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DOCUMENT TITLE

HUMAN PERFORMANCE AND LIMITATIONS

CHAPTER 21 – PRINCIPLES OF FIRST AID AND SURVIVAL

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PRINCIPLES OF FIRST AID AND SURVIVAL

CASA SYLLABUS REFERENCES

For CASA's CPL Human Performance and Limitations syllabus, the principal reference is the first aid and survival information contained in ERS(A) or Jeppesen, AU-23 in the 'EMERG' section.

ADDITIONAL READING

The following additional reading is included for interest

SURVIVAL

To survive an emergency situation you need the following:

- Knowledge of the entire situation
- Tools and/or equipment for emergency response
- **A positive mental attitude and a will to live**

Personality Traits of a Survivor:

- Can make decisions
- Can improvise
- Can adapt and "make the best" of the situation
- Has patience - can remain cool, calm and collected
- Is prepared - hopes for the best, but prepares for the worst
- Knows his personal fears and worries - and most importantly - can control them

HYPOTHERMIA

STAGES

The normal body temperature in humans is 37°C (98.6°F). Hypothermia can be divided in three stages of severity.

In **stage 1**, body temperature drops by 1-2°C below normal temperature (1.8-3.6°F). Mild to strong shivering occurs. The victim is unable to perform complex tasks with the hands; the hands become numb. Blood vessels in the outer extremities contract, lessening heat loss to the outside air. Breathing becomes quick and shallow. Goose bumps form, raising body hair on end in an attempt to create an insulating layer of air around the body (limited use in humans due to lack of sufficient hair, but useful in other species). Often, a person will experience a warm sensation, as if they have recovered, but they are in fact heading into Stage 2. Another test to see if the person

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is entering stage 2 is if they are unable to touch their thumb with their little finger; this is the first stage of muscles not working.

In **stage 2,** body temperature drops by 2-4°C (3.6-7.2°F). Shivering becomes more violent. Muscle mis-coordination becomes apparent. Movements are slow and labored, accompanied by a stumbling pace and mild confusion, although the victim may appear alert. Surface blood vessels contract further as the body focuses its remaining resources on keeping the vital organs warm. The victim becomes pale. Lips, ears, fingers and toes may become blue.

In **stage 3,** body temperature drops below approximately 32°C (90°F). Shivering usually stops. Difficulty in speaking, sluggish thinking, and amnesia start to appear; inability to use hands and stumbling are also usually present. Cellular metabolic processes shut down. Below 30°C (86°F) the exposed skin becomes blue and puffy, muscle coordination will be very poor, walking nearly impossible, and the victim exhibits incoherent/irrational behavior including terminal burrowing (a behaviour pattern whereby the afflicted will seek to enter small, enclosed spaces, such as wardrobes, cupboards, and closets), or even a stupor.

Pulse and respiration rates decrease significantly but fast heart rates (ventricular tachycardia, atrial fibrillation) can occur. Major organs fail. Clinical death occurs. Because of decreased cellular activity in stage 3 hypothermia, the body will actually take longer to undergo brain death.

PREVENTION

In air, most heat is lost through the head. Hypothermia can be most effectively prevented by covering the head. Having appropriate clothing for the environment is another important prevention. Fluid-retaining materials like cotton can be a hypothermia risk; if the wearer gets sweaty on a cold day, then cools down, they will have sweat-soaked clothing in the cold air. For outdoor exercise on a cold day, it is advisable to wear fabrics which can "wick" away sweat moisture. These include wool or synthetic fabrics designed specifically for rapid drying.

Heat is lost much faster in water. Children can die of hypothermia in as little as two hours in water as warm as 16°C (61°F)

TREATMENT

- Warm sweet drinks
- Blankets (**not hot water bottles or electric blankets**)
- **No alcohol**
- A healthy, warm person in the sleeping bag or wrapped in the same blanket as the hypothermic person – nice and cosy, but it helps with warming the patient.

