

Coaching Swimmers with Disabilities: Stroke Technique

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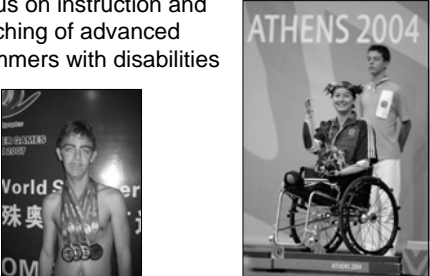
Outline

- Adapting stroke technique: disabilities
- Adapting stroke technique: principles
- Teaching starts
- Using training equipment
- Ensuring swimmer safety

At the end of the presentation, we invite you to share your expertise

Introduction

- Focus on instruction and coaching of advanced swimmers with disabilities



Adapting Stroke Technique

- Disability-specific adaptations
 - Hearing loss
 - Vision loss
 - Cognitive disabilities
 - Dwarfism
 - Amputations & limb deficiencies
 - Spinal & lower limb conditions
 - Cerebral palsy, stroke & head injury
- General principles
 - Minimize drag
 - Increase propulsion
 - Improve physical fitness



Adapting Stroke Technique: Hearing Loss



- **Disability** = usually no physical reason for stroke technique problems
- **Stroke** = inability to hear or understand coach instructions
- **Hints** = use written instructions, gestures, demonstrations, and sign language in addition to verbal directions

Adapting Stroke Technique: Vision Loss

- **Disability** = poor/no vision + reluctance to move hands and arms away from torso

- **Stroke**
 - Poor horizontal alignment (head too high/low)
 - Poor lateral alignment (head not returned to neutral position after breathing)
 - Inefficient stroke technique with tendency to have a short pull
 - Stroke tends to deteriorate as swimmer approaches wall because swimmer fears collision



Adapting Stroke Technique:

Vision Loss

■ Hints

- Move swimmer's head and body through correct actions
- Teach movements on swim bench
- Use resistance training to help swimmer feel and experiment
- Use rich verbal descriptions
- Teach swimmer to count strokes + use tappers, sprinklers hanging from backstroke flags, etc. + use padding in swim cap



Adapting Stroke Technique:

Cognitive Disabilities



- **Disability** = usually no physical reason for stroke technique problems
 - Multiple disability?
 - Most with Down syndrome have short stature and hyperflexibility
- **Stroke** = poor understanding or memory of coach instructions

Adapting Stroke Technique:

Cognitive Disabilities

■ Hints

- Simple 1 & 2 part directions
- Gradual introduction of new skills
- Frequent review of instruction
- ROUTINE!
- Repetition



Adapting Stroke Technique:

Cognitive Disabilities

- Kendall Bailey
 - 2008 Paralympian SB9 100m brst
 - American record SB9 100m brst 1:15.81



Kendall Bailey
Class S10, SB9, SM10
Peninsula Aquatics San Diego

Adapting Stroke Technique:

Dwarfism

- **Disability** = short stature, short arms, short legs, spinal stenosis, possible hip contractures
- **Stroke**
 - Form drag (especially legs)
 - Limited ability to streamline
 - Poor distance per stroke
 - Poor body roll + short catch + wide pull + short finish + wide recovery
 - Limited hip ROM
 - Legs "go numb"



Adapting Stroke Technique:

Dwarfism



- **Hints**
 - Improve streamline as much as possible (arms may not reach overhead)
 - Increase stroke rate
 - Maximize distance per pull with sculling movements
 - Increase core strength to improve body roll
 - Improve flexibility, especially of hip extensors

Adapting Stroke Technique:

Dwarfism

Casey Johnson

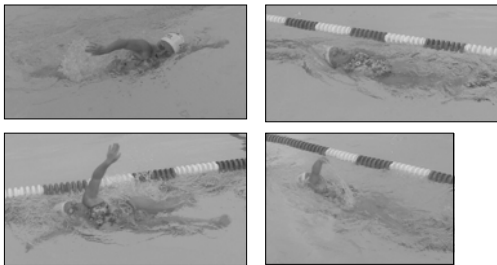
- 2004 Paralympian
bronze medal 4 x 50 free relay
- 2008 Paralympian
6th S6 50m butterfly 42.35
8th S6 100m freestyle 1:26.42
- American record
S6 100m butterfly 1:50.14



Casey Johnson
Class S6, SB6, SM6
Irvine Novaquatics

Adapting Stroke Technique:

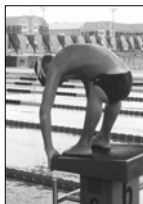
Dwarfism



Adapting Stroke Technique:

