Training and Conditioning for Swimmers with Disabilities

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Introduction

For many people, the term "training and conditioning" refers to methods of improving physical fitness. In this presentation, we are taking a much broader approach that focuses on fitness, neuromuscular, and mental training (instruction in swimming techniques is covered in a companion presentation). We also provide suggestions for incorporating different aspects of training into daily swimming practices, as well as a season plan. The authors will begin each topic with a description of relevant training methods, followed by comments from swimmers with disabilities.

Training for Fitness

Textbooks and research literature related to training and conditioning for swimmers (e.g., Counsilman & Counsilman, 1994; Maglischo, 2003; Salo & Riewald, 2008; Sweetenham & Atkinson, 2003) are replete with descriptions of both general and specific methods of training for *aerobic* and *anaerobic fitness*. Logically, and in our experience, the principles and methods advocated in these reports apply equally to swimmers who do and do not have disabilities. For example, cardiovascular fitness can be improved using the overload principle by increasing *intensity* (↑ speed/effort, ↑ distance per repetition, ↓ rest), increasing *duration* (↑ number of sets, ↑ overall distance swum in a practice, ↑ time duration of practice sessions), and *frequency* (↑ number of practices per week, ↑ number of weeks in the year).

Most coaches incorporate a variety of training and conditioning methods that depend upon the athlete's specialty as a sprint, middle distance, or distance swimmer.

- *Sprints* are typically defined as short distance races such as 25-50-100 yards/meters. Training for sprints emphasizes anaerobic work involving short distances, high speeds, and relatively longer rests.
- *Middle distance* events generally refer to races that are 200-500 yards/meters in distance. Preparation for these races usually emphasizes a combination of anaerobic and aerobic work (mostly aerobic) with various distances, moderate to high speeds, and short rests.
- *Distance* events are races greater than 400/500 yards meters, including open water events. Swimmers training for distance races do mostly aerobic work with longer distances, moderate speeds, and short rests.

Coaches of swimmers with disabilities should adopt a different conceptualization of the terms sprint, middle, distance, and distance, focusing on the duration of the race rather than the distance. For example, consider training swimmers as sprinters if their races have a duration of less than 1.5 minutes, middle distance if their races last from 1.5 to 7 minutes, and distance if the duration is greater than 6 to 7 minutes. By focusing on duration rather than distance, the coach will be in a better position to select training methods that emphasize the energy systems (aerobic or anaerobic or both) that the swimmer needs for success.

Muscular strength/endurance is obviously critical to a swimmer's success. Coaches should definitely make effective use of swimming equipment such as hand paddles, fins, and stretch cords for in-the-water training, as well as resistance training and body weight exercises out-of-the-water to increase strength/endurance of the muscle groups used for swimming. Creativity may be needed when coaching swimmers with physical disabilities such as amputations or spinal injuries. For example, some swimmers with below-knee amputations wear fins upside-down with the knee in the fin's heel position. Swimmers with limited use of the hands may benefit from elastic bandages used to fix the hands to handles on weight equipment in the gym.

Special attention should be given to core strength and stability, namely strength and endurance of the muscles that attach to the spinal column or hip bones. Core strength and stability is especially important to help swimmers maintain a streamlined body position, transfer force from one body part to another, and initiate body roll. Core strength also helps to minimize postural deviations such as lordosis, which when combined with spinal stenosis (associated with dwarfism), can cause the legs to "go numb" when swimming. Finally, core strength will help wheelchair users to transfer from the wheelchair to the pool.

Swimmers need adequate *flexibility* to help place the limbs in optimal positions to maximize force production, minimize drag, maximize distance per stroke, and prevent injury. Swimmers with physical disabilities often experience limited *joint range of motion*. When this lack of flexibility is associated with habitual inactivity, stretching exercises (or simply swimming) will help to increase range of motion. But some range of motion problems, such as contractures, usually cannot be resolved with exercise. A contracture refers to tight muscles, tendons, ligaments, or skin that prevents normal movement. Swimmers with contractures may be unable to perform some strokes or may require adaptations to stroke technique. For example, hip contractures help lift the legs to the surface in backstroke, but cause the legs to drag well below the surface in freestyle. In addition, hip contractures are likely to interfere with body roll in both strokes. Swimmers with elbow or shoulder contractures will have limited range of motion when swimming, and might choose not to use the affected limb at all.

