CEC ARTICLE 3, 2010: Creative Warm-Ups.

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I-Introduction:

The warm-up is performed to gradually increase the body temperature and prepare the body for exercise. Also, it gradually increases the heart rate and prevents damage to skeletal muscle and connective tissue. The gradual increase in exercise intensity allows adequate blood flow to the heart, increases oxygen delivery to muscles and improved nervous tissue conduction, Active stretches are included in the warm-up to increase flexibility, help minimize the risk of soft tissue injury, and ensure joint readiness for the upcoming activity. The water should feel comfortable before stretches are attempted. Active stretches are used instead of static to keep the body moving and warm. The "full body moves" and "rehearsal moves" should be included at this time. The "full body moves" increase the blood flow to all the major muscles in the lower body and open up the hip joints. They include but are not limited to squats, lunges and straight leg lifts. The "rehearsal moves" are the moves you plan to do in the aerobic portion of your workout. They are performed in place with low intensity in order to stimulate blood flow and increase core temperature. This also gives the neuro-muscular system a chance to practice the muscular patterns or "learn the move".

II- The Warm-up

A. Why do a warm-up?

The coordination of the cardio respiratory system, the neuromuscular system and the metabolic pathways is necessary for a group exercise warm-up. These three major biological subsystems have to be stimulated by the rhythmic movements in order for the body to make a smooth transition into vigorous activity from relative inactivity. To activate the following processes, continuous, rhythmic movement is crucial. At the onset of exercise, muscles begin to contract, and the heart rate, blood flow, stroke volume, cardiac output and breathing rate start to increase, allowing oxygen to travel more quickly to meet the accelerating demands of working muscles (the Krebs cycle). Oxygen is released more swiftly

from hemoglobin at higher blood temperatures to help fuel the working muscles. The rate at which calories are burned increases due to the faster rate at which the body metabolizes fatty acids and glucose. Ultimately, gradual increases in cardiac output and oxygen extraction help prepare the body for higher exercise intensity.

According to a study be McArdle, et al. (1991), there are physiological and psychological rationale for conducting a warm-up:
1) Permits a gradual metabolic adaptation (i.e., oxygen consumption), which enhances cardio respiratory performance (i.e., a higher max. cardiac output and oxygen uptake).
2) Prevents the premature onset of blood lactic acid accumulation and fatigue during higher-level aerobic exercise.
3) Causes a gradual increase in muscle temperature, which decreases the work of contraction and reduces the likelihood of muscle injury.
4) Facilitates neural transmission for motor unit recruitment.
5) Improves coronary blood flow in early stages of the conditioning exercise, lessening the potential for myocardial ischemia.
6) Allows a gradual redistribution of blood flow to active muscles.
7) Increases the elasticity of connective tissue and other muscle components.
8) Provides a screening mechanism for potential musculoskeletal or metabolic problems that may increase at higher intensities.
9) Provides a psychological warm-up to higher levels of work (i.e., increases arousal and focus on exercise).

B. Why stretch in a warm-up?

Traditionally, group exercise warm-ups have involved first active movements, then a stop in the routine to perform static stretches. Static stretches have been a part of the warm-up based theory that stretching reduces the risk of injuries. The key to reducing soft tissue injuries during a workout is to increase tissue temperature. Since static stretching requires very little active muscular contraction, it does not increase tissue temperature, thus should be replaced with an active stretch.

Static stretching and flexibility do not appear to have a statistically significant correlation to injury reduction. Mel Siff, Ph.D., from the School of Mechanical

Engineering in Johannesburg, South Africa, concluded that stretching does not protect an exerciser from injuries (Monroe, 1992). Inappropriate execution of movement or the inability of a muscle to relax during certain stages of movement was explained by Siff as the reason injuries are created. Static stretching has traditionally been included in warm-ups because it was believed to increase flexibility, but again, this might not be the case. According to Sapega and associates (1981), permanent gains in flexibility depend on three factors:

