TRIATHLON
MEDICAL
MANUAL

Prepared by
The
Triathlon Canada
Medical Committee

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INTRODUCTION:

The Triathlon is a competition composed of three distinct races: swimming, cycling and running. Each leg of the competition carries the potential for both major and minor injury to the participant. Those responsible for the organization of a triathlon must ensure that appropriate personnel and equipment are available for the treatment of all injuries requiring medical attention. Prudent medical directors should consider enlisting the first-aider support provided by well-equipped and trained volunteer groups such as St. John’s Ambulance or Canadian Ski Patrol.

The swimming leg has the potential for major problems because of hypothermia, exhaustion, drowning and near drowning, as well as digital, facial and eye trauma from contact when swimmers collide with one another. Open water swim courses present additional risks such as panic attacks, toxic chemical and/or biological infectious agents, and, if held in salt water, there is the possibility of man ‘o’ war and jellyfish stings. Equipment to record rectal temperature, re-warm the athlete, and transport him/her to a hospital (once stabilized) must be provided.

The cycling leg exposes the athlete to the risk of head and spinal injuries, abrasions and fractures. Personnel trained in the treatment of such injuries must be available as well as equipment for transportation, such as a spinal board and an ambulance. Protocols should be developed in advance of the race for transport of serious injuries to the nearest hospital.

The run segment of a triathlon also exposes the athlete to injuries which are unique to that particular sport. Athletes at this stage of the race often ignore warnings of pain and/or exhaustion. Personnel and supplies must be available to commence the cooling-down process of an overheated athlete. Competitors must be closely monitored, and transportation for immediate evacuation must be on hand, should that be deemed necessary.

Physicians who cover triathlon events require detailed knowledge on the management of such race site emergencies as hypo- and hyperthermia, cardio-respiratory emergencies and trauma. The following Manual is intended as a guide for the health care practitioner who is approached to provide medical care during a triathlon. These guidelines encompass the International Triathlon Union (ITU) medical care guidelines. It is hoped that the Manual will serve to inform race organizers about the various problems that can occur, and the type of coverage we hope all will endeavour to provide. It is recommended that a race be fully covered encompassing the guidelines in this manual. It is the responsibility of the Race Director and the Race Medical Director (RMD) to decide whether the level of coverage provided for a particular race is adequate.

THERE IS NO CONSIDERATION MORE IMPORTANT THAN THE HEALTH AND SAFETY OF THE COMPETITORS.
RACE MEDICAL DIRECTOR:

The Race Medical Director (RMD) shall be a physician designated by the Local Organizing Committee (LOC), who explicitly assumes responsibility for appointing the other medical personnel for race day, organizing the medical tent, and equipping it with proper supplies. This person must be experienced in medical care during multi-sport/endurance competitions. Ideally, the RMD should be a qualified emergentologist/intensivist or diploma graduate of the Canadian Association of Sports Medicine (CASM). If the RMD does not feel that the guidelines have been satisfactorily met, then he/she has the option to decline to cover the race.

The RMD shall be responsible to the triathletes firstly, and the Race Director secondly. Any allied health care workers involved in volunteering their services (i.e. nurses, chiropractors, athletic therapists, etc.), shall be responsible to the RMD and hence, the Race Director.

ADDITIONAL NOTES:

This manual was prepared with the Olympic distance in mind: a 1.5 km swim, a 40 km cycle and a 10 km run. It was not intended that this guide provide a detailed account on treatment of the medical problems encountered in a triathlon; rather it was written to highlight those medical emergencies which may occur during the competition, to provide suggestions on how to prevent them, and to detail the supplies and personnel which are best utilized in treating problems that may arise.

A bibliography of recommended reading has been appended (Appendix 8) to provide the reader with references on subjects of interest to the RMD.

Other appendices include a list of specific medical conditions to prepare for, recommended personnel, recommended medical supplies, fluid station requirements, an injury reporting form, and an emergency medical plan checklist.

GENERAL POINTS:

This paper is a guide for the following type of triathlon: The race begins with a 1.5 km swim along a square or pennant-shaped course. The swim may also be a point-to-point race, where swimmers exit 1.5 km from where they started. The swimmers then enter a transition zone, where they don helmets, cycling shoes and a race number. They may choose to stay in their swimsuits, trisuits or change into cycling shorts. The triathletes then mount bicycles and head out onto the 40 km cycle route, usually an out-and-back or loop course. When the cyclists have return to the transition zone, they dismount, take off their helmet and cycling shoes, change into running shoes and start on the 10 km run. At this point, athletes may not run their best, as their legs are fatigued by the cycling.
PERSONNEL:

It is essential that a physician serve as the RMD for a triathlon. The RMD's status as an MD becomes an asset when obtaining actual emergency supplies (such as I.V. supplies), as well as in understanding when, how, and where specialized equipment may need to be used. It is recommended that there also be a Medical Coordinator. This person does not have to be an MD but must have medical experience and liaise closely with the RMD. Their job is to make sure all the supplies and people make it to the appointed place on race day and to keep things running smoothly.

