

KIN 856

Dr. Riewald

Project #4 Strength and Conditioning for Injury Prevention

Andy Blain

In the sport of swimming there are several common injuries that swimmers could run into throughout the season. Injuries such as impingement of the shoulders/deltoids (because of weak external rotator muscles), "swimmers shoulder", abdominal and lower back strains, and hip impingement during the breaststroke. The swimmer's shoulder is usually the number one injury when it comes to swimming in practice and competitively. Swimmers could use improper technique (either because of fatigue, trying to sprint when the muscles are exhausted at the end of a practice, or trying to compensate by favoring one side of their body because of weakness on the other side), fail to effectively stretch out their shoulders before, during, and after a practice, overuse their shoulders by taking a large number of strokes per 50 yard swim, and forget to train the muscles on both sides of their bodies contributing to imbalance within the shoulder itself. The muscles that cause external rotation as well the shoulders that make up the rotator cuff (teres minor, supraspinatus, infraspinatus, and subscapularis) all must be exercised equally and with proper techniques in order to cut down on the injuries to those particular muscles. The injuries to the shoulder can be minimized through spending more time in practice going through technique based drills, but more importantly by going through systematic exercises that target these muscles and incorporating stretching routines into daily workouts during the season.

The core muscles such as the rectus abdominus, internal and external oblique muscles, erector spinae muscles, and gluteus muscles are all linked together and used in the sport of swimming to help the swimmer gain balance and coordinate their movements, so any strains in a certain muscle causes ongoing and nagging issues and or injuries that will hurt the swimmer's performance both in practice and competition. The injuries usually occur because swimmers neglect the muscles, do not perform sufficient repetitions for the muscles, or breathe too often on one side of their body creating an imbalance (due to over rotation to one side to breath in the freestyle stroke). One last factor that could contribute to the strains or other injuries associated with the core muscles is a lack of flexibility in the swimmers core, due to lack of dynamic and even static stretching.

The hip area is similar to the shoulder because it is also a ball and socket joint that can cause impingement of bone to bone pinching the muscles when the swimmer is at practice or a swim meet. In particular, the breaststroke kick is usually the cause for this type of injury. In the breaststroke the swimmer must load their hips up to their body in order to use the kick to get a good push and propulsion through the water. In the "loading" phase when the hips externally

rotate, the muscles of the hip become pinched and may even lead to partial dislocation because the muscles surrounding the hip are not effectively trained or exercised during the course of the season. The gluteus muscles, quadratus femoris, tensor fascia latae, hip abductors and adductors, and pectineous muscles all play a role in the external rotation of the hip as well as the slight adduction and abduction of the hip as well for the breaststroke kick. One last element that causes these common injuries to occur is the lack of flexibility within this joint, so including effective and active stretching techniques should help to eliminate some of problems.

\*Station sheets with strength and conditioning exercises as well as some dynamic stretches will be provided for the swimmers by the sheets being posted to the pool deck walls for station work throughout the whole season. The station sheets are provided below as well.

## Exercise: Resistant Band pulls for Internal/External Rotation



**Purpose:** The exercise uses the muscles of the rotator cuff for motions in the swimming pool during practices or swim meets. The exercise should help to eliminate injuries of the rotator cuff if done correctly and often. Specifically the exercise:

- engages muscles of the rotator cuff for internally/externally rotating the arms/shoulder for a freestyle swimming stroke
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming. Helps to strengthen the core muscles, which can also prevent injuries in the core area.
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meets
- engages both the eccentric and concentric muscles needed for internal/external rotation of the rotator cuff by resistant band constantly maintaining tension throughout the entire exercise

### Exercise Description:

1. Swimmer should hook a resistant band to a door or some other sturdy and immovable fixture with one hand grasping one end of the resistant band with the arm that will be moving is located on one side of the body
2. Bend your elbows to 90° to assume the start position also with the feet shoulder width apart in order to gain balance during the exercise.
3. Externally rotate your arms to the end range at a comfortable pace and then return to the starting position (keep in mind that the arm will cross in front of the body and then back to the start position).
- 4 As you externally rotate and pull the resistant band in front of your body, pinch your shoulder blades together. Do not force the end range of motion.
5. Complete 3 sets of 20-25 repetitions alternating each arm and shoulder to provide ample rest in between the sets.

