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THEME 1 for practical lessons of the discipline life safety for first-year students of the pharmaceutical department:

Theoretical basis of the life Safety

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**Safety** is the state of being "safe", the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequencesof failure, damage, error, accidents, harm or any other event which could be considered non-desirable. Safety can also be defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economical losses. It can include protection of people or of possessions.

**The tasks of discipline ‘SAFETY OF VITAL ACTIVITY’:**

* To identify potential dangers that is to recognize their species occurrence in space and time, magnitude and probability of their manifestation;
* Identify hazards, harmful and affective factors generated by the sources of these risks;
* To plan measures to create healthy and safe environment and activity in the system, man-living environment’;
* To predict the possibility and results of hazardous and harmful factors to security ‘man –living environment ‘system’’;
* Use the standard and legal base of protection of the personality and the environment, individual rights to work, health care, protection in emergency situations;
* Develop and implement measures protection from dangerous actions, harmful and damaging factors.
* Prevent of emergency situations occurrence, and in case they occur – to make adequate decisions and perform actions, directed at their liquidation ;
* Use in their practical activity social and political, socio-economics, legal, technical, nature-protective and educational measures directed at ensuring healthy and safe conditions of man existence in modern environment.

**Danger** (also **risk** or **peril**) is the possibility of something bad happening. A situation in which there is a risk of something bad happening, iscalled ***dangerous, risky or perilous***.

People often take risks, or do things that might hurt them. An example of this is crossing the road without looking carefully. There is a risk that you might get hit by a car. Anything that involves a risk of injury or to health can be described as dangerous. Smoking  is dangerous to health. Being around some animals is dangerous because they might attack humans.

**Taxonomy** (biology) is a branch of science that encompasses the description, identification, nomenclature,and classification of organism.

**Classificationof DANGER bytaxonomy** :

* origin (natural, technological, social, man-made, environmental, mixed and others)
* the official standards (physical, chemical, biological, physiological)
* localization (cosmic, atmospheric, hydrosphere, lithosphere)
* time (pulse, cumulative, potential, real) - consequences (illness, injury, death, accidents, fires, tiredness (fatigue))
* loss (social, environmental, technical, etc.).
* by field displays (manufacturing, sports, traffic, military, etc.).
* structure (simple, compound, derivative):1) a character action per person (Active, Passive);2) by harming (social, technical, environmental, etc.); 3) and others.

A **hazard** is an agent which has the potential to cause harm to a vulnerable target. The terms "hazard" and "risk" are often used interchangeably however, in terms of risk assessment, they are two very distinct terms. A hazard is any agent that can cause harm or damage to humans, property, or the environment. Risk is defined as the probability that exposure to a hazard will lead to a negative consequence, or more simply, a hazard poses no risk if there is no exposure to that hazard.

A hazard is a threat. A future source of danger. It has the potential to cause harm to:

• People - death, injury, disease and stress

• Human activity – economic, educational etc.

• Property – property damage, economic loss

 • Environment – loss fauna and flora, pollution, loss of amenities. Some examples of hazards are earthquakes, volcanic eruptions, cyclones, floods, landslides, and other such events.

Environmental events become hazards once they threaten to affect society and/or the environment adversely. A physical event, such as a volcanic eruption, that does not affect human beings is a natural phenomen on but not a natural hazard. A natural phenomen on that occurs in a populated area is a hazardous event. A hazardous event that causes unacceptably large numbers off atalities and/or overwhelming property damage is a natural disaster. In areas where there are no human interests, natural phenomena do not constitute hazards nor do they result in disasters.

The level of harm is governed by:

• Magnitude of the hazard

• Frequency of hazard or recurrence

• Intensity at the impact point

**Multiple hazards**

When more than one hazard event impacts the same area, there arises a multiple hazard situation. These different hazard events may occur at the same time or may be spaced out in time.

**Classification of Hazards:**

**I.** Natural hazards such as earthquakes or floods arise from purely natural processes in the environment.

**II.** Quasi-natural hazards such as smog or desertification arise through the interaction of natural processes and human activities.

**III.** Technological (or man-made) hazards such as the toxicity of pesticides to fauna, accidental release of chemicals or radiation from a nuclear plant. These arise directly as a result of human activities.



