Injury Prevention Strategies for Schools

Dr Mike Marshall
24 August 2017
Injury prevention strategies for schools
Injury prevention strategies for schools
Injury prevention strategies for schools

- Knowledge of injuries in school athletes
- General injury prevention programs
- Specific injury prevention programs
- The role of the coach
Injury prevention strategies for schools

- Knowledge of injuries in school athletes
- General injury prevention programs
- Specific injury prevention programs
- The role of the coach
Incidence of sports injuries at school

- 65% of all sports, recreation and exercise-related injury consultations at US emergency departments (4.3 million in 2000 and 2001) were sustained by individuals 19 years old or younger.


- Sports, recreation and exercise-related injuries were the most common cause of paediatric injuries - 19–29% of all paediatric injuries.

Increasing injuries in youth sport

- Increased number of participants (esp. girls)
- Increased duration and intensity of training
- Year-round training
- Early specialization
- Increased difficulty of skills expected & practised
- Increased participation in “extreme sports” such as skate boarding, BMX, mountain biking, rock climbing, etc.
Risks for injury in younger athletes

- Sports code, level of sport participation, contact vs. non-contact sport, weekly training time, etc.
- Greater surface area : mass
- Proportionally bigger head
- Developing brain
- “Female” (wrt ACL injuries)
- Various psychosocial factors (incl. peer pressure, domineering coach, etc.)
Risks for injury in younger athletes

- Open growth plates
- More porous bones
- More susceptible cartilage
- Imbalance between muscle strength and flexibility
- Immature coordination, skills and perception
- Less endurance
- Greater impulsiveness and recklessness
Negative effects of sports injuries

- Time away from sport
- Increased pressure to participate
- Time away from school
- Substantial medical costs
- Later sequelae:
  - Musculo-skeletal dysfunction
  - Inactive life-style
Injury prevention strategies for schools

- Knowledge of injuries in school athletes
- General injury prevention programs
- Specific injury prevention programs
- The role of the coach
FIFA 11+

- Comprehensive warm-up program (2006):
  - Comprises:
    - Running exercises (start & end)
    - Specific preventative exercises:
      - Core and leg strength, balance and agility
      - Three levels of increasing difficulty (variation & progression)
  - ≤ 20 min to complete
  - Minimal equipment (cones and balls)
# The 11+

## Part 1: Running Exercises - 8 Minutes

1. **Running Straight Ahead**
   - Description: Run straight ahead as fast as possible, maintaining good posture and form. Emphasize running with a strong, powerful stride.

2. **Running Hip Out**
   - Description: Run with one leg extended out to the side, maintaining balance and control. Focus on the fluidity of the movement.

3. **Running Hip In**
   - Description: Run with one leg extended inwards, ensuring a smooth transition of movement.

4. **Running Shoulder Contact**
   - Description: Run with one arm extended in front of you, mimicking the motion of a well-executed throw.

5. **Running Quick Forwards & Backwards**
   - Description: Perform quick forward and backward movements, incorporating rapid footwork and dynamic changes in direction.

## Part 2: Strength - Plyometrics - Balance - 10 Minutes

### Level 1: The Bench
- **Static**: Perform static exercises on the bench, focusing on core stability and lower body strength.
- **Alternate Legs**: Alternate leg exercises on the bench to enhance leg strength and balance.

### Level 2: Sideways Bench
- **Raise & Lower Hip**: Perform sideways movements raising and lowering the hip, focusing on lateral stability.
- **Dynamic**: Perform dynamic movements, focusing on explosive power and speed.

### Level 3: Hamstrings
- **Beginner**: Start with basic hamstring exercises, focusing on flexibility and control.
- **Intermediate**: Progress to more advanced hamstring exercises, focusing on strength and power.
- **Advanced**: Perform advanced hamstring exercises, focusing on explosive power and endurance.

### Level 4: Single-Leg Stance
- **Hold The Ball**: Perform single-leg stance exercises, holding a ball to enhance core stability and balance.
- **Throwing Ball With Partner**: Partner exercises focusing on coordination and strength.

