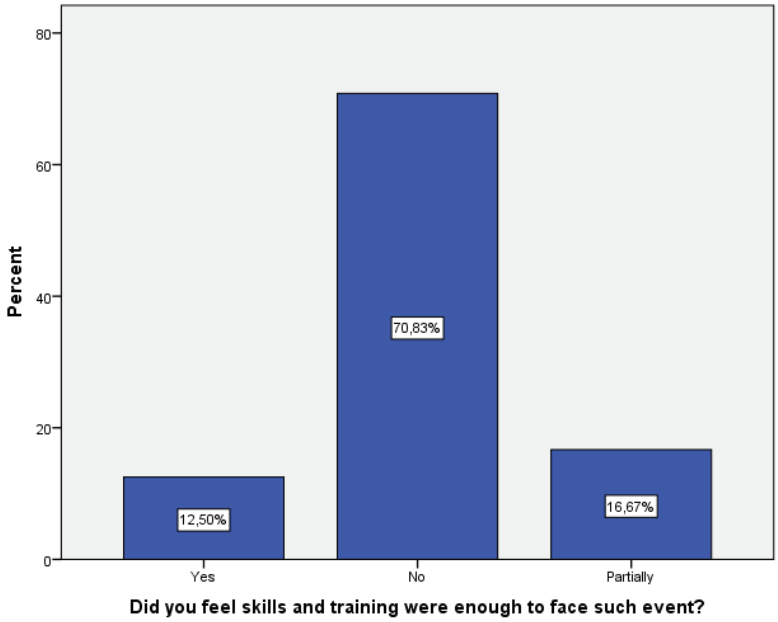
**Results by Doctors as an Independent Group**



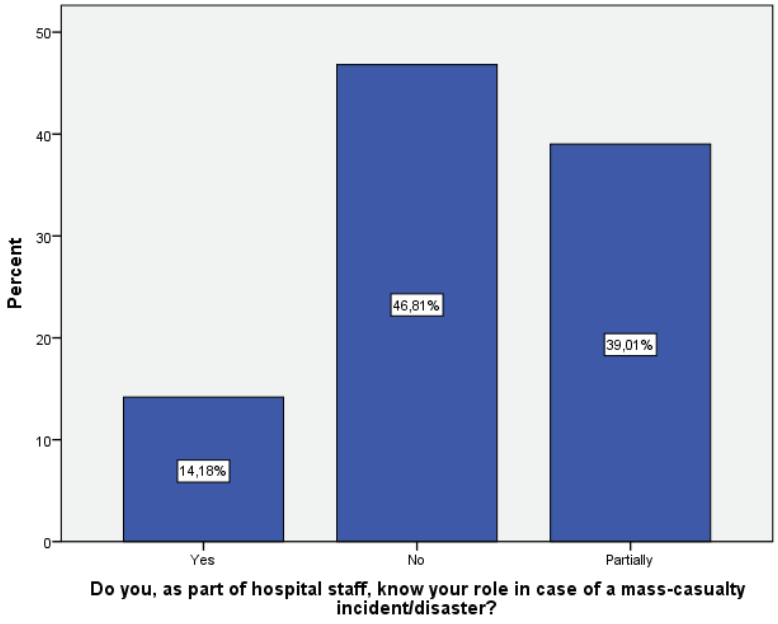

**Results by Chiefs of Department as an Independent Group**



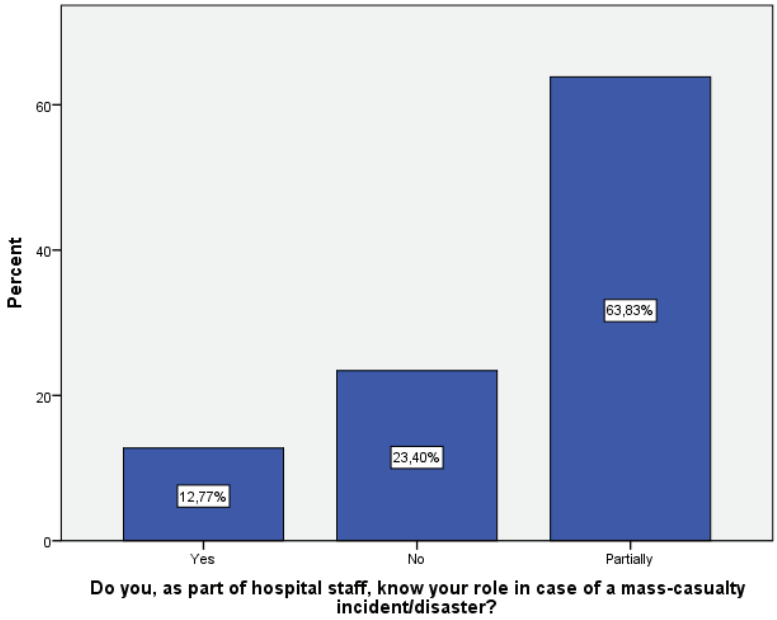
## Results by Residents as an Independent Group