1. Force of the stretch.
2. Tissue temperature of the muscles being stretched.
3. Duration of the actual stretch.

The force of a stretch is not a controversial factor. Most fitness professionals would agree that stretching for the general population should be performed in a slow controlled manner, using mild force. However, the tissue temperature of the muscle being stretched and the duration of the actual stretch merit investigation.

i. Tissue Temperature and the Stretch

Muscles are composed of muscle fibers and the connective tissues that surround the fibers. Muscle fibers themselves are quite extensible. In fact, the sarcomere portion can be passively stretched to 150 percent of its resting length (Alter, 1990). What limits range of motion, however, is primarily the muscle's connective tissue (Taylor et al. 1990)? The connective tissue becomes more and more taut as the muscle is lengthened. The tissue's temperature dictates how long the connective tissue will be able to remain elongated after a stretch has been released. The traditional 10-minute group exercise warm-up will probably not create the environment needed for permanent gains in range of motion, as the body temperature only raises one or two degrees F. However, at the end of vigorous exercise, the average core temperature is elevated 4-6 degrees F. (Williams1992). Therefore, in order to achieve permanent gains in flexibility, the most productive time to stretch is at the end of the aerobic workout, when muscles are at their warmest.

It should be noted that static stretching is recommended by the Arthritis

foundation and ACOG for arthritis warm-ups and Pre-natal warm-up. The difference here is that the pool temperature should be a minimum of 84 degrees and the stretches are not being done to promote flexibility, but to relieve tension due to another cause. In the cause of arthritis it is release the tightness of the muscles surrounding the joint because of the pain. In the case of prenatal, it is releasing the tightness of the low back and hips due to the fetus putting pressure on the joints in an unbalanced manner.

ii. Duration of a Stretch

Research suggests that the most significant and permanent gains in flexibility occur when a stretch was held for 12 – 18 seconds and repeated four times for a total of 48 – 72 seconds (Taylor et al. 1990). The static stretches performed by a participant during a group warm-up where time is limited are usually held for 10 seconds or less and are performed only once per joint. The stretches performed over a relatively short or longer period of time were found to produce significantly greater flexibility than stretching for 10 seconds, which does not appear to be optimal for permanent gains in flexibility. Static stretching neither gears up the cardio respiratory system for action as does continuous rhythmic movement, nor initiates a steady increase in energy metabolism. Evidence does not support the assumption that static stretching is critical for either preventing injuries or increasing flexibility during a warm-up. The more time you perform static stretches in your warm-up, the less time you have for an effective aerobic warm-up.

Most advocates of flexibility promote true flexibility training at the end of the aerobic workout, when tissue temperatures are at their peak (Pollock & Wilmore 1990). Rhythmic movements that gradually increase aerobic system activity will accomplish the warm-up goals.

These include:
*Dynamic joint isolations
*Full-body movements
*Rehearsal moves

These three components should be combined in logical order to insure a

proper, effective warm-up, but it is not necessary to perform the dynamic joint isolation first, full-body movements, then rehearsal moves; try different combinations and intermixing them. See section III on constructing warm-ups.

C. Dynamic Joint Isolations

These isolations help warm up the muscles and specific joints with active contractions and lengthening of the antagonist muscle. Joint isolations might include a "fish tail" to warm up the hip ball and socket, and deep six rotators. Usually we look at the major muscle groups and joints of the lower body for most classes. Ankle joints with calve activation, knee joints with quadriceps and hamstring activation, and finally hip joints with adductors, abductors, deep six rotators, gluets, and hip flexor activations.

For basic shallow water these can be:
-An alternating or single press back of the heel for the calf and,
-An alternating heel lift behind for the quad and knee,
-A knee extension and curl in front for the hamstring and knee,
-A fishtail or instep touch for the hip and deep 6 rotators and
-A pendulum or one-leg jack for the hip and iliotibial band.
All of theses can be performed single or half time, alternating or one side at a time, and with or without a hop.