### Level 5: Squats
- **With Toe Raise**: Perform squats with toe raises, focusing on lower body strength and flexibility.
- **Walking Lunges**: Perform walking lunges, focusing on lower body strength and coordination.

### Level 6: Jumping
- **Vertical Jumps**: Perform vertical jumps, focusing on explosive power and coordination.
- **Lateral Jumps**: Perform lateral jumps, focusing on lateral mobility and coordination.
- **Box Jumps**: Perform box jumps, focusing on explosive power and coordination.

## Part 3: Running Exercises - 2 Minutes

1. **Running Across The Pitch**
   - Description: Run across the pitch, maintaining good form and control.

2. **Running Bounding**
   - Description: Perform bounding exercises, maintaining a powerful and dynamic footwork.

3. **Running Plant & Cut**
   - Description: Perform plant and cut exercises, focusing on dynamic footwork and agility.

---

*Note: The exercises are designed to be performed in a circuit format, alternating between different exercises and levels to maximize muscle engagement and training efficiency.*
FIFA 11+

- FIFA 11+ performed at least twice a week by female youth football players:
  - 37% fewer training injuries
  - 29% fewer match injuries
  - Severe injury rate almost halved
  - Higher compliance associated with a significantly lower injury risk

FIFA 11+

- FIFA 11+ performed regularly not only reduces football injuries, but has the potential to substantially reduce health-related costs:
  - NZ Accident Compensation Corporation has saved NZ$8.20 for every NZ$1.00 invested in SoccerSmart Programme (including FIFA 11+)

FIFA 11+

- Meta-analysis of 12 studies of FIFA 11+ implementation showed, when done ≥ 1.5 times/week:
  - Reduction in injured players: 30% - 70%
  - Players with high compliance had 35% fewer injuries than those with intermediate compliance
  - Significant improvements in components of neuromuscular & motor performance
  - Substantial cost-saving potential

Injury prevention strategies for schools

- Knowledge of injuries in school athletes
- General injury prevention programs
- Specific injury prevention programs
- The role of the coach
Anterior cruciate ligament injury

Anterior cruciate ligament injury

- Major consequences:
  - Prolonged time away from sport
  - Surgery
  - 6 – 9 months post-operative rehabilitation
  - Long term complications (ie. knee instability, meniscus tears, cartilage injuries and development of OA

Anterior cruciate ligament injury

- 70% – 78% of ACL injuries occur in non-contact situations

Non-contact MOI includes:
- landing from a jump
- rapidly stopping or cutting
- suddenly decelerating with a change in direction

ACL injury in females

- Non-contact ACL injuries 2 – 9 (ave = 3.5) X more in females

- Female risk factors:
  - Neuromuscular recruitment patterns:
    - Slower hamstrings activation; greater quadriceps activation
  - ‘Landing’ characteristics:
    - Minimal knee flexion; hip internally rotated & adducted; tibia externally rotated; valgus stress across knee; trunk tilted laterally

- Also:
  - Anatomical differences
    - Smaller femoral notch, smaller ACL, more knee laxity, larger Q angle
  - Hormones and menstrual cycle
  - Greater flexibility

Ireland ML. The female ACL: why is it more prone to injury? Orthoped Clin N Am. 2002;33:637–51
Wider cutting technique – higher ACL injury risk

Narrower, safer cutting technique

ACL injury (Norwegian handball)
PEP program for ACL injuries

- 20 minute program done 2–3 times a week during a 12 week soccer season
- Program:
  - Educational video on safe and unsafe landing patterns
  - Team workouts:
    - stretching, strengthening & plyometrics
    - soccer-specific agility drills
- Results (intervention vs. control):
  - 1st year (52 vs. 95 teams): 88% reduction in ACL injuries
  - 2nd year (97 vs. 112 teams): 74% reduction in ACL injuries

