Technical Rescuer Lesson Two Health and Wellness: Physical Fitness

DOMAIN: COGNITIVE

LEVEL OF LEARNING: COMPREHENSION

MATERIALS

IFSTA Essentials of Fire Fighting 6th Edition; Jones and Bartlett Fundamentals of Fire Fighter Skills, 3rd Edition; National Volunteer Fire Council Heart Healthy Firefighter Resource Guide, 2nd Edition; United States Fire Administration: *Health and Wellness Guide for the Volunteer Fire and Emergency Services*, February 2009; NFPA 1583 *Standard on Health Related Fitness Programs for Fire Department Members*, 2008 Edition; American College of Sports Medicine: *Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise.*

NFPA 1006, JPR 2013 Edition

4.2.1 Technical rescuers should comply with minimum physical fitness requirements as required by the AHJ before beginning training activities or engaging in rescue operations.

Junior Member Statement:

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with

departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

TERMINAL OBJECTIVE

The Technical Rescuer Candidate shall describe in writing the five components of physical fitness, the significance of physical fitness in relation to emergency response job performance, and methods of incorporating physical fitness into daily activities.

ENABLING OBJECTIVES

1. The Technical Rescuer Candidate shall correctly identify and explain in writing the importance of physical fitness to the performance of emergency response duties.

2. The Technical Rescuer Candidate shall correctly identify and describe the five components of physical fitness and how each component relates to the successful performance of emergency response duties.

3. The Technical Rescuer Candidate shall correctly list and describe methods of improving personal levels of physical fitness.

4. The Technical Rescuer Candidate shall correctly identify methods of incorporating physical fitness programs and activities into their organization.

Technical Rescuer
Lesson Two
Health and Wellness: Physical Fitness

MOTIVATION

As technical rescuers, it is our duty to provide the highest levels of service and protection to our communities. Have you ever considered why you decided to become an emergency responder? Our very existence allows the citizens of our communities to feel safe going about their daily business. As people travel to work, go shopping, and live everyday life they feel secure knowing that a capable and well-trained first responder will be there should an emergency occur. Are you ready to provide these citizens with your very best effort when the time arises? Perhaps your technical skills are exceptional; fine tuned by years of training and experience. How about your physical and mental skills? Is your body physically fit enough to perform the strenuous activities involved with executing a confined space rescue or performing a successful vehicle extrication? Perhaps you could perform these activities with ease if they only occurred once per shift…but are you physically fit enough to perform them multiple times in a 24-hour period? Are you able to easily bear the added weight of personal protective equipment while simultaneously performing these duties? If you hesitate to answer any of those questions, perhaps it is time to perform a size up of your personal health and fitness. It is of paramount importance for emergency responders to maintain high levels of fitness to provide the best service and protection to their communities.

PRESENTATION

ENABLING OBJECTIVE #1

The Technical Rescuer Candidate shall correctly identify and explain in writing the importance of physical fitness to the successful performance of emergency response duties.

1. Discuss how over the years American lifestyles have become increasingly sedentary.

2. As previously noted in Lesson Plan 1, a lifestyle that lacks sufficient physical activity is a major risk factor for cardiovascular disease, as well as other preventable diseases such as diabetes and certain cancers.

3. The combination of poor diet and physical inactivity are rapidly approaching smoking as the leading cause of preventable death in the United States.

4. Lead the class in a discussion on the importance of physical activity to technical rescuers. Explain that increasing physical activity should be an important part of any emergency responder's disease prevention and weight management program.

5. In addition to disease prevention and weight management, rescuers must use physical exercise to train their bodies to meet the specific demands of firefighting duties.

6. The physical activities required of rescuers can be compared to the physical activities required of many professional athletes. Often, emergency responders are referred to as "occupational athletes."

7. Define and discuss the term "physical fitness."

8. The term "fitness" can have different meanings to different people. A person's fitness level is relevant to the specific lifestyle and activities that person expects to perform.

9. While someone may be considered "fit" for the general population, does that necessarily mean he or she is fit enough to be a technical rescuer?

10. Discuss the physical requirements of common technical rescue tasks. Ask students if they routinely engage in exercises that prepare their bodies for these tasks. Examples of such tasks are:
    a. Carrying heavy extrication equipment from the apparatus to the accident scene.

b. Pulling, carrying or hoisting patient or equipment loaded stokes baskets on a carry-out.
c. Climbing or hiking to the scene of a wilderness emergency while carrying heavy rescue gear.
d. Swimming against strong currents during a water rescue incident.
e. Holding extrication tools in position while cuts or spreads are made.
f. Lifting from a full squatted position: stretchers with patients onboard, heavy tools, etc.