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc)

## 90-90 External Rotation- Strength Training



**Purpose:** The exercise uses the muscles in the rotator cuff, specifically the muscles used in external rotation, to strengthen those muscles and to prevent injuries in that area of the body. Exercises should be done every other day during practices and before swim meets/competitions. Specifically the exercise:

- engages muscles of the rotator cuff for internally/externally rotating the arms/shoulder for a freestyle swimming stroke, especially if the swimmer is reaching their arms above their head for the start of the freestyle stroke.
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming. Helps to strengthen the core muscles, which can also prevent injuries in the core area.
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meets
- engages both the eccentric and concentric muscles needed for internal/external rotation of the rotator cuff by resistant band constantly maintaining tension throughout the entire exercise

### Exercise Description:

1. Attach the resistant band to a sturdy and immovable structure. Start by facing forward towards the part where the band is attached to with the feet shoulder width apart in order to gain/maintain balance.
2. Lift the arm out to the side until it is parallel to the ground. Bend the arm at the elbow until it forms a 90 degree angle and the palms face downward.
3. Rotate the arm back at the shoulder until the forearm is even with the ear or head. The upper arm position should not change and the palm should be facing the secured attachment spot of the resistant band.
4. Return to the starting spot in a controlled manner being careful not to immediately release the tension of the band.
5. Perform 3 sets of 20-25 repetitions alternating each arm and shoulder to provide ample rest in between the sets.

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.

## Exercise: Resistant Band Butterfly Pulls



Purpose: The exercise which will help in preventing against rotator cuff injuries is swimming specific and engages the muscles the rotator cuff, which is specific to the sport of swimming the butterfly stroke. Specifically the exercise:

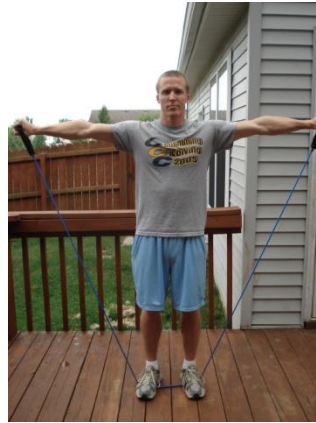
- engages and strengthens the muscles of the rotator cuff, especially the anterior deltoid muscles of each shoulder
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- engages the muscles of the rotator cuff through muscular endurance training which should help prevent against “swimmers shoulder”

Exercise Description:

1. Swimmer should hook a resistant band to a door or some other sturdy and immovable fixture with the body slightly bent forward facing away from the hooked part of the resistant band( looking away from the wall) with both arms holding each handle of the resistant band and the shoulders abducted away from the body. The feet should be staggered one in front of another to gain balance as well.
2. Once the swimmer is balanced and the shoulders are abducted, the swimmer should begin to horizontally adduct their shoulders out in front of them while keeping the elbows extended until the hands clap together in front of the swimmers body.
3. The swimmer will then lower the shoulders and hands down by the sides of their body until the hands are at either side of the hip.
4. The swimmer is done with the motion/exercise and then repeat starting with step 1
5. Swimmers will repeat the exercise with 4 sets of 20-25 repetitions with less than a minute’s rest in between sets.

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.

