

# Emergency and disaster medicine for family doctors: challenges of the modern life

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The constant increase in frequency and number of all kinds of disasters globally requires proper training for all physicians but especially for family doctors who are at the front line of community defense, response and recovering.

**The objective:** to evaluate the knowledge and skills of residents and experienced family doctors in disaster medicine (DM) and emergency medicine (EM) using specially developed questionnaire to determine the priority topics for the improving of the curriculum in EM and DM.

**Patients and methods.** The answers of 268 physicians – 156 (57,8% residents and 113 (42,2%) experienced specialists in family medicine) to 11 questions of the questionnaire about EM and DM were analyzed.

**Results.** The group of certified family doctors demonstrated in general better knowledge in EM and DM than residents except of triage, both groups have overall not satisfactory skills in emergency plan activity, care of contaminated victims, acting in case of nuclear, bacterial and chemical (NBC) disasters.

**Conclusion.** The system of training in EM and DM in Ukraine needs reforming and improvement, including the implementation of the international life support skills (BLS, ALS: ACLS, ATLS, APLS) in medical curriculum, development of training and simulative classes, mastering in reaction plan of emergency medical system (EMS), care of contaminated victims, activities in case of NBC disasters; basic tactic medicine.

**Key words:** emergency medicine, disaster medicine, family doctors.

The modern world is full of events like never before in the civilization history. New technologies, new professions and interventions are developing with the tremendous speed. Humans fly higher, deepen further, dissemble the world into atoms and genes. And finally receive in return – new pandemics, new wars – biological, chemical, nuclear; the horrors of targeted

terrorism and unconscious cruelty of the natural disasters and cataclysms. According to statistics, the number of reported natural disasters in 2015 (376) showed an increase of 13,9% compared to 2014's number (330); the number of people killed by disasters in 2015 (22,765) was significantly above its value for 2014 (7,959), number of reported victims in 2015 (110,3 million) was the second lowest of the decade remaining however 9.8% above the number of victims of 2013 (101,5 million).

The American Red Cross defines disaster as an accident that involves 100 or more persons, leads to 10 or more deaths, or an appeal for assistance. The annual worldwide impact of disasters is substantial, with an average of more than 500 incidents impacting more than 80 millions persons, displacing 5 millions from their homes, seriously injuring 74,000, and killing 50,000 peoples.

Someone survives, someone becomes a victim, most of them face significant problems related to the physical and psychological trauma, loss of homes and other material values. Is it possible to reduce the number of victims? Is it possible to minimize the costs for society to overcome the consequences of the various catastrophic events? And is it possible to reduce the risk of any disaster? Who should work on this?

The usual answer to these questions is a team of specialists, including medical specialists in disaster medicine. To determine the need for such specialists is very difficult or even impossible, because the catastrophe is an unpredictable thing, disasters occur for various reasons, affecting humans and technics at the same time; they can develop as a result of the combined simultaneous influence of several harmful factors, continue for indefinitely long time and require the involvement of different services for the most adequate response and consequences elimination (Table).

In addition, emergencies do not recognize borders; they can occur or affect simultaneously the territory and population of several countries. Well known historical events (earthquakes,

The main types of disasters

Natural	Technological	Intentions
Meteorological (hurricane, storm, heat/cold)	Transport (air, land)	Bombs
Geological (earthquake, volcano eruption, flooding)	Structural (falling houses, bridges)	Shooting
Other (fires, outbreaks of diseases)	Nuclear (accident at nuclear power plants, leakage of the radioactive substances)	Nuclear facilities
	Agro-industrial or industrial (leakage of chemicals, fire or explosion at work)	Biological agents: – bacterial: plague, cholera, tularemia, anthrax, fever Ku; – virus: smallpox, encephalitis virus, hemorrhagic fever virus; – toxins: botulinum toxin, staphylococcal enterotoxin B Chemical substances – ergo-paralytic: zarin, insecticides, pesticides; – skin and cramping: Lyusites, Mustard gas; – precursors: chlorosis ommon, chlorosarin; – fushing: phosgene, chlorine; – hematological: cyanide; – to control the crowd: tear gas, vomit

volcanic eruptions, epidemics of the viral diseases) prove that suffered countries often need medical, financial, humanitarian and other kinds of assistance from the international community, and therefore, specialists in disaster medicine must be prepared not only for the local threats, but also in general to fight with different types of the catastrophic events.

No doubt, not only medical specialists should participate in the first response to the catastrophe and further overcome of its consequences. For example, the Sendai Fault Risk Reduction Program 2015–2030 (adopted by the Third United Nations World Conference on Disaster Risk Reduction (March 2015), states that preventing the occurrence of threats is possible only «...through the implementation of complex and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and constitutional measures...» at the global level «by engaging the whole society» for «... reducing the risk of exposure to dangerous factors and disadvantages disaster, increased readiness for response and recovery». According to this program, the main task of all involved sides is a significant reduction in mortality and the number of victims of disasters (globally 100 thousand less than during the period of 2005–2015).