**Secondary hazards**

These are hazards that follow as a result of other hazard events. Hazards secondary to an earthquake may be listed as follows to illustrate the concept. Primary hazard is the earthquake. Secondary hazards are:

• Building collapse

• Dam failure

• Fire

• Hazardous material spill

• Interruption of power/ water supply/communication/ transportation/ waste disposal

• Landslide

• Soil liquefaction

• Tsunami (tidal wave)

• Water pollution

**Health Protection**

***Health Protection*** is a term used to encompass a set of activities with in the Public Health function. It involves:

* Ensuring the safety and quality of food, water, air and the general environment
* Preventing the transmission of communicable diseases
* Managing out breaks and the other incidents which threaten the public health.

The profile of Health Protection has increased significantly in recent years with issues such as immunisation, foodborne infections, pandemic flu, healthcare associated infection and communicable diseases regularly being in the public eye. The quality of public protection from hazards demands a workforce, educated and trained to the highest standards.

**Mental health** includes our emotional, **psychological**, and social well-being, feel, and act. It also helps determine how we handle stress, relate to others, and make choices. **Mental health** is important at every stage of life, from childhood and a dole scence through adulthood.



The Nested Model maps the construct into four related but also separable nested domains: 1) the subjective domain, which includes the first person phenomenological state of being; 2) the biological and psychological health and functioning of the individual; 3) the material and social environmental context; and 4) the values and ideology of the evaluator. From this conception, well-being is achieved when there is the positive alignment of these domains. That is, an individual is high in well-being when they are happy and satisfied with their lives, are functioning well psychologically and biologically, have access to necessary and desired material resources and social connections to meet their needs (and the relative absence of damaging or dangerous stressors), and are engaging in life with a purpose and a direction that is deemed by the evaluator to be good and moral. It is worth noting that we can if we “invert” the focus of the Nested Model, an outline of the key domains of illness and pathology emerges. From an ‘inverted’ perspective, domain one corresponds to subjective feelings of distress, misery or dissatisfaction with life, domain two would involve maladaptive or dysfunctional psychological and biological processes, domain three would involve material and social contextual factors that threaten to disrupt functional processes (e.g., toxins or emotional abuse) and fail to meet basic bio-physical and psychosocial needs all in a way that is deemed to be problematic by the evaluator.

**Risk Factors**

**What is a risk factor?**

Risk factors are things in your life that increase your chances of developing a condition or disease. They can include things like family history, exposures to things in the environment, being a certain age or sex, being from a certain ethnic group, or already having a health condition.

Part of learning how to take charge of your health requires understanding your risk factors for different diseases. Risk fac­tors are things in your life that increase your chances of getting a certain disease. Some risk factors are beyond your control. You may be born with the more exposed to them through no fault of your own.

***Some risk factors that you have little or no control over include your:***

* Family history of a disease
* Sex/gender — male or female
* Ancestry

***Some risk factors you can control include:***

* Food
* How much physical activity you get
* Bad habits (alcohol, drugs, smoking, etc.)
* Mode of work and rest
* Emotional and psychological state (stress, etc.)

**Risk** is a measure of the expected failure, trouble in the activities and existence of danger, tied to the deterioration of human health, environmental changes, material costs. Risk is a statistical frequency of the potential dangers that adverse circumstances that may be realized in the undesirable event; quantitative characterization of hazards.

**Risks to human life**

The danger in any area of a quantitative characteristic and depends on many factors that are constantly changing over time. One of the most characteristic manifestations of the risk of danger. The risk of action or risk of inaction is available in 90% of accident causes injuries at work. Consequences or quantification of the damages caused danger, depend on many factors, such as the number of people who were in the danger zone, the quantity and quality of material assets affected, natural resources, promising areas and more. The structure of the subject risk performs various psychological functions. It may be the goal of man, and her motive, if it seeks thrills. Psychologists believe that the need for risk is for everyone.

**Quantification of the dangers** – the introduction of quantitative characteristics to assess the degree (level) of danger.

**The degree of risk (R**) is defined as the ratio of the number of events with undesirable consequences that have already occurred **(n)** to the maximum **possible number (N)** for a specific period of time:

**R = n / N**

 R – risk for a certain period of time

 n – the number of actual manifestations of danger (injuries, accidents, disasters) for a certain period of time

N – theoretically possible past no for the activity or object.

