

PROPOSED LIST OF DRUGS, CHEMICALS, CONSUMABLES FOR SANITARY TREATMENT AT STATION OF THE SANITATION DISPOSAL ENTIRE

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SUMMARY

Objectives: To propose a list of drugs, chemicals and consumables for sanitary treatment (ST) at the Station of the Sanitation Disposal Entire (SSDE). **Subjects and methods:** Using experimental methods to propose a list of drugs, chemicals, and consumables based on selection criteria and necessary bases. **Results:** The need for user groups of materials at the SSDE has been identified, the list of drugs and chemicals has been proposed with 6 groups, 29 items, and 5 types of decontamination solutions (DS) in the list are prepared as materials; the list of consumables includes 4 groups, 15 items. **Conclusion:** The list of drugs, chemicals, and consumables has been proposed to meet the needs of 15 staff working and performing the task of full sanitizing treatment, supplementing first aid when necessary for 50 wounded soldiers (WS) through the SSDE.

* **Keywords:** List of drugs, chemicals, and consumables; Sanitary treatment; Station of the sanitation disposal entire.

INTRODUCTION

Although up to now, the risk of a large-scale nuclear war in the world has rarely occurred, small-scale nuclear conflicts, local warfare using tactical nuclear weapons (NW), the A radioactive leak, and a poor radioactive weapon as a premise occurs in a certain area, there are always many potential risks, thereby threatening the health and lives of soldiers and people [2, 3]. The preparation of human and material resources to be ready to deal with all situations related to NW is always of special importance, including the preparation

of the military medical force to perform the ST mission for the WS injured by NW. At the infantry division medical station, in the case that the enemy uses the NW, we must immediately deploy a sanitary treatment unit to fully sanitize treatment and supplement first aid when necessary for WS. However, at present, these lists have not been concretized and officially issued; thus, one of the important tasks is to build a specific list of drugs, chemicals, and consumables, thereby serving as a basis for packaging into a complete drug base for the infantry division medical station.

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SUBJECTS AND METHODS

1. Subjects

The drugs, chemicals, consumables meet the selection criteria:

- Proactive disease prevention is a top priority: Radiation protection drugs, radioactive waste drugs.

- The drug with a high prophylactic effect has been tested for safety and effectiveness with few side effects.

- Medicines and chemicals that are easy to store, use, and prepare on the spot; reasonable price, readily available or easy to find, easy to order.

- Types of consumables available on the market, suitable to the nature of combat.

2. Methods

Using empirical methods to select and propose, including drugs, chemicals and consumables in the list.

Formula for calculating the number of drugs, chemicals and consumables required in the list:

$$X_t = S_t \times T_1 \times T_2 \times W$$

In which:

X_t : The number of drugs, chemicals, and consumables required.

S_t : The need to use drugs, chemicals, and consumables for once a WS.

T_1 : The proportion of WS injured by NW.

T_2 : The rate of WS receiving ST or supplement first aid at the SSDE. Depending on each specific case, T_2 receives different values (100% or 50%).

N : The number of WS processed at the SSDE (50 WS).

RESULTS

1. Task and need to use groups of materials

Based on the specified tasks of the SSDE to concretize the tasks and needs to use the necessary groups of materials.

Table 1: Tasks and needs for materials at the station of the sanitation disposal entire.

Mission	Need to use groups of materials
Carry out complete sanitizing treatment	
<ul style="list-style-type: none"> - Remove personal protective equipment; - Check the status of WS, add first aid when necessary, and make additional notes on the commercial paper before undressing; - Acquiring personal belongings, papers... of WS; - Remove clothing, cover wounds or burns before bathing; - Sanitize handling of parts if WS does not go through the parts sanitary disposal yard (cleansing eyes, nose, mouth); - Full body decontamination bath; 	<ul style="list-style-type: none"> → Group of equipment and tools containing personal protective equipment; → Group of consumables, supporting tools to check WS status; surface contamination, wounds, burns; → Group of tools and consumables for personal belongings; → Group of consumables to replace WS; Group of equipment and consumables containing dirty clothes and medical waste; → Group of decontamination solutions; Group of consumables, tools, and equipment to support decontamination;

Mission	Need to use groups of materials
<ul style="list-style-type: none"> - Radiometric testing of WS after bathing; - Remove plastic wrap for wounds and burns; - Change into clean clothes; - Return of personal belongings and commercial paper. 	<ul style="list-style-type: none"> → Group of equipment, vehicles, personal consumables, supplies for decontamination baths; → Radiation measuring equipment; → Group of tools and consumables for medical waste; → Equipment group, clean clothes instead;
Supplement first aid when necessary	
<ul style="list-style-type: none"> - Use radioprotective drugs immediately; - Fix the wound if the fixation is not good; cover wounds and burns if the dressing is still loose; - Emergency management (anti-bleeding, anti-suffocation) if necessary; - Anti-vomiting if nausea and vomiting are present; - Use radioactive drugs immediately (if there are early signs). 	<ul style="list-style-type: none"> → Radioprotective drug (RD) group; → Group of consumables to fix wounds and burns; Group of solutions for external use to wash wounds and burns (if necessary); → Group of anti-bleeding, anti-suffocation drugs; Group of consumables, tools to support the process of anti-bleeding, anti-suffocation; → Antiemetic group; consumables for drug use; → Radioactive drugs (increase the release of radioactive substances from the body immediately (if any); Group of consumables for drug use;

From determining the need to use groups of supplies for each specific task, a detailed list of drugs, chemicals, and consumables is proposed. The remaining groups, such as equipment and tools are mentioned in another section.

