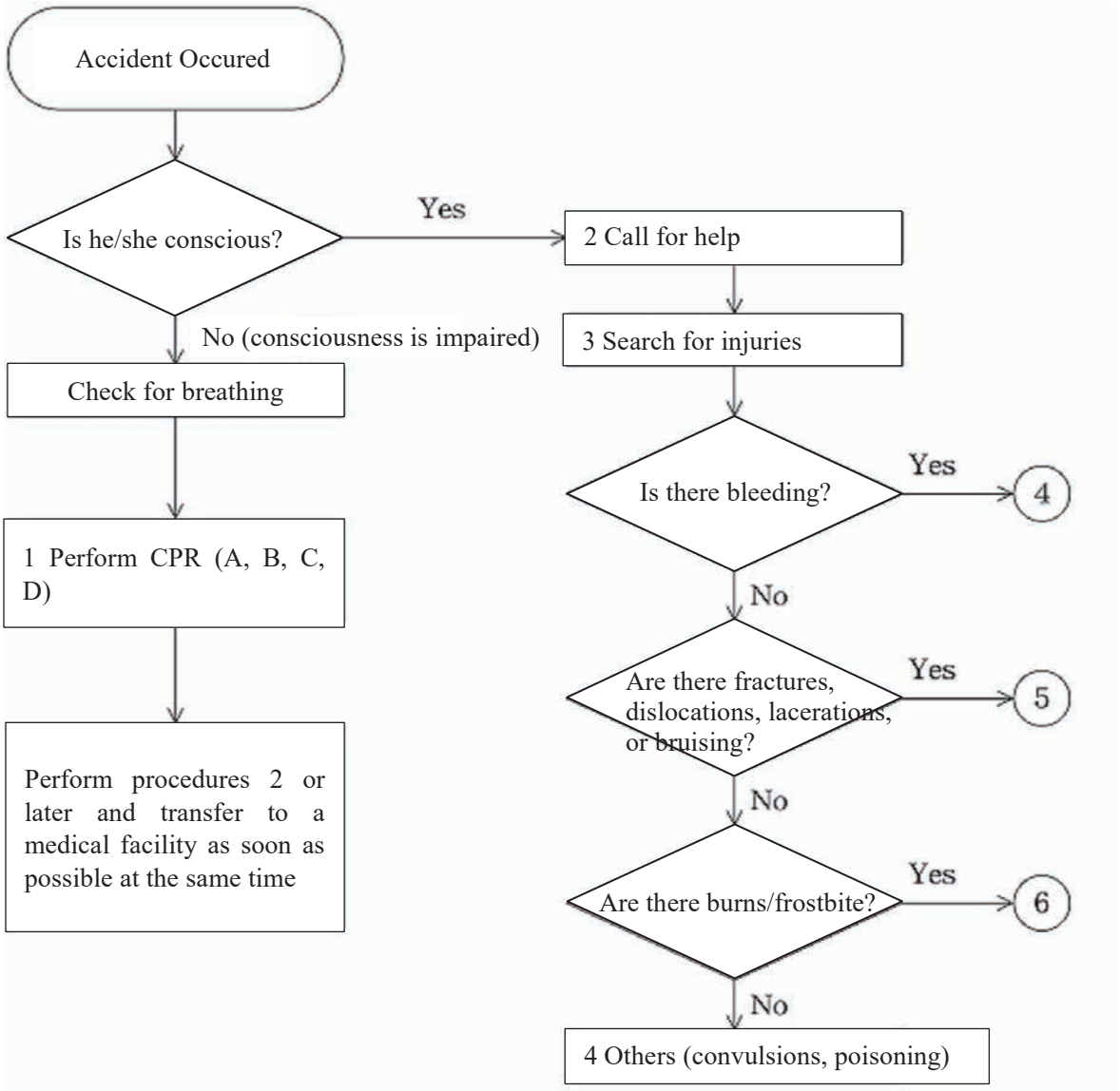
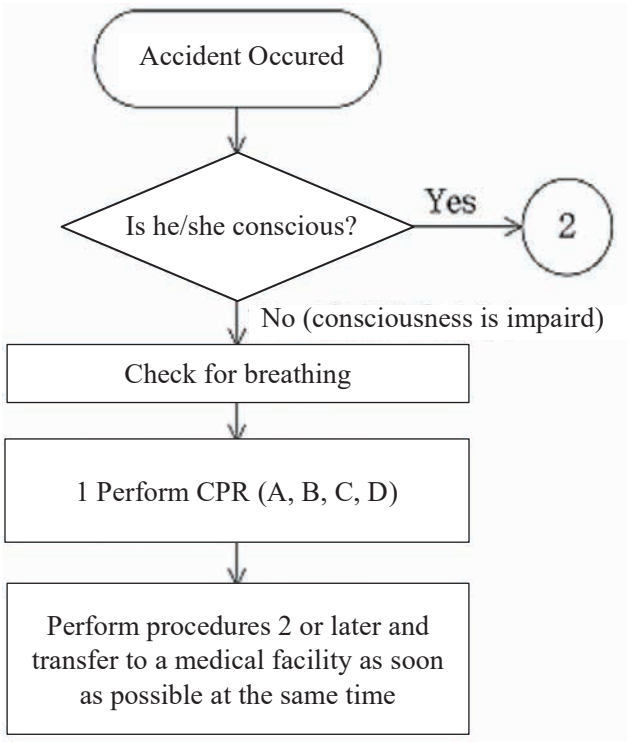
Chapter 2 First Aid Measures