ACL injury prevention program

- RCT of highly compliant (87%) male & female youth handball players
- Structured warm-up programme:
  - Running exercises with and without ball
  - Technique training, specifically focussed on:
    - Safe cutting movements
    - Two-feet landings after jump shots
    - Balance training
  - Strength and power exercises
- Results: 50% reduction in acute ACL injuries

Key components of ACL programs

- **Warm-up program:**
  - Combination of balance/co-ordination, technique, lower limb and core strength, plyometric and agility exercises

- **Focus on technique:**
  - A narrower cutting technique
  - Landing on two-feet landing + toe-landing
  - Proper balance on landing, with hip, knee and toes all in line

- **Vary exercises and increase difficulty (for motivation)**
- **Exercise in pairs (fun and maximise movement quality)**
- **Include ball exercises when basic exercises are well established**

Identify athletes at risk

- Screening tests can be used to identify athletes who are at greater risk for ACL injury
  - Drop vertical jump test
  - Single leg hop
  - Single leg squat
- ‘At risk’ posture of lower limb
- Specific programs for athletes at risk

Injury prevention strategies for schools

- Knowledge of injuries in school athletes
- General injury prevention programs
- Specific injury prevention programs
- The role of the coach
Ideal Coach: job description

- Have knowledge of:
  - Sports injuries:
    - Micro- and macro-traumas
    - Sport specific patterns of injuries
  - Injury prevention programs
- Deliver prevention programs effectively
- Communication skills (incl. player education, player motivation, etc.)
- Up-to-date with sport rule changes
- Work with healthcare professionals
Training considerations

- Time management
- Periodization of training schedule (to avoid overload)
- Strength & flexibility training
- ‘Grooving’ of movement patterns
- Age-appropriate training
- Early specialization

- Increased risk of injury in young athletes
Early identification of injury

- Elite young athletes not infrequently downplay their symptoms in order to continue playing.

- Coaches should be aware of the more common symptoms of injury:
  - Pain with activity
  - Changes in form or technique
  - Decreased interest in practice
  - Pain at night
Rugby injury patterns

- Systematic review of injuries in adolescent rugby:
  - Injury necessitating medical attention = 27.5 to 129.8 injuries per 1000 match hours
  - Injuries more common:
    - During the first 4 weeks of the season
    - In higher age groups & in A-team players
    - 8th men (then flanks and back-line players)
    - In the tackle (55% of all injuries)
    - In the lower limb (37%), head and neck (29%) and upper limb (20%)

Training vs. Competition

- In some studies, the majority of injuries occur during training not competitive events
- Reasons include:
  - Rules of sport aren’t applied as strictly in training
  - Protective gear may be neglected during training
- Players and coaches must be mindful of injury prevention at all times

‘Healthy’ attitude to injuries

- Accept that an injured player simply can’t perform optimally
- Insist on quality first aid
- Encourage qualified sports medicine management early
- Accept the opinion of qualified medical practitioners wrt injury management, RTP decisions, etc.
Injury prevention exercise programs

- Review of 21 trials (> 27,000 athletes; age range = 10.7-17.8):
  - Overall RR = 0.54
  - Girls profited more from injury prevention than boys
  - Significant injury reduction with:
    - Programs focussed on specific injuries (RR 0.48)
    - Programs aimed at all injuries (RR 0.62)
  - Pre-season & in-season programs similarly beneficial
  - Programs that include jumping/plyometric exercises showed significantly better injury prevention (RR 0.45) than programs without such exercises (RR 0.74)

Implementation of programs

- Assessment of injury prevention programs at a professional youth soccer academy (compared to FIFA 11+):
  - Implemented primarily by coaches (assisted by physios)
  - Multiple delivery formats + extensive use of equipment
  - Results:
    - Average 1 ‘FIFA 11+’ exercise in its original form
    - Another 4 ‘FIFA 11+’ exercises in a modified form
    - Implementation challenges included poor staff communication, competing training priorities & heavy game schedules