When planning the placement of people on the course, thought should be given to placing experienced medical personnel with those who are less experienced. The level of training of all the members of the medical team, including any specific skills, should be known well in advance (see Appendix 2 for Personnel). Physiotherapists for example, may not be inherently qualified for the treatment of acute injuries, while Certified Athletic Therapists are. Physiotherapists with Sports Physiotherapy Division (S.P.D) Level II and above are knowledgeable in handling on-site emergency care and sports injuries. Similarly, nurses are generally more appropriately trained for the type of care that is required at the finish line, e.g., the monitoring of patients with hyperthermia and/or the administration of I.V.s, rather than acute injury management.

Chiropractors are neither trained nor licensed to manage cardio-respiratory or other medical emergencies, and should therefore not be substituted for the medical personnel mentioned above. Canadian Ski Patrol members usually carry their own supplies to treat injuries, and are well versed at the level of a first responder in triaging, stabilizing and managing injuries out on the course. They are also very helpful in the finish line area, as are Sports First Aiders. Massage therapy is something that is often useful at races (i.e. the athletes like it), but it has no place in the acute care Medical Tent. Provision must be made to transport an athlete to the Medical Tent if necessary.

PLANNING FOR MEDICAL COVERAGE:

It is important, when requesting the services of a physician to cover an event, that at least three months', and preferably six months' advance notice is given in order to acquire commitments from other medical personnel and to organize all of the necessary equipment.

COURSE DESIGN:

From an officiating point of view, an out-and-back course for all legs of the race is preferable. Medical coverage is more efficient when only one main medical tent is required. Other course designs however, can be allowed if adequate equipment and personnel can be obtained to cover the number of first aid stations required. Another option is to move all the equipment from one area back to the main medical tent once that portion of the race is finished, but this becomes logistically more difficult.
IDENTIFICATION OF MEDICAL TEAM AND MEDICAL AREA:

The entire medical team must be properly identified so that in an emergency situation a team member is highly visible. For example, physicians may be specifically identified by the initials "M.D." on the visor of a cap or on a T-shirt. This identification is important to ensure that no time is wasted deciding who is handling the emergency. The public also needs to know that the emergency is being handled by appropriately trained personnel.

The Medical Tent must be clearly identified by appropriate signs. All race volunteers, officials, marshals, police officers, etc. should be aware of its location.

RACE NUMBER MEDICAL FORMS:

A medical form (Appendix 6) should be printed on the back of the race numbers, and be filled in before the race. It should be done with indelible ink, and include the athlete's name, information on present and past major medical conditions, medications, allergies, name of physician, and the name and number of a person to contact in an emergency. If the form was not printed on the back of the number, the information can still be written on the number at the time of registration. As this system is not foolproof, it is helpful to have a list in the Medical Tent of race participants and all the above information. This is easy to do by computer if the information is keyed in at the same time as the name, address, age and race number.

EQUIPMENT AND SUPPLIES:

The organization of the race depends on the coordination of duties between the medical team and race officials. A decision must be made by RMD as to what emergencies the medical team will be prepared for. Advanced Cardiac Life Support by provincially trained paramedics is of great benefit if available. For cardiac arrhythmias, a defibrillator is crucial in properly trained hands. Unless a crash cart containing the required ACLS drugs is available, a defibrillator is effective only for converting potentially fatal rhythms like ventricular fibrillation. It is not appropriate to have a physician arrive to provide coverage at a race with no more than a First Aid kit. Alternatively, if the RMD has been promised a certain amount of equipment by the race director, and shows up at the race to find that these items have been cut due to budget restraints, this will seriously compromise his/her ability to provide optimal medical care.

A list of supplies necessary to cover a race has been drawn up with a separate section that includes equipment required to handle cardiac emergencies. Specific quantities have not been included as this will depend on predicted race conditions, the number of participants, and the location and number of medical stations (see Appendix 3).