For senior and arthritis these can be:
-An alternating press backs of the heel or walking backward toe heel for the calf and ankle,
-An alternating heel lift behind for the quad and knee,
-A alternating knee extension and curl walk in front for the hamstring and knee,
-A fishtail or instep touch walk for the hip and deep 6 rotators and
-A pendulum for the hip and iliotibial band.
Also include foot and toe active stretches for seniors, which can be walking heel toe and toe heel.

For deep water these can be:
-A point and flex for the calf and ankle,
-An alternating heel lift behind for the quad and knee,

-A knee extension and curl in front like a skateboard for the hamstring and knee,
-A butterfly or instep touch for the hip and deep 6 rotators and
-A pendulum or crossover jack for the hip and iliotibial band.

For an advanced class or fit class, these can be:
- A running man or hip/hop heel press back for the calf,
- A single heel lift behind with a hop or mule kick for the quads,
- An alternating hop Karate kick front or side for hamstrings,
- A squat instep touch, fast instep touch or traveling fish tail for the deep 6 rotators, (the quad and rotators can be combined into a touch front touch behind.
- A crossover jack, side leaps or pendulums for the iliotibial band.

Full- Body Movements
Full-body movements open up the hip joints and shoulders and promote full deep breathing.

Examples of moves that might be used in shallow water class are
-Front leg kicks with straight arms (goose step or soldier march) / opening up the gluets and anterior and posterior deltoids, leg swing front to back or wide kicks to the corners
-Plies (squats)/ opening up the lateral movement of the hip and shoulders or side karate kicks if the water is too deep for effective squats, and
-Lunges with fly arms / opening up hip flexors, chest and back or skates if the water is too deep for effective lunges.

Examples of moves that might be used in senior water class are
-Front leg kicks with straight arms (goose step or soldier march) /opening up the gluets and anterior and posterior deltoids, leg swing front – back – front step or wide kicks to the corners,
-Plies (squats)/ opening up the lateral movement of the hip and shoulders or side shuffles if the water is too deep for effective squats, and
-Lunges or skates if the water is too deep for effective lunges.

Examples of moves that might be used in deep water are:
-Front leg kicks with straight arms (goose step or soldier march) / opening up the gluets and anterior and posterior deltoids,

-Tuck and shoot jacks / opening up the lateral movement of the hip and shoulders, and
-Tuck and shoot cross country/opening up hip flexors, chest and back.

Examples of moves that might be used in an advanced water class are
-Single side Front leg kicks and hop with straight arms (goose step or soldier march) / opening up the gluets and anterior and posterior deltoids, leg swing front to back with hop or wide kicks to the corners single or alternating with hop
-Power squats with jumps/ opening up the lateral movement of the hip and shoulders or side karate kicks if the water is too deep for effective squats, and
-Hop power lunges with fly arms / opening up hip flexors, chest and back, hop karate front hop karate back, or skates with hop if the water is too deep for effective lunges.

D. Rehearsal Moves

These moves are identical to the movements that will be used in the workout phase, but performed with less intensity in order to stimulate the blood flow and increase core temperature. This also gives the neuromuscular system a chance to practice muscular patterns. These moves increase the activity of the aerobic energy system through rhythmic movement and give the body the chance to adapt to the specific demands of the workout. The SAID principle (Specific Adaptations to Imposed Demands) states that the body will adapt specifically to whatever demands are placed on it. The moves you prefer to utilize will vary according to the type of workout you are leading, the population, and your own personal style. Organize these three warm-up components in such a way that participants are close to the lower ends of their target heart rate zones by the end of the warm-up. An easy method of determining this status is to inquire whether the pool feels warmer than when they first entered.

III. Putting together a warm-up

An effective warm-up must include the following components rhythmic limbering, dynamic joint isolation moves, full body moves, and rehearsal moves. It should last 8-10 minutes and be constantly moving. (Remember the difference for prenatal and arthritis where static stretches are included as well.) It must

gradually increase in intensity throughout the warm-up.

