

Conditioning for Golf

The Needs Analysis

In order to design the most effective golf conditioning programmes, we must first establish specific goals and objectives. In designing sports related training programmes this involves undertaking a needs analysis as the initial stage in this process.

Performing a needs analysis requires attending to the following areas:

- Evaluation of the sport
- Evaluation of movements within that sport
- Evaluation of the individual
- Evaluation of the physiology (primary metabolism) in that sport
- Evaluation of injury (both within the sport and the individual)

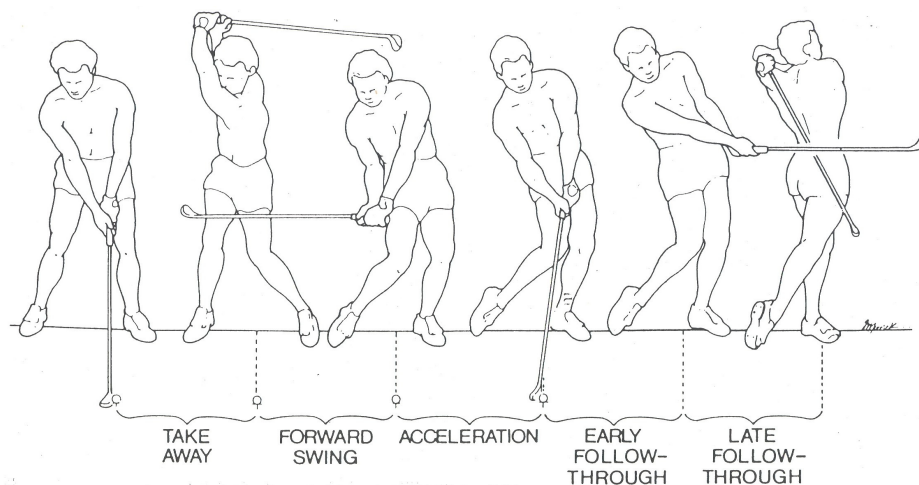
Evaluation of Sport

This enables identification of the key motor qualities or 'biomotor abilities' (Bompa 1999) which are required within the golf. A sport's analysis of golf identifies the following key abilities.

- Strength
- Static Strength Endurance
- Power
- Flexibility / Mobility

Evaluation of Movement

EMG analysis of muscular activity during the golf swing has broken the swing down into 5 phases (Jobe et al 1989). Analysis of these phases has highlighted the following key areas of muscular activity.



Bechler, J.R., F.W. Jobe, M.Pink, J.Perry, P.Ruwe (1995) 'Electromyographic analysis of the hip and knee during the golf swing' Clinical Journal of Sports Medicine 5(3): 162-166

- Phase 2 – Upper / lower gluteus maximus; gluteus medius; biceps femoris
- Analysis suggests this provides a stable base for pelvic rotation and that force generation travels from knee/hip ⇒ trunk ⇒ upper body, other work in baseball (Shaffer et al) supports this finding

Jobe, F.W., D.R.Moynes and D.Antonelli (1986) 'Rotator cuff function during a golf swing' American Journal of Sports Medicine 14(5): 388-392

- Phase 1 – L. side subscapularis
- Phase 3 – L. side subscapularis; Latissimus Dorsi; Pectoralis major.
- Very little 'deltoid' activity.

Kao, J.T., M.Pink, F.W.Job, and J.Perry (1995) 'Electromyographic analysis of the scapular muscles during a golf swing' American Journal of Sports Medicine 23(1): 19-23

- Phase 1 – R. side levator scapulae; rhomboids; trapezius
- Phase 2 – Serratus anterior

Pink, M., J.Perry and F.Job (1993) 'Electromyographic analysis of the trunk in golfers' American Journal of Sports Medicine 21(3): 385-388

- Phase 1 – R + L obliques / R + L spinal erectors
- Phase 2 - ↑↑ activity obliques / ↑↑ activity R erector
- Phase 3 - ↑↓ obliques / ↑↑ activity L erector
- Phase 4 - ↑↓ R. ↓↓ L oblique / ↓↓ activity erectors
- Phase 5 - ↓↓ R. ↑↑ L. oblique / ↑↓ erectors
- Recommend significant demands on back and oblique musculature

Pink, M., F.W. Jobe and J.Perry (1990) 'Electromyographic analysis of the shoulder during the golf swing' American Journal of Sports Medicine 18(2): 137-140