AMBULANCES:

ITU rules require that there be a minimum of 2 ambulances, or 4 per 1000 athletes. Ideally, one
ambulance should be at the finish line and one on the course. Smaller races can often get by with an ambulance on site that may get called away during the event and/or a fully equipped van on the course at all times. The ambulance(s) should have direct DEDICATED communication (radio and/or cellular phones) with the Medical Tent. The ambulance(s) should also be equipped with cardio-pulmonary resuscitation supplies and trained personnel. The ambulance(s) must have easy and unobstructed access to the finish line and the medical tent.

Many race directors feel that St. John Ambulance is adequate for this service - they are not. St. John Ambulance personnel are generally NOT permitted to transport patients; rather, they come in and set up their Mobile First Aid Posts on site. The attendants do have First Aid and cardio-pulmonary resuscitation (CPR) training, and can therefore deal with some injuries and minor emergencies. They thus function in much the same way as the Canadian Ski Patrol – as first responders. More serious and/or life-threatening accidents and injuries require adjunctive equipment and back-up assistance from physicians and the regular ambulance service. (N.B. Regulations may vary from province to province, so it is advisable to check with each local organization regarding their qualifications and authority.)

MEDICAL SUPPORT VANS:

It is also very useful to have mobile medical vans that patrol the cycling and run routes. These should be staffed by a physician, a second member of the medical team and one person to establish and maintain communications. The van must be equipped with emergency and first aid supplies. One of the vans should be a sweep vehicle and follow the last athlete to the finish line. There should be a plan made in advance to transport injured athletes who are non-emergency cases from the course back to the Medical Tent. The number of vans will depend on the race course and the number of ambulances available. One van per 350 participants would be a reasonable ratio.

COMMUNICATIONS:

A good communications system is essential. A telephone or cellular phone must be in or very near the Medical Tent. If possible there should be communications people with radios situated along the course using a medical-only frequency that is linked to the ambulances, the Zodiacs (boats on the swim course), mobile vans, the Medical Tent and First Aid stations along the course. A system that only uses the race officials' communication system is not as failure-proof.

Before the race, the hospitals in the area should be advised about the race, numbers of competitors and the type of injuries that might be expected. On the day of the race it is a good idea for the RMD to talk directly to the emergency room (ER) physician on duty. The ER doctor should also be contacted directly when an athlete is being sent to the hospital. For this purpose, a list of all important medical phone numbers should be prepared in advance, and given to all medical personnel.

Follow-up should be done on each athlete admitted to hospital. If an athlete is injured on course
and transported to hospital, or is in the Medical Tent being treated for a serious problem, the RMD should inform the race organizer and announcer. They can then attempt to locate the athlete's family or friends and keep them informed. Due respect for patient confidentiality and consent should of course be adhered to.

**MEDICAL RECORDS:**

Medical records should be kept on each athlete treated. This is often difficult in a busy Medical Tent, however it is very important to gather statistics for planning the next event and for protection in the event of a medico-legal case. If possible, duplicate or triplicate forms should be used, so that copies can be sent with an athlete to the hospital. There are some excellent forms available through the Sports Medicine Council of B.C. for a nominal fee (Appendix 6). These include a waiver section that the athlete and medical team member sign should the athlete decide to leave the medical area and/or return to the race against medical advice. Other races have opted for a card that can be tied on a string around the athlete's neck, which has to be turned in before the athlete can leave the Medical Tent.

**DRUG TESTING:**

If the event is a sanctioned event, drug testing may be required. This is generally organized by the sport governing body, but it often falls to the RMD to incorporate the testing into the medical coverage of the race. This involves such things as the location of the testing, the physical set-up and the fluids that the athletes can consume. It is best to check these regulations (available from the Canadian Centre for Ethics in Sport web page at www.cces.ca) well before the event. If the drug testing area is located some distance from the main Medical Tent, then consideration should be given to having a physician and/or nurse, and some medical supplies such as I.V. fluids available for any athlete that might require such assistance.

**MEDICAL PROTOCOLS:**

Medical protocols should be written up well before the race, distributed to all the race workers and reviewed at one of the general meetings close to the time of the race. The Race Medical Director should conduct an orientation session with the medical team reviewing protocols, going over probable race day scenarios, including treatment of hypo- and hyperthermia, and athlete evacuation from all areas of the racecourse.

**PARTICIPANT EDUCATION:**

Participant education is an important part of the RMD's job. Newspaper articles, seminars, etc. can be used to educate triathletes about the medical problems that can be encountered in a race and how to prevent them. Pre-race announcements give the RMD an opportunity to warn the athletes of any day-of-race hazards, such as temperature extremes and adverse weather
conditions. A physician may elect to fly a coloured flag from the Medical Tent indicating the environmental risk. The use of a wet bulb thermometer on race day can accurately predict the possibility of extremes of temperature, wind and humidity and hence the probability of injury due to the environment.