Even with adequate safety precautions, accidents can occur. In such cases, first aid is necessary. While first aid technically means the minimum necessary care, if appropriate measures are taken, a life can often be saved and the target's course after the accident can be improved. In this section, we will only briefly discuss the treatment of impaired consciousness (A, B, C, and D of resuscitation), hemostasis, fractures, etc. The first principle is to leave the matter to the experts as soon as possible. Emphasis should be placed on the importance of this. We would also like to emphasize the importance of maintaining a calm and collected state of mind.



1 Impaired consciousness (A, B, C, D → CAB+D in emergency resuscitations)

The most important factor is whether the target is conscious. If consciousness is impaired, saving the target's life is a matter of seconds.



[Treatment method]

A Airway management (Airway)

If consciousness is impaired, the body loses its self-protective reflex against airway obstruction. Therefore, securing the airway (enabling breathing) should be the foremost priority. The target should be placed in a dorsal recumbent position, with the head flexed backward and the mandible pushed forward (Figure 2-1).

If there is fluid in the mouth, the target should be placed in the lateral recumbent position and the corners of the mouth should be pulled down to let the fluid flow out or be scraped out with the fingers.

B Artificial respiration (Breathing)

Check for breathing, and if the target is not breathing, administer artificial respiration (mouth-to-mouth artificial respiration). Pinch the target's nose, open the mouth wide, cover the target's mouth, and breathe into the patient's chest until you feel the chest rise (Figure 2-1).

Separate from the target's mouth, watch the chest deflate, and feel the airflow of the breath with your ears. Blow in two slow breaths for one second each.

C　Cardiac massage (Circulation)

If there are no signs of circulation (breathing, coughing, body movements), cardiac arrest may have occurred. Therefore, chest compression cardiac massage should be performed immediately. If two persons are involved, one should perform cardiac massage and the other should perform artificial cardiac massage. Perform one artificial respiration for every fifth chest compression (Figure 2-1).

If performed by one person, perform 30 consecutive chest compressions at a rate of at least 100 compressions per minute, followed by two ventilations, and repeat. If the patient is lying on a soft bed or sofa, place a hard slab under the body or move the patient to a hard surface such as the floor where the chest compressions will not cause the body to sink. Continue until an ambulance or physician arrives.

D　Defibrillation

Sudden cardiac deaths due to causes other than accidents have recently received increased attention. The majority of cases are due to ventricular fibrillation, a condition for which, in addition to the ABCs of emergency resuscitation, further defibrillation of the heart using an **automated external defibrillator (AED) is urgently required, and <u>the emergency resuscitation ABCD (the latest is this Defibrillation as CAB+D) (the highest priority).</u>** One AED is located on campus in each of the following locations: Administration Bldg. 1, Lecture Bldg., Cafeteria, Physical Education and Health Care Center, Energy Center, Extreme Energy-Density Research Institute, Faculty Bldg. 1 (Mechanical Engineering and Civil Engineering), and Club House (refer to AED Locations on the next page.) In principle, AEDs are to be used by qualified personnel who have studied a course in their use, but in an emergency, they may be used by anyone.

