

The UE Ranger[®]

Baseball Package



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Introduction

Learning any skill requires a few common ingredients of repetitions, self-awareness, and feedback. The repetitions must be healthy, frequent, and similar to the end-task. Self-awareness affords us the opportunity to learn during performance, from our own independent practice and modify from trial to trial. The healthiest forms of feedback are science-proven. They include intermittent information (not full-time, every trial feedback), external rewards of when the task was accomplished well, and finally for movement-based learning, some sense of feedback that guides us toward the healthiest movement – even when we are challenged (fatigued, injured, or being matched by exceptional competition).

The science of learning is well established. The science of how to best throw a baseball is also well-established, yet there are inherent barriers that have not been sufficiently addressed before now. These barriers can be expressed in the form of just a few questions. They are:

- How do we scale the knowledge to more than one player, much less a roster of pitchers?
- How do we appreciate and respect the fact that no two pitchers throw alike considering body type, preferred arm slot, and the elements of both variability and consistency. Pitchers must use variability to their advantage (a different “look”); yet leverage consistency/reliability to maximize their accuracy?

It is tempting to compensate movement when we are tired, injured, or recovering after surgery. Any competitive athlete that is in these conditions will naturally look for another way to get that pitch by you using velocity, variability, or ball movement. The challenge for a training and coaching staff becomes, “How do we guide injured or surgically recovering players safely back to the sport that they love...without allowing them to adopt unhealthy movements on the way?” The temptation to get to “reward” (threw the ball by you) early is natural.

This compendium of exercises developed by Michael Howell aims to resolve these dilemmas posed. This unique yet proven and scientifically backed strategy is clear:

- Scale the feedback, keep the movement healthy and informative to the athlete using the UE Ranger as a mobile arm support
- Use proven exercises to prime the nervous system and encourage the proper neuromuscular recruitment of the prime movers (muscles) that both can and should be active

Why use a mobile arm support (the UE Ranger), doesn't that make the movement artificial?

The UE Ranger allows athletes and coaches alike to reduce degrees of freedom (DoF). Degrees of freedom is perhaps the most timeless concept in motor control and skill development, developed in the 1960s and used still today. Reducing the DoF affords athletes and coaches alike to concentrate their learning and skill development on the shoulder without simultaneously requiring accurate control variables at the elbow-forearm-wrist and fingers. With the assortment of attachments depicted in this manual, users will quickly and intuitively see how the UE Ranger provides the ability to isolate the shoulder, manipulate variables at the other joints, and then integrate the whole.

Leverage and maximize this manual. Use the photos, videos, educational points, and drills to their fullest. Allow it to both expand your capacities and reach as a coach by helping you with form while you cannot be there, and content when you cannot create yet another drill. Use the prescriptions and dosage to help you in efforts to apply the science, ultimately making your job easier.

Help your athletes maximize their uninjured potential, prevent injury, and recover from injury optimally, using this guide for their benefit.

Movement Health Injury Prevention and Recovery Goals:

Note that this compendium of exercises developed by Michael Howell speaks to the pre-season, in-season, and recovering athlete.

In addition, this resource is directed for the athlete, coach, training and rehabilitative personnel alike.

Finally, note these goals and this program covers all bodily systems involved in skilled motion: sensation, motor control, pain free range of movement, neuromuscular recruitment, tissue integrity (readiness), and endurance.

1. Overhead athletes will develop exceptional sensory awareness of the optimal biomechanics.
2. Overhead athletes will improve neuromuscular resources to optimize performance: arm velocity, endurance, accuracy.
3. Overhead athletes will improve musculoskeletal resources to prepare for injury-free experiences in sport.
4. Overhead athletes will optimize recovery from misuse and overuse-based injuries of the throwing arm.
5. Overhead athletes will optimize recovery from surgery on the throwing arm: shoulder, elbow/forearm and wrist.
6. Training and rehabilitative staff will have a more comprehensive and consistent approach, maximizing the overhead athlete's return to sport with enduring wellness.
7. Training and rehabilitative staff will expand their pre-season conditioning programs to include sport-specific activities to include sport-specific drills with appreciation for tissue readiness, neuromuscular recruitment, kinesthesia, and ballistic movements.

