Appendix 1

Olympic Movement Medical Code

In force as from 1 January 2006

PREAMBLE

"Fundamental Principles of Olympism

1 Olympism is a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind. Blending sport with culture and education, Olympism seeks to create a way of life based on the joy of effort, the educational value of good example and respect for universal fundamental ethical principles.

2 The goal of Olympism is to place sport at the service of the harmonious development of man, with a view to promoting a peaceful society concerned with the preservation of human dignity."

Olympic Charter, September 2004

1. The Olympic Movement, in accomplishing its mission, should take care that sport is practised without danger to the health of the athletes and with respect for fair play and sports ethics. To that end, it takes the measures necessary to protect the health of participants and to minimise the risks of physical injury and psychological harm. It also protects the athletes in their relationships with physicians and other health care providers.
2. This objective can be achieved only through an ongoing education based on the ethical values of sport and on each individual's responsibility in protecting his or her health and the health of others.
3. The present Code recalls the basic rules regarding best medical practices in the domain of sport and the safeguarding of the rights and health of the athletes. It supports and encourages the adoption of specific measures to achieve that objective. It complements and reinforces the World Anti-Doping Code and reflects the general principles recognised in the international codes of medical ethics.
4. The Olympic Movement Medical Code is intended to apply to the Olympic Games, the various championships of the International Federations and all competitions to which the International Olympic Committee (IOC) grants its patronage or support, and to all sport practised within the context of the Olympic Movement, either during training or during competition.

1. General Principles

1.1. Athletes are entitled to the same fundamental rights as all patients in their relationships with physicians and health care providers, in particular the right to respect for:

a. their human dignity;
b. their physical and mental integrity
c. the protection of their health and safety;

d. their self-determination; and
e. their privacy and confidentiality.

1.2. The relationship between athletes, their personal physician, the team physician and other health care providers must be protected and subject to mutual respect. The health and the welfare of athletes must prevail over the sole interest of competition and other economic, legal or political considerations.

2. Information

Athletes have the right to be informed in a clear and appropriate way about their health status and their diagnosis; preventive measures; proposed medical interventions, together with the risks and benefits of each intervention; alternatives to proposed interventions, including the consequences of non-treatment for their health and for their return to sports practice; and the prognosis and progress of treatment and rehabilitation measures.

3. Consent

3.1. The voluntary and informed consent of the athletes is required for any medical intervention.

3.2. Particular care should be taken to avoid pressures from the entourage (e.g. coach, management, family, etc.) and other athletes, so that athletes can make fully informed decisions, taking into account the risks associated with practising a sport with a diagnosed injury or disease.

3.3. Athletes have the right to refuse or to interrupt a medical intervention. The consequences of such a decision must be carefully explained to them.

3.4. Athletes are encouraged to designate a person who can act on their behalf in the event of incapacity. They can also define in writing the way they wish to be treated and give any other instruction they deem necessary.

3.5. With the exception of emergency situations, when athletes are unable to consent personally to a medical intervention, the authorisation of their legal representative or of the person designated by the athletes for this purpose is required, after they have received the necessary information.

When the legal representative has to give authorisation, athletes, whether minors or adults, must nevertheless assent to the medical intervention to the fullest extent of their capacity.

3.6. The consent of the athletes is required for the collection, preservation, analysis and use of any biological sample.

4. Confidentiality and Privacy

4.1. All information about an athlete's health status, diagnosis, prognosis, treatment, rehabilitation measures and all other personal information must be kept confidential, even after the death of the athlete.

4.2. Confidential information may be disclosed only if the athlete gives explicit consent thereto, or if the law expressly provides for this. Consent may be presumed

when, to the extent necessary for the athlete's treatment, information is disclosed to other health care providers directly involved in his or her health care.

4.3. All identifiable medical data on athletes must be protected. The protection of the data must be appropriate to the manner of their storage. Likewise, biological samples from which identifiable data can be derived must be protected.

4.4. Athletes have the right of access to, and a copy of, their complete medical record. Such access excludes data concerning or provided by third parties.

4.5. Athletes have the right to demand the rectification of erroneous medical data.

4.6. An intrusion into the private life of an athlete is permissible only if it is necessary for diagnosis, treatment and care, and the athlete consents to it, or if it is legally required. Such intrusion is also permissible pursuant to the provisions of the World Anti-Doping Code.

4.7. Any medical intervention must respect privacy. This means that a given intervention may be carried out in the presence of only those persons who are necessary for the intervention, unless the athlete expressly consents or requests otherwise.

5. Care and Treatment

5.1. Athletes have the right to receive such health care as is appropriate to their needs, including preventive care, activities aimed at health promotion and rehabilitation measures. Services should be continuously available and accessible to all equitably, without discrimination and according to the financial, human and material resources available for such purpose.

5.2. Athletes have the right to a quality of care marked both by high technical standards and by the professional and respectful attitude of health care providers. They have the right to continuity of care, including cooperation between all health care providers and establishments which are involved in their diagnosis, treatment and care.

5.3. During training and competition abroad, athletes have the right to the necessary health care, which if possible should be provided by their personal physician or the team physician. They also have the right to receive emergency care prior to returning home.

5.4. Athletes have the right to choose and change their own physician, health care provider or health care establishment, provided that this is compatible with the functioning of the health care system. They have the right to request a second medical opinion.

5.5. Athletes have the right to be treated with dignity in relation to their diagnosis, treatment, care and rehabilitation, in accordance with their culture, tradition and values. They have the right to enjoy support from family, relatives and friends during the course of care and treatment, and to receive spiritual support and guidance.

5.6. Athletes have the right to relief of their suffering according to the latest recognised medical knowledge. Treatments with an analgesic effect, which allow an athlete

to practise a sport with an injury or illness, should be carried out only after careful consideration and consultation with the athlete and other health care providers. If there is a long-term risk to the athlete's health, such treatment should not be given.

Procedures that are solely for the purpose of masking pain or other protective symptoms in order to enable the athlete to practise a sport with an injury or illness should not be administered if, in the absence of such procedures, his or her participation would be medically inadvisable or impossible.

6. Rights and Duties of Health Care Providers

6.1. The same ethical principles that apply to the current practice of medicine apply to sports medicine. The principal duties of the physicians and other health care providers include:

a. making the health of the athletes a priority;
b. doing no harm.

6.2. Health care providers who care for athletes must have the necessary education, training and experience in sports medicine, and must keep their knowledge up to date. They have a duty to understand the physical and emotional demands placed upon athletes during training and competition, as well as the commitment and necessary capacity to support the extraordinary physical and emotional endurance that sport requires.

6.3. Athletes' health care providers must act in accordance with the latest recognised medical knowledge and, when available, evidence-based medicine. They must refrain from performing any intervention that is not medically indicated, even at the request of the athletes, their entourage or another health care provider. Health care providers must also refuse to provide a false medical certificate concerning the fitness of an athlete to participate in training or competition.

6.4. When the health of athletes is at risk, health care providers must strongly discourage them from continuing training or competition and inform them of the risks. In the case of serious danger to the athlete, or when there is a risk to third parties (players of the same team, opponents, family, the public, etc.), health care providers may also inform the competent persons or authorities, even against the will of the athletes, about their unfitness to participate in training or competition.

6.5. Health care providers must oppose any sports or physical activity that is not appropriate to the stage of growth, development, general condition of health, and level of training of children. They must act in the best interest of the health of the children or adolescents, without regard to any other interests or pressures from the entourage (e.g. coach, management, family, etc.) or other athletes.

6.6. Health care providers must disclose when they are acting on behalf of third parties (e.g. club, federation, organiser, NOC, etc.). They must personally explain to the athletes the reasons for the examination and its outcome, as well as the nature of the information provided to third parties. In principle, the athlete's physician should be informed.

6.7. When acting on behalf of third parties, health care providers must limit the transfer of information to what is essential. In principle, they may indicate only the athlete's fitness or unfitness to participate in training or competition. With the athlete's consent, the health care providers may provide other information concerning the athlete's participation in sport in a way compatible with his or her health status.

6.8. At sports venues, it is the responsibility of the team or competition physician to determine whether an injured athlete may continue in or return to the competition. This decision may not be delegated to other professionals or personnel. In the absence of the competent physician, these individuals must adhere strictly to the instructions that he or she has provided. At all times, the priority must be to safeguard the health and safety of athletes. The outcome of the competition must never influence such decisions.

6.9. When necessary, the team or competition physician must ensure that injured athletes have access to specialised care, by organising medical follow-up by recognised specialists.

Chapter II: Protection and Promotion of the Athlete's Health during Training and Competition

7. General Principles

7.1. No practice constituting any form of physical injury or psychological harm to athletes is permissible. The members of the Olympic Movement ensure that the athletes' conditions of safety, well-being and medical care are favourable to their physical and mental equilibrium. They must adopt the necessary measures to achieve this end and to minimise the risk of injuries and illness. The participation of sports physicians is desirable in the drafting of such measures.

7.2. In each sports discipline, minimal safety requirements must be defined and applied with a view to protecting the health of the participants and the public during training and competition. Depending on the sport and the level of competition, specific rules are adopted regarding the sports venues, the safe environmental conditions, the sports equipment authorised or prohibited, and the training and competition programmes. The specific needs of each athlete category must be respected.

7.3. For the benefit of all concerned, measures to safeguard the health of the athletes and to minimise the risks of physical injury and psychological harm must be publicised in order to benefit all those concerned.

7.4. The measures for the protection and the promotion of the athletes' health must be based on the latest recognised medical knowledge.

7.5. Research in sports medicine and sports sciences is encouraged. It must be conducted in accordance with the recognised principles of research ethics, in particular the Helsinki Declaration adopted by the World Medical Association (Edinburgh, 2000), and the applicable law. It must never be conducted in a manner

which could harm an athlete's health or jeopardise his or her performance. The voluntary and informed consent of the athletes to participate in such research is required.
7.6. Advances in sports medicine and sports science must not be withheld, and must be published and widely disseminated.

8. Fitness to Practise a Sport

8.1. Except when there are symptoms or a significant family medical history, the practice of sport for all does not require undergoing a fitness test. The choice to undergo such a test is the responsibility of the personal physician.
8.2. For competitive sport, athletes may be required to present a medical certificate confirming that there are no apparent contraindications. The fitness test should be based on the latest recognised medical knowledge and performed by a specially trained physician.
8.3. A pre-participation medical test is recommended for high level athletes. It should be performed under the responsibility of a specially trained physician.
8.4. Any genetic test that attempts to gauge a particular capacity to practise a sport constitutes a medical evaluation to be performed solely under the responsibility of a specially trained physician.

9. Medical Support

9.1. In each sports discipline, guidelines must be established regarding the necessary medical support depending on the nature of the sports activities and the level of competition.

These guidelines must define, but not be limited to, the following points:

- the medical coverage of training and competition venues and how this is organised;
- the necessary resources (supplies, premises, vehicles, etc.);
- the procedures in case of emergencies;
- the system of communication between the medical support services, the organisers and the competent health authorities.

9.2. In the case of a serious incident occurring during training or competition, there must be procedures to provide the necessary support to those injured, by evacuating them to the competent medical services when needed. The athletes, coaches and persons associated with the sports activity must be informed of those procedures and receive the necessary training for their implementation.

9.3. To reinforce safety in the practice of sports, a mechanism must exist to allow for data collection with regard to injuries sustained during training or competition. When identifiable, such data must be collected with the consent of those concerned, and be treated confidentially and in accordance with the recognised ethical principles of research.

Chapter III: Adoption, Compliance and Monitoring

10. Adoption

10.1. The Code is intended to apply to all the members of the Olympic Movement, in particular the IOC, the International Sports Federations and the National Olympic Committees (hereafter the Signatories). Each Signatory adopts the Code according to its own procedural rules.

10.2. The Code is first adopted by the IOC. It is not mandatory but desirable that the other members of the Olympic Movement adopt it.

10.3. A list of all Signatories will be made public by the IOC.

11. Compliance

11.1. The Signatories implement the applicable Code provisions through policies, statutes, rules or regulations according to their authority and within their respective spheres of responsibility. They undertake to make the principles and provisions of the Code widely known, by active and appropriate means. For that purpose, they collaborate closely with the relevant physicians' and health care providers' associations and the competent authorities.

11.2. The Signatories ensure that the physicians and other health care providers caring for athletes within their spheres of responsibility act in accordance with this Code.

11.3. Physicians and other health care providers remain bound to respect their own ethical and professional rules in addition to the applicable Code provisions. In the case of any discrepancy, the most favourable rule that protects the health, the rights and the interests of the athletes shall prevail.

12. Complaints Procedure

12.1. Each Signatory designates a competent body to deal with complaints concerning alleged violations of the applicable Code provisions and with all other situations brought to its attention concerning the implementation of the Code. This body must have the power to take sanctions against the person or organisation at fault or to propose sanctions or the necessary measures to other authorised bodies.

12.2. The IOC Medical Commission designates a committee (hereafter: Complaints Committee), composed of three of its members, to deal with all cases of alleged violations of the applicable Code provisions occurring during the Games. This Committee also acts as a body to review decisions taken by the competent bodies of the Signatories pursuant to the Code. A request for a review may be submitted to this Committee by the person or organisation sanctioned, as well as by the claimant.

12.3. Decisions taken by the Complaints Committee in the first instance may be submitted to the IOC Executive Board for review. Decisions taken by the Complaints Committee as a review body and those taken by the IOC Executive Board are final.

12.4. The Signatories establish the necessary procedural rules, including the applicable sanctions in the event of a violation of the applicable Code provisions.

The competent bodies of the Signatories and the Complaints Committee have the power to act upon the filing of a complaint or under their own authority.

13. Monitoring

13.1. The IOC Medical Commission oversees the implementation of the Code and receives feedback relating to it. It is also responsible for monitoring changes in the field of ethics and best medical practice and for proposing adaptations to the Code.

13.2. The IOC Medical Commission may issue recommendations and models of best practice with a view to facilitating the implementation of the Code.

Chapter IV: Scope, Entry into Force and Amendments

14. Scope

14.1. The Code applies to all participants in the sports activities governed by each Signatory, in competition as well as out of competition.

14.2. The Signatories are free to grant wider protection to their athletes.

14.3. The Code applies without prejudice to the national and international ethical, legal and regulatory requirements that are more favourable to the protection of the health, rights and interests of the athletes.

15. Entry into Force

15.1. The Code enters into force for the IOC on 1 January 2006. It applies to all Olympic Games, starting with the 2006 Games in Turin.

15.2. The Code may be adopted by the other members of the Olympic Movement after this date. Each Signatory determines when such adoption will take effect.

15.3. The Signatories may withdraw acceptance of the Code after providing the IOC with written notice of their intent to withdraw.

16. Amendments

16.1. Athletes, Signatories and other members of the Olympic Movement are invited to participate in improving and modifying the Code. They may propose amendments.

16.2. Upon the recommendation of its Medical Commission, the IOC initiates proposed amendments to the Code and ensures a consultative process, both to receive and respond to recommendations, and to facilitate review and feedback from athletes, Signatories and members of the Olympic Movement on proposed amendments.

16.3. After appropriate consultation, amendments to the Code are approved by the IOC Executive Board. Unless provided otherwise, they become effective three months after such approval.

16.4. Each Signatory must adopt the amendments approved by the IOC Executive Board within one year after notification of such amendments. Failing this, a Signatory may no longer claim that it complies with the Olympic Movement Medical Code.