2. Proposing a list of drugs and chemicals

Table 2: List of drugs and chemicals required for the station of the sanitation disposal entire.

Number	Item	Unit	Injury rate (%)	Treatment rate (%)	Quantity
Group of radioprotective drugs					
1	Potassium iodide 130 mg	tablet	100.00	100.0	65
Group of drugs to treat skin infection (healthy skin)					
2	Clean water	liter	100.00	100.0	2,000
3	Decontamination agent for human use or soap	gram			6,000
Group of drugs to treat mucosal radiation contamination, mucosal burns					
4	Sodium chloride 0.9%	mL	41.50	100.0	6,250
5	Lidocaine 1%	mL	41.50		450
6	Atropine sulfate 1% 10 mL	jar	26.00		13
7	Sanlein 0.3% 5 mL	jar	41.50		5

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Number	Item	Unit	Injury rate (%)	Treatment rate (%)	Quantity	
Group of drugs to treat wounds and burns						
8	Sodium chloride 0.9%	mL	28.60	50.0	2,150	
9	Sodium edetate 1.86%	mL	28.60		2,150	
10	Panthenol 130g spray	bottle	32.50		4	
11	Berberine 0.1%	mL	32.50		2,450	
12	Povidone iodine 10% 40g	gram	32.50		33	
Group of drugs to treat systemic radiation, to treat the first reaction when contamination						
13	Sodium hydrocarbonate 2%	mL	51.80	50.0	3,900	
14	Ondansetron 8 mg/4 mL	tube	51.80		13	
15	Terpin hydrate 100 mg	tablet	41.50		21	
16	Salbutamol 100 mcg	bottle	41.50		21	
17	Niketamide 250 mg/mL 1mL	tube	51.80		26	
18	Morphine hydrochloride 10 mg/mL 1mL	tube	51.80		13	
19	Diazepam 5 mg/mL 2 mL	tube	51.80		13	
20	Amikacin 250 mg/mL	tube	28.60		7	
21	Ciprofloxacin 500 mg	tablet	28.60		7	
22	Metronidazole 250 mg	tablet	28.60		7	
23	Fluconazole 150 mg	tablet	28.60		7	
24	Berberine chloride 100 mg	tablet	20.73		52	
25	Atropine 1 mg/mL 1 mL	tube	20.73		5	
Group of drugs to treat internal radiation (specific drugs)						
26	Pentetate calcium trisodium 20% 5 mL	tube	41.50		50.0	10
27	Ferric hexacyanoferrate	tablet	20.73	10		
	or Aluminum phosphate 20g	sachet		5		
	or Bari sulfate 1g	sachet		16		
	or Natri alginat 500 mg 10 mL	sachet		52		
28	Drinking water	liter	41.50	10,500		
29	Sodium hydrocarbonate 500 mg	blister	20.73	10		

The list of drugs and chemicals for SSDE included 6 groups with 29 items, enough to meet the needs of 15 employees and ST for 50 contaminated WDs. In the list, all solutions for cleaning wounds and burns, and for washing eyes, nose, and ears, after determining the total demand in use, will be changed into mixed ingredients for packaging in the list.

Table 3: List of preparation materials required for the station of the sanitation disposal entire.

Number	Item	Unit	Quantity (rounded)	Number of bottles
1	Berberine active pharma ingredient (API)	gram	3	5
2	Lidocaine API	gram	5	1
3	Sodium chloride API	gram	81	18
4	Sodium edetate API	gram	47	5
5	Sodium hydrocarbonate API	gram	80	8
6	Distilled water for injection	liter	20	

In the list, pharmaceutical ingredients are calculated exactly according to the concentration and volume of solution to be reconstituted for proper packaging and preparation on site immediately before use.

3. Proposing a list of consumables

Table 4: List of consumables required for the station of the sanitation disposal entire.

