Drowning Physiology

**Drowning:** Death due to submersion in liquid (usually water)

**Some interesting statistics:**

These numbers are a percentage of the total number of deaths caused by drowning. This does not include those who die of another cause, but happen to be in the water at the time.

- 66% of all fatalities were able to swim
- 46% happened within 2 metres of safety
- 40% did not even plan to be near the water
- 100% of all fatalities were in unsupervised areas
- 50% of these were alcohol related

Rescues were attempted in 32% of the incidents and 32% of those rescues were done by people who did not know the victim. 65% of the rescues were high risk contact rescues.

(These statistics are based on the 1999 drowning report, published by the lifesaving society of BC. The data was collected from 1990-1997 coroners reports)

**Why do people drown?**

Drowning is the second leading cause of traumatic death in Canada. Drowning can happen to all sorts of people for all sorts of reasons. An infant can fall into a small puddle of water and can be drowning in the blink of an eye with no way to get up. Children might swim out further than they can swim back and then not be able to make it back. A drunken teenager can dive into shallow water and break his or her neck. A storm might came up unexpectedly and overturn a small fishing boat.

Those are just a few examples of why people drown. Accidental drowning is usually caused by a bad choice made one or more people involved.

**What happens when people drown?**

Wanting to breathe but not being able to, is one of the worst feelings one can have. It generally causes panic, fear, and irrational thought. Someone who is drowning will hold their breath as long as they can. Once they cannot hold it any longer, large amounts of water may be swallowed, followed by vomiting and aspiration. The level of oxygen in the bloodstream decreases and carbon monoxide builds up. The person then loses quickly loses consciousness.
Types of Drowning:

Wet
The victim takes a breath under water called the terminal gasp, and water enters the lungs, which prevents the exchange of oxygen. Death is due to the aspiration of water.

Dry
10-15% of drowning victims die without any water in their lungs. This is due to a spasm of the vocal cords, called a laryngospasm, which blocks the airway. Death is due to asphyxiation (lack of oxygen).

Summary of the drowning process:

1. Panic and violent struggle to return to surface
2. Period of calmness and Apnea
3. Swallowing of fluid, followed by vomiting
4. Terminal gasp: either laryngospasm for dry drowning or aspiration for wet drowning
5. Convulsions
6. Coma
7. Death

*The time that this takes is variable, but the average is between 12 and 20 seconds from #1 to #6. Biological death usually occurs about 2 minutes later, and clinical death about 4 minutes after that.

Near-Drowning:

If the process described above is interrupted, and death is averted, it is generally called a near-drowning experience. There is however a third type of drowning that can still occur.

Secondary Drowning
The more general name for secondary drowning is pulmonary edema, and this can occur within 72 hours of a near-drowning incident. The victim breathes some fluid into the lungs, resulting in difficulty breathing. The water begins to damage the surfactant that supports the alveoli, and air exchange becomes poor as those alveoli begin to collapse (atelectasis) and acidosis (build up of carbon dioxide) occurs. The entire lung can eventually collapse, and death is due to asphyxiation.

Secondary drowning can occur from as little as a tablespoon of fluid in the lungs. Symptoms of secondary drowning include difficulty breathing, pain in the chest area, nausea, dizziness and coughing. In serious cases, there could be pink frothy vomit.