Adopted by the IOC Executive Board in Lausanne on 27 October 2005

Appendix 2

Planning International Travel

A. Before Departure

1. *Travel schedule.* Work with the Federation administration to arrange a travel schedule that minimises the effects of jet lag.
2. *Facilities*. Work with the administration to ensure that adequate medical care spaces (including sports psychology) are included in the team housing allocation.
3. *Licensure*. Determine whether temporary medical licensure is required by the host country, and comply if necessary.
4. *Drug importation*. Determine whether the host country requires permission for the importation of medications, and complete applications if necessary.
5. *Environmental health*. Review international health information resources to determine whether any unusual health situations or infectious disease outbreaks exist in the host country, and take appropriate preventive measures (immunisations, medications, etc.).
6. *Supplies and Equipment*. Work with the medical staff to ensure that adequate medical supplies and equipment are on hand to support the number of athletes and other team members.
7. Athlete Health
   a. *Fitness*. Review athlete medical records, and, if possible, conduct examinations to ensure that athletes are fit and able to compete at the highest levels.
   b. *Immunisations*. Ensure that all athletes have up-to-date immunisations, i.e., tetanus, hepatitis, influenza, etc., and any others that may be required for health in the host country.
   c. *Medications*. Review all athlete medications, including over-the-counter, supplements, etc., which the athlete may be taking to be sure that none contain banned substances.

      If restricted substances are being used, be sure that an appropriate Therapeutic Use Exemption has been filed and approved. If not, complete the required application and submit to IAAF.

   d. *Hygiene and Jet Lag*. Educate athletes and staff concerning measures for personal hygiene, including food selection, hand washing, potable water and hydration, sexually transmitted diseases (STDs), and measures to ameliorate jet lag during and after travel. (See Appendix 10, *Recommendations for Minimising Jet Lag,* and Appendix 11, *General Health and Hygiene Recommendations for Athletes*).

B. During Travel

1. *Medical Supplies*. Carry a small kit with medications for emergency use, such as analgesics, anti-histamines, anti-nauseas, and anti-diarrheals.
2. *Jet Lag*. Remind athletes and staff to follow guidelines to minimise jet lag: frequent hydration (but avoid caffeine and alcohol), exercise and stretch often, re-set watches to arrival time zone and try to adapt to the new time.

C. Upon Arrival

1. Establish the Team Medical Care System
   a. Allocation of work spaces.
   b. Hours of operation.
   c. Staffing assignments, including various training and competition venues. Present this information to the team at the initial team meeting. Reinforce the need to maintain personal hygiene and to report illnesses promptly.
2. Establish contact with the Local Organising Committee (LOC) Medical Committee to determine the details of the medical care system. Determine how to access ancillary medical facilities: emergency room, ambulance, hospital, pharmacy, X-ray, supplies, etc.

   Arrange for an orientation tour of the LOC medical care system and facilities, including spaces allocated for the team.
3. Environmental Health and Sanitation
   a. Review the food preparation system.
   b. Ensure the availability of potable water at all venues.
   c. Determine the contaminated waste disposal system.
   d. Determine the procedures for isolation of ill patients in case of infectious diseases.
4. Record-Keeping.
   a. Maintain treatment logs at all venues.
   b. Maintain medical record forms for all treatments of illnesses and injuries.

D. During Training and Competition

1. Establish the medical care operation at team headquarters, and at all training and warm-up venues.
2. Establish a medical staffing rotation system for each venue; be sure to allow time off for recovery for the staff.

E. After-Action Responsibilities

1. *Trip report*. File a trip report to the Director of Athlete Services concerning the medical staff experiences and any unusual occurrences, such as major health problems, hospital admissions, etc. Make recommendations for improving the medical care system for future teams.
2. *Staff evaluations*. File a report to the Chief Medical Officer that includes the above, plus evaluations of medical staff members as to suitability for future teams, work ethic, professionalism, etc.
3. *Records*. Send all medical records to the Chief Medical Officer or designee. This may be needed for insurance purposes, and for future travel planning and other statistics of injury/illness incidence .

Appendix 3

Preparticipation Physical Evaluation

HISTORY FORM

DATE OF EXAM _____

Name _____ **Sex** _____ **Age** _____ **Date of birth** _____

Grade ____ **School** _____ **Sport(s)** _____

Address _____ **Phone** _____

Personal physician _____

In case of emergency, contact

Name _____ **Relationship** _____ **Phone (H)** _____ **(W)** _____

Explain "Yes" answers below.
Circle questions you don't know the answers to.

	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?	☐	☐
2. Do you have an ongoing medical condition (like diabetes or asthma)?	☐	☐
3. Are you currently taking any prescription or nonprescription (over-the-counter) medicines or pills?	☐	☐
4. Do you have allergies to medicines, pollens, foods, or stinging insects?	☐	☐
5. Have you ever passed out or nearly passed out DURING exercise?	☐	☐
6. Have you ever passed out or nearly passed out AFTER exercise?	☐	☐
7. Have you ever had discomfort, pain, or pressure in your chest during exercise?	☐	☐
8. Does your heart race or skip beats during exercise?	☐	☐
9. Has a doctor ever told you that you have (check all that apply): ☐ High blood pressure ☐ A heart murmur ☐ High cholesterol ☐ A heart infection		
10. Has a doctor ever ordered a test for your heart? (for example, ECG, echocardiogram)	☐	☐
11. Has anyone in your family died for no apparent reason?	☐	☐
12. Does anyone in your family have a heart problem?	☐	☐
13. Has any family member or relative died of heart problems or of sudden death before age 50?	☐	☐
14. Does anyone in your family have Marfan syndrome?	☐	☐
15. Have you ever spent the night in a hospital?	☐	☐
16. Have you ever had surgery?	☐	☐
17. Have you ever had an injury, like a sprain, muscle or ligament tear, or tendinitis, that caused you to miss a practice or game? If yes, circle affected area below:	☐	☐
18. Have you had any broken or fractured bones or dislocated joints? If yes, circle below:	☐	☐
19. Have you had a bone or joint injury that required x-rays, MRI, CT, surgery, injections, rehabilitation, physical therapy, a brace, a cast, or crutches? If yes, circle below:	☐	☐

Head	Neck	Shoulder	Upper arm	Elbow	Forearm	Hand/ fingers	Chest
Upper back	Lower back	Hip	Thigh	Knee	Calf/shin	Ankle	Foot/toes

20. Have you ever had a stress fracture?	☐	☐
21. Have you been told that you have or have you had an x-ray for atlantoaxial (neck) instability?	☐	☐
22. Do you regularly use a brace or assistive device?	☐	☐
23. Has a doctor ever told you that you have asthma or allergies?	☐	☐
24. Do you cough, wheeze, or have difficulty breathing during or after exercise?	☐	☐
25. Is there anyone in your family who has asthma?	☐	☐
26. Have you ever used an inhaler or taken asthma medicine?	☐	☐
27. Were you born without or are you missing a kidney, an eye, a testicle, or any other organ?	☐	☐
28. Have you had infectious mononucleosis (mono) within the last month?	☐	☐
29. Do you have any rashes, pressure sores, or other skin problems?	☐	☐
30. Have you had a herpes skin infection?	☐	☐
31. Have you ever had a head injury or concussion?	☐	☐
32. Have you been hit in the head and been confused or lost your memory?	☐	☐
33. Have you ever had a seizure?	☐	☐
34. Do you have headaches with exercise?	☐	☐
35. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?	☐	☐
36. Have you ever been unable to move your arms or legs after being hit or falling?	☐	☐
37. When exercising in the heat, do you have severe muscle cramps or become ill?	☐	☐
38. Has a doctor told you that you or someone in your family has sickle cell trait or sickle cell disease?	☐	☐
39. Have you had any problems with your eyes or vision?	☐	☐
40. Do you wear glasses or contact lenses?	☐	☐
41. Do you wear protective eyewear, such as goggles or a face shield?	☐	☐
42. Are you happy with your weight?	☐	☐
43. Are you trying to gain or lose weight?	☐	☐
44. Has anyone recommended you change your weight or eating habits?	☐	☐
45. Do you limit or carefully control what you eat?	☐	☐
46. Do you have any concerns that you would like to discuss with a doctor?	☐	☐
FEMALES ONLY		
47. Have you ever had a menstrual period?	☐	☐

48. How old were you when you had your first menstrual period? _____
49. How many periods have you had in the last 12 months? _____

Explain "Yes" answers here: _____

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete _____ Signature of parent/guardian _____ Date _____

Preparticipation Physical Evaluation

PHYSICAL EXAMINATION FORM

Name _____ **Date of birth** _____

Height _____ **Weight**_____ **% Body fat (optional)** _____ **Pulse**_____ **BP**____/____ (____/____ , ____/____)

Vision **R 20/** ____ **L 20/** ____ **Corrected: Y N** **Pupils: Equal** ____ **Unequal** ____

Follow-Up Questions on More Sensitive Issues	Yes	No
1. Do you feel stressed out or under a lot of pressure?	☐	☐
2. Do you ever feel so sad or hopeless that you stop doing some of your usual activities for more than a few days?	☐	☐
3. Do you feel safe?	☐	☐
4. Have you ever tried cigarette smoking, even 1 or 2 puffs? Do you currently smoke?	☐	☐
5. During the past 30 days, did you use chewing tobacco, snuff, or dip?	☐	☐
6. During the past 30 days, have you had at least 1 drink of alcohol?	☐	☐
7. Have you ever taken steroid pills or shots without a doctor's prescription?	☐	☐
8. Have you ever taken any supplements to help you gain or lose weight or improve your performance?	☐	☐
9. Questions from the Youth Risk Behavior Survey (http://www.cdc.gov/HealthyYouth/yrbs/index.htm) on guns, seatbelts, unprotected sex, domestic violence, drugs, etc.	☐	☐

Notes: _____

	NORMAL	ABNORMAL FINDINGS	INITIALS*
MEDICAL			
Appearance			
Eyes/ears/nose/throat			
Hearing			
Lymph nodes			
Heart			
Murmurs			
Pulses			
Lungs			
Abdomen			
Genitourinary (males only)†			
Skin			
MUSCULOSKELETAL			
Neck			
Back			
Shoulder/arm			
Elbow/forearm			
Wrist/hand/fingers			
Hip/thigh			
Knee			
Leg/ankle			
Foot/toes			

*Multiple-examiner set-up only.
†Having a third party present is recommended for the genitourinary examination.

Notes: _____

Name of physician (print/type) _____ **Date** _____

Address _____ **Phone** _____

Signature of physician _____, **MD or DO**

Appendix 4

American College of Sports Medicine Position Stand

Heat and Cold Illnesses During Distance Running

This pronouncement was written for the American College of Sports Medicine by: Lawrence E. Armstrong, Ph.D., FACSM, (Chair), Yoram Epstein, Ph.D., John E. Greenleaf, Ph.D., FACSM, Emily M. Haymes, Ph.D., FACSM Roger W. Hubbard, Ph.D., William O. Roberts, M.D., FACSM, and Paul D. Thompson, M.D., FACSM.

Summary

Many recreational and elite runners participate in distance races each year. When these events are conducted in hot or cold conditions, the risk of environmental illness increases. However, exertional hyperthermia, hypothermia, dehydration, and other related problems may be minimized with pre-event education and preparation. This position stand provides recommendations for the medical director and other race officials in the following areas: scheduling; organizing personnel, facilities, supplies, equipment, and communication; providing competitor education; measuring environmental stress; providing fluids; and avoiding potential legal liabilities. This document also describes the predisposing conditions, recognition, and treatment of the four most common environmental illnesses: heat exhaustion, heatstroke, hypothermia, and frostbite. The objectives of this position stand are: 1) to educate distance running event officials and participants about the most common forms of environmental illness including predisposing conditions, warning signs, susceptibility, and incidence reduction. 2) To advise race officials of their legal responsibilities and potential liability with regards to event safety and injury prevention. 3) To recommend that race officials consult local weather archives and plan events at times likely to be of low environmental stress to minimize detrimental effects on participants. 4) To encourage race officials to warn participants about environmental stress on race day and its implications for heat and cold illness. 5) To inform race officials of preventive actions that may reduce debilitation and environmental illness. 6) To describe the personnel, equipment, and supplies necessary to reduce and treat cases of collapse and environmental illness.

Introduction

This document replaces the position stand titled *The Prevention of Thermal Injuries During Distance Running* (4). It considers problems that may affect the extensive community of recreational joggers and elite athletes who participate in distance running events. It has been expanded to include heat exhaustion, heatstroke, hypothermia, and frostbite—the most common environmental illnesses during races.

Because physiological responses to exercise in stressful environments may vary among participants, and because the health status of participants varies from day to day, compliance with these recommendations will not guarantee protection from environmentally induced illnesses. Nevertheless, these recommendations should minimize the risk of exertional hyperthermia, hypothermia, dehydration,

and resulting problems in distance running and other forms of continuous athletic activity such as bicycle, soccer, and triathlon competition.

Managing a large road race is a complex task that requires financial resources, a communication network, trained volunteers, and teamwork. Environmental extremes impose additional burdens on the organizational and medical systems. Therefore, it is the position of the American College of Sports Medicine that the following RECOMMENDATIONS be employed by race managers and medical directors of community events that involve prolonged or intense exercise in mild and stressful environments.

1. Race Organization

a. Distance races should be scheduled to avoid extremely hot and humid and very cold months. The local weather history should be consulted when scheduling an event. Organizers should be cautious of unseasonably hot or cold days in early spring and late fall because entrants may not be sufficiently acclimatized. The wind chill index should be used to reschedule races on cold, windy days because flesh may freeze rapidly and cold injuries may result.

b. Summer events should be scheduled in the early morning or the evening to minimize solar radiation and air temperature. Winter events should be scheduled at midday to minimize the risk of cold injury.

c. The heat stress index should be measured at the site of the race because meteorological data from a distant weather station may vary considerably from local conditions (66). The wet bulb globe temperature (WBGT) index is widely used in athletic and industrial settings [see Appendix I;(87)]. If the WBGT index is above 28ºC (82ºF), or if the ambient dry bulb temperature is below -20ºC (-4ºF), consideration should be given to canceling the race or rescheduling it until less stressful conditions prevail. If the WBGT index is below 28ºC, participants should be alerted to the risk of heat illness by using signs posted at the start of the race and at key positions along the race course [see Appendix I;(61)]. Also, race organizers should monitor changes in weather conditions. WBGT monitors can be purchased commercially, or Figure 1 may be used to approximate the risk of racing in hot environments based on air temperature and relative humidity. These two measures are available from local meteorological stations and media weather reports, or can be measured with a sling psychrometer.

d. An adequate supply of fluid must be available before the start of the race, along the race course, and at the end of the event. Runners should be encouraged to replace their sweat losses or consume 150—300 ml (5.3–10.5 ounces) every 15 min (3). Sweat loss can be derived calculating the difference between pre- and postexercise body weight.

e. Cool or cold (ice) water immersion is the most effective means of cooling a collapsed hyperthermic runner (25,48,49,59,88). Wetting runners externally by spraying or sponging during exercise in a hot environment is pleasurable but does not fully attenuate the rise in body core temperature (14,88). Wetting the skin can result in effective cooling once exercise ceases.