Number	Item	Unit	Injury rate (%)	Treatment rate (%)	Quantity
Support in the treatment of mucosal contamination, mucosal burns					
1	Plastic syringe 20 mL	piece	41.5	100.0	42
2	Need to get drugs	piece			21
3	Medical cotton swabs 15 cm (pack of 100 pieces)	pack			104
4	Suction cotton 25 g	pack			10
Support treatment of whole body radiation, first response treatment for radiation exposure					
5	Disposable paper cup 150 mL	piece	51.8	50.0	13
6	Sterilized alcohol swab (box of 100 pieces)	box			39
7	Plastic syringe 1 mL	piece			39
8	Plastic syringe 5 mL	piece			13
Support early prevention of internal radiation (specific radioactivity drugs)					
9	Sterilized alcohol swab (box of 100 pieces)	box	41.5	50.0	10
10	Plastic syringe 5 mL	piece	41.5		10
11	Disposable paper cup 150 mL	piece	20.7		5

Number	Item	Unit	Injury rate (%)	Treatment rate (%)	Quantity
Support wound, burns treatment					
12	Nylon 30 × 30 cm	plate	32.5	50.0	16
13	Nylon 50 × 50 cm	plate	32.5		8
14	Suction cotton 25g	pack	32.5		4
15	Medical elastic bandage 8 cm × 5.5m	roll	32.5		16
16	Paper tape 2.5 cm × 5m	roll	32.5		8
17	Surgical gauze 10 × 10 cm, 4 layers	piece	28.6		21
18	Surgical gauze 30 × 30 cm, 4 layers	piece	28.6		7
19	Medical tape roll 9 cm × 2m	roll	28.6		14

The list of consumables required for SSDE is proposed on the basis of corresponding needs for drugs and chemicals. The list is divided into four groups with a total of 15 items, some items appear in many different task groups. On a case-by-case basis, the treatment rate was estimated at 100% or 50% and calculated for 50 WSs to ensure that it matches the number of WS treated by the wartime treatment ladder at the infantry division medical station.

DISCUSSION

1. About the tasks and needs of using groups of materials

The general task of SSDE is full sanitizing treatment and supplementing first aid in case WS is damaged by NW. Since then, the details of each specific task and corresponding groups of supplies have been determined. It is required to perform the mission, which includes the full group of drugs, chemicals, consumables, and the group of equipment required to deploy and perform the mission. This is an important basis along with specific based on the expected type of NW that the enemy intends to use (option to use missiles with nuclear warheads, injury rate (for this case), treatment rate at the station, staffing organization of the station, and the number of WS to be processed to recommend a specific list.

2. Regarding the proposed list of drugs and chemicals

The proposed list includes 6 groups, in which each drug and chemical in the list is selected according to agreed criteria. With RD drug group, 100% of staff working at the station (15 people) and WS must use it immediately (if not taken at the front line). There are many different classes of RD drugs, but in order to prevent radiation damage when exposed to external radiation, reduce the body's response to the effects of ionizing radiation, increase the ability to protect the thyroid gland, choose Potassium iodide 130 mg dose 1 tablet/time/day. With the group of drugs to treat skin contamination, the treatment rate is 100%, all WS are bathed with a decontamination solution or soap and clean water. This is the most important task of SSDE, depending on different types of cleaning vehicles, the ability to fully sanitize treatment for WS is

different. Currently, DDA vehicles are still best suited to combat conditions and capabilities, maneuver on mountainous terrain. With the treatment of mucosal radiation contamination, mucosal burns, the treatment rate is also 100%. WS is treated immediately after bathing by washing eyes, nose, and ears with cleaning solutions, but with wounds, burns need to be cleaned before dressing and nylon wrap to avoid getting wet when bathing [5]. Depending on whether the measured dose of radioactive material is within a safe threshold or not to decide whether to re-treat the wound before transferring or entering the station for further treatment. At SSDE, in addition to bathing, it is important to pay attention to the treatment of first responders when exposed to radiation; therefore, drugs in this group are the most on the list, with an estimated treatment rate of about 50%.

For cleaning solutions, according to calculations, although the volume of ingredients is odd, it is suitable for each batch of mixing bottles (no more than 10 liters), so it is still packaged for each preparation to ensure enough and timely supply to distribute in the needs of sanitary treatment for WS. For the lidocaine solution, mix it in a measuring cup because of the need to use less (1 bottle). With the number of solutions required, the volume of distilled water needed to ensure on-site dispensing is about 20 liters, still ensuring the on-site preparation capacity of the pharmacy department.

3. About the proposed list of consumables

On the basis of the list of drugs and chemicals, the list of consumables is determined to suit the tasks of SSDE,

including 4 groups, in which the treatment rate of 2 groups: Group for the treatment of skin and mucosal contamination, skin burns, mucosal burns, and wound and burn treatment group is 100%, the remaining 2 tasks groups, the rate is 50%. In the list, the group of materials to support the treatment of skin radiation contamination (radiation bath) does not appear, but it is proposed in another list due to the nature of the type of material.

CONCLUSION

A list of drugs, chemicals, and consumables has been proposed, which is enough to meet the needs of 15 employees working and performing the task of full sanitizing treatment and supplementing first aid when necessary for 50 WS at SSDE, in which the list of drugs and chemicals includes 6 groups with 29 items, cleaning solutions in the list are proposed as raw materials. The list of consumables includes 4 groups with 15 items.

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