Mike Studer, PT, DPT, MHS, NCS, CEEAA, CWT, CSST, BFPS, FAPTA
Consultant to Major League Baseball on the motor control of pitching and hitting.

Movement Health Essential Foundations

Described below are the physical principles that provide the essential foundations of restoring full body support of upper extremity movement health.

Healthy Biomechanics – Movement proceeding in a most efficient manner and without undue stress on noncontractile structures to preserve the integrity and prevent injury of the musculoskeletal system.

Proprioception – The unconscious perception of body position without movement and spatial orientation arising from stimuli within the body itself.

Awareness of Movement – The individual capacity to accurately perceive the coordinated joint contributions while the body is in motion. Movement awareness supports function, skill, and learning for healthy biomechanics as well as deviation from the intended therapeutic influences. Movement awareness is often referred to as kinesthesia.

Therapeutic Threshold – Optimal dosage of an intervention (exercise or modality) leading to the intended improvement. The upper limit of a stimulus of resistance for strengthening; repetitions for neuromuscular endurance; and sensory drills for balance to obtain the desired effect without injury.

Strength – The capacity to generate adequate forces to move against resistance (body weight, gravity, bat, ball, opponent).

Power – The capacity to generate sufficient force to accelerate an object (self, ball, or bat). While strength is the ability to throw a ball or swing a bat, power is the ability to move (self, ball, or bat) through the same movement, faster.

Neuromuscular Re-Education – Coordinating the nervous system for optimal muscular coordination turning muscles on and off with precision, accuracy, and reliability. This can be considered, “Getting the right message(s) to the right muscle(s) at the right time.” This is the first requirement of therapeutic strengthening, and subsequent re-establishment of healthy biomechanics.

Endurance – The ability to perform the necessary repetitive muscular contractions required to support repetitive functional movements with healthy biomechanics. This can be expressed in innings pitched, pitches thrown, consecutive days, etc.

Movement Coordination – The ability during a functional movement to sequence the appropriate muscle contractions at the most opportune time and with the most opportune intensities.

Soft Tissue Mobility – The ability of muscles, tendons, fascia, fat, blood vessels, nerves, and synovial tissues (tissue around joints) to allow necessary relational movements to support the advancement of a functional systemic movement.

Substitution or Compensation – Using muscles and joint efforts beyond those normally designed to participate in the execution of healthy movements. Generally, a sign of deficiency in one or more of the following:

- Strength and power
- Endurance
- Motor control
- Sensation (proprioception or kinesthesia)
- Soft tissue mobility

Fatigue – Point at which one loses the capacity to efficiently support healthy biomechanics and or experiences persistent pain provocations with movement. Fatigue can occur at and must be trained at each respective system that contributes: nervous system (brain, nerves through to the motor units on the muscle), vascular (blood flow), energy (oxygen or macronutrients), or tissue health (integrity of the muscle or tendon).

Michael Howell's UE Ranger Exercise Program

The following exercises were developed by Michael Howell who oversees the overhead clinic for the Lexington Clinic. He brings a wealth of experience to his role, having served as the coordinator of rehab programs for major league players with the Boston Red Sox, L.A. Dodgers, Atlanta Braves, Toronto Blue Jays and Cleveland Indians; as a scout for the Atlanta Braves; and as a member of the coaching staff with numerous high schools and youth teams. During Michael's six seasons with Chain Baseball in Savannah, Georgia, seven teams won age-division national championships, 182 players earning college baseball scholarships and 15 players signing professional baseball contracts.

This program was developed after Tim Uhl, PhD PT ATC FNATA from the University of Kentucky, contacted Michael Howell. Dr. Uhl had performed an electromyography-based (EMG) pilot study with his Athletic Training students to determine if when performing various shoulder exercises the students felt a difference between humerus supported versus not supported to better activate the rotator cuff, without having the larger deltoid over power the infraspinatus.