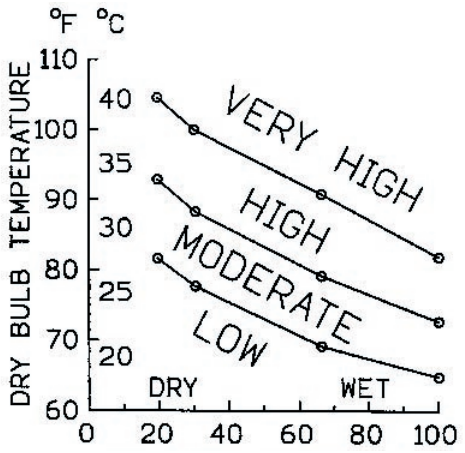

Figure 1. Risk of heat exhaustion or heat stroke while racing in hot environments. Figure drawn from data presented in American College of Sports Medicine Position stand: the prevention of thermal injuries during distance running. *Med. Sci. Sports Exercise* 19: 529-533, 1987.

f. Race officials should be aware of the warning signs of an impending collapse in both hot and cold environments and should warn runners to slow down or stop if they appear to be in difficulty.

g. Adequate traffic and crowd control must be maintained along the course at all times.

h. Radio communications or cellular telephones should connect various points on the course with an information processing center to coordinate emergency responses.

2. Medical Director

A sports medicine physician should work closely with the race director to enhance the safety and provide adequate medical care for all participants. The medical director should understand exercise physiology, interpretation of meteorological data, heat and cold illness-prevention strategies, potential liability, and the treatment of medical problems associated with endurance events conducted in stressful environments.

3. Medical Support

a. Medical organization and responsibility: The medical director should alert local hospitals and ambulance services and make prior arrangements to care for casualties, including those with heat or cold injury. Medical personnel should have the authority to evaluate, examine, and stop runners who display signs of impending illness or collapse. Runners should be advised of this procedure prior to the event.

b. Medical facilities: Medical support staff and facilities must be available at the race site. The facilities should be staffed with personnel capable of instituting immediate and appropriate resuscitation measures. The equipment necessary to institute both cooling therapy (ice packs, child's wading pools filled with tap water or ice water, fans) and warming therapy (heaters, blankets, hot beverages) may be necessary at the same event. For example, medical personnel treated 12 cases of hyperthermia and 13 cases of hypothermia at an endurance triathlon involving 2300 competitors; air temperature was 85ºF, water temperature was 58ºF.

4. Competitor Education

The physical training and knowledge of competitive runners and joggers has increased greatly, but race organizers must not assume that all participants are well-prepared or informed about safety. Distributing this position stand before registration, publicizing the event in the media, and conducting clinics or seminars before events are valuable educational procedures.

a. All participants should be advised that the following conditions may exacerbate heat illness: obesity (13,39,89), low degree of physical fitness (30,63,79,83), dehydration (23,34,69,83,84,95), lack of heat acclimatization (31,51,89), a previous history of heat stroke (82,89), sleep deprivation (5), certain medications, including diuretics and antidepressants (31), and sweat gland dysfunction or sunburn (31). Illness 1 wk prior to an event should preclude participation (32,96), especially those involving fever, respiratory tract infections, or diarrhea (41,46).

b. Prepubescent children sweat less than adults and have lower heat tolerance (11,12).

c. Adequate training and fitness are important for full enjoyment of the event and will reduce the risk of heat illness and hypothermia (22,64,67,85).

d. Prior training in the heat will promote heat acclimatization (6) and thereby reduce the risk of heat illness, especially if the training environment is warmer than that expected during a race (5,51). Artificial heat acclimatization can be induced in cold conditions (6).

e. Adequate fluid consumption before and during the race can reduce the risk of heat illness, including disorientation and irrational behavior, particularly in longer events such as a marathon (23,34,95).

f. Excessive consumption of pure water or dilute fluid (i.e., up to 10 liters per 4 hours) during prolonged endurance events may lead to a harmful dilutional hyponatremia (60), which may involve disorientation, confusion, and seizure or coma. The possibility of hyponatremia may be the best rationale for inclusion of sodium chloride in fluid replacement beverages (3).

g. Participants should be advised of the early symptoms of heat illness, which may include clumsiness, stumbling, headache, nausea, dizziness, apathy, confusion, and impairment of consciousness (41,86).

h. Participants should be advised of the early symptoms of hypothermia (slurred speech, ataxia, stumbling gait) and frostbite (numbness, burning, pain, paresthesia) on exposed skin (36). Wet clothing, especially cotton, increases heat loss and the risk of hypothermia (68).

i. Participants should be advised to choose a comfortable running speed and not to run faster than environmental conditions or their cardiorespiratory fitness warrant (43,71,91).

j. It is helpful if novice runners exercise with a partner, each being responsible for the other's well-being (71).

5. Responsibilities and Potential Liability

The sponsors and directors of an endurance event are reasonably safe from liability due to injury if they avoid gross negligence and willful misconduct, carefully inform the participants of the hazards, and have them sign waivers before the race (78). However, a waive signed by a participant does not totally absolve race organizers of moral and/or legal responsibility. It is recommended that race sponsors and directors: 1) minimize hazards and make safety the first concern; 2) describe inherent hazards (i.e., potential course hazards, traffic control, weather conditions) in the race application; 3) require all entrants to sign a waiver; 4) retain waivers and records for 3 yrs; 5) warn runners of the predisposing factors and symptoms of environmental illness; 6) provide all advertised support services; 7) legally incorporate the race or organizations involved; 8) purchase liability insurance (18,78,80).

Race directors should investigate local laws regarding Good Samaritan action. In some states physicians who do not accept remuneration may be classified as Good Samaritans. Race liability insurance may not cover physicians (78), therefore the malpractice insurance policy of each participating physician should be evaluated to determine if it covers services rendered at the race.

Medical and race directors should postpone, reschedule, or cancel a race if environmental conditions warrant, even though runners and trained volunteers arrive at the site and financial sponsorship has been provided. Runners may not have adequate experience to make the decision not to compete; their safety must be considered. Downgrading the race to a "fun run" does not absolve race supervisors from their responsibility or decrease the risk to participants (15,66).

Background for this Position Stand

Dehydration is common during prolonged endurance events in both hot and cold environmental conditions because the average participant loses 0.5–1.5 quarts (0.47–1.42 liters) of sweat/hr, and fluid replacement is usually insufficient (2,42,69). Runners may experience hyperthermia [body core temperature above 39ºC (102.2ºF)] or hypothermia [body core temperature below 35ºC (95ºF)], depending on the environmental conditions, caloric intake, fluid consumption, and clothing worn. Hyperthermia is a potential problem in warm and hot weather race when the body's rate of heat production is greater than its heat dissipation (2). Indeed, on extremely hot days, it is possible that up to 50% of the participants may require treatment for heat-related illnesses such as heat exhaustion and heatstroke (1,66). Hypothermia is more likely to occur in cold or cool-windy conditions. Scanty clothing may provide inadequate protection from such environments, particularly near the end of a long race when running speed and heat production are reduced. Frostbite can occur in low air temperature and especially when combined with high wind speed. The race and medical directors should anticipate the above medical problems and be capable of responding to a large number of patients with adequate facilities, supplies, and support staff. The four most common heat and cold illnesses during distance running are heat exhaustion, heatstroke, hypothermia, and frostbite.

1. Heat Exhaustion

Body sweat loss can be significant in summer endurance races and may result in a body water deficit of 6–10% of body weight (41,95). Such dehydration will reduce the ability to exercise in the heat because decreases in circulating blood volume, blood pressure, sweat production, and skin blood flow all inhibit heat loss (41,81) and predispose the runner to heat exhaustion or the more dangerous hyperthermia and exertional heatstroke (41,66).

Heat exhaustion, typically the most common heat illness among athletes, is defined as the inability to continue exercise in the heat (7). It represents a failure of the cardiovascular responses to workload, high external temperature, and dehydration (16,41,42). Heat exhaustion has no known chronic, harmful effects. Symptoms may include headache, extreme weakness, dizziness, vertigo, "heat sensations" on the head or neck, heat cramps, chills, "goose flesh" ("goose bumps"), vomiting, nausea, and irritability (41,42). Hyperventilation, muscular incoordination, agitation, impaired judgment, and confusion also may be seen. Heat syncope (fainting) may or may not accompany heat exhaustion (41). The onset of heat exhaustion symptoms is usually sudden and the duration of collapse brief. During the acute stage of heat exhaustion, the patient looks ashen-gray, the blood pressure is low, and the pulse rate is elevated. Hyperthermia may add to the symptoms of heat exhaustion, even on relatively cool days (20,22,30,37,38,43,62,90).

Although it is improbable that all heat exhaustion cases can be avoided, the most susceptible individuals are those who either exert themselves at or near their maximal capacities, are dehydrated, not physically fit, and not acclimatized to exercise in the heat. It is imperative that runners be adequately rested, fed, hydrated, and acclimatized (7); they should drink ample fluids before, during, and after exercise (3). Also, repeated bouts of exercise in the heat (heat acclimatization) reduce the incidence of both heat exhaustion and heat syncope. Heat acclimatization can best be accomplished by gradually increasing the duration and intensity of exercise training during the initial 10–14 days of heat exposure (6).

Oral rehydration is preferred for heat exhaustion patients who are conscious, coherent, and without vomiting or diarrhea. Intravenous (IV) fluid administration facilitates rapid recovery (42,57). Although a variety of IV solutions have been used at races (42), a 5% dextrose sugar in either 0.45% saline (NaCl) or 0.9% NaCl are the most common (1). Runners may require up to 4 l of IV fluid if severely dehydrated (57).

2. Exertional Heatstroke

Heat production, mainly from muscles, during intense exercise is 15–20 times greater than at rest, and is sufficient to raise body core temperature by 1ºC (1.8ºF) each 5 min without thermoregulatory (heat loss) adjustments (56). When the rate of heat production exceeds that of heat loss for a sufficient period of time, severe hyperthermia occurs.

Heatstroke is the most serious of the syndromes associated with excess body heat. It is defined as a condition in which body temperature is elevated to a level

that causes damage to the body's tissues, giving rise to a characteristic clinical and pathological syndrome affecting multiple organs (32,83). After races, adult core (rectal) temperatures above 40.6º (105.1ºF) have been reported in conscious runners 924,52,69,74,77), and 42-43ºC (107.6–109.4ºF) in collapsed runners (72–74,86,90). Sweating is usually present in runners who experience exertional heatstroke.

Strenuous physical exercise in a hot environment has been notorious as the cause of heatstroke, but heatstroke also has been observed in cool-to-moderate [13–28ºC (55–82ºF)] environments (5,32,74), suggesting variations in individual susceptibility 95,31,32). Skin disease, sunburn, dehydration, alcohol or drug use/abuse, obesity, sleep loss, poor physical fitness, lack of heat acclimatization, advanced age, and a previous heat injury all have been theoretically linked to increased risk of heatstroke (5,31,51,84). The risk of heatstroke is reduced if runners are well-hydrated, well-fed, rested, and acclimatized. Runners should not exercise if they have a concurrent illness, respiratory infection, diarrhea, vomiting, or fever (5,7,46). For example, a study of 179 heat casualties at a 14-km race showed that 23% reported a recent gastrointestinal or respiratory illness (70), whereas a study of 10 military heatstroke patients reported that three had a fever or disease and six recalled at least one warning sign of impending illness at the time of their heatstroke (5).

Appropriate fluid ingestion before and during prolonged running can minimize dehydration and reduce the rate of increase in body core temperature (23,34). However, excessive hyperthermia may occur in the absence of significant dehydration, especially in races of less than 10 km, because the fast pace generates greater metabolic heat (90).

The mortality rate and organ damage due to heatstroke are proportional to the length of time between core temperature elevation and initiation of cooling therapy (5,26). Therefore, prompt recognition and cooling are essential (1,5,22,42,48,51,62,74,83). A measurement of deep body temperature is vital to the diagnosis, and a rectal temperature should be measured in any casualty suspected of having heat illness or hypothermia. Ear (tympanic), oral, or axillary measurements are spuriously affected by peripheral (skin) and environmental temperatures and should not be used after exercise (8,75,76). When cooling is initiated rapidly, most heatstroke patients recover fully with normal psychological status (79), muscle energy metabolism (65), heat acclimatization, temperature regulation, electrolyte balance, sweat gland function, and blood constituents (5).

Many whole-body cooling techniques have been used to treat exertional heatstroke, including water immersion, application of wet towels or sheets, warm air spray, helicopter downdraft, and ice packs to the neck, underarm, and groin areas. There is disagreement as to which modality provides the most efficient cooling (7,47,97), because several methods have been used successfully. However, the fastest whole-body cooling rates 925,48,49,59,88) and the lowest mortality rates (25) have been observed during cool and cold water immersion. Whichever modality is utilized it should be simple and safe, provide great cooling power, and should not restrict other forms of therapy (i.e., cardiopulmonary resuscitation, defibrillation, IV

cannulation). The advantages and disadvantages of various cooling techniques have been discussed (47,75,97).

Heatstroke is regarded as a medical emergency that might be fatal if not immediately diagnosed and properly treated. Early diagnosis is of utmost importance and time-consuming investigation should be postponed until body temperature is corrected and the patient is evacuated to a nearby medical facility that is aware of such conditions.

3. Hypothermia

Hypothermia [body core temperature below 35ºC (95ºF)] occurs when heat loss is greater than metabolic heat production (94). Early signs and symptoms of hypothermia include shivering, euphoria, confusion, and behavior similar to intoxication. Lethargy, muscular weakness, disorientation, hallucinations, depression, or combative behavior may occur as core temperature continues to fall. If body core temperature falls below 31.1ºC (88ºF), shivering may stop and the patient will become progressively delirious, uncoordinated, and eventually comatose if treatment is not provided (10).

During cool or cold weather marathons, the most common illnesses are hypothermia, exhaustion, and dehydration. The most common medical complaints are weakness, shivering, lethargy, slurred speech, dizziness, diarrhea, and thirst (1,45). Runner complaints of feeling hot or cold do not always agree with changes in rectal temperature (74). Dehydration is common in cool weather (1,45). Runners should attempt to replace fluids at a rate that matches their sweat and urine losses. Cases of hypothermia also occur in spring and fall because weather conditions change rapidly and runners wear inappropriate clothing that becomes sweat-soaked during training or competition (19).

Hypothermia may occur during races, for example when distance runner complete the second half of the event more slowly than the first half (54). Evaporative and radiative cooling increase because wet skin (from sweat, rain, or snow) and clothing are exposed to higher wind speed at a time when metabolic heat production decreases. Hypothermia also occurs after a race, when the temperature gradient between the body surface and the environment is high. Subfreezing ambient temperatures need not be present and hypothermia may develop even when the air temperature is 10–18ºC (50–65ºF) (19,36,74). A WBGT meter can be used to evaluate the risk of hypothermia (see Appendix I). Cold wind increases heat loss in proportion to wind speed; i.e., wind chill factor. The relative degree of danger can be assessed [note: see Table 11-2 in Chapter 11, Part 1, *Heat and Cold* of this volume] (55). Wind speed can be estimated; if you feel the wind in your face the speed is at least 16 km/h (kph) [10 miles/h (mph)]; if small tree branches move or if snow and dust are raised, approximately 32 kph (20 mph); if large tree branches move, 48 kph (30 mph); if an entire tree bends, about 64 kph (40 mph) (9).

To reduce heat loss, runners should protect themselves from moisture, wind, and cold air by wearing several layers of light, loose clothing that insulate the skin with trapped air (17). An outer garment that is windproof, allows moisture to escape, and

provides rain protection is useful. Lightweight nylon parkas may not offer thermal insulation but offer significant protection against severe wind chill, especially if a hood is provided. Wool and polyester fabrics retains some protective value when wet; cotton and goose down do not (10). Areas of the body that lose large amount of heat (head, neck, legs, hands) should be covered (17).