At the present stage, in many countries of the world, regardless the level of socio-economic development, the health care reforms with the formation of the public health system has started. One of the key tasks of the reform is planning of actions, response and recovery for all types of disasters. Thus, theoretically, in all cases of any disasters, it is expected that at least specialists in public health and physicians will cooperate. In case of a catastrophic event, especially in case of the mass destruction, all available specialists must provide assistance in controlling the situation. All local doctors, regardless of specialty, should be able to provide such assistance. It must be emphasized that in many cases should be expected some kinds of artificial isolation of the community (for example, in case of natural disasters), and in such conditions family doctors can become the only physicians available to the affected population; in that case family physicians will take all obligations and duties to control emergency (in accordance with the pre-planned scenario), organization and providing of medical care to community members.

Constantly increasing number of threats and frequency of disasters has prompted the US medical community to conclude that disaster medicine should be the second specialty for all physicians. However, there are still unanswered questions remain – what should these specialists do? What kind of education and training should they have? How many such specialists should be trained, for example, in Ukraine? Which other professionals should be involved in such activities – nurses? Paramedics? Policemen? All citizens?

Taking into account the significant increase in the frequency and number of the catastrophic situations at the end of the 20th and early 21st century (terrorism, pandemics of viral infections, air and land transport accidents, radioactive contamination, natural disasters), in many countries, both governing bodies and citizens are questioning the efficacy and effectiveness of the forces that should be involved in solving of these problems. Thus, in the US, according to the American Medical Association (AMA), «... doctors should work in tandem with other professionals to develop a public health strategy to improve the effectiveness and availability of medical care during epidemics, terrorist attacks, and natural disasters». AMA defines the following doctor's responsibilities for disaster preparedness and response (2004): «... national, regional and local response plans for the epidemic, terrorist acts and other types of disasters require a significant involvement of doctors. All doctors are committed to helping the sick and the wounded, are obliged to provide assistance at a disaster. Ethical obligations of the profession require even the risk of their own health, safety, life ...».

At the same time, the necessary condition for achieving the best performance of the system is improvement in doctors training in

disaster medicine. Since 2007, AMC has promoted the necessity of specializing in this field for all physicians: only in circumstances where disaster medicine will become the second specialty of each doctor, it is possible to achieve a significant reduction in mortality and morbidity rates in the case of any disaster type. At the same time, the American Academy of Family Physicians emphasizes that obtaining the required level of knowledge and skills for conducting effective activities in case of disasters is the personal responsibility of each family doctor and should be an integral part of their professional development plan; every family doctor should become a mentor of these issues for members of his family, colleagues, patients.

Despite the significant importance of the medical sector in achievements of all the objectives of the response and recovery plan, according to the results of published studies from different countries the training of medical doctors in disaster medicine remains limited and inadequate in terms of achievement of the necessary competences. Thus, in Europe, the structured curriculum is implemented only in Germany. Italy is undergoing a preliminary phase (training of only selected medical students who have their own motivation to participate in such programs). In Belgium disaster medicine programs are introduced only to several faculties; in the Netherlands, there are no such programs in any medical school.

In 2009, an analysis of a 523 medical students interviews was published in the United States, which showed that only 26,2% of future physicians consider their own training in pandemic infections as sufficient. Some of the students who had knowledge in the natural disasters or radiation safety were even less – 17,2% and 13,4%, respectively, while most respondents (85%) did not even know whom and where to report an emergency situation. At the same time, the majority of students wrote that they would like to have more trainings in disaster medicine and would participate in all phases of disaster management (planning, response, and recovery). Similar results were obtained in Belgium by the disaster medicine specialists based on the self-assessment of medical and disaster medicine skills in military and civilian medical students.

Most responders had full or partial basic training on CBRN (response to chemical, biological, radionuclide injury) but demonstrated insufficient knowledge of appropriate actions (although military doctors showed better performance). Only 10-25% of all respondents gave correct answers to the basic questions about the necessary steps to assist the victims with chemical and radionuclide contamination. At the same time, the majority of respondents, both military and civilian, indicated their readiness to learn the subject (and pointed out the importance and necessity of such training), and to take part in the elimination of the consequences of catastrophic events.

According to the definition of the American Academy of Family Physicians, the family doctor is always at the first line of the response to any disastrous situation, because is the closest and most available to the community specialist. So integrating the necessary knowledge and skills in disaster medicine into the family doctors training program is an urgent need for all nations and countries including Ukraine.

**The objective:** to determine the level of knowledge and skills in «Emergency Medicine and Disaster Medicine» (EM and DM) of family doctors (residents and experienced) by using questionnaires to define the priority tasks for improvement of the curriculum.