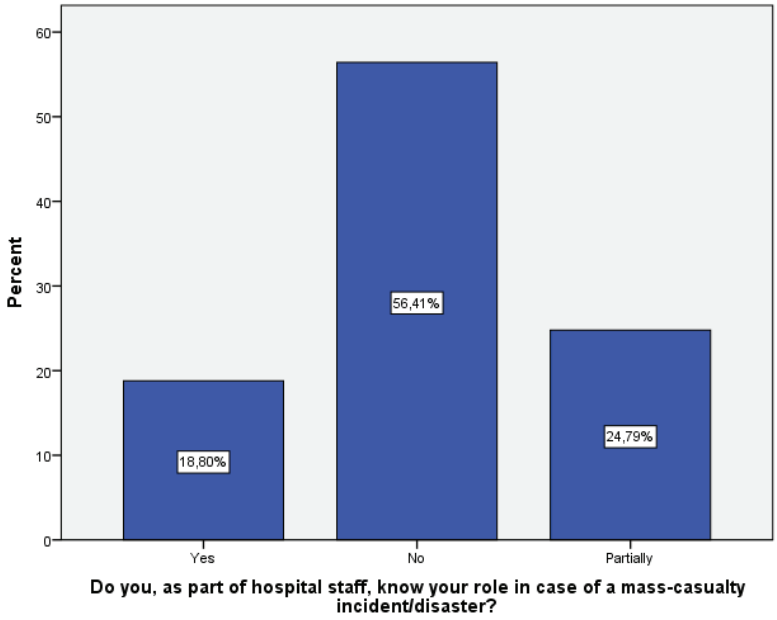

## Results by Doctors as an Independent Group



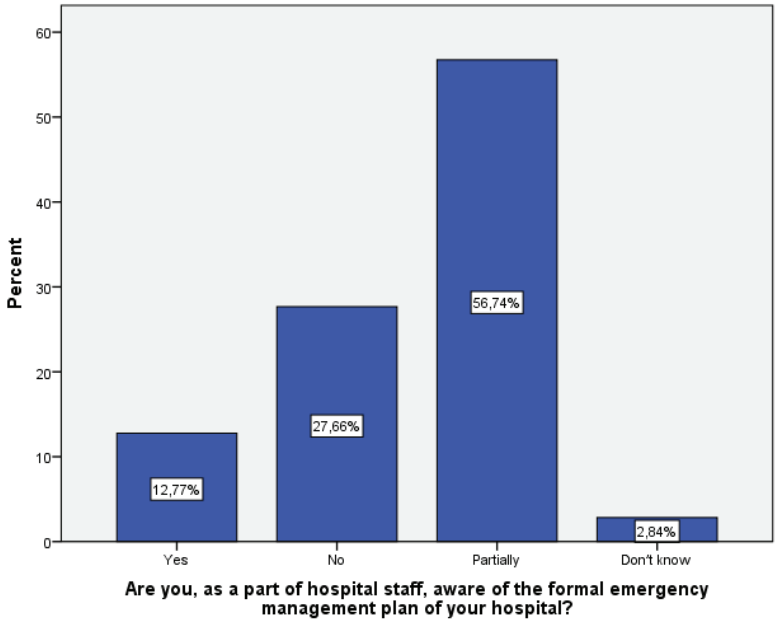
**Results by Chiefs of Department as an Independent Group**