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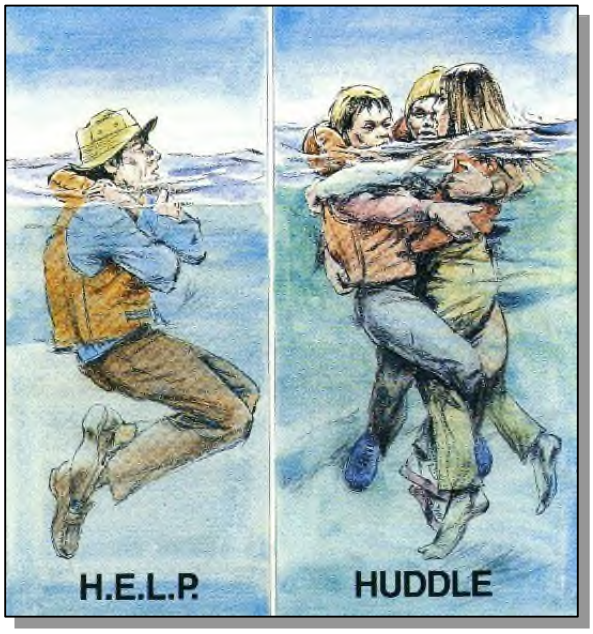
IMMERSION

Immersion in water below 20°C is the most dangerous. As the body's core temperature falls below 35°C mental confusion, loss of dexterity and strength are all experienced. Further temperature drop produces shivering followed by stiffness and reduced consciousness. Contrary to popular belief alcohol increases temperature loss.

Adopting the HELP or HUDDLE position can reduce heat loss.



GUIDE TO SURVIVAL TIME FOR PERSONS IN WATER OF VARIOUS TEMPERATURES

Temperature	*Expected time of survival of man immersed in the sea*
Less than 2°C	Less than 3/4 hours
2°C to 4°C	Less than 1 1/2 hours
4°C to 10°C	Less than 3 hours
10°C to 15°C	Less than 6 hours
15°C to 20°C	Less than 12 hours
Over 20°C	Probably indefinite (but depends on fatigue)

Effect of wind on exposed persons

Estimated wind speed (knots)	*Actual thermometer temperature reading*					
	10℃	*0℃*	*-12℃*	*-23℃*	*-35℃*	*-45℃*
0						
10						
20						
30	Little danger for properly dressed persons		Increased danger of freezing of exposed flesh		Great danger of freezing of exposed flesh	
40 or more						

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DEHYDRATION

From the table below you can see water procurement is essential for survival.

You may collect rain as it falls by storing the run-off from large leaves, collecting it in plastic or metal containers, or in a sheet of plastic. The greater the collection surface, the greater the volume you may collect. If you collect rain in clean containers, it will be ready for drinking. The water in some surface sources may also be pure, but it is safer to assume that it isn't. The rule is to filter and purify water where possible.

Construction of a 'Desert Still' is often a practical solution

Desert water table

		Appropriate survival in days		
Condition and max shade temp	*Total water available per person*	*Resting in the shade at all times*	*Travelling at night, resting in shade by day*	*Approx. distance (in km) that can be covered when travelling*
	no water	2-5½	1-3	30
Hot	1 litre	2-6	2-3½	30
37°C	2 litres	2-6½	2-3½	40
and	4 litres	2½-7½	2½-4½	50
above	10 litres	3½-11½	3½-6½	65-80
	no water	5½-9½	3-7½	30½-65
Warm	1 litre	6-11	3½-8	30-80
26°C	2 litres	6½-12	3½-8½	40-90
to	4 litres	7½-14	4½-10	50-105
37°C	10 litres	11½-23	6½-14	80-145
	no water	9½-11	7½-8½	70-105
Cool	1 litre	11-12	8-9	80-130
26°C	2 litres	12-13	8½-10	90-175
and	4 litres	14-16	10½-12	105-265
below	10 litres	23-25	14-17	145-290

Source: RC Hutchinson, *Food for survival after a disaster,* Melbourne University Press. Melbourne,1959.

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