The formula allows you to calculate the total size of the group and risk. In assessing the overall risk of the value of N determines the maximum number of events, and in the assessment of the risk group – the maximum number of event sin a particular group, which is selected from the total amount by a certain sign.

As the degree of acceptability of risk is so negligible, say, the maximum allowable, the excess, but to achieve zero risk, is absolute security is impossible in practice. At present the most common is the concept of acceptable (acceptable) risk. Its essence is to achieve a level of security, which could take society (economically justified). Acceptable risk is defined as actually existing in some kind of activity that does not keep people aware of the actions related to alleged danger.

**The allowable risk** is a compromise between the level of security and implementation of technical, economic, social and political potential of the state.

In some countries (the Netherlands, Sweden and others.) acceptable risk level set by law, such as the maximum acceptable level of individual risk of death beings consider the probability of 10.6 per year. A very small individual risk of death is 10-8 on the year, the maximum risk to ecosystems such, which may be affected by no more than 5% of the ecological community type.

***The risk-based approach*** is a complex of organizational measures providing for monitoring, analysis, risk assessment of any entity on the basis of probabilistic safety analysis to prevent disasters and risk management in general.

***The main tasks of risk*** based on the safety of industrial and warehouse buildings (structures), complex potentially dangerous objects and objects high risk, enterprises, technical systems, objects of occupancy (airports, sea and river , rail and road stations of national and regional significance, stations), which are of strategic importance to the economy of the state.

***The principles of risk*** based approach are used as a strategic planning and daily activities of civil defense. One of the possible areas of improvement in this area is more effective practical measures to prevent dangerous situations and minimize their negative consequences. This can be done by borrowing best practices of effective regulation of state security in Europe.

***For risk-based approach to process safety management involves the following steps:***

1. Identification of risk factors. It is to identify all sources of risk (threats), events that trigger the occurrence of accidents or emergency situations, description of the object and existing remedies possible scenarios of the events and their ranking.
2. Evaluation of risk. This process of determining probability occurrence of adverse events (accidents) during the period and magnitude of impacts on human health, property and the environment.
3. Risk management. In the field of natural technogenic security it is oriented to minimize social and economic consequences of emergencies and natural technogenic in Ukraine by intro- mentation of modern mechanisms of regulation based on risk-based approach and ensuring an acceptable level of safety of the population and territories.
4. To achieve the declared goal should be to develop:
	1. Monitoring system of risk analysis and forecasting of emergencies as the basis of activities aimed at reducing the risk of their occurrence;
	2. A system of prevention of emergency situations and mechanisms of government regulation risks;
	3. Emergency response system;
	4. Management of the training system of controlling professionals and the public to reduce the risk and reduce the scale of emergencies.

The risk-based approach also provides valuation risks - regulatory activities to develop and approve the rules of techno and natural safety rules and regulations of business activities, which investigated based on the values of risk within acceptable limits. It helps set the boundaries of acceptability of technological activity.

To introduce in Ukraine valuation risk emergency situations of technogenic and natural character should create state system of regulation.

For its effective operation should:

1. Develop a common methodological approach to risk assessment hazards of different nature and species that exist in the territory of Ukraine ;
2. consider all factors and sources of danger affecting the magnitude of the risk of emergencies;
3. consider the human impacts and climatic features of the area, the weight of all the effects (economic, environmental, social), which can be caused by the expected emergency situations of natural and manmade.

**RISK is also defined as:**

* Individual risk: (a consequence / h) = frequency (event / time unit) x variable (result / event).
* Public risk of possible losses, risks (loss / time) = frequency (accidents / time unit) x value (losses / failures).

**Classified by types of risks:**

• scale (with respect to - the individual, that individual and social - group, region, nation, humanity);

• feasibility (reasonable, unreasonable or absurd);

• volition (voluntary, forced)

• area of activity (economic, domestic, industrial, political, in nature);

• the degree of acceptability (negligible, acceptable maximum permissible excessive).

***Rejected risk level*** is so low that it is within the tolerances of natural (background) level.

***An acceptable level of risk*** is such that society can accept (allow), including technical, economic and social opportunities at this stage of development.