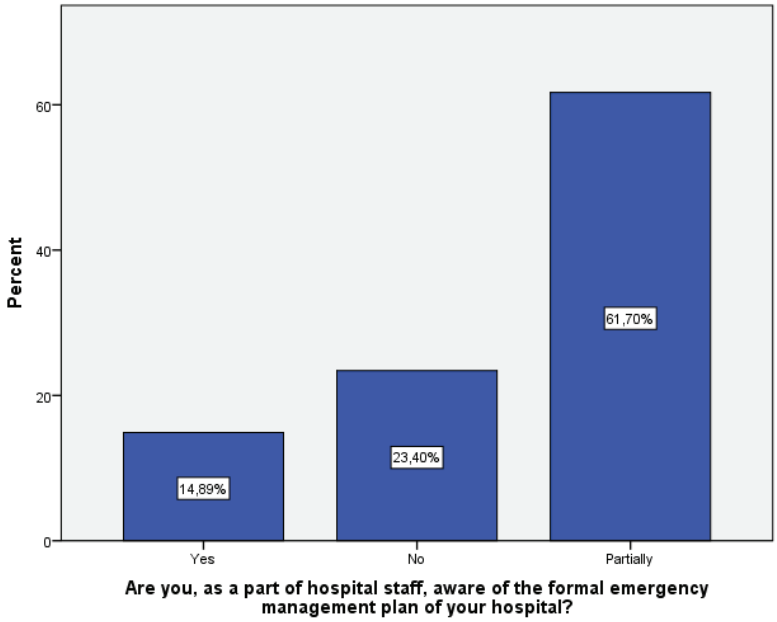

**Results by Residents as an Independent Group**



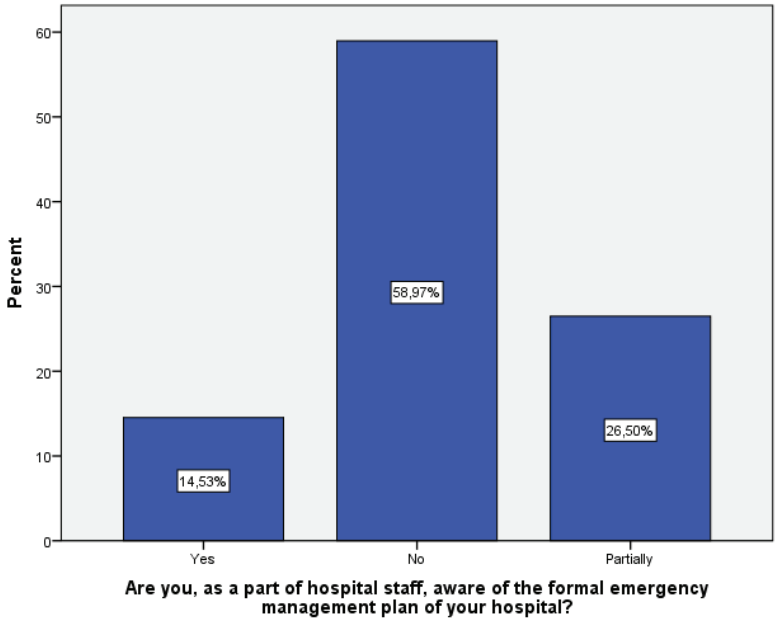
**Results by Doctors as an Independent Group**



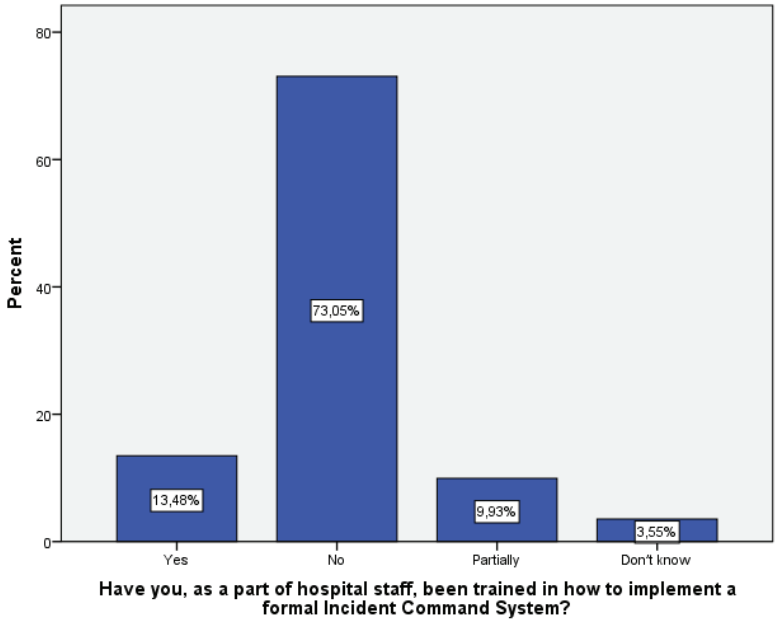

**Results by Chiefs of Department as an Independent Group**



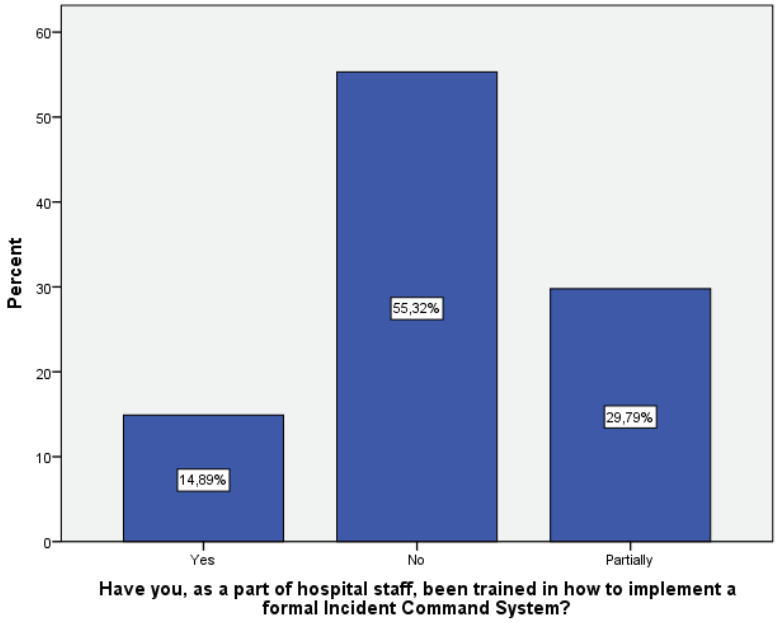
## Results by Residents as an Independent Group