**TRAFFIC CONTROL:**

Traffic control on the course and around the transition areas, finish chute, and medical tent should be given priority. A method should be devised to keep unauthorized people (especially the media) out of the medical tent. Family members or friends may accompany an injured athlete, if necessary, but the numbers need to be limited. The medical tent cannot function at its optimal efficiency if these security measures are not taken. A volunteer and/or police officer should coordinate traffic control. Remember that every attempt should be made to preserve the athletes’ confidentiality and dignity while being treated.

**LIABILITY INSURANCE AND RACE WAIVERS:**

Liability insurance must be purchased separately for each event, generally through the provincial sport governing body. Specific provisions for medical and paramedical volunteers must be included in the policies. Many of the medical personal will already have their own coverage e.g. physicians should be covered under the Canadian Medical Protective Association, but it is always wise to double-check this important issue.

Race waivers on the entry form must be signed by all participants. The wording should be concise and specific. Note that ITU and Triathlon Canada rules give officials and medical team members the right to pull an athlete from the race for any health or safety-related reason. It is important that any medical team member that pulls an athlete from a race be fully supported in this decision by the RMD and other members of the medical staff.

Evaluation and treatment of a triathlete may not mean disqualification, unless it involves transport of the athlete, administration of I.V. fluids, or similar medical treatment.

**FINANCIAL CONSIDERATIONS:**

There should be a budget for medical supplies. This is seldom included in the budgetary planning for the race. Many medical supplies can be borrowed and returned at the end of the race, but not all supplies can be procured this way. Every effort should be made to fund replacement of any used supplies from the physicians' medical bags, or therapists' first aid kits.

The medical team all volunteer their time and expertise, and do not get reimbursed from provincial medical plans for any medical treatments provided. Therefore, race officials should provide anything that they can in the way of T-shirts, caps, lunches, parking passes, etc. as "perks" for the many hours of donated volunteer time.
TRIATHLON - SPECIFIC CONSIDERATIONS

Swim Leg:

The swim section of the triathlon course is potentially the most dangerous. If an athlete experiences cramps, fatigue or cold, the result could be death. Any athlete can suffer cramps, but inexperienced athletes may over-exert themselves and/or eat too much before the race. Fatigue is often the result of poor stroke technique combined with a low level of fitness for swimming. Many athletes attempt triathlons even though they are not very good swimmers, and fatigue combined with cold water can be a fatal combination. In Olympic distance triathlons, a good swimmer will be in the water for less than 25 minutes, a poor swimmer as long as 45 minutes. Combine the latter with the low percentage of body fat usually present in the average triathlete, and the result can be hypothermia and potential death.

Hypothermia should be suspected in any competitor pulled from the water; a rectal temperature must be taken to document the exact temperature. Special low reading rectal thermometers (down to 30 degrees C) must be used. Most athletes can be warmed by the use of blankets and a warm drink, but removal of a wet bathing suit and warm bottles placed under the axilla and on the groin area will help raise body temperatures in more serious cases. A few will need to have an I.V. inserted, using a warmed solution. I.V. bags can be easily heated in a microwave oven between one to three minutes on high (take off the outer plastic covering first!). Hypovolemia is a component of most thermoregulatory problems, so fluid replacement should be carried out with either oral or I.V. fluids.

All of the above measures should be available for use at the swim area. It is helpful to have propane heaters and/or space blankets in the tent. In some race locations where cold water temperatures are the norm, heaters become an essential item. Triathlons are often held in isolated locations, and sending a hypothermic patient for a long ambulance ride without first undertaking re-warming measures, can potentially be life threatening.

Another common danger is the potential contact between competitors. An accidental kick in the face may cause an athlete to submerge. With numerous competitors racing to overcome one another there is a significant possibility of failing to spot a swimmer in trouble. In some events where the risk is extremely high, underwater S.C.U.B.A. divers may be used. There should also be a mechanism to verify that all competitors have emerged from the water and have passed through the transition area.

Dangerous situations in the swim leg may be reduced by the following measures:

1. Ensure the start area is safe i.e. the water entry point must be free of obstructions such as posts and boulders. The transition area should be free of rocks and provide good non-slippery footing.

