FIRE SAFETY

- Fire is a form of a chemical reaction that involves the rapid oxidation of combustible fuel (material) with the subsquent liberation of heat and light.

Types of fire

As far as safety is concerned, there are two types of fire;

a) controlled (safe) fire.

- There is good control on the size, duration, temperature, smoke and fumes of fire.
- This is used in our daily life such as cooking, heating (by gas, coal or kerosene), car, aeroplane and rocket engines.
- It requires the presence of air (oxygen), fuel and heat (ignition source).
- These components are termed the fire-triangle.

b) uncontrolled (dangerous) fire.

- There is no control on the size, duration, temperature (1000 ^{o}C or more), smoke and fumes of fire.
- This type of fire occurs due to the accidental (or due to criminal act) spread of fire to catch combustible materials.
- In addition to oxygen, fuel and heat, this type of fire requires an uninhbited chain reaction.
- In an uninhbited chain reaction burning continues and may even accelerate.
- This chain reaction occurs due to the breakdown and recombination of the molecules that will add to the fuel of the fire.

Effects of uncontrolled fire

a) human loss: burning from extreme heat; suffocation from smoke and fumes and death
b) Structural damage: damage to labs, offices and buildings
c) Material damage: damage to instruments, equipments, furniture and supplies
d) Disruption of work
e) Financial losses

Fire Safety Equipments and devices.

- Smoke & heat detectors (usually in the ceiling)
- Fire and emergency alarms (switched on by emergency buttons or handles)
- Fire and emergency lights (red)
- Water sprinklers (usually in the ceiling)
- Fire extiguishers (various types according to class of fire)
- Water hydrants with attached hose
- Fire blanket (to wrap around the burned person or to cover devices on fire)
- Emergency exits signs and lights
- Fire and emergency exits
- Fire and emergency stairs and escapes
- Fire break area (for assembly of people)

General fire safety considerations

1- LEARN NOT TO BURN

2- Each lab (hospital) must hold compulsary fire drills (including lectures, demonstrations and practice on fire and the use of fire fiting equipments)

3- Each lab (hospital) MUST have the following fire alert and fighting equipments;

a) smoke and heat detectors
b) fire alarm & emergency buttons(switches)

c) fire alarm sound system (whole hospital)
d) water sprinklers
e) various types of fire-extinguishers
f) connected water hose reel
g) unobstructed fire & emergency exit
h) push bar type fire escape doors
i) fire blankets
j) emergency shower

4- Fire extinguishers must be always full and operational
5- Fire extinguishers must be checked regularly
6- Fire extinguishers must be placed in unobstructed, easy to access and well signed location
7- Do not obstruct corridors and exits with any furniture or equipments
8- Lab doors must be fire resistant and have a fire resistant glass window
9- Lab doors must be kept shut all the time to compartementalize fire
10- Coridors and lab sections must have automatic fire shut doors to compartementalize fire
11- All sections must have clear fire break and evacuation area
12- If you discover fire; DO NOT PANIC, BE CALM BUT ACT SERIOUSLY
a- phone the Fire Brigade (civil Defence) or Safety Department
b- sound the alarm
c- switch off the electricity power breaker
d- if fire is small, then use the suitable fire fighting equipment properly (fire extinguisher, fire blanket)
e- if fire is not small; evacuate the area and go through the emegency exits to the nearest fire break area
f- do not stop to collect personal or other belongings
g- never use the elevator
h- walk down the stairs in a continuous flow movement
i- DO NOT RUSH or CAUSE STAMPEDE, serious injuries and death may occur
k- once outside the building assemble in the fire-break area outside
l- do not re-enter the lab or building unless it is declared safe by the fire brigade
m- REMEMBER; Even after the fire has been extinguished there may still be small pockets of fire, very hot elements, and the danger of collapse of walls, roofs or the whole building
n- record the incident in a record book

13- When you hear an alarm; DO NOT PANIC, BE CALM BUT ACT SERIOUSLY
a- make sure that you understand the alarm ringing system of the hospital
b- if it indicates serious fire; then evacuate the area immediately and go through the emegency exits to the nearest fire break area
c- do not stop to collect personal or other belongings
d- never use the elevator
e- walk down the stairs in a continuous flow movement
f- DO NOT RUSH or CAUSE STAMPEDE, serious injuries and death may occur
g- once outside the building assemble in the fire-break area outside
h- do not re-enter the lab or building unless it is declared safe by the fire brigade
i- REMEMBER; Even after the fire has been extinguished there may still be small pockets of fire, very hot elements, and the danger of collapse of walls, roofs or the whole building

TAKE FIRE SERIOUSLY EVEN IF IT IS A SMALL ONE.