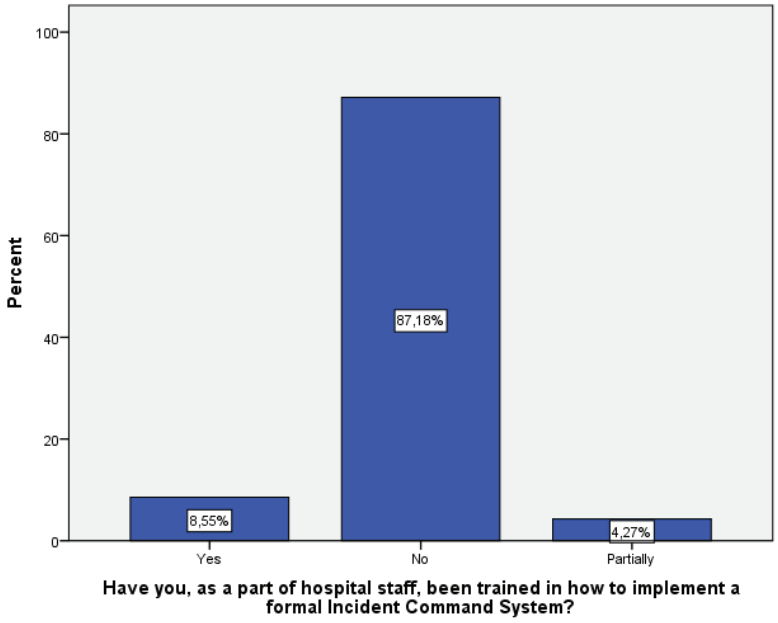

## Results by Doctors as an Independent Group



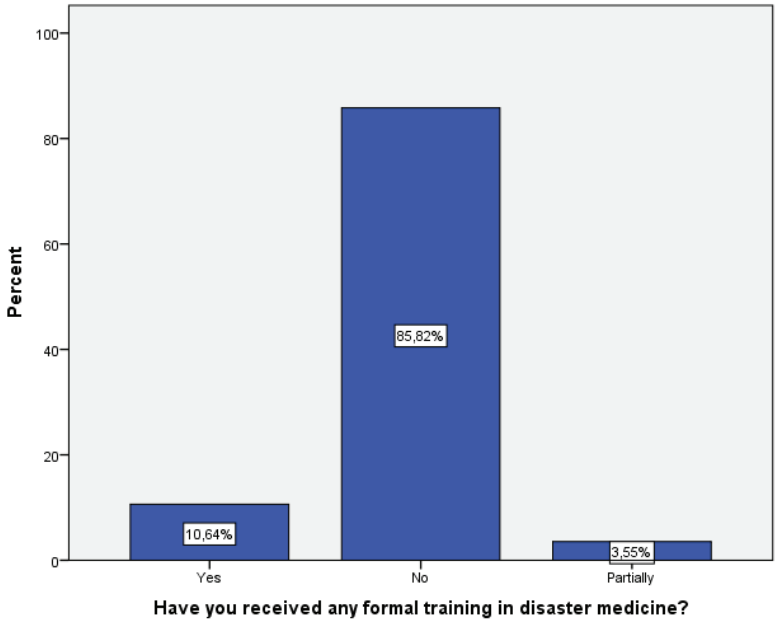
## Results by Chiefs of Department as an Independent Group