Implementation of programs

- Implementation of FIFA 11+ in 65 (of 125) female Norwegian football teams aged 13–17 years in one season
- Results:
  - 77% of teams completed program (mean 1.3 sessions/wk)
  - 35% lower risk of all injuries in high compliance group vs. intermediate compliance
  - Coaches who had previously utilised injury prevention training, coached teams with a 46% lower risk of injury
- Positive attitudes towards injury prevention correlated with high compliance and lower injury risk

Implementation of programs

- ACL injury surveillance (female handball):
  - 1998-99: 0.5 ACL injuries/team/season
  - 2010-11: 0.25 ACL injuries/team/season (ie. 50% reduction when compliance was good)

- “The coach is the key partner. The coach is the one who can include balance and strength exercises with knee control as a natural part of every warm-up. Our results indicate that coaches have taken our messages seriously ...” (Grethe Myklebust)

Player education

- Attitudes of Australian Football players (aged 17-38 years) regarding lower limb injury and prevention:
  - 74.4%: doing specific exercises in training would reduce injury risk
  - 64.1%: training should focus more on improving game performance rather than injury prevention
  - < ¾ of all players believed that balance (69.2%), landing (71.3%) or cutting/stepping (72.8%) training could prevent injury

Promote fair play

- Risk of injury is lowered by:
  - Respecting the rules
  - Respecting the referee
  - Respecting the opposition

- In addition:
  - Enhances enjoyment
  - Valuable life lesson
Promote fair play

- The last ‘exercise’ in the FIFA 11+ program is Promote Fair Play
Rule changes

- Head injury risk in rugby:
  - 1.94 HIAs/1000 tackles (tackler = 1.4; ball carrier = 0.54)
  - Tackle characteristics most associated with HIAs:
    - Active shoulder (vs. passive shoulder and smother tackle)
    - Front on (vs. side, back or angle approach)
    - Tackler at high speed or accelerating into tackle
    - Ball carrier static or unbalanced and ‘unbraced’
  - Body position:
    - Tackler: upright
    - Ball carrier: falling or diving
  - High contact (head-head or head-shoulder contact 4.25 X greater risk than contact below the sternum)

Rule changes

- Head injury risk in rugby:
  - 1.94 HIAs/1000 tackles (tackler = 1.4; ball carrier = 0.54)
  - Tackle characteristics most associated with HIAs:
    - Active shoulder (vs. passive shoulder and smother tackle)
    - Front on (vs. side, back or angle approach)
    - Tackler at high speed or accelerating into tackle
    - Ball carrier static or unbalanced and ‘unbraced’
  - Body position:
    - Tackler: upright
    - Ball carrier: falling or diving
  - High contact (head-head or head-shoulder contact 4.25 X greater risk than contact below the sternum)

Applying rule changes

- Accept that the changes are based on quality research
- Train correct tackling techniques:
  - Tackler: bent at the waist
    contact below the sternum
  - Ball carrier: bent at the waist
    braced
- Potential to significantly reduce HI risk to the tackler and the ball carrier

Work with healthcare professionals

... not!
Training considerations

- Time management
- Periodization of training schedule (to avoid overload)
- Strength & flexibility training
- ‘Grooving’ of movement patterns
- Age-appropriate training
- Early specialization

Increased risk of injury in young athletes
Training considerations

- Time management
- Periodization of training schedule (to avoid overload)
- Strength & flexibility training
- ‘Grooving’ of movement patterns
- Age-appropriate training
- Early specialization

Specific area of expertise of the biokineticist

Increased risk of injury in young athletes
Communication

• “South African sports medicine is 10 years behind that in Australia ...”

Dr Peter Harcourt circa 1997
Communication

• “South African sports medicine is 10 years behind that in Australia ...”

• ... in the way you communicate with the coach and the athlete”

Dr Peter Harcourt circa 1997

Dr Peter Harcourt
Melbourne Sports Medicine Physician
Thank you for your attention

Dr Mike Marshall
24 August 2017