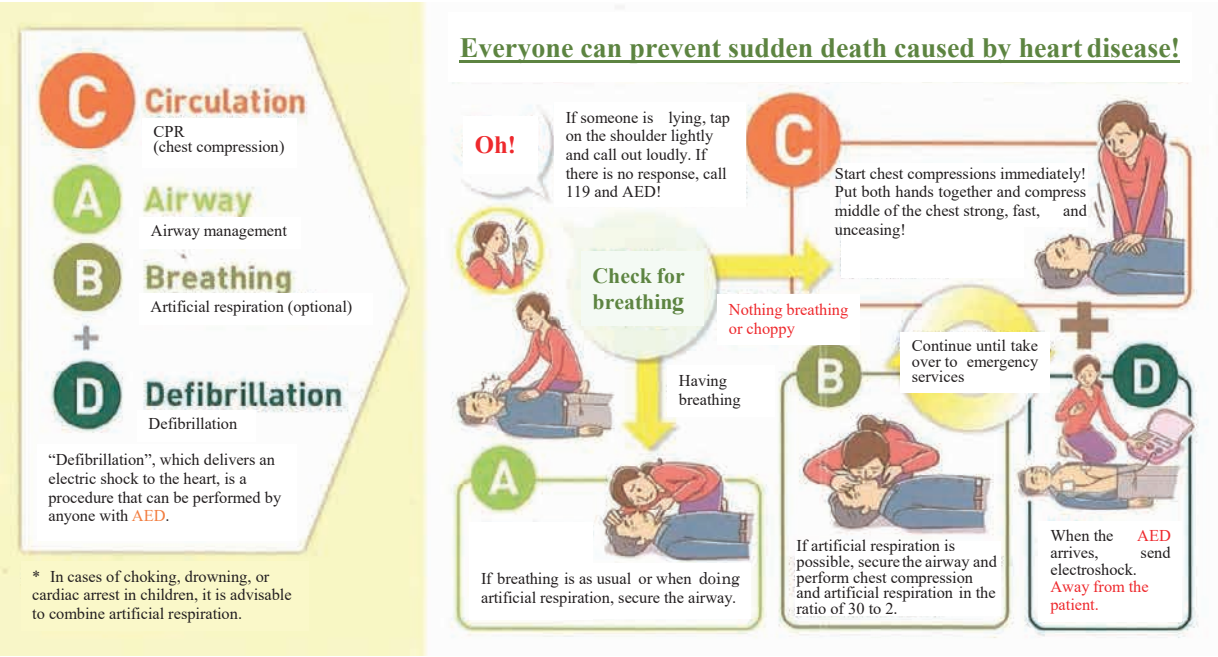
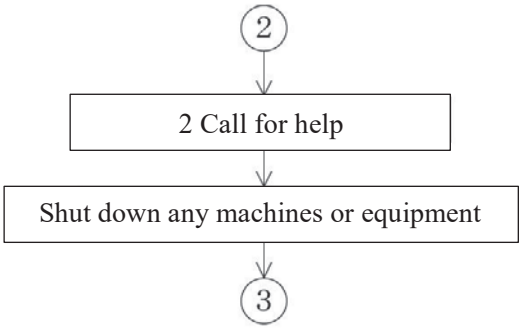


Figure 2-1　CAB+D of emergency resuscitation (from the Japan Medical Association)