Mild [34–36º (93–97ºF)] or moderate [30–34ºC (86–93ºF)] hypothermia should be treated before it progresses. Wet clothing should be replaced with dry material (sweatsuit, blanket) that is insulated from the ground and wind. Warm fluids should be consumed if patients are conscious, able to talk, and thinking clearly. Patients with moderate and severe [<30ºC (86ºF)] hypothermia should be insulated in a blanket and evacuated to a hospital immediately (19,58). Although severe hypothermia should be treated in the field (27), it is widely recognized that life-threatening ventricular fibrillation is common in this state and may be initiated by physical manipulation, chest compression, or intubation (10,27,58,93). However, with conclusive evidence of cardiac standstill and breathlessness, emergency procedures (i.e., Basic Life Support, Advanced Cardiac Life Support) should be initiated. Life-support procedures (27) and commonly observed laboratory (i.e., electrolyte, acid-base) values (10,58) have been described by others.

4. Frostbite

Frostbite involves crystallization of fluids in the skin or subcutaneous tissue after exposure to subfreezing temperatures [-0.6ºC (31ºF)]. With low skin temperature and dehydration, cutaneous blood vessels constrict and circulation is attenuated because the viscosity of blood increases (55). Frostbite may occur within seconds or hours of exposure, depending upon air temperature, wind speed, and body insulation. Frostbitten skin can appear white, yellow-white, or purple, and is hard, cold, and insensitive to touch (55). Rewarming results in intense pain, skin reddening, and swelling. Blister formation is common and loss of extremities (fingers, toes, ears, hands, feet) is possible (36,55). The degree of tissue damage depends on duration and severity of the freezing and effectiveness of treatment.

No data have been published regarding the incidence of frostbite among athletes during training or competition. Since winter running races are rarely postponed when environmental conditions are harsh, and frostbite is the most common cold injury in military settings (35), it is imperative that runners be aware of the dangers. Cross-country ski races are postponed if the temperature at the coldest point of the course is less than -20ºC (-4ºF), due to the severe wind chill generated at race pace.

Runners risk frozen flesh within minutes if the air temperature and wind speed combine to present a severe wind chill. Because runners prefer to have unrestricted movement during races, and because they know that exercise results in body heating, they may not wear sufficient clothing. Runners can avoid frostbite and hypothermia in cold and windy conditions by protecting themselves by dressing adequately: wet skin or clothing will increase the risk of frostbite (21,29).

When tissue freezes [skin temperature -2º–0ºC, (28–32ºF)], water is drawn out of the cells and ice crystals cause mechanical destruction of skin and subcutaneous

tissue (36). However, initial ice crystal formation is not as damaging to tissues as partial rethawing and refreezing (40). Therefore, the decision to treat severe frostbite in the field (versus transport to a hospital) should consider the possibility of refreezing. If there is no likelihood of refreezing, the tissue should be rapidly rewarmed (36,40) in circulating warm water (40–43.3ºC, 104–110ºF), insulated, and the patient transported to a medical facility. Research on animals suggests that topical aloe vera and systemic ibuprofen may reduce tissue damage and speed rehabilitation in humans (9). Other aspects of hospital treatment protocols are detailed elsewhere (9,36,40).

Race Organization

The following suggestions constitute the ideal race medical team. They are offered for consideration, but are not intended as absolute requirements. Staff and equipment needs are unique to each race and may be revised after 1–2 yr, in light of the distinctive features of each race. Depending on the weather conditions, 2–12% of all entrants will typically enter a medical aid station (1,45,50,74).

1. Medical Personnel

a. Provide medical assistance if the rae is 10 km (6.2 miles) or longer.

b. Provide the following medical personnel per 1,000 runners: 1–2 physicians, 46 podiatrists, 1–4 emergency medical technicians, 2–4 nurses, 3–6 physical therapists, 3–6 athletic trainers, and 1–3 assistants. Approximately 75% of these personnel should be stationed at the finish area. Recruit one nurse (per 1,000 runners) trained in IV therapy.

c. Recruit emergency personnel from existing organizations (police, fire-rescue, emergency medical service).

d. One physician and 10–15 medical assistants serve as the triage team in the finish chute. Runners unable to walk are transported to the medical tent via wheelchair, litter, or two-person carry.

e. Consider one or two physicians and two to four nurses trained in the rehabilitative medical care of wheelchair athletes.

f. Medical volunteers should attend a briefing prior to the event to meet their supervisor and receive identification tags, weather forecast, instructions, and schedules. Supervisors from the following groups should be introduced: medical director; podiatry, nursing, physical therapy, athletic training, medical records, triage, wheelchair, athlete care, and medical security (optional: chiropractic, massage therapy). Medical volunteers should be distinguished from other race volunteers; luminous/distinctive vests, coats, or hats work well.

2. Medical Aid Stations

a. Provide a primary medical aid station (250–1,500 ft^2 [23–139m^2] for each 1,000 runners; see Table 1) at the finish area, with no public access. Place security guards at all entrances with instructions regarding who can enter.

Table 1: Suggested equipment and supplies per 1,000 runners.

Item	Secondary Aid Station[b]	Primary Aid Station[c]
Stretchers (at 10 km and beyond)	2–5	4–10
Cots	10	30
Wheelchairs	0	1
Wool blankets (at 10 km and beyond)	6–10	12–20
Bath towels	5–10	10–20
High and low temperature rectal thermometers (37–43°C; 99–110°F) and (22–37°C; 72–99°F)[d]	5	10
Elastic bandages (2, 4, and 6 inch)	3 each	6 each
Gauze pads (4 x 4 inch)	1/2 case	1 case
Adhesive tape (1.5 inch)	1/2 case	1 case
Skin disinfectant	1 l	2 l
Surgical soap	1/2 case	1 case
Band-aids	110	220
Moleskin	1/2 case	1 case
Petroleum jelly, ointments	1/2 case	1 case
Disposable latex gloves	80 pairs	175 pairs
Stethoscopes	1	2
Blood pressure cuffs	1	2
Intravenous (IV) stations[d]	1	2
IV fluids (D5:1/2 NS; o.5 or 1 l)[d]	15[e]	30[e]
Sharps and biohazard disposal containers[d]	1	2
Alcohol wipes	50	100
Small instrument kits	1	1
Athletic trainer's kit	1	1
Podiatrist's kit	1–2	2–4
Inflatable arm and leg splints	2 each	2 each
Tables for medical supplies	1	2
Hose with spray nozzle, running water[e]	1	2
Wading pool for water immersions[e]	1	2
Fans for cooling	1	2–4
Oxygen tanks with regulators and masks	0	2
Crushed ice in plastic bags	7 kg	14 kg
Rehydration fluids	50 l[e]	100 l[e]
Cups (≥0.3 l, 10 oz)	1250	2250
Eye drops	1	1
Urine dipsticks[d]	10	20
Glucose blood monitoring kit[d]	1	2
Inhalation therapy for asthmatics[d]	1	1
EMS ambulance or ACLS station	1	1
Injectable and oral drugs[d]		

[a]Revised from Adner, M. M., J. J. Scarlet, J. Casey, W. Robison, and B. H. Jones. The Boston Marathon medical care team: ten years of experience. *Physician Sportsmed.* 16:99-106, 1988; and Noble, H. B. and D. Bachman. Medical aspects of distance race planning. *Physician Sportsmed.* 7:78-84, 1979.
[b]Increase supplies and equipment if race is out and back. [c]At finish area. [d]Supervised by a physician.
[e]Depends on environmental conditions.

b. Position secondary medical aid stations along the route at 2- to 3-km (1.2- to 1.9-mile) intervals for races over 10 km, and at the halfway point for shorter races (see Table 1). Some race directors have successfully secured equipment and medical volunteers from military reserve or national guard medical units, the American Red Cross, and the National Ski Patrol.

c. Station one ambulance per 3,000 runners at the finish area and one or more mobile emergency response vehicles on the course. Staff each vehicle with a nurse and radio person or cellular telephone. Stock each vehicle with a medical kit, automatic defibrillator, IV apparatus, blankets, towels, crushed ice, blood pressure cuffs, rehydration fluid, and cups.

d. Signs should be posted at the starting line and at each medical station to announce the risk of heat illness or cold injury (see Appendix I).

e. A medical record card should be completed for each runner who receives treatment (1,74). This card provides details that can be used to plan the medical coverage of future events.

f. Provide personal protective equipment (gloves, gowns, face shields, eye protection) and hand washing facilities.

g. Provide portable latrines and containers for patients with vomiting and diarrhea.

h. Initial medical assessment must include rectal (not oral, aural, or axillary temperature; see ref. 8,76), central nervous system function, and cardiovascular function. Rehydration and cooling or warming are the cornerstones of treatment (32,41,42,50,74,94).

3. Universal Precautions

All medical personnel may encounter blood-borne pathogens or other potentially infectious materials, and should observe the following precautions (53,63):

a. Receive immunization against hepatitis B prior to the event.

b. Recognize that blood and infectious body fluids may be encountered from needle sticks, cuts, abrasions, blisters, and clothing.

c. Reduce the likelihood of exposure by planning tasks carefully (i.e., prohibiting recapping of needles by a two-handed technique, minimizing splashing and spraying).

d. Wear personal protective equipment such as gloves, gowns, face shields and eye protection. Remove this equipment and dispose/decontaminate it prior to leaving the work area.

e. Wash hands after removing gloves or other personal protective equipment.

f. Dispose of protective coverings, needles, scalpels, and other sharp objects in approved, labeled biohazard containers.

g. Do not eat, drink, smoke, handle contact lenses, or apply cosmetics/lip balm in the medical treatment area.

h. Decontaminate work surfaces, bins, pails, and cans [1/10 solution of household bleach (sodium hypochlorite) in water] after completion of procedures.

4. Fluid Stations

a. At the start and finish areas provide 0.34–0.45 l (12–16 oz) of fluid per runner. At each fluid station on the race course (2–3 km apart), provide 0.28–0.34 l (10–12 oz) of fluid per runner. Provide both water and a carbohydrate-electrolyte beverage in equal volumes.

b. In cool or cold weather [≤10ºC (50ºF)], an equivalent amount of warm fluid should be available.

c. Number of cups (≥ 0.3 l, 10 oz) per fluid station on the course = number of entrants + 25% for spillage and double use. Double this total if the course is out and back.

d. Number of cups at start and finish area = (2 x number of entrants) + 25% additional.

e. Cups should be filled prior to the race and placed on tables to allow easy access. Runners drink larger volumes if volunteers hand them cups filled with fluid.

5. Communications/Surveillance

a. Provide two-way radio or telephone communication between the medical director, medical aid stations, mobile vans, and pick-up vehicles.

b. Arrange for radio-equipped vehicles to drive the race course (ahead and behind participants) and provide communication with the director and his/her staff. These vehicles should be stationed at regular intervals along the course to search the course for competitors who require emergency care and encourage compromised runners to stop.

c. Place radio-equipped observers along the course.

d. Notify local hospitals, police, and fire-rescue departments of the time of the event, number of participants, location of aid stations, extent of medical coverage, and the race course.

e. Use the emergency response system (telephone number 911 [in U.S.] or 112 [international]) in urban areas.

6. Instructions to Runners

a. Advise each race participant to print name, address, telephone number, and medical problems on the back of the race number (pinned to the body). This permits emergency personnel to quickly identify unconscious runners. Inform emergency personnel that this information exists.

b. Inform race participants of potential medical problems at pre-race conferences and at the starting line. Signed registration forms should clearly state the types of heat or cold injuries that may arise from participation in this event.

c. Provide pre-event recommendations regarding training, fluid consumption, clothing selection, self-care, heat acclimatization, and signs or symptoms of heat/cold illness (88).

d. The race director should announce the following information to all participants by loudspeaker immediately prior to the race:

- Current and predicted maximum (or minimum) temperature, humidity, wind speed, and cloud cover;

- The WBGT category and risks for hyperthermia or hypothermia (see Appendix I);
- Location of aid stations, types of assistance, and fluid availability;
- Signs and symptoms of heat or cold illness;
- Recommended clothing;
- The need for fluid replacement before, during, and after the race;
- The policy of race monitors to stop runners who are ill;
- A request that runners seek help for impaired competitors who appear ill, who are not coherent, who run in the wrong direction, or who exhibit upper-body swaying and poor competitive posture;
- A warning to novice runners entering their first race that they should run at a comfortable pace and run with a partner;
- Warnings to runners who are taking medications or who have chronic illnesses (asthma, hypertension, diabetes, cardiovascular problems).

Acknowledgment

This position stand replaces the 1987 ACSM position paper, "The Prevention of Thermal Injuries During Distance Running."

The pronouncement was reviewed for the American College of Sports Medicine by members-at-large, the Pronouncement Committee, and by: Arthur E. Crago, M.D., Stafford W. Dobbin, M.D., Mary L. O'Toole, Ph.D., FACSM, LTC Katy L. Reynolds, M.D., and John W. Robertson, M.D., FACSM.

References

See http://www.acsm-msse.org/pt/re/msse/positionstandards.htm for list of references (scroll to December 1, 1996 for pdf).

Appendix I. Measurement of Environmental Stress

Ambient temperature is only one component of environmental heat or cold stress; others are humidity, wind speed, and radiant heat. The most widely used heat stress index is the wet bulb globe temperature (WBGT) index (96):

$$\text{WBGT} = (0.7\ T_{wb}) + (0.2\ T_{g}) + (0.1\ T_{db})$$

Where Twb is the wet bulb temperature, Tg is the black globe temperature, and T_{db} is the shaded dry bulb temperature (28). T_{db} refers to air temperature measured with a standard dry bulb thermometer not in direct sunlight. T_{wb} is measured with a water-saturated cloth wick over a dry bulb thermometer (not immersed in water). T_{g} is measured by inserting a dry bulb thermometer into a standard black metal globe. Both T_{wb} and T_{g} are measured in direct sunlight.

A portable monitor that gives the WBGT index in degrees Celsius or degrees Fahrenheit has proven useful during races and in military training (28,44,87,96). The measurement of air temperature alone is inadequate. The importance of humidity

in total heat stress can be readily appreciated because T_{wb} accounts for 70% of the index whereas T_{db} accounts for only 10%.

The risk of heat illness (while wearing shorts, socks, shoes, and a t-shirt) due to environmental stress should be communicated to runners in four categories (see Fig. 1):

Very high risk: WBGT above 28ºC (82ºF);
High risk: WBGT 23–28ºC (73–82ºF);
Moderate risk: WBGT 18–23ºC (65–73ºF);
Low risk: WBGT below 18ºC (65ºF).

Large signs should be displayed, at the start of the race and at key points along the race course, to describe the risk of heat exhaustion and heatstroke (Fig. 1). When the WBGT index is above 28ºC (82ºF), the risk of heat exhaustion or heatstroke is very high; it is recommended that the race be postponed or canceled. High risk [WBGT index = 23–28ºC (73–82ºF)] indicates that runners should be aware that heat exhaustion or heatstroke may be experienced by any participant; anyone who is particularly sensitive to heat or humidity probably should not run. Moderate risk [WBGT index = 18–23ºC (65–73ºF)] reminds runners that heat and humidity during the course of the race if conducted during the morning or early afternoon. Low risk [WBGT index = below 18ºC (65ºF)] does not guarantee that heat exhaustion (even heat stroke, see ref. 5,32) will not occur; it only indicates that the risk is low.

The risk of hypothermia (while wearing shorts, socks, shoes, and a t-shirt) also should be communicated to runners. A WBGT index below 10ºC (50ºF) indicates that hypothermia may occur in slow runners who run long distances, especially in wet and windy conditions. Core body temperatures as low as 92ºF have been observed in 65ºF conditions (74).