## Resistant Band: Locked Elbows Lateral Raise/Abduction



Purpose: This strength exercise prevents injuries of the shoulder and strengthens the rotator cuff by performing swimming specific motions. Specifically the exercise:

- engages and strengthens the muscles of the rotator cuff and shoulder, especially the medial deltoid muscle of each shoulder
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming in order to prevent muscle imbalances in the core
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- strengthens muscles in the shoulder and rotator cuff to prevent injuries of “swimmers shoulder” by the swimmer engaging in regular muscular endurance type activities before swim meets and before swim practices

Exercise Description:

1. The swimmer is standing on a resistant band with feet shoulder width apart and each hand grabbing on to a handle of the band with the arms down by the side.
2. The swimmer begin to slowly abduct the shoulders and arms away from their body( to the swimmers sides) with the fingers pointing away from the body of the swimmer.
3. Once the shoulders/arms are at shoulder level the swimmer will lower the arms/shoulders back down to the starting spot of the body (adduct the shoulder back towards the midline of the body).
4. Swimmers are to perform 3 sets of 15-20 repetitions with a 1 minute rest in between sets

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.

## Exercise: Resistant Band Hip Abduction



Purpose: This strength exercise prevents injuries of the hip abductors for the breaststroke kick both during practice and before swim meets. Specifically the exercise:

- engages and strengthens the muscles of the hip abductors, especially during the breaststroke kick of the breaststroke
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming in order to prevent muscle imbalances in the core
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- can be modified to strengthen muscles of the hip adductors and inside leg muscles, which are needed to “squeeze “the breaststroke kick together

Exercise Description:

1. Hook up the resistant band to a sturdy and immovable fixture in order to accomplish the exercise.
2. The swimmer should stand sideways with the band wrapped around one leg of the swimmer with the feet shoulder width apart in order to gain balance and have a good base of stability.
3. The swimmer will pull the band with their leg across their body in a pendulum like motion until the legs reach a 45 degree angle and then move the leg back down to the starting position.
4. The swimmer will switch legs during each set in order to give each side of their muscles ample rest.
5. The swimmers will perform 3 sets of 20 repetitions with the rest coming from the swimmer switching legs during the exercise

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.

## Exercise: Hip Abduction Machine



Purpose: This strength exercise prevents injuries of the hip abductors for the breaststroke kick both during practice and before swim meets. Specifically the exercise:

- engages and strengthens the muscles of the hip abductors, especially during the breaststroke kick of the breaststroke
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- can be modified to strengthen muscles of the hip adductors and inside leg muscles, which are needed to “squeeze “the breaststroke kick together
- engages muscles of the body in sport specific exercises that will translate into better swimming for the athlete

Exercise Description:

1. Sit in machine with the inside of each thigh placed against pads of the exercise machine with hands grabbing the handles.
2. Slowly move each thigh away from the center of the body creating a butterfly motion with the legs from moving apart.
3. Slowly move each thigh back toward the center of the body to complete one repetition.
4. Swimmers will complete 3 sets of 15-20 repetitions at a 50-60% of the 1 rep max

**Equipment:** One leg abducting machine from the weight room. Exercises must be performed at the schools weight room in order to perform the exercise



## Exercise: Oblique Crunches



Purpose: The exercise prevents injuries of the internal and external obliques by strengthening the abdominal muscles during practice sessions throughout the season. Specifically the exercise:

- engages and strengthens the muscles of the internal and external oblique's
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- works the muscles of the oblique's evenly creating a equal balance of core strength on both sides of the body, in order to prevent against muscle imbalances on the sides of the body that might accumulate during the season
- engages in both eccentric and concentric contractions of the oblique's

Exercise Description:

1. The swimmer is lying down on an exercise mat on one side of their body.
2. Starting with the laying on the left side of the body, the swimmer will place their left arm on their right side of their abdominals (in order to feel the obliques contracting), while the right hand is placed behind their right ear, being careful not to pull on head.
3. Once the swimmer has their hand placed correctly on their body, the swimmer will perform crunches lifting up with the sides of their, while the feet and hips stay on the ground. Each crunch will lift the body off the mat in a concentric manner, and then slowly lower the body back down to the mat in an eccentric contraction.
4. The swimmer will rotate from side to side every minute in order to equally exercise both sides of the body and create an equal balance of muscle.
5. The swimmer will perform 6 sets (3 on each side of the body) with 45-60 repetitions or until the time of 1 minute is up.

**Equipment:** An exercise mat so the swimmer can comfortably lie on to perform the exercise. The exercises can be performed both on the pool and at home.