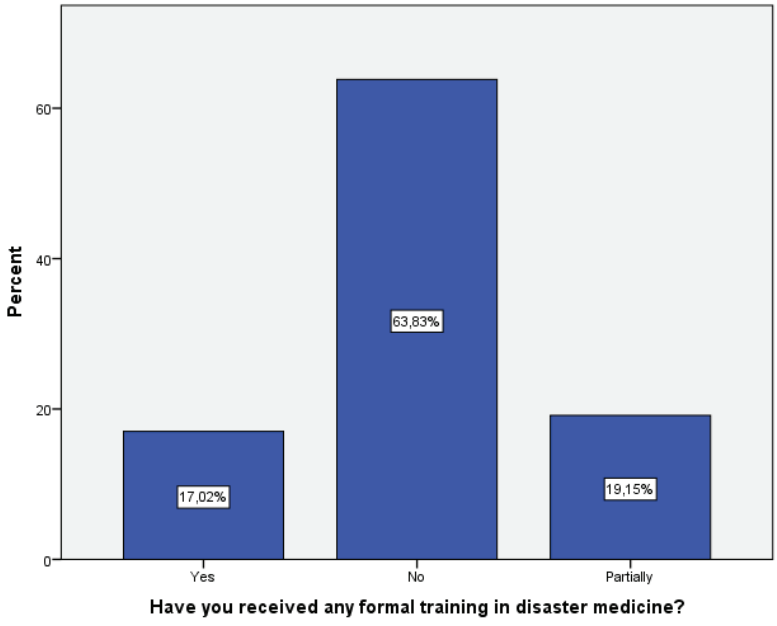

## Results by Residents as an Independent Group



**Results by Doctors as an Independent Group**




**Results by Chiefs of Department as an Independent Group**



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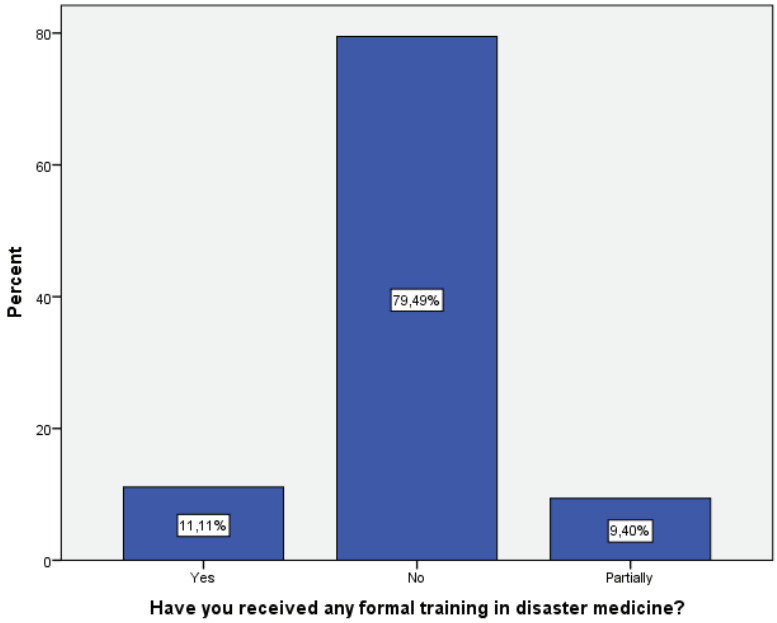
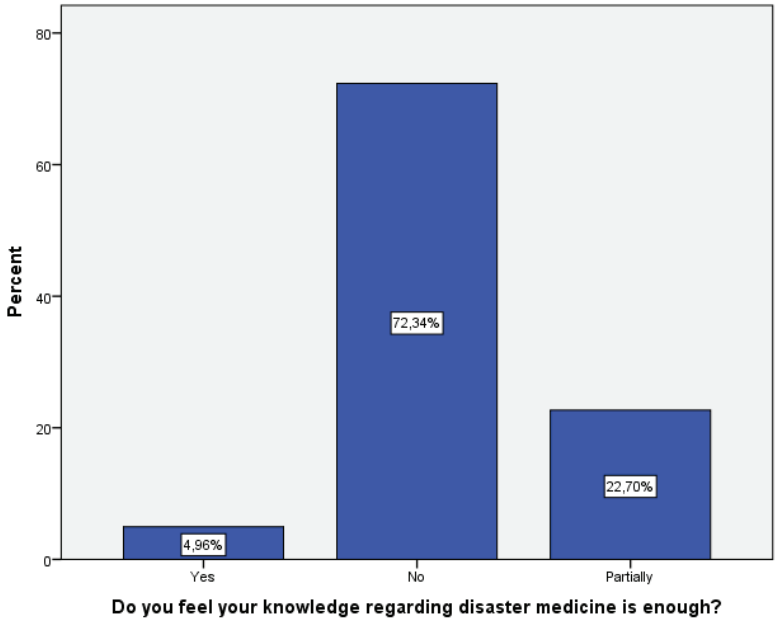
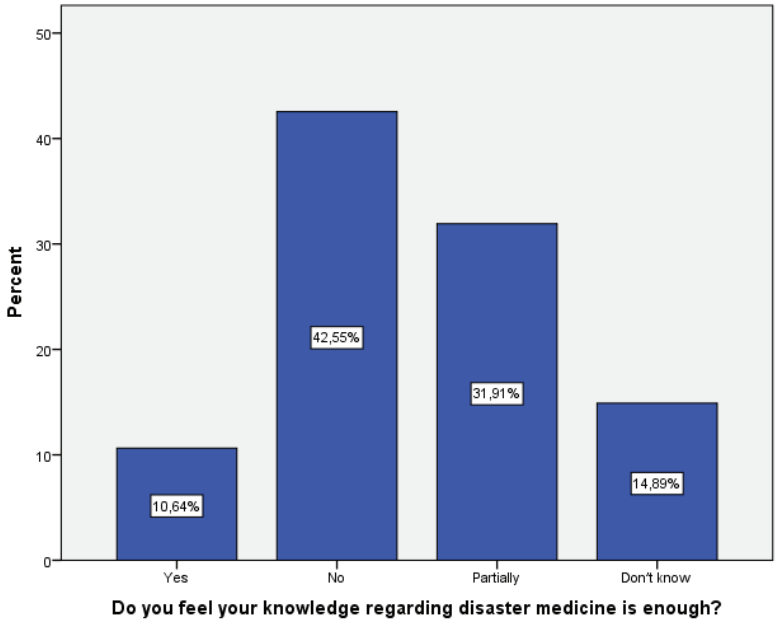