2. Have a low ratio of swimmers to safety guards (lifeguards and people in boats).
3. Choose a safe start method (see below).
4. Limit the number of people allowed in a mass start.
5. Have swimmers wear bright caps.
6. Use a square or pennant-shaped course.
7. Have clear guidelines of when a race will be cancelled or the course shortened and have this decision lie with the Lifeguard Co-ordinator, the Medical Director, and the Technical Delegate to the race.

Safety for the swimming leg should be organized by the Lifeguard Co-ordinator. The safety guard (lifeguards and people in boats) should utilize different modes of transportation with varying levels of training. Qualified lifeguards on rescue boards should be spaced evenly along the course line to rescue swimmers at risk of drowning. The Royal Life Saving Society recommends one guard for every 25 swimmers. Volunteers in motorboats should be available to transport swimmers rescued by the lifeguards. Zodiac boats work well for this; 5 boats per 1000 participants is recommended. Once back at shore there must be a fast and easy way to transport the athlete to medical care. Volunteers in kayaks and canoes, with lines from the sterns of their boats, can be used to help tired swimmers back to shore. Most importantly, there must be cooperation and communication with the personnel in the Medical Tent, in order to ensure continuity of care of an injured athlete.

Triathlon start methods are as varied as the race course itself. Here are a few of the most commonly used starts:

1. Competitors begin on shore and, at the sound of the gun, run into the water.
2. Some athletes start in the water and some on shore.
3. Athletes gather on shore or on a dock. A few minutes before the gun sounds competitors enter the water and gather behind a starting line, standing about waist deep in the water.
4. As in number 3, but the athletes have to tread water. There is some jockeying for position by contenders but in general, competitors seed themselves. Poor swimmers tend not to enter the water early as they do not want to tread water for an extended length of time. This may be reinforced with an announcement before starting time. Slower swimmers trail the pack, which will reduce potential contact with other competitors. When a race starts with the competitors treading water there is less chance of swimmers going over those in front (a real problem when the race starts with a run into the water).

The maximum number of athletes that should participate in a mass start is 400. If more athletes must be accommodated a wave start should be used. Waves may be determined by swim time or by age groups. All athletes must have numbers drawn on their bodies with waterproof pens and
have numbered caps. This helps with officiating, and provides essential information if there is a mishap.

Bright caps greatly improve the visibility of swimmers; neon coloured caps are best. Markers lining the course should be a different colour from the caps. Some races use different coloured caps for the different waves of swimmers. Consideration could be given to identifying athletes with pre-existing medical problems with a different style or colour of cap. In this way, they could be tracked through the swim part of the triathlon, and picked up by number when they enter the transition area.

The design of the course adds to its safety. A square or pennant-shaped course paralleling the shoreline is the safest. The finish area of the swim must also be designed for maximum safety of the swimmers. The formation of a narrow funnel at the finish allows all competitors to be assessed by race marshals for signs of fatigue and/or hypothermia. The ground area both in the water and on shore should be as solid as possible in order to provide for a firm foothold, and should be a material that can be run on in bare feet. Laid down surfaces such as astro-turf, often lift as competitors run over it. It is essential to have volunteers stationed at hazardous areas to warn the athletes.

A policy must be formulated prior to race day to stipulate issues such as when to cancel a race. Many environmental conditions contribute to the relative safety of the race but main factors include water temperature, current, lightning, visibility and fecal coliform count. Despite tentative research done in the area, a definitive answer on when to cancel a race due to water temperature still cannot be given. It would appear that body composition is very important in a person's thermal response to swimming in cold water, since subcutaneous fat is the primary insulator against body heat loss in water.

For a group of athletes with a wide range of body composition and swimming ability, the lower limit would be 13 degrees C and the competitors would have to wear wetsuits or vests. Triathlon Canada and ITU have water temperature charts, which indicate temperatures at which the athlete may or may not wear wetsuits. If the water temperature drops below 13 degrees C or if lightning is present, the swim portion of the race should be cancelled (or the entire race, depending on severity and duration). To guard against individual variation in reaction to water temperature, competitors must be allowed to wear wetsuits and/or insulated caps if they feel the need when the water temperature is under 22 degrees. The current Triathlon Canada guidelines for wearing wetsuits for age-groupers and juniors, are as follows; wetsuits are not allowed at water temperatures above 22 degrees C. Wet suits are mandatory for distances 2000 m or less & below 14 degrees C, for 2000-3000 m & below 15 degrees C, 3000-4000 m & below 16 degrees C.