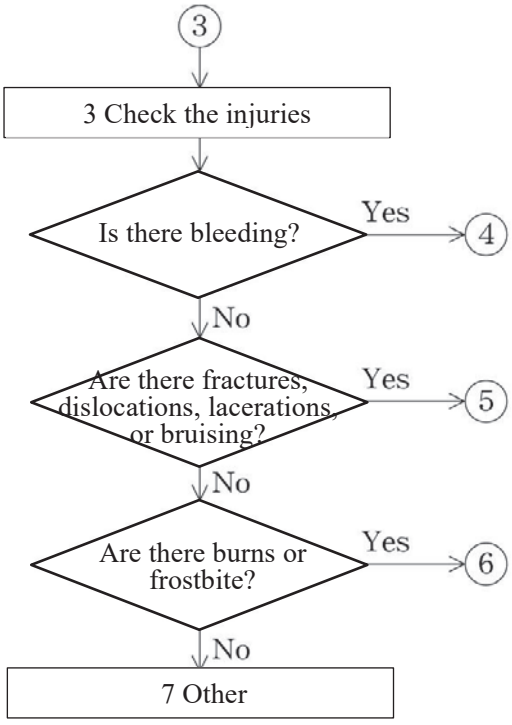

Campus Map
In front of Extreme Energy-Density Research Institute
Lecture Bldg. 1F
(Japanese/English)
Faculty Bldg. 1
(Mechanical Engineering and
Civil Engineering) , 2F
(Japanese/English)
Administrative Bldg. 1, 2F
Entrance to Center for Machining
Technology Development, Bldg.
for Experiment and Practice Training
Commissary Bldg. 1
in front of Cafeteria 1
(Japanese/English)
Physical Education and
Health Care Center
(Japanese/English)
Club House
(Japanese/English)
Energy Center
(Japanese/English)
AED Locations at Nagaoka University of Technology
From January 2021, bilingual AEDs, in which the guidance voice is played in Japanese first and then English, have been installed at some locations (six bilingual AEDs as of 2024).
Parking
Post
AED
共通ゾーン
Common zone
住居ゾーン
Residencial zone
教育研究ゾーン
Instruction and Research zone
屋外体育施設ゾーン
Outdoor Athletic zone
実験実習ゾーン
Experimental zone
その他
Others
長岡技術科学大学
Nagaoka University of Technology
1603-1 Kamitomiokamachi, Nagaoka Niigata 940-2188 JAPAN
HP https://www.nagaokaut.ac.jp/
TEL 0258-46-6000

2 Call for help

Even relatively minor injuries may later exhibit severe complications (e.g., whiplash, hip dislocation in the passenger seat of a car, intracranial hemorrhage, internal injuries, etc.) and are often upsetting at the outset. First, call for help. Next, if there is a chance, turn off machinery and other equipment to prevent subsequent accidents. Hence, a person to perform first-aid is required. The rescuer must provide the necessary treatment and ensure that the patient is at rest (physically and mentally).



3 Check the injuries



4 If the victim is bleeding

If bleeding is present, local pressure must be applied to stop the bleeding. A bleeding of approximately 1.5 L is life-threatening. However, deep, non-visible areas (bruises, fractures, etc., particularly in the head) are often unknown; thus, in such a possible case, the affected area should be cooled and the patient taken to a medical facility as soon as possible.

[Hemostatic measures]

(1) Direct pressure hemostasis

Press down hard with a cloth, handkerchief, towel, etc. and keep in place for at least 10 min. Do not remove pressure unnecessarily. If sufficient pressure is applied, most cases will stop bleeding. At the very least, this will reduce the amount of bleeding.

(2) Indirect pressure hemostasis

If the bleeding point is farther from the heart than the tourniquet in Figure 2-2, apply tourniquet pressure to that point. It must be loosened at least once every 30 min, and this method requires skill. Therefore, it is essential that the patient be transported to a medical facility as soon as possible after the tourniquet is applied. When the tourniquet is applied, the wound should be disinfected as soon as possible.

☆Dismemberment

If a finger or other part is amputated, the amputated piece may be reattached by surgery if it is managed as cleanly as possible, placed in a plastic bag, etc., and cooled with ice.