## Results by Doctors as an Independent Group



**Results by Chiefs of Department as an Independent Group**

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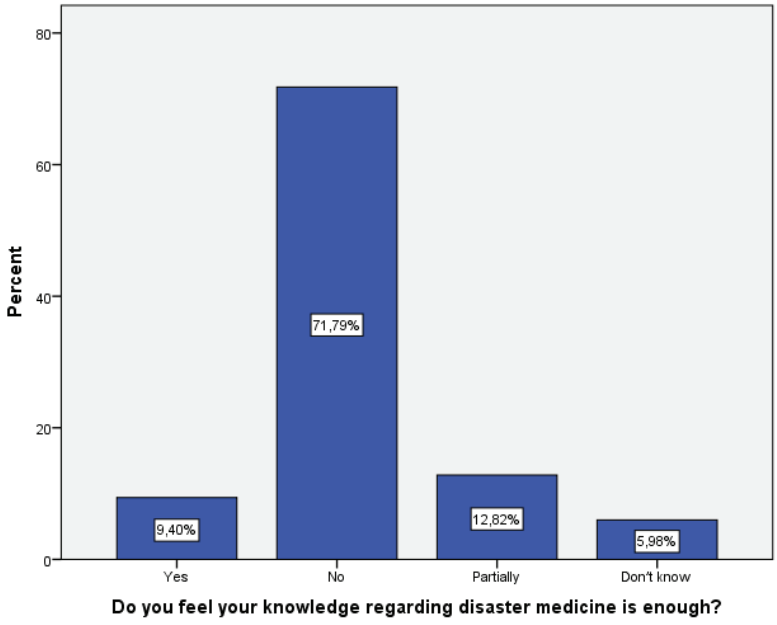

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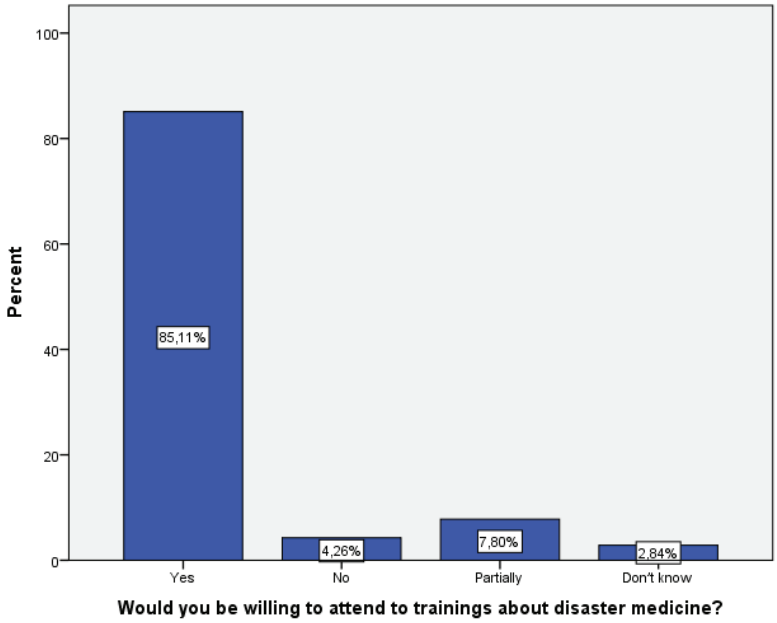
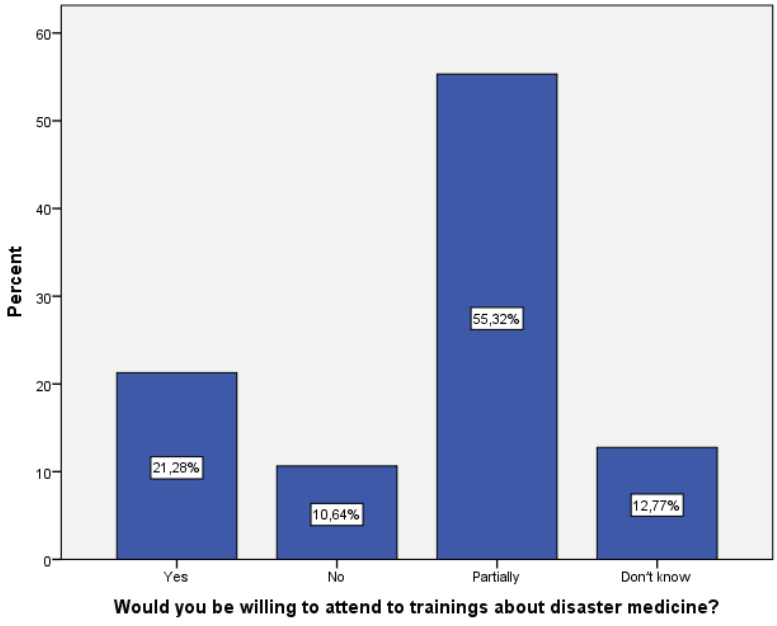



