

Chapter 12

Shelter Sanitation and Preventive Medicine

AN OUNCE OF PREVENTION

Should fallout force Americans to stay crowded into basements and expedient shelters for days or weeks, they should protect themselves against the spread of infectious diseases by taking both accustomed and unaccustomed preventive measures. Thousands of our jungle infantrymen in World War II learned to practice many of the health-preserving techniques described in this chapter. If modern medical facilities were temporarily unavailable, the prevention of diseases would become much more important to all of us.

The following infection-preventing measures are simple, practical, and require some self-discipline. The author has observed their practice and has used them while exploring and soldiering in a number of jungle, desert, and mountain regions. I also have used these measures while field-testing nuclear war survival skills in several states.

Basic first aid also would be of increased importance during a major confrontation or war. Good first aid booklets and instructions are available in practically all communities, so most first aid information will not be repeated here.

DISPOSAL OF HUMAN WASTES

To preserve health and morale in a shelter without a toilet or special chemicals for treatment of excrement and urine, human wastes should be removed before they produce much gas. A garbage can with a lid or a bucket covered with plastic will not hold the pressurized gas produced by rotting excrement. The following expedient means of disposal are listed in *increasing* order of effectiveness.

- Use a 5-gallon paint can, a bucket, or a large waterproof wastebasket to collect both urine and excrement. Use and keep it near the air-exhaust end of the shelter. Keep it tightly covered when not in use; a piece of plastic tied over the top keeps out insects and reduces odors. When such waste containers are full or begin to stink badly while covered, put them outside the shelter—still covered to keep out flies.

For some people, especially the aged, bringing a toilet seat from home would be justified. Padding on the edge of the bucket also helps those who have to sit down. An improvised seat of plywood or board serves well.

If only one container is available and is almost filled, periodically dump the wastes outside—unless fallout is still being deposited. Before an anticipated attack, people who plan to stay in a shelter should dig a waste-disposal pit if they do not have sufficient waste containers for weeks of shelter occupancy. The pit should be located about 3 feet from the shelter in the down-wind direction. This usually will be the air exhaust end of an earth-covered shelter. The pit should be surrounded by a ring of mounded, packed earth about 6 inches high, to keep surface water from heavy rains from running into it.

Quickly putting or dumping wastes outside is not hazardous once fallout is no longer being deposited. For example, assume the shelter is in an area of heavy fallout and the dose rate outside is 400 R/hr—enough to give a potentially fatal dose in about an hour to a person exposed in the open. If a person needs to be exposed for only 10 seconds to dump a bucket, in this 1/360th of an hour he will receive a dose of only about 1 R. Under war conditions, an additional 1-R dose is of little concern. If the

shelter design does not permit an occupant to dispose of wastes without running outside, he can tie cloth or plastic over his shoes before going out, and remove these coverings in the entry before going back inside the shelter room. This precaution will eliminate the chance of tracking "hot" fallout particles into the shelter, and the small chance of someone getting a tiny beta burn in this way.

- Have all occupants only urinate in the bucket, and defecate into a piece of plastic. Urine contains few harmful organisms and can be safely dumped outside.

Two thicknesses of the thin plastic used to cover freshly drycleaned clothes will serve to hold bowel movements of several persons. Gather the plastic around the excrement to form a bag-like container. Tie the plastic closed near its upper edges with a string or narrow strip of cloth. Do not tie it so tightly as to be gas-tight. Each day's collection should be gently tossed outside. As the excrement rots, the gas will leak out of the tied end of the plastic covering. Flies will be attracted in swarms, but they will not be able to get into the plastic to contaminate their feet or to lay eggs. And because rotting excrement is so attractive to flies, shelter occupants will be bothered less by these dangerous pests.

- Use a hose-vented, 5-gallon can or bucket lined with a heavy plastic bag; cover tightly with plastic when not in use. Figure 12.1 shows this type of expedient toilet.

The vent-hose runs through a hole near the top of the paint can shown and is taped to seal it to the can. Such a hole can be quite easily cut with a chisel or a sharpened screwdriver. The hose is long enough to extend outside the shelter. Its outer end should be secured about 6 inches above ground level, to prevent water from running into it during a heavy rain. When a toilet-can is tightly covered, foul gases can escape through the hose to the outdoors.

With its opening tied shut, a large plastic trash bag containing as much as 30 pounds of wastes can be lifted out of a toilet-can and disposed of outside the shelter.