***Maximum allowable risk*** is a maximum risk, which should not be exceeded, despite the expected result.

***Excessive risk*** is characterized by exceptionally high level, which in most cases leads to negative consequences.

**Environmental risk** - the probability of adverse changes in the environment caused by anthropogenic or otherwise influence; causing damage to the environment as possible losses on specified time. Any business or other decisions should be taken so as not to exceed the limits of harmful effects on the environment. Set them sometimes difficult because many rapids impact of anthropogenic and natural factors are unknown.

***Environmental risk management strategy*** can be based on a selection of risk levels ranging from minimum to the maximum. Environmental safety management strategy should be based on the concept of acceptable (non-zero) risk. According to this study not only the factors and sources of risk, but also provide the events, assessment of natural and technological disasters. In many cases it avoids major disasters, finding alternative solutions.

***Developed several management strategies of ecological security:***

* + Prevention of accidents up to the rejection of products hazardous industries, the closure of emergency facilities;
	+ Prevention of emergency situations when it is impossible to avert a catastrophe caused (building protective structures, dams, creation of underground infrastructure, early evacuation of the population);
	+ Mitigation of disasters, implementation of stabilization countervailing measures.

***Environmental Risk Assessment includes:***

* Studying scenarios of possible accidents and their consequences for the environment and the population;
* Analysis of measures to prevent the consequences of accidents and their limitations;
* Calculation of the likely damage caused to the activities of the company;
* Details of means of reducing losses; environment impact assessment of residual contamination;
* System of informing the supervisory organizations and citizens about a possible accident.

***For the environmental risk assessment using the following basic approaches:***

1. engineering. Major efforts are focusing on the collection of statistical data on accidents and related emissions of toxic substances in the environment to calculate the probability of accidents;
2. model. Developing mathematical models of processes that lead to the emergence of risks to humans and the environment from the use of harmful chemicals and compounds;
3. expert. If the statistical data or not some fundamental dependence is not found, then seek help from experts who assess the effects of events related to risk analysis;
4. sociological. Determine the level of risk for different groups.

**Man-made risk** is the risk to the public, social, technological and natural objects caused by adverse events caused by man.The most intense and powerful source of generating new types of risks are Techno sphere - part of the environment created by man and transformed to meet your needs. The number and consequences of major industrial disasters of modern times tended to show a constant increase in man-made risks.

**Social risks and ways to ensure the public**

The problem of social risks is historical in nature, and market relations, it is of particular relevance. Interest in it originated in lawyers, sociologists, psychologists, economists, philosophers. **Social risk** events in human life, in which there is a risk of loss of material resources to meet its primary (basic) requirements necessary to maintain and play a full life as a member of human society. In a broad sense all the risks that come upon man for her life is social, because due to social life. But among them distinguished group of risks that the global legal practice to understand how certain events in life that contribute to its financial support to society. It is generally recognized international standards provide certain life circumstances in which the person who got them, ensuring it can expect from the human community.

**Insurance risk** - the circumstances because of which citizens and (or) their families may lose temporarily or permanently livelihood and need financial support or social services on compulsory state social insurance.

**Insured event** - an event on which the insured person there is a right to obtain financial security or social services, the law of Ukraine on certain types of compulsory social insurance.

There is also a large group of social risks caused by military, political, technological and environmental phenomena. They are caused by the power that far exceeds the capacity of the individual to resist them; high level of risk and irreversible physical, material and moral losses.

***First in the world formed two basic models of population protection in case of social risks:***

* *Bismarck system (continental),* the basic idea of ​​which was to organize social security based on mutual aid and social security working population;
* *Beveridge system (Atlantic),* which is based on the principle of minimum consumer budget total population. Today there is a tendency to merge and improve these systems.

At present there are different versions of social protection:

* social-democratic model of Scandinavian countries, for which the state assumes considerable responsibility for social protection and seeks to ensure full employment;
* neoliberal model (USA), according to which social security problems mostly resolved between employers (employers) and employees under the mediation of trade unions;
* neo-conservative model (Germany), based on the mixed public-private solving social problems; collective responsibility system under state control; Beveridge system.