A. Is order of the components important or specified?

If it is understood the dynamic joint isolation moves, full body moves, and rehearsal moves are all subsets of rhythmic limbering than at first it would seem that order is not important. What is important is that the warm-up gradually increases in intensity and be able to be followed by the class. Therefore the moves are chosen for dynamic joint isolation moves, full body moves, and rehearsal moves and then they can be ordered based on their intensity level to construct a warm-up.

B. Can you use combination warm-up moves (Moves with more than one purpose)?

When choosing the moves for dynamic joint isolation moves, full body moves, and rehearsal moves it becomes clear that some moves can perform more than one function. For example, a straight leg swing does the hip flexor activation of a lunge, and the gluet activation of a straight leg kick. A frog jump does a gluet activation and a hip rotator activation. If some of the rehearsal moves can also be used for dynamic joint isolation moves or full body moves, they do not have to be performed twice in the warm-up.

i. What are combination moves?

Combination moves are moves that fulfill more than one component or use more than one joint in the warm-up. In general, most of the moves are combination moves because the upper body dynamic joint isolations are included as well. However, it is when a move can perform 2 or more lower body components and an upper body component, that its use in the warm-up can be useful.

ii. When are they appropriate?

Combination moves are very useful in several situations. First, when there are a large number of rehearsal moves to cover and in order from having the

warm-up be too long, combination moves can be used to make sure the dynamic joint isolation and full body components are satisfied with a minimum number of moves. Second, to add variety and different neuromuscular activation to the warm-up. Finally, they may be more effective in certain pool situation (depth, temperature, space) than other moves.

As a not they should not be used to shorten the warm-up to less than 5 minutes so the workout can get going faster. The Krebs cycle and other physiological responses that need to become activated need a certain amount of time and are not "hurried up" by getting through the components required in the warm-up faster.

C. Can you use patterning in a warm-up?

When putting together a warm-up, patterning can be use to do the right side and then the left, to rehearse a short sequence key to the routine, or to show levels on a move or series of moves. Therefore, links and layers are the most useful patterning techniques for a warm-up beside linear. In the case of patterns within the warm-up, may instructors feel that the warm-up then becomes a more integrated part of the routine and the transition between warm-up and routine becomes smoother? This is a style choice by the individual instructor. The precautions with using too much choreography in the warm-up are making the warm-up run too long, or making it too complicated for participants to get an effective warm-up. The participants need to be able to perform at least 8 repetitions of a move to get its benefit.

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1. Why perform a warm-up?

2. Why is a gradual increase in intensity advised?

3. Why are active stretches included in the warm-up?

4. What are full body moves for?

5. What are the 3 major biological systems activated in a warm-up?

6. Why do the 3 major biological systems have to be activated by rhythmic movement?

7. At the onset of cardiac exercise, what happens? (7 things)

8. According to McArle what are the 9 rational for a warm-up?

9. What are the 3 factors according to Sagapena that affect permanent gains in flexibility?

10. When is static stretching recommended in the warm-up?

11. What are dynamic joint isolations?

12. Are the dynamic joint isolations moves for the lower body a set group of exercises?

13. Are the full body moves for the lower body a set group of exercises?

14. What are rehearsal moves?

15. Do the components of a warm-up have to be in a specific order?

16. What are combination moves?

17. Give 2 examples of combinations moves?

18. Can you use patterning in a warm-up ?

19. What is a disadvantage of using patterning in a warm-up?

20. Is a warm-up dependent on type of class and level or should it be prescribed at a certain level to accommodate all levels?

21. What are some active stretches and full body moves for shallow water? Include for all 5 muscle groups of lower and 3 directions for full body moves)

22. What are some active stretches and full body moves for deep water? Include for all 5 muscle groups of lower and 3 directions for full body moves)

23.What are some active stretches and full body moves for seniors? Include for all 5 muscle groups of lower and 3 directions for full body moves)

24. What are some active stretches and full body moves for advanced water classes? Include for all 5 muscle groups of lower and 3 directions for full body moves)