The 6-member Utah family described in preceding chapters used a home-like expedient toilet during their 77-hour shelter stay. Figure 12.2 pictures the toilet seat they took with them, placed on a hose-vented container in a hole in the ground. The toilet was at one end of the shelter. A person sitting on this

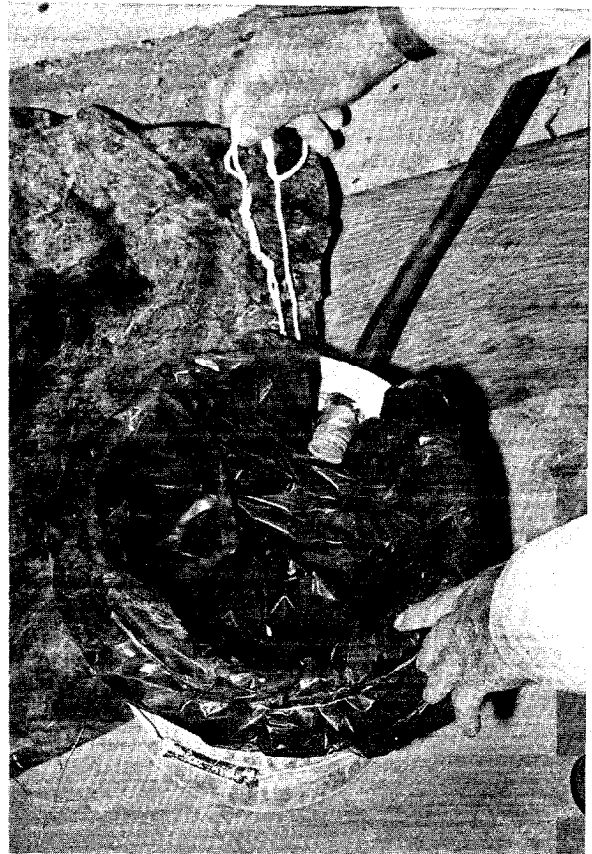


Fig. 12.1. A 5-gallon paint can used for a hose-vented toilet-can.

toilet could put his feet in the adjacent "stand-up hole" and be more comfortable.

The blanket shown hanging on the left in Fig. 12.2 could be drawn in front of the toilet for privacy. Behind the girl's head was the emergency crawlway-ventilation trench. When the toilet was being used, the shelter-ventilating KAP pumped air under the blanket-curtain and out the ventilation trench, resulting in very little odor in the rest of the shelter.

Vomiting is certain to cause both morale and health problems, especially for unprepared shelter occupants fearing this first dramatic symptom of radiation sickness. Nervousness, combined with the effects of unaccustomed food and water, will cause even some healthy persons to vomit. In a crowded shelter, the sight and smell of vomit will make others throw up. Plastic bags, well distributed throughout a shelter, are the best means to catch vomit and keep it



Fig. 12.2. The hose-vented expedient toilet used by the Utah family for over 3 days. (The unconnected telephone was brought along as a joke.)

off the floor. Buckets, pots, or a newspaper folded into a cone also will serve.

DISPOSAL OF DEAD BODIES

In large shelters which are occupied for many days, someone may die even when no occupants have been injured by blast, fire, or radiation. The sight or the sickly-sweet stink of a decaying human body is greatly disturbing. Some civil defense workers have theorized that the best way to take care of a corpse in a shelter until the fallout dose-rate outdoors is low enough to allow burial is to seal it in a large plastic bag. A simple test with a dead dog proved this idea impractical: gas pressure caused the bag to burst. One solution is to put the corpse outside as soon as the odor is evident. First, if possible, place it in a bag made of large plastic trash bags taped together and perforated with a few pinholes.

CLEAN WATER AND FOOD

Disinfecting water by boiling (preferably for at least 10 minutes) or by treating it with chlorine or iodine has been described in Chapter 8, Water.

When water is first stored, it should be disinfected by the addition of 1 scant teaspoon of ordinary household bleach for each 10 gallons.

To avoid contaminating water when removing small quantities from a container such as a waterproof bag, the simplest way is first to pour some into a pot or other medium-sized container, from which small amounts can be poured into individual cups. Dipping water with a cup runs more risk of contamination. The cleanest way to take small quantities of water out of a container is to siphon it with a flexible tube, as described in Chapter 8, Water.

Sanitary storage of food in expedient shelters is often difficult. Although almost any paper or plastic covering will keep fallout particles from food, shelter dampness can cause paper containers to break. Ants, roaches, and weevils can cut through paper or plastic coverings to reach food inside. Placing paper containers of food in plastic bags and suspending the bags from the ceiling of the shelter entryway gives good protection against bugs, and quite good protection against moisture for a few weeks. (Do not obstruct the air flow through an entryway if heat is a problem.) A small amount of insect repellent or grease smeared on the suspending string or wire will stop all crawlers. Metal and strong plastic containers with tight lids protect food best.

The hygienic preparation and serving of food in a shelter, especially in hot weather, require that all cooked food be eaten promptly. It is best to eat within half-an-hour after cooking. Canned foods should be consumed shortly after opening. The cleaning and disinfecting of utensils, bowls, etc., should be done promptly, to prevent bacteria from multiplying and to lessen the chances of ants and other insects being attracted into the shelter. Sugar should be mixed with cereals in the cooking pot, to avoid spilling.

In Oak Ridge National Laboratory shelter tests, only a few infants and toddlers have been included among the occupants. Feeding infants and small children over a piece of plastic would be one good way to keep the inevitable spillage from complicating shelter life.

To avoid using dishes, most foods can be served on squares of plastic. Spoons and such plastic

"dishes" can be licked clean after eating, then disinfected by boiling or by dipping them into chlorine bleach solution containing one tablespoon of Clorox-type bleach to a quart of water.