Amputations and Limb Deficiencies

- Disability – loss of all or part of arm(s) or leg(s)
- Stroke (depends on site of amputation)
 - Asymmetrical, unbalanced stroke
 - Compromised body roll in long-axis strokes
 - Possible difficulty streamlining
 - Limited propulsion/sculling with arm amputation
 - Limited propulsion from kick with leg amputation
 - Excessive drag with double-leg amputation



Adapting Stroke Technique:

Amputations and Limb Deficiencies



Hints

- Increase core strength to help body roll
- Swim against stretch cords to identify asymmetries and gaps in propulsion
- *Single-leg amputees* - Center kick behind body instead of same-side hip. Experiment with kicking patterns.
- *Double-leg amputees* - Experiment with ways to kick with stumps. Experiment with effect of head position on body position.
- *Arm amputees* - Use paddle-wheel motions, stressing arm pressure against water + use faster stroke rate.

Adapting Stroke Technique:

Amputations and Limb Deficiencies

Roy Perkins

- 2008 Paralympian
- 1st 50m fly 35.95
- 3rd 100m free 1:15.31
- 4th 50m free 34.61
- 4th 200m free 2:46.68
- 5th 200m IM 3:23.63



Roy Perkins
Class S5, SM5
Peninsula Aquatics San Diego

- World records
- S5 50m fly 35.95
- S5 100m fly 1:27.11
- American records
- 15 long course records

Free * Back * Brst * Fly

Adapting Stroke Technique:

Spinal & Lower Limb Conditions

- Disability – paraplegia
 - Limited leg function and mobility
 - Hip, knee, and ankle contractures
 - Possible asymmetries in muscle tone because of wheelchair use (propulsion muscles stronger)
- Disability – quadriplegia
 - Paraplegia limitations *plus* ...
 - Limited hand function
 - Limited arm and trunk strength and mobility
- Other disabilities – muscular dystrophies, ataxias, osteogenesis imperfecta, arthrogryposis, polio, etc.



Adapting Stroke Technique:

Spinal & Lower Limb Conditions

- **Stroke** – problems depend upon level of SCI
 - Poor hand shape/pitch
 - Poor feel for the water
 - Poor streamline
 - Hips/legs drag + little or no propulsion from kick
 - Poor body roll + short catch + wide pull + short finish + wide recovery + early breathing



Adapting Stroke Technique:

Spinal & Lower Limb Conditions

- **Hints**
 - Strengthen affected muscles if possible – core strength helps hold hips/legs near surface and facilitate body roll
 - Emphasize the best possible body and limb positions (e.g., forearm pulling when hands are weak)
 - Emphasize sculling movements for DPS
 - Breathe at end of same side pull
 - Encourage kicking if possible
 - Use ROM, relaxation, and PT exercises to minimize contractures when possible



Adapting Stroke Technique:

Cerebral Palsy, Stroke, & Head Injury



- **Disability – spastic CP, stroke & head injury**
 - Poor coordination
 - Adduction and inward rotation in affected limbs + flexion in arms + extension in legs
 - Hemiplegia affects ½ (right/left side) of body
 - Diplegia affects legs more than arms/trunk
 - Contractures + range of motion limitations
 - Persistent postural reflexes
- **Disability – athetosis**
 - Poor coordination
 - Unwanted, purposeless movements
 - Range of motion limitations

Adapting Stroke Technique:

Cerebral Palsy, Stroke, & Head Injury



Stroke

- Poor hand shape/pitch
- Poor feel for the water
- Poor streamline
- Hips/legs drag + little or no propulsion from kick
- Poor body roll + short catch + wide pull + short finish + wide recovery + early breathing



Adapting Stroke Technique:

Cerebral Palsy, Stroke, & Head Injury

■ Hints

- Use resistance training in and out of water (hand paddles, fins, stretch cords, etc.)
- Use *extensive* repetition
- Use range of motion exercises, relaxation, imagery, and physical therapy interventions to minimize contractures and unwanted muscle tone
- If action causes more drag than propulsion, consider not using that body part(s)
- Increase core strength to hold hips/legs at surface
- Encourage kicking if possible
- Try different head positions to improve body position

Adapting Stroke Technique:

Cerebral Palsy, Stroke, & Head Injury

Michael DeMarco (back)

- 2004 Paralympian
3rd 50m brst 1:03.20
- 2008 Paralympian
7th 50m freestyle 1:00.69
7th 100m freestyle 2:07.72
8th 50m backstroke 1:03.03
- American records
13 long course records