11. Ask the class what type of exercise might prepare their bodies for such tasks?

12. Repeat the points covered in lesson one regarding firefighter injury. Strains, sprains and overexertion of the body are the most common injuries. Point out many of these types of injuries can be avoided with proper physical fitness and improved flexibility of the muscles, ligaments, tendons and joints.

Reference: Jones and Bartlett Fundamentals of Fire Fighter Skills, 3rd Edition, pages 28-29.
Reference: National Volunteer Fire Council Heart Healthy Firefighter Resource Guide, 2nd Edition pages 24-29
http://www.healthy-firefighter.org/files/documents/HH_Resource_Guide_2011_web.pdf

PRESENTATION

ENABLING OBJECTIVE #2

The Technical Rescuer Candidate shall correctly identify and describe the five components of physical fitness and how each component relates to the performance of emergency response duties.

1. The American College of Sports Medicine defines physical fitness as: "*a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity.*" These characteristics are further separated into either health-related or skill-related components.

2. Discuss what physical fitness means to technical rescuers specifically.
    a) Fitness is relative to the types of activities an individual expects to perform.
    b) Compare the activities and physical requirements of technical rescue tasks to the physical requirements of other professions.

3. List and discuss the five major health-related components of physical fitness.
    a) Cardiovascular Endurance (Aerobic Capacity).
    b) Muscular Endurance.
    c) Muscular Strength.
    d) Flexibility.
    e) Body Composition.

4. Each component of physical fitness is measured according to how efficiently a person's body can meet and adapt to demands placed upon a specific body system.

5. Cardiovascular endurance is determined by how efficiently the heart and lungs are able to supply oxygen during sustained physical activity. This is also known as an individual's aerobic capacity.

6. Point out the fact that the ability to supply energy for activities lasting for more than 30 seconds depends upon the body's ability to use incoming oxygen. This is known as the maximum oxygen consumption rate.

7. An individual's maximum oxygen consumption rate is referred to as his or her VO2 max.
    a) VO2 max= milliliters of oxygen consumed per kilogram of body weight, per minute.
    b) VO2 max is expressed as "mL/kg/min"

8. VO2 max determines an individual's peak and maximum sustained power outputs (physical exertion).

9. The capacity for VO2 max depends on the capacity of the cardiovascular system. Because of this relationship, one of the primary ways doctors assess cardiovascular health is by measuring a person's VO2 max.

10. NFPA 1583 *Standard on Comprehensive Occupational Medical Program for Fire Departments* specifically requires that the aerobic capacity of firefighters should be determined by assessing VO2 max.

11. NFPA 1583 *Standard on Comprehensive Occupational Medical Program for Fire Departments* requires that firefighters have a VO2 max of at least 42 mL/kg/min.

    ***Instructor Note: While points 10 and 11 specifically address firefighters, understanding the aerobic requirements of firefighting can serve as a tool for guiding technical rescuers in gauging their own aerobic capacity in relation to similarly physically strenuous job tasks.**

12. It is important to note that muscular strength and endurance improvement is dependent upon a person's level of aerobic capacity. Many emergency responders mistakenly believe that muscular strength is the only physical requirement needed to be a rescuer or firefighter. Having an enhanced aerobic capacity can:
    a) Increase the body's ability to recover quickly from muscular stresses from weight training or firefighting tasks.
    b) Increase the body's ability to more efficiently utilize calories from food.
    c) Increase the ability of muscles to grow in size and strength.
    d) Increase the body's natural anti-oxidant producing mechanisms.

13. Muscular endurance is the ability of a muscle, or group of muscles to perform repetitive activities without fatigue.

14. Push ups and abdominal curl ups are effective methods of assessing overall muscular endurance.

15. Discuss the reasons muscular endurance is important to the job performance of a technical rescuer.

16. Muscular strength is the ability of a muscle or group of muscles to exert force against a resistance.

17. Discuss the reasons muscular strength is especially important to the successful job performance of a technical rescuer.

18. List common technical rescue duties that require substantial amounts of muscular strength.

19. Increased levels of muscular endurance and strength can enable a technical rescuer to perform required tasks with less effort; therefore making the rescuer more efficient, safer, and less prone to injury.

20. Define and discuss flexibility.
    a) Range of motion around a joint.

21. Higher levels of flexibility improve range of motion, physical functioning, and decrease risk for muscle and connective tissue injury.

22. Most muscular and skeletal problems result from poor flexibility. Emergency service workers in particular tend to experience low back problems due to poor flexibility in the hamstrings and lower back.

23. Discuss the reasons increased flexibility is important to the job performance and injury prevention of technical rescue activities.