Visibility is also important. If the wave chop is so great that a swimmer can not be seen by the first level of guards (i.e. those lying on paddle boards), then the swim course should be shortened or altered, or as a last resort, cancelled. Also, if swimmers cannot see course markers easily, the swim should be cancelled as they will expend too much energy stopping in order to redirect themselves.

Water quality is an area of safety often overlooked. Appendix 8 lists a website for Health
Canada, which has an article on Recreational Water Safety Guidelines, which will help to ensure the water quality of the swim is appropriate.

**Cycle Leg:**

The cycle leg of a triathlon also has the potential to result in hypothermia. However, injuries from collisions, and problems associated with exhaustion and hyperthermia are more common. Collisions do not occur frequently in age group triathlons, because of the "no drafting" rule: age group athletes are required to stay a specified distance away from each other on the cycle course. (Note that elite athletes may race in a separate, draft legal wave). The following measures help to reduce collisions:

1) The "no drafting" rule in age group races is an important aspect of safety, as well as being essential for a fair race. Officials should be assigned to monitor the course and have the power to penalize competitors who are breaking the rules.

2) Choose the safest possible bike route when designing the course. The route should be away from major roads, yet be over a quality surface. All major intersections should be manned by police personnel and/or professional flag people and volunteers, and all other intersections and hazards should be staffed by volunteer race marshals. Any manhole or road indentation should be clearly marked before the event, or be blocked off. The road into and out of the transition area must be closed to cars. All major corners should have at least one marshal and a hand broom to sweep the road clear of gravel; the entire bike course should be swept by machine the day before or the morning of the race. Railroad crossings must be well marked, with the tracks covered if possible, and a marshal should be present to warn competitors of the hazard. It is also important to check train schedules ahead of time to ensure the race will not be interrupted by train traffic.

3) Bikes should pass a bike inspection prior to the race in order to decrease the chance of mechanical failure. The bike inspection should include, but not be limited to: helmet (damage, chin straps properly in place), both brakes functioning properly, tires in good shape, headset and seat-post secure.

Problems with heat regulation may be prevented by wearing appropriate clothing and by paying close attention to hydration. Competitors should be advised to carry their own liquids, which should include at least two bottles on a hot day. Race organizers should also provide at least one (and preferably two) water stations. See Appendix 4 for Fluid Stations.

All competitors must wear cycle helmets at all times during the bike portion of the race, to prevent head injuries. This is clearly stated in both the Triathlon Canada and ITU Rules. Helmets must meet the American National Standards Institute (ANSI) and/or the Snell Foundation recommendations. Helmets should be inspected in the pre-race bike check. During the race, an official should check that helmets are on and done up before the athlete takes their bike out of the bike rack. Those without a helmet will be sent back to get one, and will not be allowed to proceed until they have one. The helmet must remain done up until the athlete has re-racked their bike back in the transition zone.
If a collision does occur, proper communication via radio transmission is essential to transport medical personnel to the injured athlete. It is often possible to arrange coverage by a local radio club and it is helpful to have one operator at each first aid station, particularly at those bases that are manned by a physician.

Adequate preparations must be made for the transport of an injured competitor from the bike course. A system for requesting ambulance assistance should be outlined to all members of the medical team, race officials, volunteers and radio personnel. Arrangements must be made ahead of time for the management of serious neck and spinal injuries, as well as fractures.

The location of First Aid stations and the manning of these stations is very important. First aid stations should be situated near high-risk areas (e.g., at the bottom of major hills) and should be marked on the official course map. Athletic therapists, sports physiotherapists, sport First Aiders and nurses should work alongside physicians, and special designation should be given to those stations which have physicians.

**Running Leg:**

This leg comes with its own set of problems, which are normally seen at any 10 km race. These problems are compounded by exhaustion, as it is the last leg of the event. Hypothermia and hyperthermia are common, and obviously are related to the conditions on race day, however it is important to remember that both can occur on the same day.

The salient points of prevention of thermal injuries like hypo/hyperthermia include:
- racers and officials must understand the risk of thermal injury and how to minimize it
- race officials should consult local weather authorities in order to plan races for the coolest part of the day
- on the day of the race weather conditions must be assessed and appropriate action taken
- participants must be educated on the risks and how to prevent thermal injury
- enough emphasis cannot be place on the importance of adequate fluid stations for the running leg.