## PATIENTS AND METHODS

The study was performed at the Department of Disaster Medicine and Military Training of the Shupyk National Medical Academy of Postgraduate Education in 2016–2017 with the use of specially developed questionnaire which covered the main topics of EM and DM accordingly to the educational standard and pre- and postgraduate curriculum. The questionnaire consisted of 11 questions, was proposed for voluntary answers to the doctors and residents on specialty «General practice-family medicine».

The answers were analyzed in statistic program using 3 points marks – (0 – not satisfactory, 1 – satisfactory, 2 – good). 268 doctors and residents were enrolled in the study (aged 23–65, mean age 37,2±6,1 years, women – 76%, men – 24%; less than 2 years of practice had 58,2% of responders, 3–25 years – 39,8%, and more than 25 years – 2% of the participants); 156 participants were residents (1 group of respondents, 57,8%) and 113 persons were certified physicians (2 group, 42,2%).

### RESULTS

In general, 43,3% (n=2331) of all answers were marked as «good», 37,6% (n=2022) – as «satisfactory» and 19,1% (n=1027) – as «not satisfactory». Overall the 2 group of respondents demonstrated better level of knowledge than 1 group. Thus, to the question «What will you do in case of emergency state (ES) in your region?» only 30,7% of the 1 group gave the good and satisfactory answers, (in 2 group – 80,5%), did not know what to do at all 69,3% residents and 19,5% experienced doctors. Question «Whom you should report the ES?» was better answered by both groups (2 points got 78,2% of 1 group and 86,9% of 2 group). It is needed to emphasize that to the question «What is the regulatory document for the physicians obligations in any ES?» we did not get right answer among residents and only 8,3% doctors of 2 group knew the document which means that «medical response plan» is not covered enough in both residents and advanced training curriculum.

To the question «What will you do in case of ES with mass victims?» 76,6% of residents gave good and satisfactory answers, compare to 42,6% in 2 group, which can reflect better training in triage in medical universities at present comparing to 10–15 years ago.

The 5<sup>th</sup> question «Who is the contaminated victims and what is the first care for them?» was difficult to answer for the majority of participants – only 22,3% of residents and 16,5% of doctors got 1 or 2 points on this question.

At the same time to the question «Are you ready for work in case of pandemic influenza?» the most frequent answer in both

groups was «Ready» (51,3% in 1 group and 84,9% in 2 group), which reflects the positive professional and psychologic attitude to the physicians duties among participants. The same professionally positive attitude and wish to work was shown by respondents in answers to question «Are you ready to volunteering work in different ES with mass victims?» (positive answer gave 78,2% of residents and 64,3% of doctors).

The significant difference between groups was found in level of knowledge about work in case of chemical and toxic; nuclear disasters: unsatisfactory mark got 82,7% (chemical) and 85,8% (nuclear) participants from 1 group and 68,1%, 23,7% doctors from 2 group accordingly. To the contrary the satisfactory answers to question about skills in CPR were more often in residents (84,8%) than in doctors (2topic1,6%) which means better teaching of this topic at undergraduate level and its absent in postgraduate training programs.

Self assessment of the knowledge in the life support skills (BLS, ALS: ACLS, APLS, ATLS) showed satisfactory level in no more than 30% of residents and only in 6,8% of physicians, which points to the significant need for Ukraine to adopt and implement the well known international programs of EM into medical curriculum.

Less than 10% of all participants gave satisfactory answers to the question about tactic medicine which is the sign of low level knowledge in military medicine and battle trauma.

### CONCLUSIONS

1. The system of training in EM and DM in Ukraine needs reforming and improvement, including the implementation of the international life support skills (BLS, ALS: ACLS, ATLS, APLS) in medical curriculum and development of training and simulative classes.

2. The priority in teaching and training in EM and DM should be given to reaction plan to ES, care of contaminated victims, activities in case of NBC disasters; basic tactic medicine.

## Екстрена медична допомога і медицина катастроф для сімейного лікаря – виклики сучасності

Г.Г. Рошнін, Л.В. Хімїон

Глобальне зростання частоти та кількості всіх видів катастроф вимагає якісної підготовки з питань медицини катастроф (МК) та екстреної медичної допомоги (ЕМД) лікарів всіх спеціальностей, а особливо – сімейних лікарів, які працюють на першій лінії захисту, реагування та відновлення.

**Мета дослідження:** оцінювання знань та вмій лікарів-інтернів та практикуючих спеціалістів з сімейної медицини з питань ЕМД та МК за допомогою спеціально розробленого опитувальника для визначення пріоритетних напрямків удосконалення навчальних програм.