**Health Determinants**

***Determinants of health*** are factors that contribute to a person’s current state of health. These factors may be biological, socioeconomic, psychosocial, behavioral, or social in nature.

Determinants of health fall under several broad categories:

1. Social factors
2. Health services
3. Individual behavior
4. Biology and genetics

Determinants of health reach beyond the boundaries of traditional healthcare and public health sectors; sectors such as education, housing, transportation, agriculture, and environment can be important allies in improving population health.

**Policy making**

Policies at the local, State, and Federal level affect individual and population health. Increasing taxes on tobacco sales, for example, can improve population health by reducing the number of people using tobacco products. Some policies affect entire populations over extended periods of time while simultaneously helping to change individual behavior. For example, the 1966 Highway Safety Act and the National Traffic and Motor Vehicle Safety Act authorized the Federal Government to set and regulate standards for motorvehicles and highways. This led to an increase in safety standards for cars, including seatbelts, which in turn, reduced rates of injuries and deaths from motorvehicle accidents.

* 1. **Social factors**

Social determinants of health reflect social factors and the physical conditions in the environment in which people are born, live, learn, play, work and age. Also known as social and physical determinants of health, they impact a wide range of health, functioning and quality of life outcomes.

Examples of social determinants include:

* Availability of resources to meet daily needs, such as educational and job opportunities, living wages, or healthful foods
* Exposure to crime, violence, and social disorder, such as the presence of trash
* Social support and social interactions
* Exposure to massmedia and emerging technologies, such as the Internet or cellphones
* Socioeconomic conditions, such as concentrated poverty
* Quality schools
* Transportation options
* Public safety
* Residential segregation

Examples of physical determinants include:

* Natural environment, such as plants, weather, or climate change
* Built environment, such as buildings or transportation
* Worksites, schools, and recreational settings
* Housing, homes, and neighborhoods
* Exposure to toxic substances and other physical hazards
* Physical barriers, especially for people with disabilities
* Aesthetic elements, such as good lighting, trees, or benches

Poor health outcomes are often made worse by the interaction between individuals and their social and physical environment.

* 1. **Health Services**

Both access to health services and the qualityof health services can impact health. Healthy People 2020 directly addresses access to health services as a topic area and in corporates quality of health services through out a number of topic areas.

Barriers to accessing health services include:

* Lack of availability
* High cost

These barriers to accessing health services lead to:

* Unmet health needs
* Delays in receiving appropriate care
* Inability to get preventive services
* Hospitalizations that could have been prevented
	1. **Individual Behavior**

Individual behavior also plays a role in health outcomes. For example, if an individual quits smoking, his or her risk of developing heart disease is greatly reduced. Many public health and healthcare interventions focus on changing individual behaviors such as substance abuse, diet, and physical activity. Positive changes in individual behavior can reduce the rates of chronic disease in this country.

Examples of individual behavior determinants of health include:

* Diet
* Physical activity
* Alcohol, cigarette, and other druguse
* Handwashing
	1. **Biology and Genetics**

Some biological and genetic factors affect specific populations more than others. For example, older adults are biologically prone to being in poorer health than a dole scents due to the physical and cognitive effects of aging.

Sickle cell disease is a common example of a genetic determinant of health. Sickle cell is a condition that people inherit when both parents carry the gene for sickle cell. The gene is most common in people with ancestors fromWest African countries, Mediterranean countries, South or Central American countries, Caribbean islands, India, and Saudi Arabia.

Examples of biological and genetic social determinants of health include:

* Age
* Sex
* HIV status
* Inherited conditions, such as sickle-cellanemia, hemophilia, and cystic fibrosis
* Carrying the BRCA1 or BRCA2 gene, which increases risk for breast and ovarian cancer
* Family history of heart disease

**Social Determinants of Health**

Social determinants of health are economic and social conditions that influence the health of people and communities. These conditions are shaped by the amount of money, power, and resources that people have, all of which are influenced by policy choices. Social determinants of health affect factors that are related to health outcomes. Factors related to health outcomes include:

* How a person develops during the first few years of life (early childhood development)
* How much education a persons obtains
* Being able to get and keep a job
* Having food or being able to get food (food security)
* Having access to health services and the quality of those services
* Housing status
* How much money a person earns
* Discrimination and social support