This concept has been further supported by research by Kang et al who used a similar concept of performing shoulder external rotation supported vs unsupported and found that the ratio EMG activity of infraspinatus to posterior deltoid was 4 to 1 in the unsupported position vs. 10 to 1 more EMG activity in the supported arm position.¹

Michael asked if he could use Dr. Uhl's extra UE Ranger and modify it. Michael put a moldable plastic cup on the UE Ranger to support the humerus and started developing eccentric and concentric strengthening exercises using the UE Ranger.

The following exercises have been performed by athletes in his overhead program since 2019 with great success.

Michael works closely with the physicians, physical therapists and certified athletic trainers at the Lexington Clinic to identify and address physical and mechanical concerns, helping to prevent injury in overhead athletes. Contact Michael Howell at mihow@lexclin.com

References

1. Kang MH, Oh JS, Jang JH. **Differences in Muscle Activities of the Infraspinatus and Posterior Deltoid during Shoulder External Rotation in Open Kinetic Chain and Closed Kinetic Chain Exercises.** *J Phys Ther Sci.* Jun 2014;26(6):895-7. doi:10.1589/jpts.26.895

Key Points

1. **Power Position:** Throwing arm is placed in 90° abduction, 90° elbow flexion, and forearm pronated. Power position is defined as traditional external rotation of the arm (upper arm at 90 degrees out to the side (abduction), elbow bent at 90 degrees towards the ceiling) and palm away from the body (forearm/hand turned away from the body (pronation)). This is not a biomechanical position for pitching but rather a position where measurements are obtained and exercises are performed. For example, a pitcher who is performing an exercise program where power position is indicated would be instructed to “wave at the center fielder” but that is not how he would pitch for real.

W. Ben Kibler, Aaron Sciascia, John Stuart Mattison Pike, Michael Howell, Kevin Wilk – **Effect of Forearm Position on Glenohumeral External Rotation in Baseball Players**, *Sports Health*, 14: 577-584, 2022

2. Adjusting weight based on age
 - a. When using weighted balls for these exercises, the ball is held and NOT thrown
 - b. Weight increases in ½ pound increments within an exercise
 - c. Age-adjusted ball weights
 - i. 15 years old or older = 4-6 pounds (4, 4.5, 5, 5.5, 6)
 - ii. 14 years old to 12 years old = 2.5-4.5 pounds (2.5, 3, 3.5, 4, 4.5)
 - iii. 11 years old and younger = 1.5-3.5 pounds (1.5, 2, 2.5, 3, 3.5)
3. ALL exercises should be performed without pain.
4. If poor mechanics are observed, stop exercise. Adjustments to mechanics/technique may be attempted but if poor mechanics persist after attempts of correction, then stop exercise as this indicates patient is not ready to perform the maneuver.
5. Performance may continue if fatigued but only if mechanics are not negatively affected by the fatigue.
6. Performance of program is recommended to be every other day.

“The UE Ranger has significantly enhanced my warmup and routine for throwing activities. The ability to isolate and engage specific shoulder muscles, while concurrently inhibiting larger muscle groups, is nothing short of impressive. The activation I am able to achieve due to this product has taken my game to another level. There’s not another product like it out there. Simply, a game changer!”

- Liam O’Sullivan - 9 year Professional Baseball Pitcher (cover photo)

UE Ranger Mobility - Devices: UE Ranger Small Base, Tube, Open Hand Support, Door Mount

Description

1. Place UE Ranger on wall at the level of the patient's shoulder
2. Patient places hand on platform of UE Ranger and stands in Power Position
3. Patient is instructed to actively flex, extend, laterally rotate, and medially rotate wrist while keeping arm stable in Power Position

Sets/Repetitions

All 4 motions performed sequentially = 1 repetition (rep)