24. Body composition is the relative amounts of muscle, fat, bone in a persons' body. This is typically expressed as a percentage.
    a) Example: A 200lb man has 20% body fat.
       Lean weight= 160 lbs. or 80%
       Fat weight= 40lbs or 20%

25. List and discuss the benefits of improving body composition.
    a) Reduction of cardiovascular risk.
    b) Reduction of diabetes risk.
    c) Reduction of chronic disease risk.
    d) Improved blood pressure.
    e) Improved insulin sensitivity.
    f) Improved immune function.
    g) Improved mood and sleep.
    h) Improved physical appearance.
    i) Improved athletic performance.

26. Point out that pound for pound, lean body mass takes up less space than fat mass. Explain how two people can weigh the same, but have totally different body compositions as a result of physical activity and proper nutrition.

Reference: Jones and Bartlett Fundamentals of Fire Fighter Skills, 3rd Edition, pages 28-29.
Reference: National Volunteer Fire Council Heart Healthy Firefighter Resource Guide, 2nd Edition pages 24-29 http://www.healthy-firefighter.org/files/documents/HH_Resource_Guide_2011_web.pdf
Reference: United States Fire Administration: *Health and Wellness Guide for the Volunteer Fire and Emergency Services*, February 2009, pages 26-30. http://www.usfa.fema.gov/downloads/pdf/publications/fa_321.pdf
Reference: NFPA 1583 *Standard on Health Related Fitness Programs for Fire Department Members*, 2008 Edition.
Reference: American College of Sports Medicine: *Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise*http://journals.lww.com/acsm-msse/Fulltext/2011/07000/Quantity_and_Quality_of_Exercise_for_Developing.26.aspx

PRESENTATION

ENABLING OBJECTIVE #3

The Technical Rescuer Candidate shall correctly list and describe methods of improving personal levels of fitness.

1. Discuss the difference between physical activity and exercise.
   a) Physical activity – any bodily movement produced by the contraction of skeletal muscles that result in a substantial increase over resting energy expenditure.
   b) Exercise – a type of physical activity consisting of planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

2. While getting proper amounts of physical activity each day is recommended for good health, technical rescuers should aim to go above and beyond these recommendations by adding regular exercise to their daily activities. Exercises performed by technical rescuers should be specific for the types of duties their bodies are expected to perform.

3. List and discuss the weekly recommendations for improving and maintaining cardiovascular endurance.
   a) At least 30 minutes of moderate intensity activity on 5 or more days per week.
   b) At least 20 minutes of vigorous intensity activity on 3 days per week.

4. Point out the fact that fitness benefits can be obtained even if a person breaks their bouts of exercise into 10-minute sessions throughout the day.

5. List examples of various activities that are considered to be of moderate intensity.
   a) Walking at 3.0mph – 4.0mph.
   b) Carrying or stacking wood.
   c) Mowing lawn with a push mower.
   d) Shooting basketball for practice.
   e) Bicycling on flat terrain.
   f) Golf (walking and carrying clubs).
   g) Leisurely swimming.
   h) Fishing from riverbank, walking.
   i) Non-competitive volleyball.

6. List examples of various activities that are considered to be of vigorous aerobic activity.
   a) Walking at 4.5mph+.
   b) Hiking.
   c) Jogging at 5-6mph.
   d) Running at 7mph.
   e) Shoveling sand, snow, etc.
   f) Playing a game of basketball.
   g) Competitive volleyball.
   h) Heavy farming activities.

7. Discuss the importance of tracking heart rate at rest and during exercise.
   a) Resting heart rate is a good indicator of overall cardiac health. Lower resting heart rates (60 bpm

or less) typically indicate optimum cardiac functioning. In simpler terms, the more conditioned your cardiovascular system is, the less work your heart has to do even while at rest!
   b) Monitoring heart rate during exercise can provide you with a real time guide of your body's response to changes in physical activity.
   c) Monitoring heart rate after exercise can indicate how efficiently your body recovers from physical activity.

8. Explain how to determine an individual's maximum heart rate (MHR).
   a) MHR = 220 – age

9. Explain heart rate training zones and how they are used to set goals for aerobic activity.
   a) Heart rate training zones represent a percentage of maximum heart rate and is used to set goals for each exercise session.
   b) Zones are classified according to intensity levels and correspond to a specific cardiovascular adaptation.

10. Discuss recommendations for determining appropriate heart rates for specific health goals.
   a) Endurance and general aerobic fitness for beginners: 50-65% of MHR.
   b) Endurance and general aerobic fitness for intermediate exercisers: 70-85% of MHR.
   c) Endurance and general aerobic fitness for advanced exercisers: 70-85% of MHR.
   d) Weight loss: Intervals of high intensity (80-85% of MHR) followed by lower-intensity recovery periods (50-65% of MHR).

11. Define and discuss resistance training, and explain how it enhances both muscular strength and muscular endurance.

12. The American College of Sports Medicine recommends that adults perform resistance training of each major muscle group 2-3 days per week, with at least 48 hours separating the exercise training sessions for the same muscle group.