Body composition can affect success for swimmers with disabilities, as it does for all swimmers. Although there is no universally accepted range of body fat for male and female swimmers, it is obvious that under-nourished swimmers will not have the energy to perform well, and that over-fat swimmers will experience undesirable drag when swimming. Coaches should educate swimmers about proper nutrition and body size without placing undue pressure on athletes to lose weight/fat (this can lead to eating disorders). Special concerns for swimmers with disabilities include individuals with severe cerebral palsy who may have difficulty drinking or eating enough to provide energy for sports. They should supplement the usual diet with high-energy drinks, and bring such foods to swimming practices and meets. Other swimmers,

such as those with diabetes, may have unique dietary needs that should be understood by their coaches. Overfat and overweight swimmers can benefit from the usual regimens of less food, more exercise, etc.

We would be remiss to discuss training and conditioning of swimmers with disabilities without also discussing *overtraining*. Overtraining is of particular concern to swimmers who use mobility equipment such as wheelchairs, walkers, or crutches. For them, injuries to the upper body will not only limit their swimming activities, but will also affect also most activities of daily living. Furthermore, recovery from such injuries may be impeded because the person is unable to rest the affected body part (e.g., shoulder) per typical medical recommendations. When determining workloads for swimming practices, coaches should consider the amount of upper-body work such athletes do every day as part of daily living activities in combination with swimming-related activities.

Training the Neuromuscular System

Most coaches acknowledge that swimmers must consistently practice correct technique during workouts to prepare for best performances in competition. By demanding consistent attention to detail, the coach essentially is training the swimmer's neuromuscular system to give optimal physiological responses. *Repetition of correct technique* is important for all swimmers, but especially those with neurological conditions such as cerebral palsy, stroke, or head injury, and those who have memory deficits associated with cognitive disabilities or stroke who may benefit from far more repetition than the typical swimmer. Swimmers should understand why they are asked to repeat certain skills, and should be instructed in ways in which they can self-assess their performances (e.g., look for …, it should feel like …, listen for …). Some swimmers have trouble transferring learned skills to new situations, so coaches should be certain to require correct repetitions at different speeds, in different pools, and using different training methods.

Mental Training

This presentation focuses on five mental training techniques, namely attentional control, goal setting, imagery, positive self-talk, and relaxation (Hogg, 1995). Swimmers with physical and sensory disabilities should be able to participate in mental training without accommodation given that these are cognitive skills; however, younger children and those with cognitive disabilities frequently need more help from their coaches.

- **Attentional control**. Attentional control refers to the swimmer's ability to focus on relevant aspects of a task such as stroke technique advice, number of repetitions, or goal times. Ability to demonstrate attentional control generally improves with age and maturity as a swimmer, but there is much that a coach can do to help beginning swimmers or those with cognitive disabilities. Coaches can use *novelty* to direct attention by: (a) varying the mode of task presentation with verbal, demonstration, or hands-on cues; (b) creating interesting drills or sets that focus attention on important techniques or goals, such as having swimmers balance an object on the forehead while swimming backstroke to emphasize a still head position; or (c) asking swimmers to determine their own stroke drills for a particular set. *Task cards* are very useful when swimmers have trouble understanding or remembering. The coach could simply write the set or practice on a

white board. If individual swimmers are working on different sets or intervals, the coach could use index cards or small white boards to communicate the practice. Some swimmers understand better if illustrations are substituted for words, and some stay on task better if required to check-off completed tasks. Of course, swimmers who pay attention and execute a task as directed should receive at least occasional *positive reinforcement* from the coach.

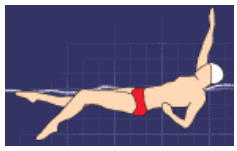
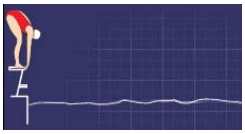
Done	Stroke	Set
✓		1 x 500 (20 lengths) No stopping! 
✓		8 x 50 (2 lengths) on the top 
✓		8 x 25 (1 length) on whistle 
		10 starts
	continue …	