- Phase 1 – (End range) infraspinatus & supraspinatus
- Phase 2 – Latissimus Dorsi; anterior deltoid
- Phase 3 – Subscapularis; pectoralis major
- Phases 4 & 5 – Anterior deltoid

Watkins, R.G., G.S Uppal, J.Perry, M.Pink, and J.Dinsay (1996) 'Dynamic Electromyographic analysis of trunk musculature in professional golfers' American Journal of Sports Medicine 24(4): 535-538

- Phase 1 – Erector spinae / obliques
- Phase 2 – Gluteus maximus / Hamstrings / Erector spinae / Obliques
- Phase 3 – Entire trunk musculature / L gluteus maximus (stability?)
- Phase 4 – Obliques
- Phase 5 – Obliques (deceleration / eccentricly)

In summary using EMG data, observation and swing analysis the following areas can be identified as fundamental to our conditioning programme design:

- Quadriceps; Hamstrings; Gluteals
- Erector spinae; Obliques; (Entire trunk musculature)
- Rotator cuff complex; Anterior deltoid
- Latissimus Dorsi; Rhomboids; Serratus Anterior; Levator Scapulae; Trapezius

Having identified the major muscles within the golf swing it is important to complete the evaluation of movement by considering three other factors.

1. Joint angles & positions
2. Contraction type (isometric / concentric / eccentric)
3. Loading needs / Velocity of movement

Evaluation of the Individual

A specific evaluation of the individual you are working with should consider the following issues:

- Age (Biological / Chronological); Gender
- Current training / health status
- Training background / experience
- Flexibility / Mobility (Static & Dynamic)
- Performance Testing
- Fitness Polygon / Performance Profile

Evaluation of Physiology

This evaluation considers the primary metabolism involved with the golf swing and should guide us in selecting workloads, rest periods and intensities for our training.

It is important to consider the following questions in this evaluation:

1. How long does the event last?
2. Is the event performed continuously?
3. If not continuous, what is the balance between work and rest?

This analysis for the golfer highlights the importance of the anaerobic energy systems in golf performance. Each swing is completed in around 1 second (ATP-PCr), the swing follows a short time 'at address' of 5-30 seconds dependant on the golfer (ATP-PCr / Fast glycolysis); the golfer then rests for 3-5 minutes before repeating the swing again. The game requires around 4 miles of walking over a 4 hour period (average speed 1 mph) this at first glance suggests an aerobic demand, however the speed involved indicates the challenge to aerobic energy pathways will be minimal unless the individual is very sedentary or has very low current aerobic endurance levels. This means in terms of specificity we must address/challenge predominantly the ATP-PCr and glycolytic systems in our programme design.

Evaluation of Injury

The final stage of your needs analysis focuses on the injury characteristics or profile of the sport and the client or golfer. It is essential in designing safe and effective programmes that you obtain a comprehensive understanding of injury profile of golf as a sport, this provides an awareness of areas of common sites of injury during the game and may highlight areas of focus for specific preparatory conditioning work.

Several significant reviews have taken place on injury in golf, the following broad findings have been identified.

Theriault, G. and P. Lachance (1998), 'Golf Injuries', Sports Medicine 26(1): 43-57

- Injuries originate from either overuse or traumatic origin
- Elbow, wrist, shoulder and lumbar spine most common sites
- In male professionals (wrist/hand ⇒ lumbar spine ⇒ shoulder)
- In male amateurs (lumbar spine ⇒ elbow & wrist/hand)
- In females similar pattern by anatomical site, however trend for upper limb rather than lumbar spine injury

McCarroll J.R. (1996) 'The Frequency of Golf Injuries' Clinics In Sports Medicine 15(1): 1-7

- Identified the following as key anatomical injury sites:
 1. Male amateurs (Back / elbow)
 2. Male professionals (Low back / wrist)
 3. Female amateurs (Elbow / low back)
 4. Female professionals (Wrist / Low back)

You must then obtain a comprehensive history of injury for the golfer. This will include all major previous injuries along with any current injury concerns, indeed you may often find the golfer is currently playing with some kind of irritating injury problem.

(You may have noted that once you have completed the initial analysis of sport / movement / physiology and common sites of injury these sections do not require completing for each golfer. A periodic update of current research is all that you will require in these areas)

Armed with the results of your needs analysis you are now in a position to establish with your golfer the major short, medium and long term goals and objectives for their conditioning programme.

Once the needs analysis and goal setting processes are complete you are ready to design the programme.

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