Michael DeMarco, Class S3, SB2, SM3
Peninsula Aquatics San Diego

Adapting Stroke Technique:

Cerebral Palsy, Stroke, & Head Injury

Nate Tauzer (back * brst * fly)

■ Best times

- 50m free 33.41
- 100m free 1:13.52
- 400m free 6:20.50
- 100m back 1:25.44



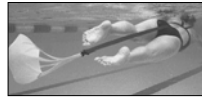
Nate Tauzer,
Class S9, SB8, SM9
Peninsula Aquatics
San Diego

Adapting Stroke Technique:

Principle #1: Minimize Drag

- Drag refers to water forces that cause the swimmer to slow down

$$D = \frac{(Cd)(\rho)(A)(V^2)}{2}$$



- D = drag
 - Cd = coefficient of drag
 - A = cross-sectional area
 - V = velocity
- The swimmer has the most control over A and V

Cd expresses the relationship between the swimmer's body shape and the flow/viscosity of the water

Adapting Stroke Technique:

Principle #1: Minimize Drag

Minimize drag

- Good streamline
- Good horizontal alignment
- Good lateral alignment
- Good shoulder roll



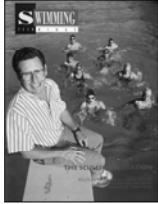
Also

- Tight-fitting swim suits and swim caps
- Shave uncovered body parts
- Swim in "fast" uncrowded pools

Adapting Stroke Technique:

Principle #2: Increase Propulsion

- Maximize propulsive surface
 - Arms/hands and legs/feet in optimal positions
 - Many books and videos describe effective stroke techniques
- Scull
 - Press against water with hands and forearms
 - Hand pitch/angle of attack of about 40°
 - Downward, upward, outward, inward
 - Steady pressure on the water



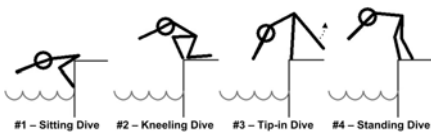
Adapting Stroke Technique:

Principle #3: Improve Physical Fitness

Strength & endurance	Helps create propulsion – also core strength helps body roll, ability to transfer forces from one side of body to the other, maintain good horizontal/lateral alignment
Range of motion	Flexibility helps the swimmer to execute stroke techniques
Body composition	Excessive body size increases drag
Cardiorespiratory fitness	Helps swimmer to maintain stroke technique over desired distance

Teaching Starts:

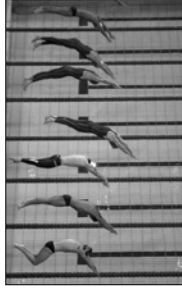
Teaching Forward Starts



- At least one foot at front of platform, toes over edge
- Fingers pull on platform to initiate dive
- Push-off forcefully with both legs
- Reach forward
- Entry – hands then head, shoulder, hips, and legs
- Level-off and start swimming

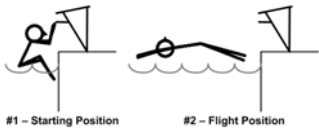
Teaching Starts:

Teaching Forward Starts



Teaching Starts:

Teaching Backstroke Starts



- Start with feet submerged and at least one hand on wall
- Push-off
 - Swing arms back and sideways
 - Chin down on blocks, chin up during flight
 - Push with legs, arch back to lift hips
- Streamline at water entry, then kick, then swim

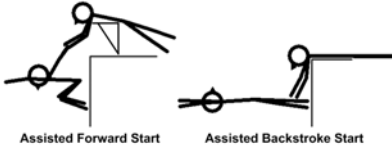
Teaching Starts:

Teaching Backstroke Starts



Teaching Starts:

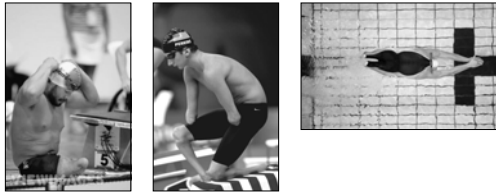
Teaching Assisted Starts



- Hold hand if swimmer is capable of some push-off with feet
- Otherwise hold feet to wall

Teaching Starts:

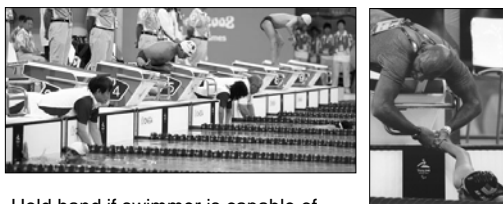
Disability Modifications



Swimming rules permit a variety of starting positions for the forward start (e.g., standing, kneeling, sitting) on the starting block, on the deck, or in the water

Teaching Starts:

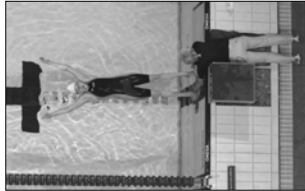
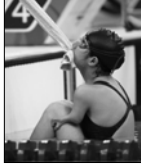
Disability Modifications



Hold hand if swimmer is capable of some push-off with feet. Otherwise hold feet to wall.