## Exercise: Plank Holds with/Rotation



Purpose: The exercise prevents injuries of the internal and external oblique's, rectus abdominal muscles, lower back muscles, and gluteus muscles by strengthening those muscles during practice sessions throughout the season. Specifically the exercise:

- engages and strengthens the muscles of the swimmers core
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- works the muscles of the core evenly through held isometric contractions, in order to prevent against core weaknesses and muscle imbalances on the sides of the body that might accumulate during the season
- engages the muscles of the core to transfer that energy to other areas of the body for swimming( the stronger the core of the body, the more efficient the swimmer will be).

### Exercise Description:

1. The swimmer will begin face down on the mat with their hands underneath them by their chest and the legs close together with the feet touching.
- 2a. The swimmer will begin holding their body off the ground in a straight position with the forearms and toes touching the ground keeping all other points of the body in line, similar to that of a push-up position, but with the forearms on the ground and not the hands.
- 2b. For rotation of the plank the swimmer will start on the left side of their body off the ground and then rotate after 1 minute to the right side, with the left forearm on the ground and their right arm extended straight out at shoulder level in order to gain balance.
3. The swimmer will rotate positions in order from the side, to the front, and back to opposite side plank holds every 1 minute and perform 9 sets with each side getting a total of 3 sets.
4. Once all the sets have been accomplished the swimmer will start back in the ready position.

**Equipment:** Exercise mat for student to perform plank holds on. The exercises can be done at the pool, weight room, and at home.

## Exercise: Resistant Band Rows



Purpose: The exercise prevents injuries of the rotator cuff and the core by strengthening the muscles in both through practice and regular repetition of strength building activities. Specifically the exercise:

- engages and strengthens the muscles of the swimmers core and rotator cuff
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- improves strength in the upper body and the back
- builds muscular endurance for the muscles in the rotator cuff, helping to eliminate “swimmers shoulder”
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming in order to prevent muscle imbalances in the core

### Exercise Description:

1. Hook up the resistant band to a sturdy and immovable fixture in order to accomplish the exercise.
2. Each hand should be grabbing an end of the tubing with the legs in a staggered position in order to maintain balance during the exercise. The swimmer should be facing the immovable structure.
3. The core should be tightened during the exercise in order to maintain body position and balance.
4. The swimmer should bend the arm back at the elbows until the wrists are even with the sides of the body.
5. The swimmer should slowly release the bands resistance back to the starting position of the exercise.
6. Swimmer should perform 3 sets of 20-25 repetitions

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.

### Exercise: Resistant Band (Drawing Sword)



Purpose: The exercise prevents injuries of the rotator cuff by strengthening the muscles through practice and regular repetition of strength building activities. Specifically the exercise:

- engages and strengthens the muscles of the swimmers rotator cuff
- elevates body temperature of the swimmer and gets the heart and lungs ready for practice and/or swim meet
- improves strength in the upper body and the back through a variety of motions in different planes
- builds muscular endurance for the muscles in the rotator cuff, helping to eliminate “swimmers shoulder”
- isometrically contracts the core muscles in order to stabilize the body, just like the core muscles stabilize the body in the water when the swimmer is swimming

Exercise Description:

1. Hook up the resistant band to a sturdy and immovable fixture in order to accomplish the exercise.
2. Swimmer should stand side ways with the legs slightly bent and the feet a little more than shoulder width apart.
3. Swimmer should grab one end of the band and move back until tension is increased to a medium level.
4. Starting with the right arm, the swimmer should pull the band diagonally from the left hip to above the right shoulder (like drawing a sword from a holder). Repeat and change order when using the left hand( body would face the other way as well).
5. The exercise is finished when the hand comes back down to the ready position or to one of the hips
6. Swimmer should perform 3 sets of 20 repetitions and switch arms after every 20 reps

**Equipment:** One resistant band with a medium resistance and a place to wrap the band on to keep the resistance steady (ex. Door, bleacher, etc). Exercise can be done at practice or home.