Appendix 5

IAAF Policy on Fluid Replacement

Heat Stress and Heat Illness

Heat stress and heat illness occur when the body's heat production goes beyond the many factors responsible for heat loss.

Heat production is determined by the athlete's metabolic rate (energy expenditure), i.e., race pace, body weight, and running economy. About three-quarters of the energy produced by exercise is stored as heat. Thus, higher-intensity races such as a 10 kilometre race are more likely to lead to heat injury than longer races, which are run at a slower pace.

Many factors determine the body's ability to dissipate heat: environmental factors such as ambient temperature, relative humidity, and air currents, as well as the athlete's level of fitness and his or her degree of heat adaptation. The environmental factors can be assessed by measuring the Wet Bulb Globe Temperature (WBGT). It is advised to run distance races below 18 degrees of WBGT value.

One of the major factors responsible for cooling and maintaining the body's temperature in warm weather is the body's ability to evaporate sweat. Hence, adequate hydration is one of the most important elements in the prevention of heat injury, and the ability to maintain a high level of performance.

Performance begins to become impaired when the body loses more than 2–3% of body weight, primarily as fluid losses from sweating. The athlete's heart rate and core temperature will be increased. Thus, maintaining adequate hydration is important, but athletes must realise that hydration alone is not sufficient to prevent heat injury.

Athletes must learn to recognise thirst as a late indicator of dehydration. They should consume fluid before they feel thirst. However, drinking excess amounts of fluid in the absence of thirst may lead to over-hydration and exertional hyponatremia (low blood sodium), especially if the fluids consumed are sodium-free. Exertional hyponatremia can be a life-threatening condition, and is more likely to occur in slower runners who are exercising for four hours or more. Their metabolic rate and heat production are lower, and due to their slower pace they are more able to consume more fluids than they need.

Pre-Race Preparation

1. Heat adaptation. Train under similar conditions as those expected during the race. This ideally may require 7–10 days. If this is not possible, train with additional clothing in order to raise core temperature. However, NEVER wear rubber suits or other clothing that inhibits sweat evaporation.
2. Practice drinking during training runs, so that you can drink comfortably while running. Use the same drinks in the training run and the race run. Observe weight changes during training sessions to get a feel for typical sweat rates, then develop a drinking plan that allows you to replace most

of these losses during the session. (For example, if you find that you sweat at a rate of ~1 litre per hour, drinking at a rate of 400–800 ml per hour is likely to be a good plan).

3. Salt food heavily for several days prior to the competition. Restore salt in the body.
4. Begin the race well-hydrated. Consume 500–600 ml of water or a sports drink during the 2–3 hours before the race, and another 300 ml 10–15 minutes before the start (300 ml of water can be absorbed within 15 minutes).
5. Be aware of WBGT, which will let you know the possibility of heat illness.
6. Do not use any non-steroidal anti-inflammatory drugs (NSAIDs) except acetaminophen. NSAIDs are thought to increase the possibility of hyponatremia while running long distances.

During the Race

1. Consume an adequate amount of fluids to prevent dehydration (see point 2 under race preparation).
2. Consume cool liquids that contain 0.2–0.45% sodium and 5% glucose or glucose polymer. This combination replaces electrolytes lost in sweat, aids in preventing hyponatremia, and provides carbohydrate for energy.
3. As sweat losses and the ability to absorb fluids may vary considerably among individuals, it is useful to determine one's individual needs by using the guidelines found in References 1 and 2 (see below).
4. It may not be possible or necessary to drink at a rate that completely replaces sweat losses during an event. In most cases, drinking to keep losses less than 2% of body mass is suitable. You should not drink at rates greater than sweat losses so that you gain weight over the session.

After the Race

1. Begin to re-hydrate and restore muscle glycogen as soon as possible after the race. Fluids containing electrolytes (sodium and potassium) and carbohydrates are needed to replace losses.
2. Optimal replenishment of muscle glycogen is best carried out in the first 2–4 hours post-competition.
3. If possible, the athlete should weigh him or herself before and after the race to determine the amount of fluid loss, and replace this loss with 1 1/4–1 1/2 times this amount.

Dehydration and hyponatremia can be prevented in distance running, and performance should be improved by proper fluid and salt replacement before and during the races.

This policy has been written by Dr. Fumihiro Yamasawa, Dr. Harmon Brown, and Professor Louise Burke on behalf of the IAAF Medical and Anti-Doping Commission.

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Appendix 6

Supplies for Injury Prevention/First Aid

On-Site Medical Supplies

Following are lists of medical bag items and medical supplies for contact/collision and high-risk sports.

General

- Alcohol swabs and povidone iodine swabs
- Bandage scissors
- Bandages, sterile/nonsterile, Band-Aids
- Disinfectant
- Gloves, sterile/nonsterile
- Local anesthetic/syringes/needles
- Paper/ Pen
- Plastic bags
- Sharps box and biohazard bag
- Sling
- Suture set/Steri-Strips
- Wound irrigation materials (e.g. , sterile normal saline, 10- to 50-cc syringe)

Cardiopulmonary

- Oropharyngeal airway
- Blood pressure cuff
- Epinephrine 1:1000 in a prepackaged unit
- Mouth-to-mouth mask
- Short-acting $beta_2$ agonist inhaler
- Stethoscope

Head and Neck/Neurologic

- Dental kit (e.g., cyanoacrylate, Hank's solution)
- Eye kit (e.g., blue light, fluorescein stain strips, eye patch pads, cotton tip applicators, ocular anesthetic and antibiotics, contact remover, mirror)
- Semirigid cervical collar
- Spine board and attachments
- Flashlight
- Pin or other sharp object for sensory testing
- Reflex hammer

General

- Access to a telephone
- Crutches
- Extremity splints
- Ice
- List of emergency phone numbers
- Injury and illness care instruction sheets for the athlete
- Benzoin
- Blister care materials
- Contact lens case and solution
- Ferric subsulfate solution (e.g., Munsell's for cauterizing abrasions and cuts)
- Nail clippers
- Nasal packing material
- Oral fluid replacement
- Oto-ophthalmoscope
- Razor and shaving cream
- Scalpel
- Skin lubricant
- Skin staple applicator
- Small mirror
- Tape cutter
- Tongue depressors
- Topical antibiotics
- Massage lotion

Cardiopulmonary

- Advanced Cardiac Life Support (ACLS) drugs and equipment
- IV fluids and administration set
- Tourniquet
- Automated external defibrillator (AED)

In addition, sideline medical supplies should include the following:

- Blanket/Crutches
- Sling psychrometer and temperature/humidity activity risk chart

Appendix 7

Cardiopulmonary Resuscitation (CPR)/Basic Life Support (BLS) Guidelines

Adult Basic Life Support

Adapted from the 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, *Circulation.* 2005; 112:IV-19–IV-34.

Basic life support (BLS) includes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke, and foreign-body airway obstruction (FBAO); cardiopulmonary resuscitation (CPR); and defibrillation with an automated external defibrillator (AED). This section summarizes BLS guidelines for lay rescuers and healthcare providers.

Introduction

Sudden cardiac arrest is a leading cause of death in the United States and Canada.[1–3] At the first analysis of heart rhythm, about 40% of victims of out-of-hospital SCA demonstrate ventricular fibrillation (VF).[3–5] VF is characterized by chaotic rapid depolarizations and repolarizations that cause the heart to quiver so that it is unable to pump blood effectively.[6] It is likely that an even larger number of SCA victims have VF or rapid ventricular tachycardia (VT) at the time of collapse, but by the time of first rhythm analysis the rhythm has deteriorated to asystole.[7]

Many SCA victims can survive if bystanders act immediately while VF is still present, but successful resuscitation is unlikely once the rhythm deteriorates to asystole.[8] Treatment for VF SCA is immediate bystander CPR plus delivery of a shock with a defibrillator. The mechanism of cardiac arrest in victims of trauma, drug overdose, drowning, and in many children is asphyxia. CPR with both compressions and rescue breaths is critical for resuscitation of these victims.

The American Heart Association uses 4 links in a chain (the "Chain of Survival") to illustrate the important time-sensitive actions for victims of VF SCA. Three and possibly all 4 of these links are also relevant for victims of asphyxial arrest.[9]

- Early recognition of the emergency and activation of the emergency medical services (EMS) or local emergency response system: "phone 911."[10,11]
- Early bystander CPR: immediate CPR can double or triple the victim's chance of survival from VF SCA.[8, 12–14]
- Early delivery of a shock with a defibrillator: CPR plus defibrillation within 3 to 5 minutes of collapse can produce survival rates as high as 49% to 75%.[15, 16]
- Early advanced life support followed by postresuscitation care delivered by healthcare providers.

Bystanders can perform 3 of the 4 links in the Chain of Survival. When bystanders recognize the emergency and activate the EMS system, they ensure that basic and advanced life support providers are dispatched to the site of the emergency. In many communities the time interval from EMS call to EMS arrival is 7 to 8 minutes or longer.[17] This means that in the first minutes after collapse the victim's chance of survival is in the hands of bystanders.

Shortening the EMS response interval increases survival from SCA, but the effect is minimal once the EMS response interval (from the time of EMS call until arrival) exceeds 5 to 6 minutes.[18, 19] EMS systems should evaluate their protocols for cardiac arrest patients and try to shorten response intervals when improvements are feasible and re- sources are available. Each EMS system should measure the rate of survival to hospital discharge for victims of VF SCA and use these measurements to document the impact of changes in procedures.[21]

Victims of cardiac arrest need immediate CPR, which provides a small but critical amount of blood flow to the heart and brain. CPR prolongs the time VF is present and increases the likelihood that a shock will terminate VF (defibrillate the heart) and allow the heart to resume an effective rhythm and effective systemic perfusion. CPR is especially important if a shock is not delivered for 4 or more minutes after collapse.[22] Defibrillation does not "restart" the heart; defibrillation "stuns" the heart, briefly stopping VF and other cardiac electrical activity. If the heart is still viable, its normal pacemakers may then resume firing and produce an effective ECG rhythm that may ultimately produce adequate blood flow.

Adult BLS Sequence

The steps of BLS consist of a series of sequential assessments and actions, which are illustrated in the BLS algorithm (Figure 1). The intent of the algorithm is to present the steps in a logical and concise manner that will be easy to learn, remember, and perform.

Before approaching the victim, the rescuer must ensure that the scene is safe. Lay rescuers should move trauma victims only if absolutely necessary (e.g., the victim is in a dangerous location, such as a burning building).

Check for Response

Once the rescuer has ensured that the scene is safe, the rescuer should check for response. To check for response, tap the victim on the shoulder and ask, "Are you all right?" If the victim responds but is injured or needs medical assistance, leave the victim to phone 911. Then return as quickly as possible and recheck the victim's condition frequently.

Activate the EMS System

If a lone rescuer finds an unresponsive adult (i.e., no movement or response to stimulation), the rescuer should activate the EMS system (phone 911), get an AED (if available), and return to the victim to provide CPR and defibrillation if needed. When 2 or more rescuers are present, one rescuer should begin the steps of CPR while a second rescuer activates the EMS system and gets the AED. If the emergency occurs in a facility with an established medical response system, notify that system instead of the EMS system.

Healthcare providers may tailor the sequence of rescue actions to the most likely cause of arrest.[23, 24] If a lone healthcare provider sees an adult or child suddenly collapse, the collapse is likely to be cardiac in origin, and the provider should phone

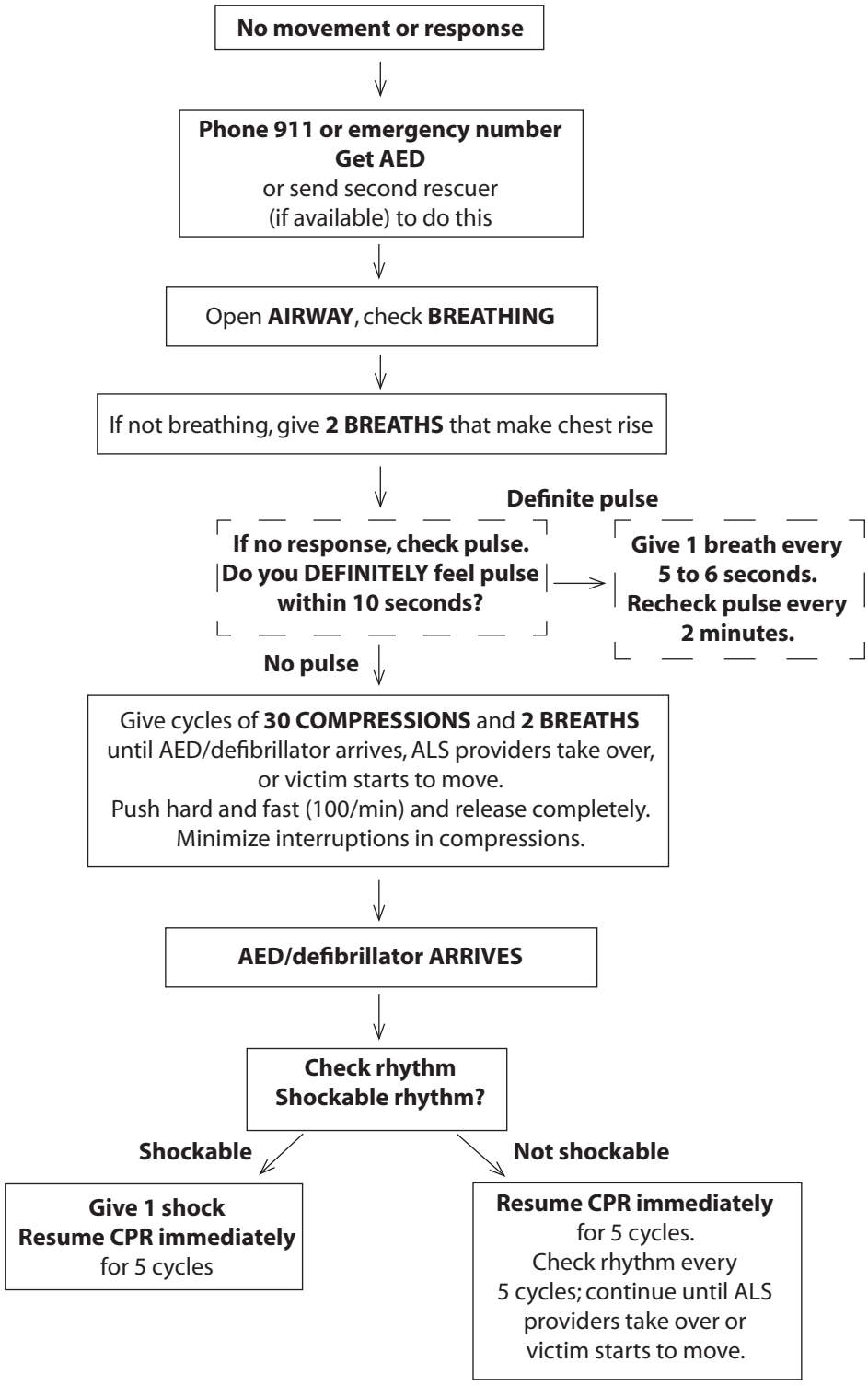

Figure 1. Adult BLS Healthcare Provider Algorithm. Boxes bordered with dotted lines indicate actions or steps performed by the healthcare provider but not the lay rescuer.

911, get an AED, and return to the victim to provide CPR and use the AED. If a lone healthcare provider aids a drowning victim or other victim of likely asphyxial (primary respiratory) arrest of any age, the healthcare provider should give 5 cycles (about 2 minutes) of CPR before leaving the victim to activate the EMS system.