0 Stable: substances which will remain stable when exposed to heat, pressure or water.

CLASSES of Fires

Class A ORDINARY COMBUSTIBLES: wood, paper, rubber, fabrics and many plastics

Class B FLAMMABLE LIQUIDS & GASES: gasoline, oils, paint, lacquer and tar

Class C FIRES INVOLVING LIVE ELECTRICAL EQUIPMENT

Class D COMBUSTIBLE METALS OR COMBUSTIBLE METAL ALLOYS (No picture symbol)

Class K FIRES IN COOKING APPLIANCES THAT INVOLVE COMBUSTIBLE COOKING MEDIA: vegetable or animal oils and fats

Fire Extinguisher Chart

Extinguisher		Type of Fire					
Colour	Type	Solids (wood, paper, cloth, etc)	Flammable Liquids	Flammable Gasses	Electrical Equipment	Cooking Oils & Fats	Special Notes
	**Water**	✓ Yes	✗ No	✗ No	✗ No	✗ No	Dangerous if used on 'liquid fires' or live electricity.
	**Foam**	✓ Yes	✓ Yes	✗ No	✗ No	✓ Yes	Not practical for home use.
	**Dry Powder**	✓ Yes	✓ Yes	✓ Yes	✓ Yes	✗ No	Safe use up to 1000v.
	**Carbon Dioxide (CO2)**	✗ No	✓ Yes	✗ No	✓ Yes	✓ Yes	Safe on high and low voltages.
	**Halon**	Halon fire extinguishers are not recommended for home use but will knock fire down quickly and can be used on all domestic fire types.					

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Types of Fire Extinguishers

There are many different types of extinguishers. It is essential that you familiarize yourself with the location and operation of fire extinguishers in your home or workplace!

Stored-Pressure Water Extinguishers:

These extinguishers are suitable for use on Class A fires **only** (ordinary combustibles). Caution: **DO NOT** use these extinguishers on Class B,C or D fires! Standard water extinguishers contain 2 1/2 gallons of water. Under normal conditions, stream reach is 15-30 feet. Discharge time is 30-60 seconds. These extinguishers must be protected against freezing if they will be exposed to temperatures less than 40 degrees F (4 degrees C).

Film-Forming-Fluoroprotein (FFFP) Foam Extinguishers:

These extinguishers are designed for use on Class A and B fires. They are essentially 2 1/2 gallon water extinguishers with a FFFP foam additive. When using this type of extinguisher on a Class B fire, you must be careful to avoid splashing liquid fuels. The foam has the ability to make water float on fuels that are lighter than water.

Halon 1211 Fire Extinguishers:

Halon 1211, or bromochlorodifluoromethane extinguishers, are primarly designed for Class B and C fires. Hand carried extinguishers are available in sizes from 2 1/2 to 22 pounds. Caution: when used in a confined area, halon can cause dizziness and loss of coordination. You should immediately evacuate an area after using an extinguisher of this type. Larger wheeled units are available up to 150 pounds. Stream reach is about 8 to 18 feet. Discharge time is dependent on the size of extinguisher.

Dry Chemical Extinguishers (Hand Carried):

Dry chemical fire extinguishers are the most common extinguishers at Davis-Monthan AFB. They are two types available: those rated for Class B and C fires, and those rated for Class A, B, and C fires. These extinguishers are available from 2 1/2 to 30 pounds. Caution: when used indoors, these extinguishers will produce a thick cloud of dust, which obscures vision and may cause choking. They have a range of 5-20 feet, although they can be easily affected by wind. Discharge time is 10-25 seconds.

Using Hand-Held Fire Extinguishers

Extinguishers have their limits

A portable fire extinguisher can save lives and property by putting out a small fire or containing it until the Fire Department arrives. Portable extinguishers are not designed to fight a large or spreading fire. Even against small fires, they are useful only under the following conditions:

- An extinguisher must be large enough for the fire at hand. It must be available and in working order, fully charged.
- The operator must know how to use the extinguisher quickly, without taking time to read directions in an emergency.
- The operator must be strong enough to lift and operate the extinguisher.