A shelter occupant without a spoon can eat very thick grain mush in a sanitary manner by placing it on a piece of plastic held in his hand, forming it into a ball, and taking bites. Although Chinese peasants often eat wet-rice balls held in their bare hands, experiments have indicated—not unexpectedly—that Americans do not like to eat this way.

Cooking without oil or fat makes disinfecting utensils much easier when water and fuel are being conserved. Cereals and sugar are easy to wash off with a little water, without soap.

CONTROL OF INSECTS

Insect sprays used in high-protection-factor shelters are likely to cause more problems than they eliminate. Poisonous insecticides should be used with caution. Insect repellents on the skin and clothing are generally helpful, but not likely to be in sufficient supply to last for weeks or months. Some insect problems and simple means of controlling them are described below.

Mosquitoes would multiply rapidly after an attack, because normal control measures would not be in effect. Using insect screen or mosquito netting to cover the ventilation openings of a shelter is the best way to keep out mosquitoes, flies, and all larger insects. However, if the shelter has no air pump, it is impractical to use screens that obstruct the free movement of vital air—except in cold weather.

The fly population would explode after a nuclear attack. Radiation doses several times larger than doses that would kill people do not sterilize insects. In extensive rural areas where almost all people could have adequate shelter to be safe from fallout, most domestic animals and wild creatures would be killed. Trillions of flies would breed in the dead bodies.

Shelter occupants should make every effort to prevent flies from reaching disease-spreading human wastes.

Ants, especially in the warmer parts of the country, could drive people out of expedient shelters. The best prevention is to try to find a shelter-building site that is not near an ant nest. If shelter occupants are careful in storing food and eating, ants are less likely to become a problem.

Ticks and chiggers are usually found on grass and low bushes. To avoid carrying these pests into the shelter, do not bring grass or dead leaves into your shelter for bedding except in freezing weather. Cut leafy branches high above the ground: few pests live in tall vegetation.

PERSONAL POSSESSIONS

Toothbrushes are not boiled or otherwise disinfected after being used, because we all develop considerable resistance to our own infective organisms. For the same reason, each individual should have his own personal drinking cup, bowl, and spoon. They should be cleaned as well as possible and kept covered when not in use.

PREVENTION OF SKIN DISEASES

In crowded shelters, especially during hot weather, skin diseases are likely to be a more serious problem than is generally recognized. The importance of learning how to prevent skin diseases was made apparent by one of the very few shelter-occupancy tests to be conducted in the summer without air conditioning. This was a Navy test in which 99 men lived for 12 days in an underground shelter cooled only with outdoor summer air.¹⁵ The incidence of skin complaints was high, even though medical treatment was available on a daily basis. The total number of reports to sick call was 560; 34 of these 99 healthy young men contracted heat rash and 23 had other skin complaints such as fungus infections. However, these sailors lived in an inadequately ventilated shelter and did not cleanse their sweaty skins or use the other methods listed below for preventing skin troubles.

Even in shelters that are skillfully ventilated with adequate outdoor air, skin diseases will be a serious problem—especially in hot weather—unless special hygiene measures are followed. Humid heat and heat rash increase susceptibility to skin diseases. Most of the following measures for preventing skin diseases have been practiced by jungle natives for thousands of years.

- Wash off sweat and dead skin. (When it is hot and humid, dead skin is continuously rubbing and flaking off and starting to decay.) Many jungle natives rinse their bodies several times a day. Bathing several times a day with soap is harmful in humid heat; the rapid loss of normal skin oils is one of the causes of skin diseases. Your skin can be kept fairly

clean by rinsing off each day with just a cup of water, while rubbing gently with a very small cloth. A 6-inch square of bedsheet cloth serves well. So that you can dispose of the dirty water afterwards, wash yourself while standing on a piece of plastic with its edges held up slightly. (Place sticks or narrow boards under the edges.) Use about two-thirds of the precious water for the first rinse, starting from the face down and gently rubbing neck, armpits, stomach, groin, buttocks, and feet with a washcloth. Then use the remaining water to rinse off again, using bare fingers. If boiling water is available, sterilize washcloths every day by boiling them for a few minutes.

- Sleep as cool and bare as practical, to dry the maximum skin area.
- If practical, sit and sleep only where other members of your family do and avoid use of bedding by more than one family.
- Avoid infection from toilet seats by disinfecting with a strong chlorine solution and then rinsing, by covering with paper, or by not sitting down.

- Wash or disinfect clothing as often as practical, especially underwear and socks. Disinfecting clothing, not laundering it, is the most important health objective under difficult shelter conditions. Dipping clothing into boiling water disinfects it. Unless plenty of water is available for rinsing, do not disinfect clothing by putting it in a chlorine bleach solution.
- Wear shoes or sandals when walking about, to prevent fungus infections of the feet.

RESPIRATORY DISEASES

The spread of respiratory and other diseases transmitted by coughing and sneezing would be difficult to control in long-occupied shelters. Adequate ventilation would help in disease prevention. In small shelters, it would be better if persons who are sneezing or coughing could stay near the opening being used for air exhaust. In large shelters with many occupants, the risk of one or more of them having a disease that is easily spread obviously will be higher than in a small shelter.