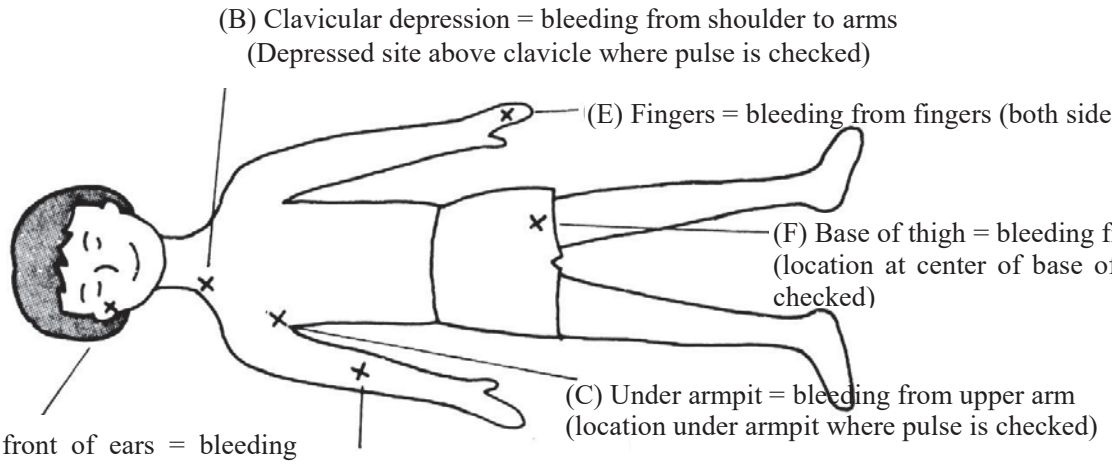
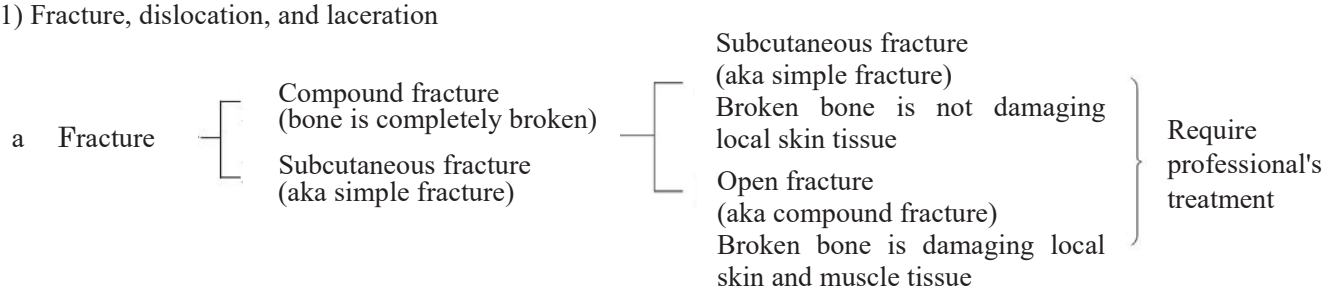


Figure 2-2 main hemostatic points

5 Fractures, dislocations, lacerations, and bruising

(1) Fracture, dislocation, and laceration



b Dislocation - a joint dislocated due to a strong external impact

c Laceration - a sprain in which the muscles (ligaments) or blood vessels that connect the joint are damaged after the joint has been dislocated and returned to its original position

[Treatment]

◎ Fractures

○Excruciating pain when moved or touched.

○Swollen.

○Deformed.

○Unable to move.

○Bleeding from the wound and bone protruding. (Open fracture)

1) The victim should be moved as minimally as possible and treated on the spot.

2) Generally, the victim should be placed horizontally on his/her back, but if the shoulder, collarbone, or arm is injured, it is easier to place the patient in a sitting position.

3) For hands (fingers, wrists, forearms, upper arms) and feet (ankles, lower legs), the patient should be immobilized with a splint and transported to the hospital but should be kept warm and handled with care as bleeding and pain often cause shock symptoms.

4) Materials for creating a splint include splint wood, umbrella, newspaper or magazine rolled into a stick shape, cardboard cut into long, thin strips, disposable chopsticks, object pointers, blankets, bedding, etc.

◎ Dislocation (Treat as for a fracture.)

○Joint is deformed.

○Swollen and painful.

○Inability to move.

○Dislocation of the shoulder, jaw, elbow, or fingers is common but can be fatal if it occurs in the spine or cervical vertebrae; therefore, the victim must be handled carefully.

If not healed properly, the joint may become immobile; therefore, be sure to consult an orthopedic surgeon.

1) Cool the dislocated area. (Place an ice-cube or cooled towel in a plastic bag.)

2) Fix the dislocated joint with a triangular bandage or bandage to prevent it from moving.

◎ Lacerations

○ Joints swell.

○ Internal bleeding changes the color of the skin.

○ Painful when touched.

○ Ankles, wrists, fingers, and knees are most likely to be affected.

1) After applying a sponge, cotton, or other material and fixing it with a bandage, soak it in cold water for about 30 minutes to cool it down.

2) Remove the wet bandage, apply a poultice (Zenol, Patex, etc.), wrap the bandage slightly tighter, and elevate it on a cushion or something similar to keep it at rest. (If no poultice is available, apply an ice pack over the bandage and keep the patient cool for about one day.

3) Have the victim rest until the swelling eases.

4) Do not rub the affected area.

5) Do not bathe while the victim is in pain.

6) If the pain is severe, consult an orthopedic surgeon.

(2) Bruising

Even in the absence of bleeding, there may be subcutaneous hemorrhage, internal bleeding, or internal organ damage, which requires close observation. Observation for more than one day is necessary, particularly in cases involving the head. If pain or subcutaneous bleeding is present and a fracture or internal organ injury is suspected, the victim must be immediately transported to a medical institution. However, extreme caution should be exercised as the condition may be aggravated by transport.