Figure 1. Sample Task Card for Beginning Swimmer

- **Goal setting**. Goals serve to motivate both swimmers and their coaches. Athletes typically are advised to collaborate with their coaches to establish long-term goals for the duration of a season, or even for a quadrennium, as well as a series of short-term *SMART goals* that eventually lead to successful attainment of the long-term goal. SMART goals are Specific with carefully described behaviors such as stroke techniques or goal times; Measureable so that swimmer and coach know when success is attained; Applicable to the long-term goal; Realistic given the swimmer's current abilities; and a Timeline for attainment is given (in some descriptions of SMART goals, the "A" refers to attainable or ambitious). Swimmers with disabilities sometimes need help setting goals simply because they do not know what is possible. Most members of the swimming community are not familiar with competitions such as the Paralympic Games or Deaflympics, and accordingly have no idea about how to qualify for such opportunities. Some persons with disabilities have never truly challenged themselves to achieve in sports; a situation that may be complicated by health care providers who sometimes convey limits with respect to participation in physical activity, or by parents who may be overprotective.

- **Imagery**. Imagery literally refers to imagining a certain situation as a way of mentally practicing a desired outcome. Imagery can be used to focus on visual, auditory, proprioceptive, or other sensory feelings and images. Imagery works best when the athlete first studies a correct example or demonstration as a guide, such as a poster or videotape of correct technique, and then imagines performing the skill in the same manner. Coaches

should conduct imagery sessions in a quiet, dimly-lit space, and should use rich verbal descriptions. Athletes should be relaxed and motivated to benefit from the imagery experience. Deaf swimmers are likely to have difficulty with imagery if eyes are closed (a usual method of doing imagery) because they won't be able to lip read or use sign language. Persons with muscle spasms may have trouble maintaining a completely relaxed body position without use of sandbags or similar weights to quiet limbs with tremor or spasms. Imagery can be very useful to help swimmers with cognitive disabilities to remember routines (e.g., remember when we went to the XYZ swim meet, you sat in the chairs at the end of the pool to wait for your race, etc.). Imagery can also be used to mentally practice splits, race times, and celebrating successes.

- **Positive self-talk**. *Confidence* is critical to success in swimming, both for the swimmer and coach. Of course, confidence is related to factors such as level of training and conditioning, prior improvement and success, and general health. But confidence can also be regarded as a skill to be learned and practiced. Both *positive self-talk* and the absence of *negative self-talk* are helpful to the development of confidence. Positive self-talk refers to messages such as "I can", "I will", and "I believe", while negative self-talk refers to statements with opposite sentiments. Some swimmers with disabilities, especially beginners, have low confidence because they have not developed sufficient independence to do things for themselves and subsequently to experience the positive outcomes related to success. Others have difficulty because of a tendency to compare self skills and performances to those of swimmers who do not have disabilities. Coaches can help swimmers with low confidence by teaching cue words that convey positive approaches, developing team and individual mottos, encouraging swimmers to strive for personal bests rather than comparing self to other swimmers, and providing a role model of positive self-talk, coping skills, and confidence.

- **Relaxation**. Swimmers need relaxation skills in at least three contexts: (a) as a prerequisite to effective mental training; (b) to help achieve an optimal psychological state prior to competition, especially for swimmers who tend to get "psyched out"; and (c) to help physically prepare their muscles for competition. *Mental relaxation* refers to a combination of positive thinking to create a calm, receptive mood, as well as avoiding negative thoughts that lead to stress and tension. Mental relaxation is often achieved through use of music, messages delivered in a calm soothing voice by the coach, and a comfortable physical environment. *Physical relaxation* refers low muscle tone. For example, a technique called progressive muscular relaxation asks the athlete to systematically tense and then relax different body parts. This method helps athletes to feel the difference between tension and relaxation, so that they can strive for the low muscle tone associated with relaxation.

Sportsmanship

Most teams have philosophies and standards for expected behavior by swimmers and coaches (and sometimes family members). Coaches must deliberately teach those expectations to their swimmers, and periodically remind swimmers about expectations throughout the season. Examples of expectations include codes of conduct, team rules and practice routines, and appropriate responses to winning and losing. Coaches should give positive reinforcement

to swimmers who comply with expectations or make significant progress, and they should serve as role models to swimmers of those expected behaviors.

Season Planning

Season planning. Typical components of swimming training include instruction in swimming techniques (strokes, starts, turns), physical fitness appropriate for the swimmers' goals, mental training, and sportsmanship. Coaches should follow a three-step approach when integrating these components into a season plan: (a) establish SMART goals for each component of training; (b) allocate percent time to each component for each phase of the swimming season; and (c) write practices that correspond to the season plan.