Teaching Starts:

Disability Modifications



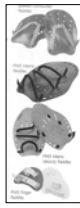
Teaching Starts:

Exiting the Water

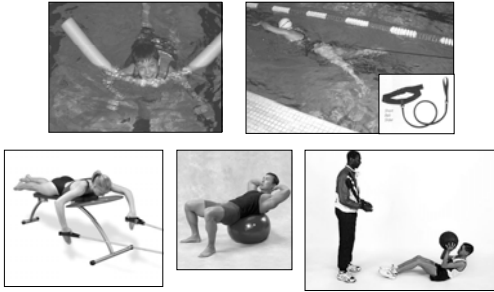


Assist swimmers as needed when they exit the pool

Using Training Equipment



Using Training Equipment



Ensuring Swimmer Safety:

Common Causes of Injuries

■ The three most common causes of injury in competitive swimming are:

- Unsupervised horseplay
- Training injuries, e.g.,
 - Collisions with other swimmers, lane lines, etc.
 - Overuse injuries
- Slippery surfaces



Ensuring Swimmer Safety:

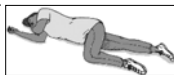
Seizures

Out of the Water

- Protect from injury
- Cushion the head
- Nothing in mouth
- Do not restrain
- Place in recovery position
- Stay with person
- Call EMS if lengthy or repeated seizures

In the Water

- Support in water
- Face above water surface with airway open
- Remove person from water ASAP (backboard?)



Ensuring Swimmer Safety:

Atlantoaxial Instability (AAI)

- What is AAI?
 - Excess space between 1st and 2nd cervical vertebrae
 - Spinal cord may be injured if person forcefully flexes or extends the neck
- Who has AAI?
 - About 15% of persons with Down syndrome
 - Assessed by X-ray
- Special Olympics policy
 - No butterfly
 - No diving



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Ensuring Swimmer Safety:

Other Disability-Related Concerns

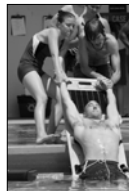
- Lack of sensation – wear swim shoes/protective clothing
- Poor balance or poor vision – keep pool decks dry and uncluttered
- Diabetes – allow water and snacks
- Shunts – avoid diving, swimming underwater, and blows to the head
- Hypothermia – limit time in cold water or use wet suit/vest during practice + after swimming use towels, blankets, and warm showers to help swimmer get warm
- Sun sensitivity – wear rash shirts and use sunscreen
- Other concerns?

Ensuring Swimmer Safety:

Emergency Action Plan

- Prevent accidents
 - Keep deck clean and dry
 - Lifeguard on duty
 - Lock doors when pool is closed
- Evacuation plan
 - Injuries or accidents
 - Fire or weather emergencies
 - Accommodate disabilities
- Chain of command
 - Who calls EMS? Phone number?
 - Who helps the injured person?
 - Who supervises other swimmers?

Know the emergency action plan for every swimming pool that you use!



Ensuring Swimmer Safety:

Teacher/Coach Responsibilities



- Check pool for hazards
- Supervise swimmers for safety – even if a lifeguard is present
- Teach swimmers to be safe
- Know your swimmers
 - Motivation
 - Health problems
 - Equipment needs
- Train your assistants
- Maintain CPR & FA certifications

Conclusion

- Important attributes for teaching and coaching swimmers with a disability

- Be willing to try
- Accept and respect swimmer
- Collaborate with swimmer
- Maintain high standards
- Be creative
- Use problem-solving skills



Conclusion

Remember to treat swimmers with disabilities as the athletes and skilled swimmers that they are!



Jessica Long
Sullivan & ESPY
Award Winner



Erin Popovich
Women's Sports Foundation &
ESPY Award Winner

Thank You!



Paper presented at the 37th National Adapted Physical Education Conference, Promoting Physical Activity for All, California Association for Health, Physical Education, Recreation and Dance, San Diego, CA.