13. It is important that resistance training programs include multi-joint or compound exercises. These are exercises that involve more than one joint and muscle group.

14. Point out the importance of preventing muscular imbalances by occasionally training opposing muscles groups (agonists and antagonists) on the same day.
    a) Examples of opposing muscle groups:
        (1) Lower back and abdomen.
        (2) Quadriceps and hamstrings.
        (3) Biceps and triceps.
        (4) Chest and upper back.

15. Each muscle group should be trained using two to four sets of exercises at a minimum.

16. Explain and discuss how resistance training intensity will vary with each person according to his or her individual goals.
    a) Goals of increasing strength: 8-12 reps per set, with a load (weight) of 60% to 80% of a person's 1 repetition max. (1 repetition max or 1RM is the amount of weight a person can lift completely once, but not more than once.) Rest intervals between sets should be 2-3 minutes.
    b) Goals of increasing muscular endurance: 15-25 reps per set with a load (weight) of 50% 1RM, with short rest intervals between sets (1 minute or less).

17. Discuss the importance of including a flexibility component to each exercise training session.

18. The American College of Sports Medicine recommends the following regarding flexibility:
    a) Stretching exercises should involve the major muscles tendon groups of the body (neck, shoulders, upper and lower back, pelvis, hips and legs).

    b) Stretching exercises should be performed for at least 10 minutes at the conclusion of training sessions or at the conclusion of any physical activity involving muscular strength, power and endurance.

c) 4 or more repetitions per muscle group should be performed for a minimum of 2-3 days per week.

19. Discuss the components of a proper exercise training session.
    a) Warm-up: 5-10 minutes of low to moderate intensity aerobic and muscular endurance activity designed to increase body temperature and reduce the potential for post exercise muscle soreness.
    b) Stretching: 5-10 minutes of flexibility exercise performed after the warm-up or cool-down phase.
    c) Conditioning or sports related exercise: 20-60 minutes of aerobic, resistance, or sport specific training.
    d) Cool-down: At least 5-10 minutes of low to moderate aerobic or endurance exercise that allows the body to slowly recover from training.

20. Discuss the progressive overload principle of training.
    a) The body will always adapt to increasing demands placed upon it.
    b) To continue improvement and avoid plateau, it is necessary to progressively increase the intensity of training programs.
    c) Progressive overload can be accomplished by periodically adding more weight, repetitions, sets or training durations.
    d) Rest and recovery must be built into training programs to avoid overtraining and injury.

21. Define and discuss the specificity principle of training.
    a) The body responds and adapts to the specific type of physical stress placed upon it.
    b) For this reason it is important for firefighters to design their physical training around the specific demands of firefighting tasks.

Reference: IFSTA Essentials of Firefighting, 6th Edition: pages 61, 64, and 66.
Reference: Jones and Bartlett Fire Officer Principles and Practice, 2nd Edition, Pages 26-30.
Reference: American College of Sports Medicine: *Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness*

in Apparently Healthy Adults: Guidance for Prescribing Exercise
http://journals.lww.com/acsm-msse/Fulltext/2011/07000/Quantity_and_Quality_of_Exercise_for_Developing.26.aspx

PRESENTATION

ENABLING OBJECTIVE #4

The Technical Rescuer Candidate shall correctly identify methods of incorporating physical fitness programs and activities into their organization.

1. It is the responsibility of every technical rescuer to take steps of ensuring they are physically fit enough to successfully perform technical rescue functions

2. It is the responsibility of every technical rescuer to ensure that he or she is physically ready to perform required duties.

3. While it is important to have administrative support of incorporating physical fitness into programs and activities, emergency responders should not have to wait for permission or be directed to exercise.

5. Before beginning normal training sessions, gather members together for a 15 minute light to moderate aerobic warm up and stretching activity.

6. Set aside one training night/day per quarter for physical fitness activities or education.

7. Appoint at least one member of the department as the organization's health and fitness coordinator. This person can be responsible for:
   a) Organizing and facilitating annual medical evaluations.
   b) Researching fitness and health related needs of the membership.
   c) Providing training and education in areas of health and fitness that would be of most benefit to membership.
   d) Work with local fitness facilities to obtain memberships at group rates.

e) Work with ladies auxiliary members to ensure nutritious refreshments are being provided on incidents.
f) Collect resources for distribution to members on topics of health and fitness.
g) Organize training events dedicated to health and fitness education.
h) Provide motivation to members actively seeking positive health and lifestyle change.

SUMMARY

This lesson plan introduces the student to the five major health related components of physical fitness. Each component plays a crucial role in the successful performance of emergency response duties. It is important that technical rescuers understand the role of physical fitness to the safe and efficient performance of technical rescue duties.