When phoning 911 for help, the rescuer should be prepared to answer the dispatcher's questions about location, what happened, number and condition of victims, and type of aid provided. The caller should hang up only when instructed to do so by the dispatcher and should then return to the victim to provide CPR and defibrillation if needed.

Open the Airway and Check Breathing

To prepare for CPR, place the victim on a hard surface in a face up (supine) position. If an unresponsive victim is face down (prone), roll the victim to a supine (face up) position. If a hospitalized patient with an advanced airway (e.g., endotracheal tube, laryngeal mask airway [LMA], or esophageal- tracheal combitube [Combitube]) cannot be placed in the supine position (e.g., during spinal surgery), the healthcare provider may attempt CPR with the patient in a prone position.

Open the Airway: Lay Rescuer

The lay rescuer should open the airway using a head tilt– chin lift maneuver for both injured and noninjured victims. The jaw thrust is no longer recommended for lay rescuers because it is difficult for lay rescuers to learn and perform, is often not an effective way to open the airway, and may cause spinal movement.

Open the Airway: Healthcare Provider

A healthcare provider should use the head tilt– chin lift maneuver to open the airway of a victim without evidence of head or neck trauma. Although the head tilt– chin lift technique was developed using unconscious, paralyzed adult volunteers and has not been studied in victims with cardiac arrest, clinical[25] and radiographic evidence.[26, 27] have shown it to be effective. Approximately 2% of victims with blunt trauma have a spinal injury, and this risk is tripled if the victim has a craniofacial injury, a Glasgow Coma Scale score of 8 or both.[28] If a healthcare provider suspects a cervical spine injury, open the airway using a jaw thrust without head extension.[29] Because maintaining a patent airway and providing adequate ventilation is a priority in CPR, use a head tilt– chin lift maneuver if the jaw thrust does not open the airway.

Check Breathing

While maintaining an open airway, look, listen, and feel for breathing. If you are a lay rescuer and do not confidently detect normal breathing or if you are a health-care provider and do not detect adequate breathing within 10 seconds, give 2 breaths (see below). If you are a lay rescuer and you are unwilling or unable to give rescue breaths, begin chest compressions.

Professional as well as lay rescuers may be unable to accurately determine the presence or absence of adequate or normal breathing in unresponsive victims[30] because the airway is not open[31] or the victim has occasional gasps, which can

occur in the first minutes after SCA and may be confused with adequate breathing. Occasional gasps are not effective breaths. Treat the victim who has occasional gasps as if he or she is not breathing and give rescue breaths. CPR training should emphasize how to recognize occasional gasps and should instruct rescuers to give rescue breaths and proceed with the steps of CPR when the unresponsive victim demonstrates occasional gasps.

Give Rescue Breaths

Give 2 rescue breathes, each over 1 second, with enough volume to produce visible chest rise. This recommended 1-second duration to make the chest rise applies to all forms of ventilation during CPR, including mouth-to-mouth and bag-mask ventilation and ventilation through an advanced airway, with and without supplementary oxygen.

During CPR the purpose of ventilation is to maintain adequate oxygenation, but the optimal tidal volume, respiratory rate, and inspired oxygen concentration to achieve this are not known. The following general recommendations can be made:

1. During the first minutes of VF SCA, rescue breaths are probably not as important as chest compressions[32] because the oxygen level in the blood remains high for the first several minutes after cardiac arrest. In early cardiac arrest, myocardial and cerebral oxygen delivery is limited more by the diminished blood flow (cardiac output) than a lack of oxygen in the blood. During CPR blood flow is provided by chest compressions. Rescuers must be sure to provide effective chest compressions (see below) and minimize any interruption of chest compressions.
2. Both ventilations and compressions are important for victims of prolonged VF SCA, when oxygen in the blood is utilized. Ventilations and compressions are also important for victims of asphyxial arrest, such as children and drowning victims who are hypoxemic at the time of cardiac arrest.
3. During CPR blood flow to the lungs is substantially reduced, so an adequate ventilation-perfusion ratio can be maintained with lower tidal volumes and respiratory rates than normal.[33] Rescuers should not provide hyperventilation (too many breaths or too large a volume). Excessive ventilation is unnecessary and is harmful because it increases intrathoracic pressure, decreases venous return to the heart, and diminishes cardiac output and survival.[34]
4. Avoid delivering breaths that are too large or too forceful. Such breaths are not needed and may cause gastric inflation and its resultant complications.[35]

The ECC Guidelines 2000[36] recommended a variety of tidal volumes, respiratory rates, and breath delivery intervals. But it is unrealistic to expect the rescuer to distinguish half-second differences in inspiratory times or to judge tidal volumes delivered by mouth-to-mouth or bag-mask ventilation. So these guidelines provide simple recommendations for delivery of rescue breaths during cardiac arrest:

- Deliver each rescue breath over 1 second.
- Give a sufficient tidal volume (by mouth-to-mouth/mask or bag mask with or without supplementary oxygen) to produce visible chest rise.
- Avoid rapid or forceful breaths.

- When an advanced airway (i.e., endotracheal tube, Combi-tube, or LMA) is in place during 2-person CPR, ventilate at a rate of 8 to 10 breaths per minute without attempting to synchronize breaths between compressions. There should be no pause in chest compressions for delivery of ventilations.

If you are delivering ventilation with a bag and mask, use an adult ventilating bag (volume of 1 to 2 L); a pediatric bag delivers inadequate tidal volume for an adult.[37, 38] When giving rescue breaths, give sufficient volume to cause visible chest rise. In 1 observational study trained BLS providers were able to detect "adequate" chest rise in anesthetized, intubated, and paralyzed adult patients when a tidal volume of approximately 400 mL was delivered.[33] It is likely, however, that a larger volume is required to produce chest rise in a victim with no advanced airway (e.g., endotracheal tube, Combitube, LMA) in place. We therefore recommend a tidal volume of 500 to 600 mL but emphasize that the volume delivered should produce visible chest rise. It is reasonable to use the same tidal volume in patients with asphyxial and arrhythmic cardiac arrest.

Mouth-to-Mouth Rescue Breathing

Mouth-to-mouth rescue breathing provides oxygen and ventilation to the victim.[39] To provide mouth-to-mouth rescue breaths, open the victim's airway, pinch the victim's nose, and create an airtight mouth-to-mouth seal. Give 1 breath over 1 second, take a "regular" (not a deep) breath, and give second rescues breathe over 1 second. Taking a regular rather than a deep breath prevents you from getting dizzy or lightheaded. The most common cause of ventilation difficulty is an improperly opened airway, so if the victim's chest does not rise with the first rescue breath, perform the head tilt– chin lift and give the second rescue breath.

Mouth-to–Barrier Device Breathing

Despite its safety, some healthcare providers and lay rescuers may hesitate to give mouth-to-mouth rescue breathing and prefer to use a barrier device. Barrier devices may not reduce the risk of infection transmission,[40] and some may increase resistance to airflow.[41] If you use a barrier device, do not delay rescue breathing. Barrier devices are available in 2 types: face shields and face masks. Face shields are clear plastic or silicone sheets that reduce direct contact between the victim and rescuer but do not prevent contamination of the rescuer's side of the shield.[42]

A rescuer with a duty to respond should use a face shield only as a substitute for mouth-to-mouth breathing. These responders should switch to face mask or bag-mask ventilation as soon as possible.[42] Masks used for mouth-to-mask breathing should contain a 1-way valve that directs the rescuer's breath into the patient while diverting the patient's exhaled air away from the rescuer.[42] Some masks include an oxygen inlet for administration of supplementary oxygen. When oxygen is available, healthcare providers should provide it at a minimum flow rate of 10 to 12 L/min.

Ventilation With Bag and Mask

Rescuers can provide bag-mask ventilation with room air or oxygen. A bag-mask device provides positive-pressure ventilation without an advanced airway and therefore may produce gastric inflation and its complications (see above). When using a bag-mask device, deliver each breath over a period of 1 second and provide sufficient tidal volume to cause visible chest rise.

The Bag-Mask Device

A bag-mask device should have the following[43, 44]: a non jam inlet valve; either no pressure relief valve or a pressure relief valve that can be bypassed; standard 15-mm/22-mm fittings; an oxygen reservoir to allow delivery of high oxygen concentrations; a nonrebreathing outlet valve that cannot be obstructed by foreign material and will not jam with an oxygen flow of 30 L/min; and the capability to function satisfactorily under common environmental conditions and extremes of temperature.

Masks should be made of transparent material to allow detection of regurgitation. They should be capable of creating a tight seal on the face, covering both mouth and nose. Masks should be fitted with an oxygen (insufflation) inlet, have a standard 15-mm/22-mm connector,[45] and should be available in one adult and several pediatric sizes.

Bag-Mask Ventilation

Bag-mask ventilation is a challenging skill that requires considerable practice for competency.[46, 47] The lone rescuer using a bag-mask device should be able to simultaneously open the airway with a jaw lift, hold the mask tightly against the patient's face, and squeeze the bag. The rescuer must also watch to be sure the chest rises with each breath. Bag-mask ventilation is most effective when provided by 2 trained and experienced rescuers. One rescuer opens the airway and seals the mask to the face while the other squeezes the bag. Both rescuers watch for visible chest rise.[46, 47] The rescuer should use an adult (1 to 2 L) bag to deliver a tidal volume sufficient to achieve visible chest rise. If the airway is open and there are no leaks (i.e., there is a good seal between face and mask), this volume can be delivered by squeezing a 1-L adult bag about one half to two thirds of its volume or a 2-L adult bag about one-third its volume. As long as the patient does not have an advanced airway in place, the rescuer(s) should deliver cycles of 30 compressions and 2 breaths. The rescuer delivers the breaths during pauses in compressions and delivers each breathe over 1 second.

The healthcare provider should use supplementary oxygen (O_2 40%, a minimum flow rate of 10 to 12 L/min) when available. Ideally the bag should be attached to an oxygen reservoir to enable delivery of 100% oxygen. Advanced airway devices such as the LMA145 and the esophageal-tracheal Combitube are currently within the scope of BLS practice in a number of regions (with specific authorization from medical control).[48] These devices may provide acceptable alternatives to bag-mask devices for healthcare providers who are well trained and have sufficient experience to use them. It is not clear that these devices are any more or less complicated to use

than a bag and mask; training is needed for safe and effective use of both the bag-mask device and each of the advanced airways.

Ventilation With an Advanced Airway

When the victim has an advanced airway in place during CPR, 2 rescuers no longer deliver cycles of CPR (i.e., compressions interrupted by pauses for ventilation). Instead, the compressing rescuer should give continuous chest compressions at a rate of 100 per minute without pauses for ventilation. The rescuer delivering ventilation provides 8 to 10 breaths per minute. The 2 rescuers should change compressor and ventilator roles approximately every 2 minutes to prevent compressor fatigue and deterioration in quality and rate of chest compressions. When multiple rescuers are present, they should rotate the compressor role about every 2 minutes.

Rescuers should avoid excessive ventilation by giving the recommended breaths per minute and limiting tidal volume to achieve chest rise.[34] A translational research study showed that delivery of 12 breaths per minute during CPR leads to increased intrathoracic pressure, impeding venous return to the heart during chest compressions.[34] Reduced venous return leads to diminished cardiac output during chest compressions and decreased coronary and cerebral perfusion.[49, 50] It is critically important that rescuers maintain a ventilation rate of 8 to 10 breaths per minute during CPR and avoid excessive ventilation.[34, 50]

Cricoid Pressure

Pressure applied to the victim's cricoid cartilage pushes the trachea posteriorly, compresses the esophagus against the cervical vertebrae, and can prevent gastric inflation and reduce the risk of regurgitation and aspiration.[51, 52] Application of cricoid pressure usually requires a third rescuer, one who is not responsible for chest compressions or ventilations. Cricoid pressure should be used only if the victim is deeply unconscious (i.e., has no cough or gag reflex).

Pulse Check (for Healthcare Providers)

Lay rescuers fail to recognize the absence of a pulse in 10% of pulseless victims (poor sensitivity for cardiac arrest) and fail to detect a pulse in 40% of victims with a pulse (poor specificity). In the ECC Guidelines 2000[36] the pulse check was deleted from training for lay rescuers and de-emphasized in training for healthcare providers. There is no evidence, however, that checking for breathing, coughing, or movement is superior for detection of circulation.[53] For ease of training, the lay rescuer will be taught to assume that cardiac arrest is present if the unresponsive victim is not breathing. Healthcare providers also may take too long to check for a pulse, and have difficulty determining if a pulse is present or absent. The healthcare provider should take no more than 10 seconds to check for a pulse. If a pulse is not definitely felt within 10 seconds, proceed with chest compressions.

Rescue Breathing Without Chest Compressions

If an adult victim with spontaneous circulation (i.e., palpable pulses) requires support of ventilation, give rescue breaths at a rate of 10 to 12 breaths per minute, or about 1 breath every 5 to 6 seconds. Each breath should be given over 1 second regardless of whether an advanced airway is in place. Each breath should cause visible chest rise. During delivery of rescue breaths, reassess the pulse approximately every 2 minutes, but spend no more than 10 seconds doing so.

Chest Compressions

Chest compressions consist of rhythmic applications of pressure over the lower half of the sternum. These compressions create blood flow by increasing intrathoracic pressure and directly compressing the heart. Although properly performed chest compressions can produce systolic arterial pressure peaks of 60 to 80 mm Hg, diastolic pressure is low and mean arterial pressure in the carotid artery seldom exceeds 40 mm Hg.

Blood flow generated by chest compressions delivers a small but critical amount of oxygen and substrate to the brain and myocardium. In victims of VF SCA, chest compressions increase the likelihood that a shock (i.e., attempted defibrillation) will be successful. Chest compressions are especially important if the first shock is delivered 4 minutes after collapse.[22]

Much of the information about the physiology of chest compressions and the effect of varying compression rates, compression-ventilation ratios, and duty cycles (percent of time the chest is compressed versus time allowed for chest recoil) is derived from animal models. Researchers at the 2005 Consensus Conference,[54] however, reached several conclusions about chest compressions:

1. "Effective" chest compressions are essential for providing blood flow during CPR.

2. To give "effective" chest compressions, "push hard and push fast." Compress the adult chest at a rate of about 100 compressions per minute, with a compression depth of 1½ to 2 inches (approximately 4 to 5 cm). Allow the chest to recoil completely after each compression, and allow approximately equal compression and relaxation times.

3. Minimize interruptions in chest compressions.

4. Further studies are needed to define the best method for coordinating ventilations and chest compressions and to identify the best compression-ventilation ratio in terms of survival and neurologic outcome.

Technique

To maximize the effectiveness of compressions, the victim should lie supine on a hard surface (e.g., backboard or floor),[58] with the rescuer kneeling beside the victim's thorax.[56] The safety and efficacy of over-the-head CPR (OTH- CPR) for lone rescuers and 2-person straddle CPR are unknown, but these techniques may be advantageous in confined spaces.[57] "CPR-friendly" deflatable mattresses have been

studied, and they do not provide an adequate surface on which to perform chest compressions.[57]

The rescuer should compress the lower half of the victim's sternum in the center (middle) of the chest, between the nipples.[55] The rescuer should place the heel of the hand on the sternum in the center (middle) of the chest between the nipples and then place the heel of the second hand on top of the first so that the hands are overlapped and parallel.[58] Depress the sternum approximately 1½ to 2 inches (approximately 4 to 5 cm) and then allow the chest to return to its normal position. Complete chest recoil allows venous return to the heart, is necessary for effective CPR, and should be emphasized in training.[59] Compression and chest recoil/relaxation times should be approximately equal.[60]

Lay rescuers should continue CPR until an AED arrives, the victim begins to move, or EMS personnel take over CPR. Lay rescuers should no longer interrupt chest compressions to check for signs of circulation or response. Healthcare providers should interrupt chest compressions as infrequently as possible and try to limit interruptions to no longer than 10 seconds except for specific interventions such as insertion of an advanced airway or use of a defibrillator. We strongly recommend that patients not be moved while CPR is in progress unless the patient is in a dangerous environment or is a trauma patient in need of surgical intervention. CPR is better and has fewer interruptions when the resuscitation is conducted where the patient is found. Allow the chest wall to recoil completely after each compression.