**Results by Chiefs of Department as an Independent Group**



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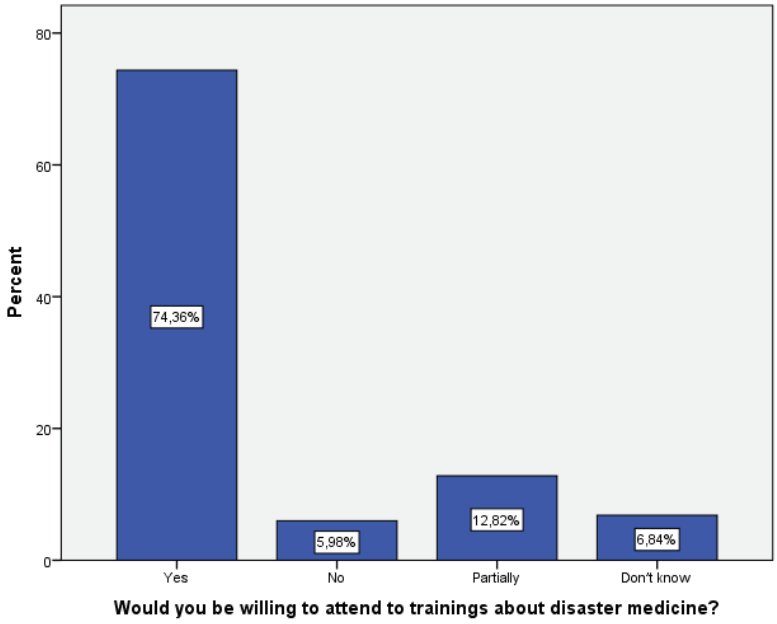
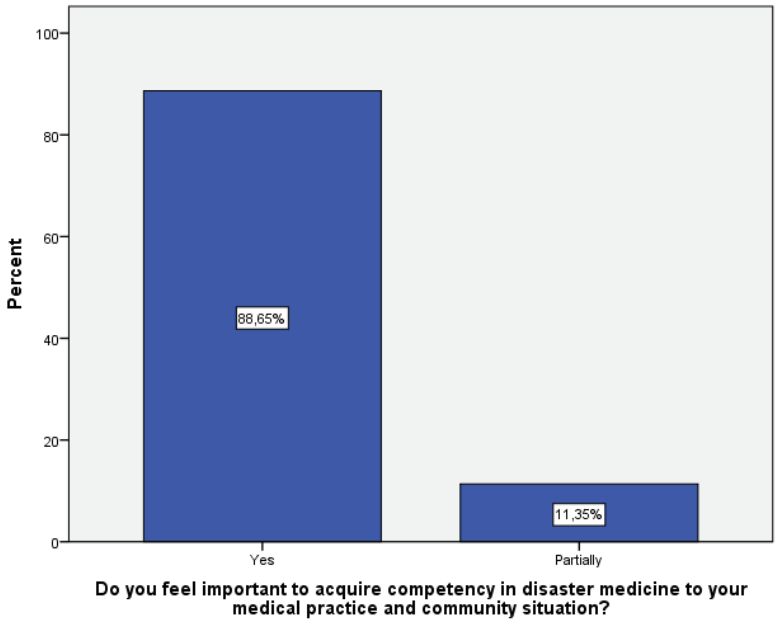
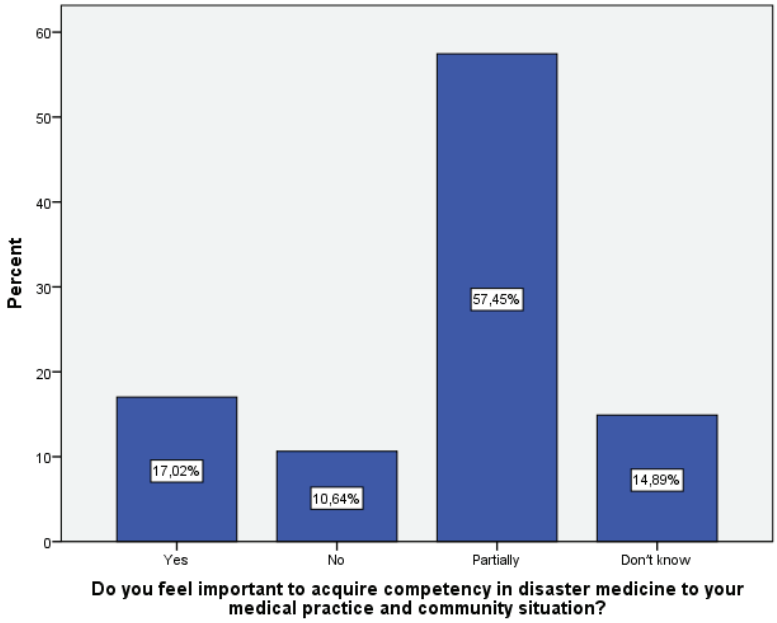