Consideration should be given to making the running route a lap course. This allows the officials to view more of the race and therefore observe runners in difficulty.
Appendix 1

Specific Medical Conditions to Prepare for:

- Hyperthermia
- Hypothermia
- Hypovolemia
- Hypervolemia (i.e. hyponatremia)
- Fluid/electrolyte imbalance
- Exercise induced reactive airways or bronchospasm
- Anaphylaxis
- Cardiac arrythmias
- Pneumothorax
- Drowning or near-drowning
- Closed head and C-spine injury
- “Road rash”
- Sundry blisters, abrasions and friction burns
- Major and minor musculoskeletal trauma
- Stings and bites
Appendix 2

Personnel

Recommended numbers:

- 1 Race Medical Director (physician)
- 1 physician for every 200 athletes
- Paramedics, Emergency Medical Technicians or ambulance attendants
- 1 paramedical person in the Medical Tent for every 100 athletes (nurses, physiotherapists, athletic therapists).
- 1 on-course Sports First Aid person for every 50 participants (e.g. Canadian Ski Patrol, St. John Ambulance, Sport First Aiders, athletic therapists, physiotherapists).

N.B. Registered Massage Therapists should not take the place of medical personnel. If available they can work under the supervision of the RMD as and work in an area separate but adjacent to the acute care Medical Tent. It is often helpful to have a Medical Co-ordinator to help organize and procure medical supplies, oversee communications etc. The Co-ordinator does not need to be a physician.

- Lifeguard Co-ordinator to arrange and oversee the swim leg and to report directly to the RMD.
- 1 lifeguard for every 25 athletes in an open-water swim.

Note: the RMD has the authority to change the requirements for personnel, including the number of ambulances, depending on anticipated weather conditions, number of participants, type of course, access to hospitals etc., unless it is a ITU sanctioned race, where the original guidelines should hold.
Appendix 3
Medical Supplies and Triage

Main Medical Tent
- Located adjacent to the finish line
- Medical tent for each transition area (if more than one)
- The tent must be big enough to contain cots for 5% of the competitors, a communication area and supplies
- Portable cots/beds, sufficient for 5% of the total number of competitors.
- Ice: 1 kg per 4 competitors, include sufficient plastic bags
- Oral fluids: 1 litre of water per 5 competitors; sufficient cups
- Blankets and towels for 15% of competitors
- Telephone or cell phone in the tent or close by
- Radio at the tent for communication with on-course medical personnel and ambulance(s)
- Warm fluids and hot water bottles for treatment of hypothermia. It is also useful to have a method to warm the I.V. solution and the water bottles. Propane heaters are necessary for swims held in cold water.
- Important to have receptacles for vomit; a common problem in the medical tent.
- Important to have lots of garbage bags, paper towels, cleaning fluid, etc.
- Have pen and paper available to record patient information and to keep an injury log
- A system must be set up for triaging and a separate area set aside for more serious cases.
- Drop sheets to separate beds, to maintain patient confidentiality and athlete dignity.
- Medical team members should be in the finishing chute and circulating through the post-race areas, to identify anyone having problems.
- Communication from the first aid stations along the course should identify athletes (by sex, description and race number) who look as if they could be a potential medical problem.
- Large signs to identify medical areas are essential. These should be made up ahead of time.

Essential Emergency Supplies
The following is an example only, and should not be interpreted as a complete list.
- Ambu Bag and Laerdle mask
- Oxygen tank, delivery tubing, fittings
- Airways of various sizes
- Laryngoscope and endotracheal tubes
- Portable suction is very helpful (a turkey baster will do)
- I.V. Set-ups for 10% of competitors with 1 litre of fluid per set-up
- I.V. poles (can be improvised using clothes line, hangers, etc.)
- Parenteral I.V. solution for volume expansion, glycemic correction and hypovolemia
- Alcohol swabs,
- I.V. cannulas,
- I.V. administration sets,
- I.V. arm boards
- Opsite, tourniquet
- Micropore tape
- Scissors
- Cling wrap
- Latex gloves
- BP cuff (normal and large sized)
- Stethoscope
- Reflex hammer
- Penlight
- Oto/ophthalmoscope
- Rectal thermometers, both standard and hypothermic (reads down to 30 degrees C)
- Tympanic thermometers are not recommended as they can result in false readings.
- Sundry wound and burn dressings
- Nasal packing
- Eye wash and patches

**Medications:**
- Ventolin inhaler
- 50 ml Dextrose injectable or Instaglucose
- Nitroglycerin spray or sublingual Nitroglycerin
- Adrenaline 1:1000 and/or Ana-Kit
- Diazepam/Midazolam in appropriate doses
- Injectable narcotics if available
- Injectable Naloxone
- Syringes, needles and needle disposal kit
- Xylocaine: local/parenteral and gel forms