Rescuer fatigue may lead to inadequate compression rates or depth. Significant fatigue and shallow compressions are seen after 1 minute of CPR, although rescuers may deny that fatigue is present for 5 minutes. When 2 or more rescuers are available, it is reasonable to switch the compressor about every 2 minutes (or after 5 cycles of compressions and ventilations at a ratio of 30:2). Every effort should be made to accomplish this switch in 5 seconds. If the 2 rescuers are positioned on either side of the patient, one rescuer will be ready and waiting to relieve the "working compressor" every 2 minutes.

Compression-Ventilation Ratio

A compression-ventilation ratio of 30:2 is recommended and further validation of this guideline is needed.[49, 50] In infants and children, 2 rescuers should use a ratio of 15:2. This 30:2 ratio is based on a consensus of experts rather than clear evidence. It is designed to increase the number of compressions, reduce the likelihood of hyperventilation, minimize interruptions in chest compressions for ventilation, and simplify instruction for teaching and skills retention. Once an advanced airway is in place, 2 rescuers no longer deliver cycles of CPR (i.e., compressions interrupted by pauses for ventilation). Instead, the compressing rescuer should give continuous chest compressions at a rate of 100 per minute without pauses for ventilation. The rescuer delivering ventilation provides 8 to 10 breaths per minute. The 2 rescuers should change compressor and ventilator roles approximately every 2 minutes to prevent compressor fatigue and deterioration in quality and rate of

chest compressions. When multiple rescuers are present, they should rotate the compressor role about every 2 minutes.

The compression rate refers to the speed of compressions, not the actual number of compressions delivered per minute. The actual number of chest compressions delivered per minute is determined by the rate of chest compressions and the number and duration of interruptions to open the airway, deliver rescue breaths, and allow AED analysis.[61] Rescuers must make every effort to minimize these interruptions in chest compressions.

Defibrillation

All BLS providers should be trained to provide defibrillation because VF is the most common rhythm found in adults with witnessed, nontraumatic SCA.[7] For these victims survival rates are highest when immediate bystander CPR is provided and defibrillation occurs within 3 to 5 minutes.[8, 12–14]

Immediate defibrillation is the treatment of choice for VF of short duration, such as witnessed SCA.

The effect of CPR before defibrillation for prolonged VF SCA has largely been positive. When EMS arrived more than 436 to 537 minutes after dispatch, a brief period of CPR (1½ to 3 minutes) before defibrillation improved ROSC and survival rates for adults with out-of-hospital VF/VT in a before-after study.[36] Thus, for adult out-of-hospital cardiac arrest that is not witnessed by the EMS provider, rescuers may give a period of CPR (e.g., about 5 cycles or about 2 minutes) before checking the rhythm and attempting defibrillation. In settings with lay rescuer AED programs (AED on-site and available) and for in-hospital environments or if the EMS rescuer witnesses the collapse, the rescuer should use the defibrillator as soon as it is available.

Foreign-Body Airway Obstruction (Choking)

Death from FBAO is an uncommon but preventable cause of death.[63] Most reported cases of FBAO in adults are caused by impacted food and occur while the victim is eating. Most reported episodes of choking in infants and children occur during eating or play, when parents or childcare providers are present. The choking event is therefore commonly witnessed, and the rescuer usually intervenes while the victim is still responsive.

Recognition of Foreign-Body Airway Obstruction

Because recognition of airway obstruction is the key to successful outcome, it is important to distinguish this emergency from fainting, heart attack, seizure, or other conditions that may cause sudden respiratory distress, cyanosis, or loss of consciousness.

Foreign bodies may cause either mild or severe airway obstruction. The rescuer should intervene if the choking victim has signs of severe airway obstruction. These include signs of poor air exchange and increased breathing difficulty, such as a silent

cough, cyanosis, or inability to speak or breathe. The victim may clutch the neck, demonstrating the universal choking sign. Quickly ask, "Are you choking?" If the victim indicates "yes" by nodding his head without speaking, this will verify that the victim has severe airway obstruction.

Relief of Foreign-Body Airway Obstruction

When FBAO produces signs of severe airway obstruction, rescuers must act quickly to relieve the obstruction. If mild obstruction is present and the victim is coughing forcefully, do not interfere with the patient's spontaneous coughing and breathing efforts. Attempt to relieve the obstruction only if signs of severe obstruction develop: the cough becomes silent, respiratory difficulty increases and is accompanied by stridor, or the victim becomes unresponsive. Activate the EMS system quickly if the patient is having difficulty breathing. If more than one rescuer is present, one rescuer should phone 911 while the other rescuer attends to the choking victim.

Although chest thrusts, back slaps, and abdominal thrusts are feasible and effective for relieving severe FBAO in conscious (responsive) adults and children 1 year of age, for simplicity in training we recommend that the abdominal thrust be applied in rapid sequence until the obstruction is relieved. If abdominal thrusts are not effective, the rescuer may consider chest thrusts. It is important to note that abdominal thrusts are not recommended for infants 1 year of age because thrusts may cause injuries.

Chest thrusts should be used for obese patients if the rescuer is unable to encircle the victim's abdomen. If the choking victim is in the late stages of pregnancy, the rescuer should use chest thrusts instead of abdominal thrusts. Because abdominal thrusts can cause injury,[64] victims of FBAO who are treated with abdominal thrusts should be encouraged to undergo an examination by a physician for injury. Epidemiologic data[63] does not distinguish between FBAO fatalities in which the victims were responsive when first encountered and those in which the victims were unresponsive when initially encountered. However, the likelihood that a cardiac arrest or unresponsiveness will be caused by an unsuspected FBAO is thought to be low.[63]

If the adult victim with FBAO becomes unresponsive, the rescuer should carefully support the patient to the ground, immediately activate EMS, and then begin CPR. A randomized trial of maneuvers to open the airway in cadavers and prospective studies in anesthetized volunteers show that higher sustained airway pressures can be generated using the chest thrust rather than the abdominal thrust.[65, 66] Each time the airway is opened during CPR, the rescuer should look for an object in the victim's mouth and remove it. Simply looking into the mouth should not increase the time it takes to attempt the ventilations and proceed to the 30 chest compressions.

A healthcare provider should use a finger sweep only when the provider can see solid material obstructing the airway of an unresponsive patient. No studies have evaluated the routine use of the finger sweep to clear an airway in the absence of

visible airway obstruction.[22] The recommendation to use the finger sweep in past guide- lines was based on anecdotal reports that suggested that it was helpful for relieving an airway obstruction.[64]

Summary: The Quality of BLS

Methods should be developed to improve the quality of CPR delivered at the scene of cardiac arrest by healthcare providers and lay rescuers. These may include education, training, assistance or feedback from biomedical devices, mechanical CPR, and electronic monitoring. Components of CPR known to affect hemodynamics include ventilation rate and duration, compression depth, compression rate and number, complete chest recoil, and hands-off time. Systems that deliver professional CPR should implement processes of continuous quality improvement that include monitoring the quality of CPR delivered at the scene of cardiac arrest, other process-of-care measures (e.g., initial rhythm, bystander CPR, and response intervals), and patient outcome up to hospital discharge. This evidence should be used to maximize the quality of CPR delivered.

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Summary of BLS ABCD Maneuvers for Infants, Children, and Adults (Newborn Information Not Included)

Maneuver	Adult Lay rescuer: ≥8 years HCP*: Adolescent and older	Child Lay rescuers: 1–8 years HCP: 1 year to adolescent	Infant Under 1 year of age
Airway	Head tilt–chin lift (HCP: suspected trauma, use jaw thrust)		
Breathing Initial	2 breaths at 1 second/breath	2 effective breaths at 1 second/breath	
HCP: Rescue breathing without chest compressions	10–12 breaths/minute (approx.)	12–20 breaths/minute (approximate)	
HCP: Rescue breaths for CPR with advanced airway	8–10 breaths/minute (approximately)		
Foreign-body airway obstruction	Abdominal thrusts		Back slaps and chest thrusts
Circulation **HCP**: Pulse check (≤10 sec)	Carotid		Brachial or femoral
Compression landmarks	Lower half of sternum, between nipples		Just below nippl (lower half of sternum)
Compression method Push hard and fast; allow complete recoil	Heel of one hand; other hand on top	Heel of one hand or as for adult	2 or 3 fingers HCP (2 rescuers): 2 thumb-encircling hands
Compression depth	1 1/2–2 inches	Approximately 1/3 to 1/2 the depth of the chest	
Compression rate	Approximately 100/minute		
Compression-ventilation ratio	30:2 (one or two rescuers)	30:2 (single rescuer) HCP: 15:2 (2 rescuers)	
Defibrillation AED	Use adult pads Do not use child pads	Use AED after 5 cycles of CPR (out of hospital)	No recommendations for infants <1 year of age

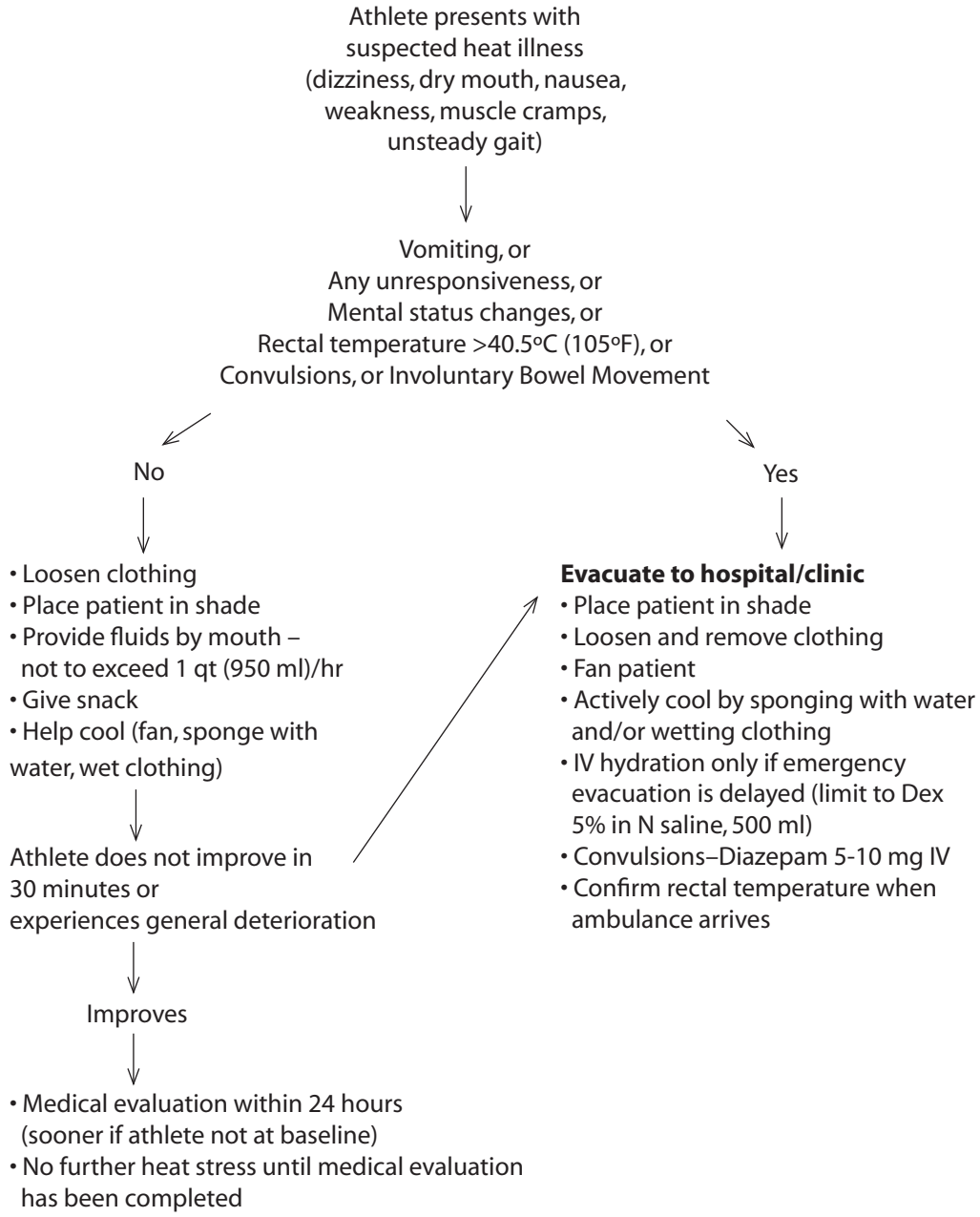
Use pediatric system for child 1–8 years if available

HCP: For sudden collapse (out of hospital) or in-hospital arrest, use AED as soon as available

***Note: Maneuvers used by only Healthcare Providers are indicated by HCP.**

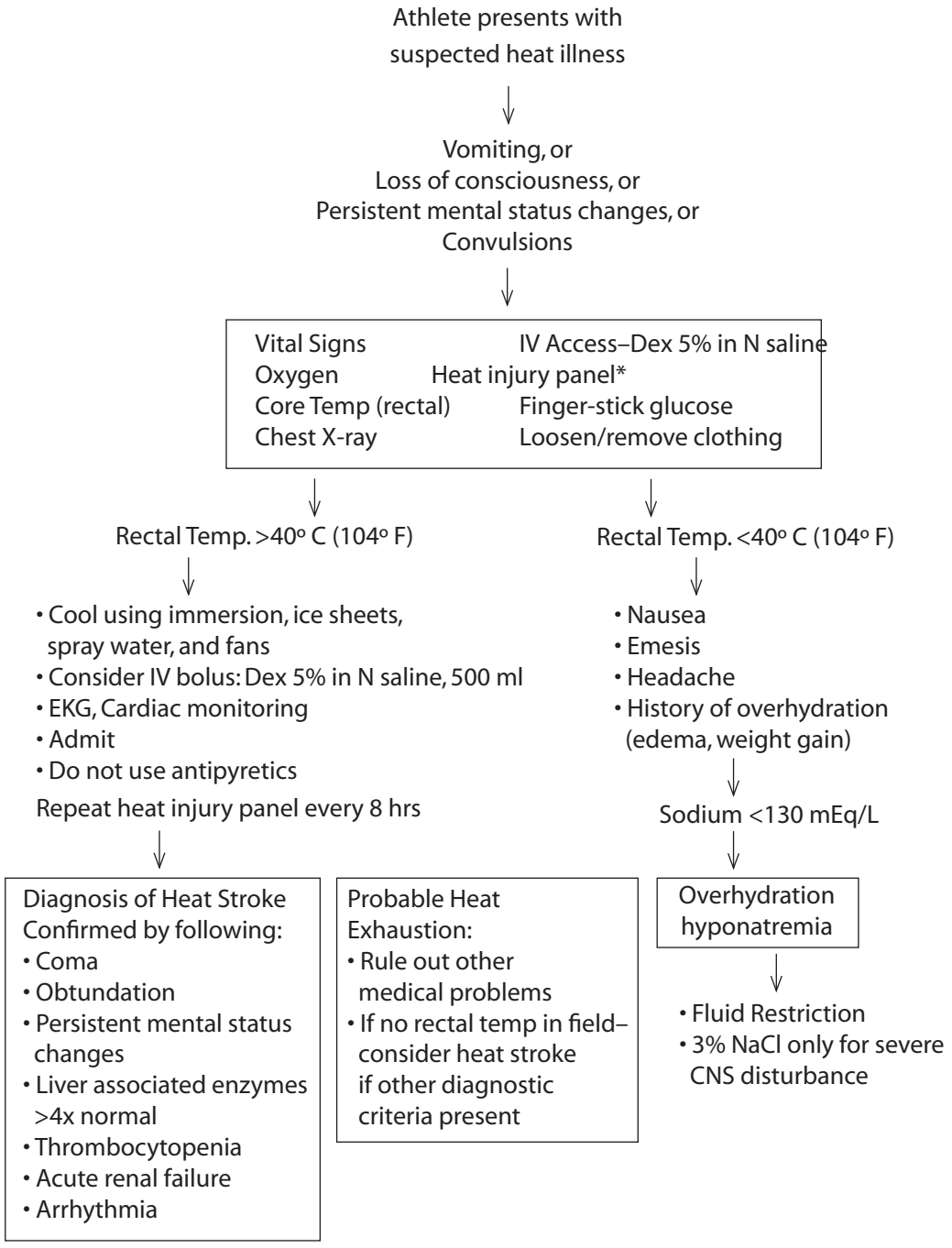
Appendix 8

Differential Diagnosis and Treatment of Exertional Heatstroke and Heat Exhaustion on Site



Appendix 9

Differential Diagnosis and Treatment of Exertional Heatstroke, Heat Exhaustion, and Hyponatremia in a Clinic Setting



*Heat injury panel: Liver, CPK, electrolytes, renal, CBC, urinalysis, PT/PTT

Appendix 10

Recommendations for Minimising Jet Lag

Three Days Before Travel

- On this day, go to bed at your usual time but avoid any sleep deprivation. Be sure to get a minimum of 7 1/2 hourse of sleep.
- Begin to utilize a high protein/low carbohydrate breakfast and lunch, and a high carbohydrate dinner.