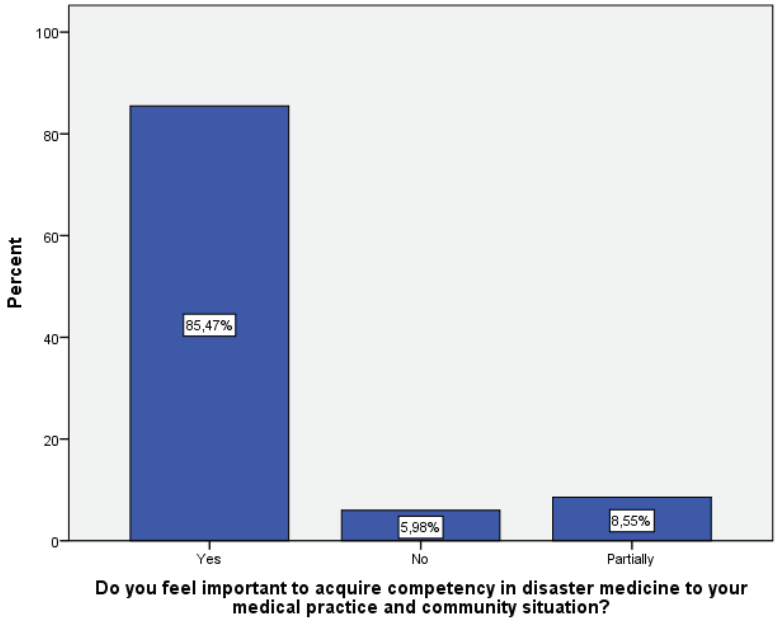

## Results by Doctors as an Independent Group



## Results by Chiefs of Department as an Independent Group




## Results by Residents as an Independent Group



## A.8 PEARSON CHI SQUARE TEST RESULTS REGARDING LATVIAN MEDICAL STAFF

**Pearson Chi-Square Tests**

| | | Position |
|---|---|---|
| Have you ever been involved in a mass-casualty situation or a disaster as a professional? | Chi-square | 39,288 |
| | df | 4 |
| | Sig. | **,000*** |
| Would you describe the operations of that/those event(s) well coordinated at every level? | Chi-square | 42,081 |
| | df | 6 |
| | Sig. | **,000*** |
| Did you feel skills and training were enough to face such event? | Chi-square | 50,037 |
| | df | 6 |
| | Sig. | **,000*** |
| Do you, as part of hospital staff, know your role in case of a mass-casualty incident/disaster? | Chi-square | 22,831 |
| | df | 4 |
| | Sig. | **,000*** |
| Are you, as a part of hospital staff, aware of the formal emergency management plan of your hospital? | Chi-square | 40,152 |
| | df | 6 |
| | Sig. | **,000*** |
| Have you, as a part of hospital staff, been trained in how to implement a formal Incident Command System? | Chi-square | 32,690 |
| | df | 6 |
| | Sig. | **,000*** |
| Have you received any formal training in disaster medicine? | Chi-square | 14,236 |
| | df | 4 |
| | Sig. | **,007*** |
| Do you feel your knowledge regarding disaster medicine is enough? | Chi-square | 32,089 |
| | df | 6 |
| | Sig. | **,000*** |
| Would you be willing to attend to trainings about disaster medicine? | Chi-square | 77,742 |
| | df | 6 |
| | Sig. | **,000*** |
| Do you feel important to acquire competency in disaster medicine to your medical practice and community situation? | Chi-square | 127,939 |
| | df | 6 |
| | Sig. | **,000*** |

*. The Chi-square statistic is significant at the, 05 level.

There is an essential role of the medical institutions in overcoming consequences of the crisis. Firstly, competent medical staff, secondly, appropriate equipment and, thirdly, regular trainings, are of most importance. Disasters are natural and human made. Unfortunately, climate changes, increase of terrorism, as well as increasing threats of spreading of mass destruction weapons make both of them even more probable. We should not ask "If?", we should ask "Where and when?" The study is superbly topical.

**Brigadier General (ret.) Kārlis Krēsliņš , Dr.habil.sc.**

This scientific work has come about at a time when there are many kinds of disasters in the world and often people are dying. Are our healthcare institutions and medical professionals ready to respond and will they be able to act properly in such situations? The results of this study are of great doubt about that. Therefore, the outbreak of this situation lies in improvement of evidence in practice-based study programs on disaster medicine at medical colleges and universities in cooperation with hospitals.

**Professor Uldis Vikmanis, Dr.habil.med.**

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