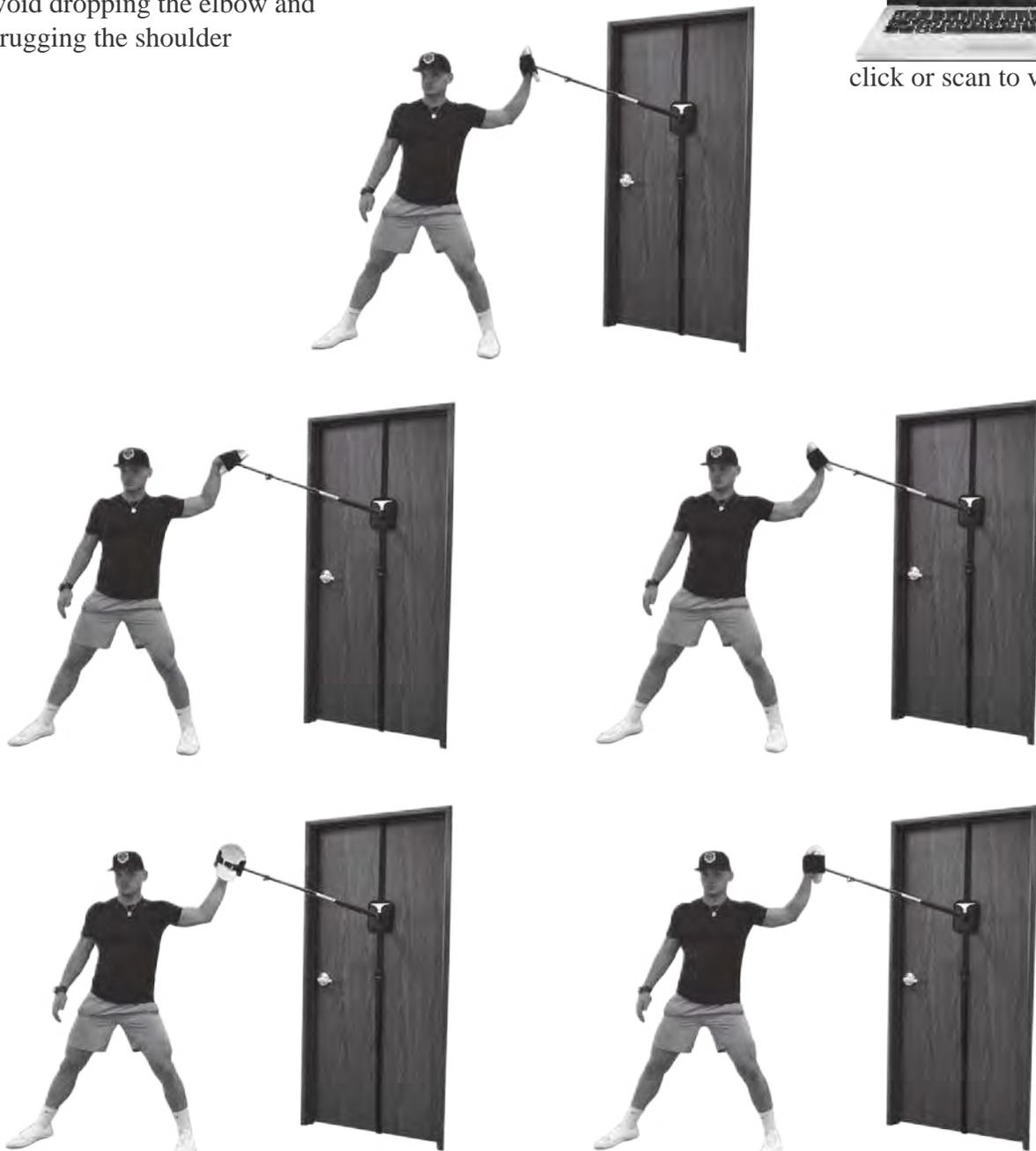
Recommendation: 1 set x 10 rep

Precautions

- Maintain humerus at 90° abduction
- Avoid dropping the elbow and shrugging the shoulder



click or scan to view video



UE Ranger Biceps Mobility - Devices: UE Ranger Large Base, Tube, Humerus Support; 2-3 pound ball