Two Days Before Travel

- Continue the pattern of high protein breakfast and lunch (no caffeine), and high carbohydrate dinner, but eat skimpier portions. At tea time, you can still have caffeine but reduce sweets. Snack during the day should consist of low calorie, high protein foods (for example, chicken soup with pieces of meat but no noodles). No evening snacks are permitted.
- If you are training, do not reduce your caloric intake too much. If you usually burn 2500 calories a day, do not fall below this level.
- Again, follow your usual sleep schedule, and avoid any sleep deprivation (get a minimum of 7 1/2 hours sleep).

One Day Before Travel

- You will likely be running around making last-minute preparations. This will stimulate you, so do this early in the day. If you do not have a travel kit, prepare one early in the day (see below for recommended contents). You may also want to prepare a high protein "picnic" for the flight. It will supplement food provided on the plane and may be your first meal on your new time. Remember, travel kit foods must either not need refrigeration or be eaten before they spoil. These foods are intended "for emergency use"; the airline will usually try to accommodate your schedule if you ask them.
- On this evening, say your goodbyes to friends and family, since you will have many other things to keep you busy on the travel day. You may want to remain awake a bit later than usual—feel free to do this.
- Delaying sleep activity helps adjust your biological clock. However, avoid any sleep deprivation, and get a minimum of 7 1/2 hours sleep.

Travel Day: West to East

- If your schedule allows it, sleep in. Try to get up to 8–9 hours of sleep.
- If you use caffeine, drink 2–3 cups of a strong caffeinated beverage immediately upon awakening (before 11 a.m.) but do not take in any more caffeine, if possible, for the rest of the day. The caffeine "jolt" in the morning will push your body in the right direction.
- If you can, take a nap after breakfast, and keep your activity to a minimum throughout the day. Avoid the morning sunlight as much as possible. When

you depart from your home city, feel free to sleep on the plane, and do not drink caffeine-containing beverages.

- **If you train** before departing, have a late, low calorie, high protein breakfast of just enough calories to get you through the workout. If possible, reduce your workout schedule this day and cut back your calories accordingly; be careful, however, not to cut back calories to the point that you feel weak. **If you do not train**, remember you are burning calories like a non-athlete, so consume a very skimpy, *high protein*, low calorie breakfast.
- **After breakfast** do not eat again until breakfast time in your destination city. Physical activity on this day should be kept to a minimum.
- It is suggested you put on two watches. Set one to destination time and one to home time. Use the watch for home time until you get on the plane to the destination city, but begin to think about what you would be doing if you were already on the destination time. Once you get on the plane, use the watch set to the destination time and take off the watch set to home time.
- Remember to carry your in-flight "travel kit" with you.
- Arrive at the airport early to avoid the rush. If sleeping is a normal activity on destination time, feel free to nap while waiting in the airport.
- Continue to fast until breakfast time in the destination city, and then, even if you are still in flight, break the fast with breakfast eaten on destination time. This large, high-protein breakfast begins a feast day, and represent the start of eating all your meals on destination time.
- If you arrive during the day, rest as much as possible on the plane. Grab a blanket and pillow, put on your blindfold, and insert your ear plugs to simulate night. Loosen restrictive clothing, or change into comfortable clothing, if possible.
- If it is night when you arrive, stay awake as much as possible on the plane. This helps you to be ready to sleep following your arrival.
- When your watch tells you it is time to be awake on destination time, get up and move around; take your travel kit to the toilet and wash your face, brush your teeth, etc.—that is, perform your usual morning rituals as much as possible. Interact with people to stimulate your body. If possible, walk up and down the aisle, and do simple isometric or stretching exercises.
- At breakfast and/or lunch time in the destination city, have high protein, high calorie meals. This helps push your body's biochemistry into its new time frame. Eat the high protein picnic you brought with you if the airline doesn't serve appropriate food at appropriate times. Do not worry if the foods look more like a dinner or snack; your body sees it as a source of protein. If eating the meal supplied by the airline, eat only the protein portions and ignore starches and sweets. Supplement this meal with your picnic. If you arrive in the destination only in time for lunch, you may eat

most of your picnic at this time, but keep some food in reserve in case you are detained by airport security or delayed between flights (if changing planes). Be sure that, according to the destination city time, you eat a high protein lunch on this day.

- During the flight, drink plenty of fluids, avoiding alcohol and caffeinated beverages. Humidity in jet cabins is very low, so liquid intake is important to avoid dehydration. Alcohol and caffeinated beverages are diuretics that cause the body to eliminate fluid. Water and fruit juices are the best fluids to drink.

Recommended Contents of In-Flight Travel Kit

- Essential toiletries: Toothbrush, toothpaste, razor, small hand towel, lotion, etc.
- High-protein snacks: Small package of cheese and crackers, hard boiled egg(s), low-sugar granola bars, peanut butter, nuts
- Eye mask or blindfold
- Ear plugs
- Light-weight slippers
- Books, cards, mp3 player, DVD player, or other items to entertain you during waking hours

Appendix 11

General Health and Hygiene: Recommendations for Athletes

The serious athlete must assume much of the responsibility for maintaining his/her health in order to train and compete well. These guidelines also apply to healthful living in general

A. Healthy Lifestyle Factors

- Rest and sleep adequately between periods of hard training or other intense physical activity. There is no hard and fast rule about the number of hours of sleep needed, although in general 6–8 hours of sleep should be sufficient. It's the soundness of the sleep, more than the number of hours, that's important. Each person has his/her own individual sleep requirements. Avoid unnecessary loitering (as per shopping trips, etc.) before competition time.
- Don't smoke. Using tobacco is detrimental to health in general and physical fitness in particular. Immediate acute effects include decrease in oxygen carrying capacity of the blood, elevation of pulse rate, increased coagulability of the blood, and spasm of the coronary blood vessels. Lung and heart disease as well as lung cancer are a few of the consequences of long-term tobacco addiction.
- Avoid other than moderate intake of alcohol.
- Say no to drugs. Drugs are no substitute for proper training. They are banned. You can be caught and the consequences to your athletic career are serious. Even if you are not caught, they have serious short and long-term effects on your health.
- Be sensible with respect to your sexual activities. Normal sex with legitimate partners is not detrimental to high level sports performance. However, stress associated with illicit or clandestine sexual encounters can affect performance. And remember, always practice safe sex (see C. 4).
- Eat a balanced diet commensurate with your type and level of activity. Follow the advice of your nutritionist, dietician, or doctor. Be sensible in your attitudes towards food fads, and avoid overindulgence. Adhere to strict timing of your meals prior to training or competition.

B. Basic Personal Hygiene

- Bathe regularly, use soap and dry your skin thoroughly afterwards. Launder and change your clothes regularly. This will minimise the risk of bacterial and fungal skin infection.
- Choose clothing to suit weather conditions. Clothes should fit properly to avoid chafing and abrasions.
- Abstain from using material/articles that contain substances that cause you allergic reactions or contact dermatitis.

- Choose appropriate and good quality footwear that fits properly to avoid blisters. Break in new shoes gradually, padding them at points of pressure or friction.
- Take care of your teeth. Brush and floss daily. See the dentist regularly to ensure early diagnosis of problems.

C. Infections (see also Appendix 12, *Respiratory Tract Infections*)

- A high level of fitness does not protect you against infections, especially viral infections. Avoid deliberate exposure to situations where airborne infections are facilitated. Minimise contacts with infected/sick people, animals, and contagious objects.
- When you have an infection, especially with a fever, refrain from strenuous physical activity.
- Food and waterborne bacteria, viruses, and protozoa can cause diarrhea. This is especially likely during travel to foreign countries. Eat only wholesome food that is freshly cooked under hygienic conditions. When the safety of the water supply is not assured drink only boiled or properly bottled water or beverages.
- Sexually transmitted diseases (STDs), including AIDS, are usually transmitted through sexual activity. Practice safe sex, that is, use latex condoms. AIDS and Hepatitis B can also be transmitted through contaminated needles and contaminated blood products. Should you become infected and have symptoms, seek proper medical attention immediately. Do not self-treat or share medicine with friends to avoid incomplete treatment or masking of other concomitant STDs.

D. Bronchial Asthma

It is not uncommon for good athletes to be asthmatic. Asthma by itself is not a contraindication to physical activity. Control your asthma through proper medical attention. Remember that some medications for asthma or other respiratory infections contain substances that are on the list of banned drugs. For this reason, it is best not to use over-the-counter medications.

E. Immunisations and Other Prophylactic Measures

Most countries have childhood immunisation programs against serious infectious diseases, such as TB, polio, diphtheria, whooping cough, tetanus, measles, and "German measles" (rubella) for females of childbearing age. In addition there are efficacious vaccines against hepatitis B, mumps, Japanese B encephalitis, and typhoid. Additional vaccines may be necessary when travelling to areas where these diseases may be endemic. Inquire through your local health department concerning outbreaks and recommended immunisations before you travel. Make sure that you are up to date with all vaccines needed at home and for travels.

Chemoprophylaxis, or prevention of disease through medications, should also be considered when travelling to areas where malarial infection is possible. This could also be considered for prevention of meningococcal meningitis and traveller's diarrhea.

Appendix 12

Respiratory Tract Infections (RTI)

A. Prevention

- Keep your distance from people who are coughing, sneezing or have a "runny nose."
- Wash hands regularly, before meals, and after direct contact with potentially contagious people, animals, blood, secretions, public places, bathrooms, etc.
- Do not use other people's drinking bottles, cups, cutlery, etc.
- Wear proper outdoor clothing and avoid getting cold and wet after exercise.
- Use disposable paper towels and limit hand to mouth/nose contact when suffering from respiratory tract infection (RTI) symptoms.
- Quickly isolate a team member with RTI symptoms and move his/her roommate to other accommodations.
- Check air conditioning/ventilation systems for potentially contagious material.
- Protect upper and lower airways from being directly exposed to cold and dry air during strenuous exercise, by using a face mask, etc., at temperatures below -15ºC.
- Practice good recovery routines, including proper nutrition and rehydration.

B. Guidelines for Exercise During Episodes of RTI

First day of illness

- Cease strenuous exercise or competitions when experiencing RTI symptoms such as:
  - Sore throat or coughing
  - Runny or congested nose
- Cease all exercise when experiencing additional RTI symptoms such as:
  - Muscle/joint pain and headache
  - Fever and generalised feeling of malaise
- Drink plenty of fluids, keep from getting wet and cold, and minimise life-stress.
- Consider use of topical therapy with nasal drainage, decongestants, and analgesics if fever occurs.
- Report illness to a team physician or health care personnel and keep away from other athletes if you are part of a team training or travelling together.

Second day

- If you have a fever (temperature >37.5–38ºC) or increased coughing: No training!

- If no fever or malaise and no worsening of "above the collar" symptoms: Light exercise (pulse <120bpm) for 30–45 minutes by yourself (indoors during the winter).

Third day

- If fever and RTI symptoms persist: Consult your (team) physician by phone or at office.
- If no fever or malaise and no worsening of initial symptoms: Moderate exercise (pulse < 150bpm) for 45–60 minutes, preferably by yourself and indoors.

Fourth day

- If no symptom relief: Do not try to exercise but make an office visit to your doctor.
- If first day of improved condition: Follow the guidelines for "return to exercise after RTI," below.

C. Guidelines for Returning to Exercise After RTI

- Make sure that you have one day without fever and with improvement of RTI symptoms before returning to exercise.
- Observe the body's reaction to your first exercise session before starting on a new session.
- Stop physical exercise and consult your physician if:
  - A new episode with fever or worsening of initial symptoms occurs.
  - Persistent coughing and exercise-induced breathing problem occurs.
- Use the same number of days to step up to normal training as spent off of regular training because of illness.
- Observe closely your tolerance to increased exercise intensity and take an extra day off if you do not recover satisfactorily.
- Use proper outdoor clothing and specific cold air protection for airways when exercising in temperatures below -10ºC the first week after RTI.

Adapted from: Ronsen, O. Prevention and management of of respiratory tract infections in athletes. New Studies in Athletics 20:3, 49-56, 2005.

Appendix 13

Process for the Management of Gender-Related Issues

1. Gender-related issues will be managed according to the IAAF Policy for Gender Verification, and the IOC Consensus Statement on Sex Reassignment.

2. Gender issues are likely to arise as a result of:
   a. A "challenge" by another athlete or team as brought forward to authorities at an athletics event.
   b. "Suspicion" raised as to an athlete's gender as witnessed during the process of specimen collection during doping control.
   c. An approach made to an IAAF/Regional AAA or National Federation by an athlete or his/her representative requesting advice or clarification.

3. The matter may be handled at various levels, including:
   - National Federation
   - The Medical Delegate of an athletics event
   - The IAAF Medical/Anti-Doping Commission

4. Procedures
   a. The case is brought to the attention of the relevant medical authority at one of the above levels when it first arises.
   b. The authority decides whether there is reason to investigate.
   c. The authority determines who will investigate the matter, e.g., Special Panel at an international event.
   d. The athlete is referred to the investigating authority in confidence for further investigation and advice.
   e. The verdict is passed on to the National Federation with advice for further action, including appropriate advice to the athlete as to the need to "withdraw" from competition until the problem is definitely resolved through appropriate medical and surgical measures.
   f. Evaluation of the effects of such measures to determine if and when the athlete can return to competition as per IOC Consensus guidelines.

5. The IAAF must establish a resource panel at the Medical/Anti-Doping Commission level that may be available for consultation if there is a need for resolution of complex cases.