Serious thought should be given to having equipment on hand to handle a cardiac arrest; not all competitors are young and healthy. These supplies are required if the race is to be ITU sanctioned:
- ECG/Defibrillators; 2 available and tested
- ECG leads, contact gel
- Ambubag, oxygen
- airways of various sizes, laryngoscope and endotracheal tubes
- drugs currently recommended by A.C.L.S. guidelines
- portable suction
- McGill forceps

**General Supplies**

**Medications**
- Ativan S.L.
- Gravol 50 mg p.o. and 50 mg/ml IM
- Tylenol/ ASA
- Gelusil
- Non-steroidal anti-inflammatories

**Wound and Fracture Care:** to care for up to 5% of competitors
- Peroxide
Betadine
- Xylocaine: local/parenteral and gel
- Surgical scrub brushes (betadine)
- Polysporin
- Gauze
- Cling wrap
- Spray Bactin
- Steristrips
- Elastoplast in different sizes
- Splints
- Triangle bandages
- Moleskin
- Gloves
- Suture material and needles

**Supplies Specific for Swim Area:**
- Rectal thermometers that read down to 30 degrees C
- Warm fluids for oral use
- Hot water bottles and a method for heating bottles and I.V. solution
- Wool blankets and/or space blankets
- Towels
- Propane heaters

**Supplies Specific for Cycle Area:**
- Hypothermic rectal thermometers
- Wound and fracture care supplies
- Xylocaine spray
- Surgical scrub brushes
- Access to a spinal board

**Supplies Specific for Run Area:**
- Rectal thermometers
- Ice and plastic bags
- Cool water and cups
- I.V. equipment
- Supplies for minor wound care
Appendix 4

Fluid Stations

Swim Start:
- 2 cups per person
- 200 ml of water per person
- 100 ml of replacement fluid per person

Swim Finish: (located at transition entrance)
- As above

Bike:
- At 12 - 13 km point
- At 28 - 30 km point
- 350 ml water bottle per person

Transition: (located at run departure gate)
- 2 cups per person
- 200 ml of water per person
- 1\2 orange per person
- 100 ml replacement fluid/person
- Ice 500 kg

Run: (every 2 km)
- 3 cups per person
- 200 ml of water per person, per station
- 100 ml of replacement fluid per person, per station
- Ice, 500 kg

Finish Line Chute:
- 2 cups per person
- 500 ml water per person

Post Race Area (away from the finish chutes)
- 2 cups per person
- 500 ml of water per person
- Additional sealed fluids to include fruit juices and replacement drinks
- Ice 500 kg
- Food, including fruit, bagels, etc.

The above guidelines are from the ITU Operations Manual. The ice amounts are not given per person and may be excessive for a small race. Approximately one kg of ice per four participants (total) should be disbursed between the medical tent, the ambulance and the medical vans.
Appendix 6
Sample Injury Reporting Form
Appendix 7

Emergency Medical Plans
Appendix 8

Resources

1. Canadian Academy of Sports Medicine (CASM)  www.casm-acms.org
   This website outlines position papers on:
   - HIV in Sports
   - Female Athlete Triad
   - Pregnancy
   - Mandatory Use of Bicycle Helmets

2. Canadian Centre for Ethics in Sport (CCES)  www.cces.ca
   This website has information on:
   - Canadian Policy on Doping in Sport
   - Medical Declaration form and medical waiver for athletes taking banned or restricted substances
   - Drug Classification booklet for Banned and Restricted Medications in Sport


   Guidelines for Canadian Recreational Water Quality

5. Triathlon Canada  www.triathloncanada.com
   Under National Federation, you will find the Competition Rules (ITU rules adapted for use at local to National level events).

6. International Triathlon Union (ITU)  www.triathlon.worldsport.com
   Under Rules, you will find the Operations Manual (outlines Medical Requirements for World Cup and World Championship races) and Rules (ITU Competition Rules).
PLEASE NOTE:
The Medical Committees of Triathlon Canada and Triathlon BC cannot be held responsible for any injury or loss of life which may arise as a result of the use or non-use of this Triathlon Medical Manual.

The authors would be pleased to answer any questions concerning the contents of this manual. For further information, you may contact Liz Graham at: 604-731-1924 or grahame@interchange.ubc.ca

This document has been edited and approved by The British Columbia Triathlon Association Medical Committee, July 1992.

This document was reviewed and revised by Dr. Alain Leblanc and Liz Graham, Chair, Triathlon Canada Medical Committee, in March 2000.

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