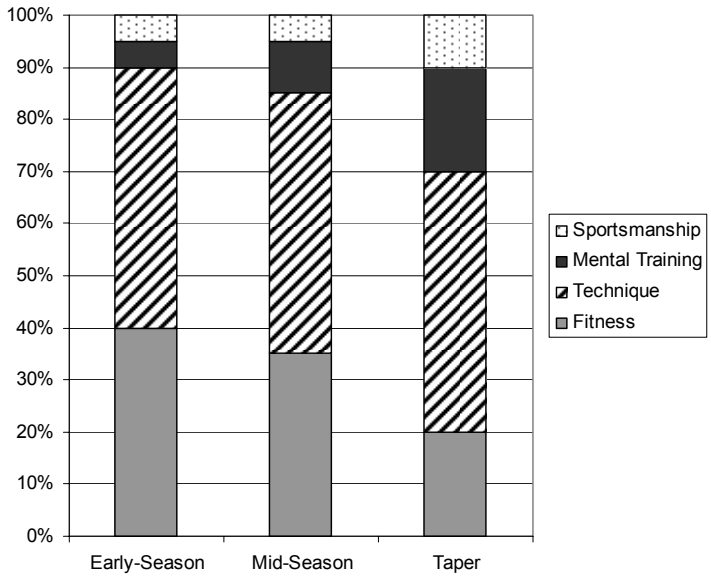


Figure 2. Sample Season Plan

Of course, coaches have a variety of ways to define components of training, as well as different philosophies about the importance of different components. The point here is that coaches should have a well-considered plan with clearly established SMART goals for each component.

Workout planning. A similar approach can be used for workout planning. Ample time must be given for warm-up and cool-down. Attention given to other elements of swimming practices depends upon the coach's philosophy and goals for the team.

Warm-up

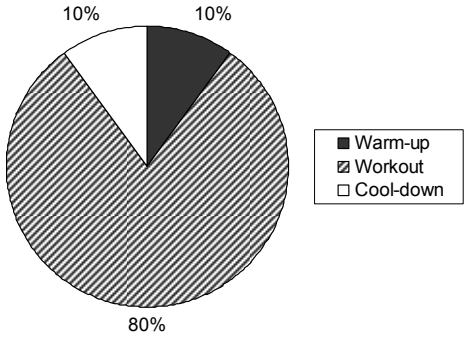
- Easy activity to increase heart rate, blood pressure, and muscle temperature

Workout

- Technique instruction
- Training and conditioning
- Mental training
- Sportsmanship

Cool-down

- Easy activity to decrease heart rate, blood pressure, and muscle temperature



Coaches should use creativity and common sense to determine appropriate ***disability accommodations*** (USA Swimming, 2001). For example, swimmers who do not have a good proprioceptive sense might benefit from doing part of the warm-up on deck using stretch cords or swimming against such resistance during the workout. Swimmers with quadriplegia and those with Down syndrome typically have a lower-than-usual maximum heart rate that should be considered when determining intensity of workouts. Some swimmers with dwarfism and some with Down syndrome have a condition called atlantoaxial instability that contraindicates diving entries. Swimmers with seizures may require extra supervision throughout the workout. It is beyond the scope of this paper to mention all such considerations; instead, the coach should talk with the swimmer and swimmer's family to learn about individual concerns and to collaborate about potential adaptations and solutions.

Conclusion

Experienced coaches and physical educators will notice that our suggestions for training swimmers with disabilities are essentially the same as for training any competitive swimmer. The only differences are associated with common-sense disability accommodations or safety considerations. The swimmers with disabilities who contributed to this presentation concur. They want to be challenged and trained like any other swimmer by coaches and teachers with expertise in swimming.

References

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International Organizations

International Paralympic Committee ..... www.paralympic.org
Deaflympics ..... www.deaflympics.com
Special Olympics International ..... www.specialolympics.org
Down Syndrome International Swimming ..... www.dsiso.org/

USA Organizations

U.S. Paralympics ..... www.usoc.org (click on Paralympic team)
U.S. Deaf Sports Federation ..... www.usdeafsports.org
Wheelchair Sports USA ..... www.wsusa.org
Disabled Sports USA ..... www.dsusa.org
U.S. Association of Blind Athletes ..... www.usaba.org
Dwarf Athletic Association of America ..... www.daaa.org
American Association of Adapted Sports ..... www.adaptedsports.org
Blaze Sports USA ..... www.blazesports.org
Special Olympics North America ..... www.specialolympics.org