**Матеріали та методи.** Проаналізовано відповіді на 11 запитань опитувальника стосовно ЕМД і МК 268 лікарів – 156 (57,8%) інтернів і 113 (42,2%) працюючих сімейних лікарів.

**Результати.** Група практикуючих лікарів загалом продемонструвала кращі знання стосовно ЕМД та МК порівняно із лікарями-інтернами, за виключенням знань з медичного сортування. Обидві групи респондентів показали незадовільний рівень знань з питань плану реагування в надзвичайній ситуації та надання допомоги контамінованим потерпілим за умов радіаційного, бактеріологічного та хімічного (РБХ) забруднення.

**Заключення.** Система підготовки лікарів з питань екстреної медичної допомоги і медицини катастроф потребує реформування і удосконалення шляхом впровадження в навчальні програми міжнародних стандартів з підтримки життя (BLS, ALS: ACLS, ATLS, APLS), створення тренінгових симуляційних центрів, надання пріоритету у викладанні та запровадженні плану реагування у випадку надзвичайної ситуації, надання допомоги контамінованими потерпілим та навичкам роботи у випадку РБХ забруднення, вивченню основ тактичної медицини.

**Ключові слова:** екстрена медична допомога, медицина катастроф, сімейний лікар.

## Екстренная медицинская помощь и медицина катастроф для семейного врача – вызовы времени

Г.Г. Рошнин, Л.В. Химион

Глобальное увеличение частоты и количества всех видов катастроф требует качественной подготовки по вопросам экстренной медицинской помощи (ЭМП) и медицины катастроф (МК) врачей всех специальностей, но особенно – семейных врачей, которые работают на передовой защиты общества, реагирования и восстановления.

**Цель исследования:** оценка знаний и навыков врачей-интернов и практикующих семейных врачей в вопросах ЭМП и МК при помощи специально разработанного опросника для определения приоритетных направлений усовершенствования учебных программ.

**Материалы и методы.** Проанализированы ответы на 11 вопросов опросника относительно ЭМП и МК 268 врачей – 156 (57,8%) интернов и 113 (42,2%) практикующих семейных врачей.

**Результаты.** В целом группа практикующих врачей продемонстрировала более высокий уровень знаний по вопросам ЭМП и МК чем группа интернов, за исключением вопросов медицинской сортировки. Обе группы респондентов показали неудовлетворительный уровень знаний в вопросах плана реагирования при катастрофах, оказания помощи контаминированным пострадавшим в условиях радиационного, бактериологического и химического (РБХ), токсического, радиационного загрязнения.

**Заключение.** Система подготовки врачей по вопросам ЭМП и МК требует реформирования и усовершенствования путем внедрения в учебные программы международных стандартов поддержки жизнедеятельности (BLS, ALS: ACLS, ATLS, APLS), создания тренинговых и симуляционных классов, приоритетному изучению и внедрению плана реагирования при катастрофах, навыков оказания помощи контаминированным пострадавшим и работы в случае РБХ загрязнения.

**Ключевые слова:** экстренная медицинская помощь, медицина катастроф, семейный врач.

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НОВОСТИ МЕДИЦИНЫ

БЕССОННИЦА? ПРИЧИНЫ В ГЕНАХ!

Бессонница – проблема, которая рано или поздно приходит к каждому. Долгое время с ней борются как с психологической проблемой. Это не удивительно, так как в современном обществе нас на каждом шагу подстерегают стрессы, перегрузки, хроническая усталость.

Но является ли стресс единственной и основной причиной бессонницы? Последние исследования проведенные нейробиологами Нидерландов, Германии и Исландии, дали ответ – четкое "нет". Ученые определили, что бессонница имеет генетическое начало. Это подтверждается и предыдущими исследованиями, которые определили, что бессонница, часто имеет семейный характер.

В ходе исследований ученые провели анализ генома более ста тысяч человек. Чтобы выявить генетические факторы, связанные с жалобами на бессонницу, были проведены исследования ассоциации генома (GWAS) и исследования генофондной ассоциации генома (GWGAS). В результате было выделено семь вариантов генома, которые способствуют развитию бессонницы. Некоторые варианты этих ген совпадают с генами ответственными за развитие депрессии, синдрома беспокойных ног и других сопутствующих синдромов. В ходе этого исследования было совершенно еще одно удивительное открытие. Из-за разных механизмов в организмах у женщин и мужчин, разные

гены отвечают за развитие бессонницы. Результаты исследования дают новое представление о генетической архитектуре бессонницы и доказывают, что бессонница не может возникать только на почве нервного расстройства и стрессов.

Ведущий автор исследований профессор Ван Сомерен из Нидерландского института, уверен, что данное открытие приведет к перевороту в лечении бессонницы. И он абсолютно прав! Новое открытие приведет к новому подходу в лечении бессонницы, созданию новых препаратов, которые будут упразднять проблему не только с психологической стороны.

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