Description

1. Patient kneeling on knee of throwing arm
2. Humerus placed in UE Ranger with or without strap secured around the mid-belly of biceps brachii
3. Elbow flexed fully while holding a weighted ball
4. Patient actively extends elbow while slowly pronating forearm
5. As patient reaches full extension, the wrist should be actively flexed
6. Patient releases ball, then returns arm to starting position

Sets/Repetitions

Recommendation: 1 set x 10-15 rep

Precautions

- Avoid shrugging the shoulder
- Avoid laterally flexing or rotating the neck
- Avoid hyperextending or laterally flexing trunk



click or scan to view video



Eccentric Internal to External Rotation - Devices: UE Ranger Large Base, Tube, Humerus Support; Cord/Elastic Tubing/Pulley with 5-7 pounds of resistance applied

Description

1. Patient kneeling on knee of throwing arm
2. Humerus placed in UE Ranger with or without strap secured around the mid-belly of biceps brachii
3. Arm positioned in Power Position
4. Patient grasps cord and actively moves arm into internal rotation
5. Patient is instructed to slowly return arm to external rotation
6. Once full external rotation is achieved, patient pronates forearm (Power Position) and holds Power Position for 2 seconds

Sets/Repetitions

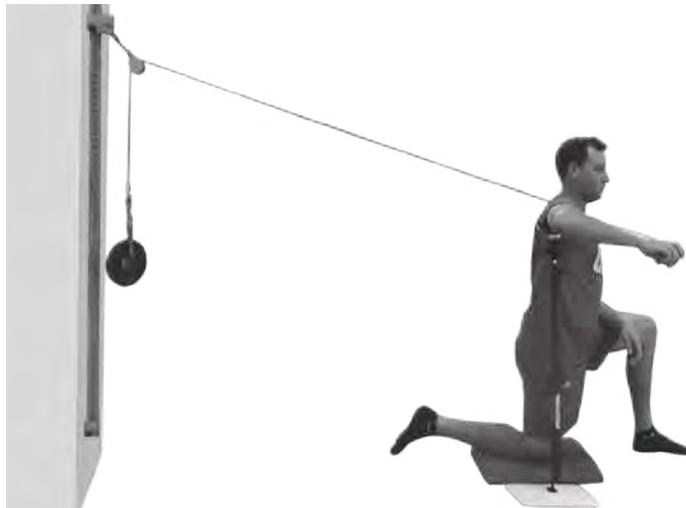
Recommendation: 1 set x 10 rep

Precautions

- Avoid shrugging the shoulder
- Avoid laterally flexing or rotating the neck
- Avoid hyperextending or laterally flexing trunk



click or scan to view video



Eccentric External to Internal Rotation - Devices: UE Ranger Large Base, Tube, Humerus Support; Cord/Elastic Tubing/Pulley with 5-7 pounds of resistance applied

Description

1. Patient kneeling on knee of throwing arm
2. Humerus placed in UE Ranger with or without strap secured around the mid-belly of biceps brachii
3. Arm positioned in Power Position
4. Patient grasps cord, rotates forearm to neutral, and slowly controls arm moving into internal rotation against resistance
5. Patient is instructed to return arm to Power Position while clinician releases resistance