It's easy to remember how to use a fire extinguisher- simply follow the steps- "P-A-S-S"

Pull the Pin: Pull the pin at the top of the extinguisher that keeps the handle from being pressed. Break the plastic seal as the pin is pulled.

Aim: Aim the nozzle or outlet toward the fire. Some hose assemblies are clipped to the extinguisher body. Release the hose and point.

Squeeze: Squeeze the handle to release the extinguishing agent. The handle can be released to stop the discharge at any time. Before approaching the fire, try a very short test burst to ensure proper operation.

Sweep: Sweep from side to side at the **base** of the fire until it is out. After the fire is out, watch for remaining smoldering hot spots or possible reflash of flammable liquids. *Make sure the fire is out.*

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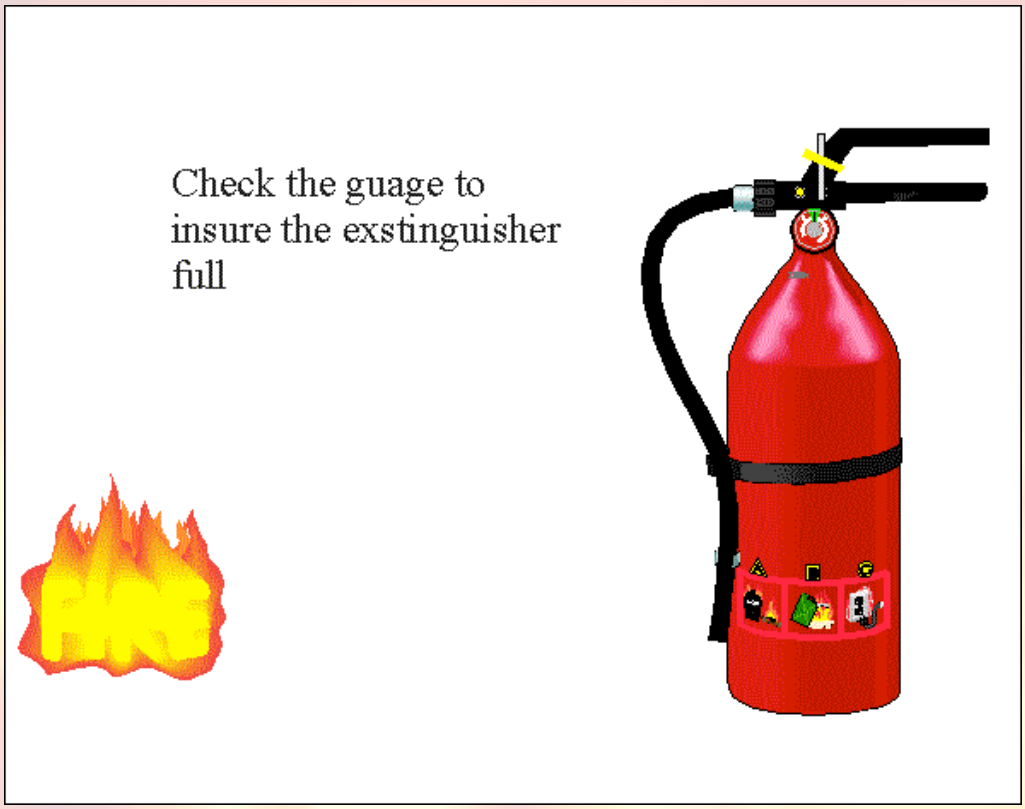

When to Fight a Fire

Be certain to report any fire before attempting to extinguish it!

Fight a fire only if:

- The Fire Department has been called.
- Everyone has left or is leaving the building.
- The fire is small and confined to the immediate area where it started.
- You can fight the fire with your back to a safe escape route.
- Your extinguisher is rated for the type of fire you are fighting, and is in good working order.
- You have had training in use of the extinguisher and are confident that you can operate it effectively.

If you have the slightest doubt about whether or not to fight the fire- DON'T! Instead, get out, and close the door behind you.

Do not fight a fire if:

- The fire is spreading beyond the immediate area where it started, or is already a large fire.
- The fire could block your escape route.
- You are unsure of the proper operation of the extinguisher.
- You are in doubt whether the extinguisher you are holding is appropriate for the type of fire.

If any of these conditions are true, leave immediately, close off the area, and leave the fire to the Fire Department.