[Treatment]

1) Cooling. Cooling is useful regardless of the presence or absence of pain or subcutaneous bleeding.

2) Rest.

6 Burns, frostbite, etc.

(1) Burns

If the wound site is small, cool it anyway. Any method that removes heat from the affected area is acceptable. Cold water, ice cubes, pieces of metal. Keep the site cool until the pain subsides.

The severity of the burn is related to the area of the burn, which can be dangerous if it exceeds 15% of the body's surface area. Cool thoroughly, cover with a clean cloth or towel, and promptly seek medical attention.

(2) Frostbite

The opposite of burns, local heating is performed by immersing the affected area in warm water (the temperature of bath water) at 38–42 °C for a while. However, as with burns, it is essential to take the patient to a medical institution as soon as possible.

(3) Explosions

Often accompanied by burns. However, be particularly careful as the airway may be affected. In addition, the eyes and respiratory system may be affected by the compounds produced. Be careful of eye trauma and ruptured eardrums.

(4) Electric shock (electrocution)

Generally, mortality is high. A cardiac massage is necessary, particularly since it is often due to cardiac arrest. If respiratory arrest occurs, artificial respiration is necessary. See CAB+D in Emergency Resuscitation.

(5) Heat stroke

This is most likely to occur when working in a hot environment for a long period of time. There are two types of heat stroke, hyperthermia and simple dehydration, the former being life-threatening. In either case, the patient must be cooled down and taken to a medical institution as soon as possible.

(6) Hypothermia

Remove wet clothing and warm with warm water. Oxygen is required.

7 Convulsions, poisoning

(1) Seizures

If unconscious, perform CAB+D for emergency resuscitation; loosen clothing and keep hazardous materials away from the area. Lay the victim on his/her side or face to the side.

(2) Poisoning

Even if the causative agent is unclear, in severely poisoned patients, it is imperative to first normalize breathing and circulation to sustain life, while eliminating toxic substances and preventing breathing.

1) Isolation from the incident site

In gas poisoning, the patient should be evacuated from the scene as quickly as possible and administered fresh air to breathe. (Oxygen inhalation is even better if possible.)

2) Cleaning of body surfaces

Toxic substances adhering to the body surface should be washed out thoroughly with water for the time being.

3) Emesis (induction of vomiting)

If it is certain that the patient has orally ingested the poison and has not yet vomited, induce

vomiting to eliminate the poison. However, vomiting should not be induced when the patient is unconscious, or when corrosive poisons (acids, alkalis, etc.) or volatile poisons (kerosene, gasoline, etc.) have been ingested. Mechanical stimulation of the pharynx with a finger or other object should be used to induce vomiting.

Take the above first aid measures and get medical attention immediately.

<Important> Always have an SDS on hand.

The **"Act Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management" (Chemical Substances Control Act)**, promulgated on July 13, 1999, obliges manufacturers to issue a **Safety Data Sheet for Chemical Substances (SDS)**. SDSs can be obtained for most of the chemicals in the laboratory from the purchasing vendor. These SDSs contain information on first aid measures (measures to be taken in the event of harm to employees or others caused by the substance, specifically if the substance is "inhaled," "adheres to skin," "gets in eyes," or "swallowed"). SDSs can be obtained from the University's Drug Management Support System or on the Internet. For details, please refer to the following URLs.

8 Reference URLs

○Cardiopulmonary resuscitation procedure

https://www.med.or.jp/99/cpr.html

○AED

http://www.mhlw.go.jp/shingi/2004/07/s0701-3.html

http://www.aed-life.com/

○SDS

Japan Reagent Association (M)SDS Search

http://www.j-shiyaku.or.jp/Sds

○Act Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR System and SDS System)

Ministry of Economy, Trade and Industry

http://www.meti.go.jp/policy/chemical_management/law/index.html

Ministry of Health, Labour and Welfare

http://www.mhlw.go.jp/new-info/kobetu/seikatu/kagaku/index.html

Act Concerning Control of Poisonous and Deleterious Substances (Poisonous and Deleterious Substances Control Act)

http://www.nihs.go.jp/law/dokugeki/dokugeki.html

Ministry of the Environment

http://www.env.go.jp/chemi/prtr/risk0.html

○Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

http://www.env.go.jp/chemi/ghs/

○Tokyo Institute of Technology Integrated Safety Management Center

http://www.gsmc.titech.ac.jp/