Sets/Repetitions

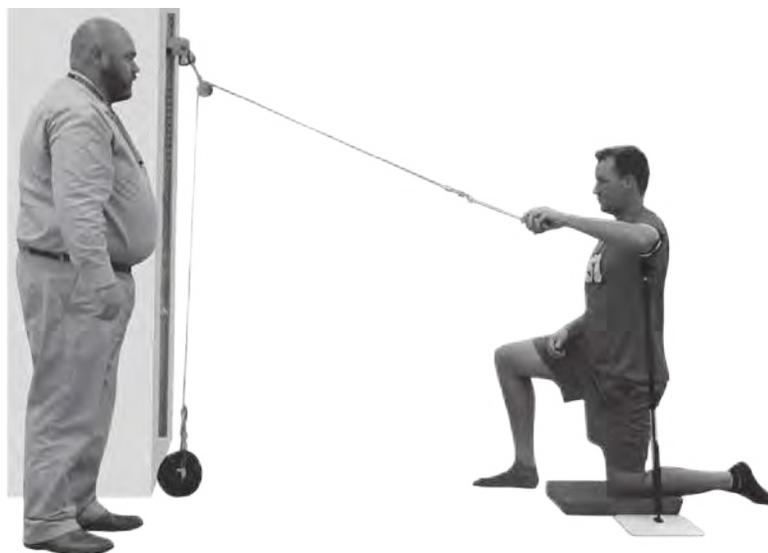
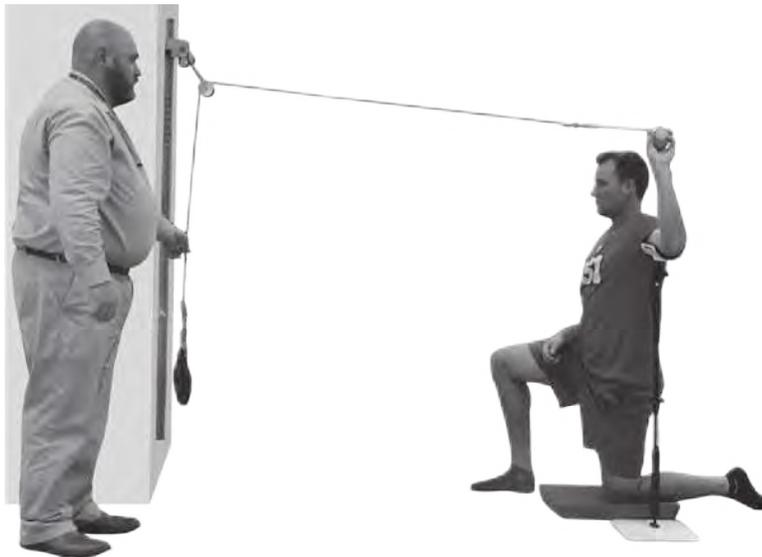
Recommendation: 1 set x 10 rep

Precautions

- Avoid shrugging the shoulder
- Avoid laterally flexing or rotating the neck
- Avoid hyperextending or laterally flexing trunk



click or scan to view video



Internal Rotation to External Rotation with Power Position

- Devices: UE Ranger Large Base, Tube, Humerus Support

Description

1. Patient kneeling on knee of throwing arm
2. Humerus placed in UE Ranger with or without strap secured around the mid-belly of biceps brachii
3. Arm positioned in 90° abduction and 90° elbow flexion
4. Patient begins with arm in internal rotation
5. Clinician places weighted ball in patient's hand
6. Patient actively externally rotates arm
7. Patient pronates forearm (Power Position) and holds 3 seconds
8. Clinician takes ball from patient's hand
9. Patient returns arm to beginning position of internal rotation
10. Clinician places weighted ball of higher weight in patient's hand
11. Patient repeats movements

Sets/Repetitions

Recommendation: 1 set x 10 rep

NOTE: 5 weighted balls are used advancing in ½ pound increments

Precautions

- Avoid shrugging the shoulder
- Avoid laterally flexing or rotating the neck
- Avoid hyperextending or laterally flexing trunk



click or scan to view video



Eccentric Internal Rotation from Power Position - Devices: UE Ranger Large Base, Tube, Humerus Support

Description

1. Patient kneeling on knee of throwing arm
2. Humerus placed in UE Ranger with or without strap secured around the mid-belly of biceps brachii
3. Arm positioned in Power Position
4. Clinician places weighted ball in patient's hand
5. Patient actively rotates forearm to neutral position and slowly controls arm moving into internal rotation holding for 3 seconds
6. Clinician takes ball from patient's hand at terminal internal rotation
7. Patient is instructed to return arm to starting position
8. Clinician places weighted ball of higher weight in patient's hand
9. Patient repeats movements

Sets/Repetitions

Recommendation: 1 set x 10 rep

NOTE: 5 weighted balls are used advancing in ½ pound increments

Precautions

- Avoid shrugging the shoulder
- Avoid laterally flexing or rotating the neck
- Avoid hyperextending or laterally flexing trunk



click or scan to view video

