



# BOXING FEDERATION OF INDIA

## Injury Prevention-Boxing

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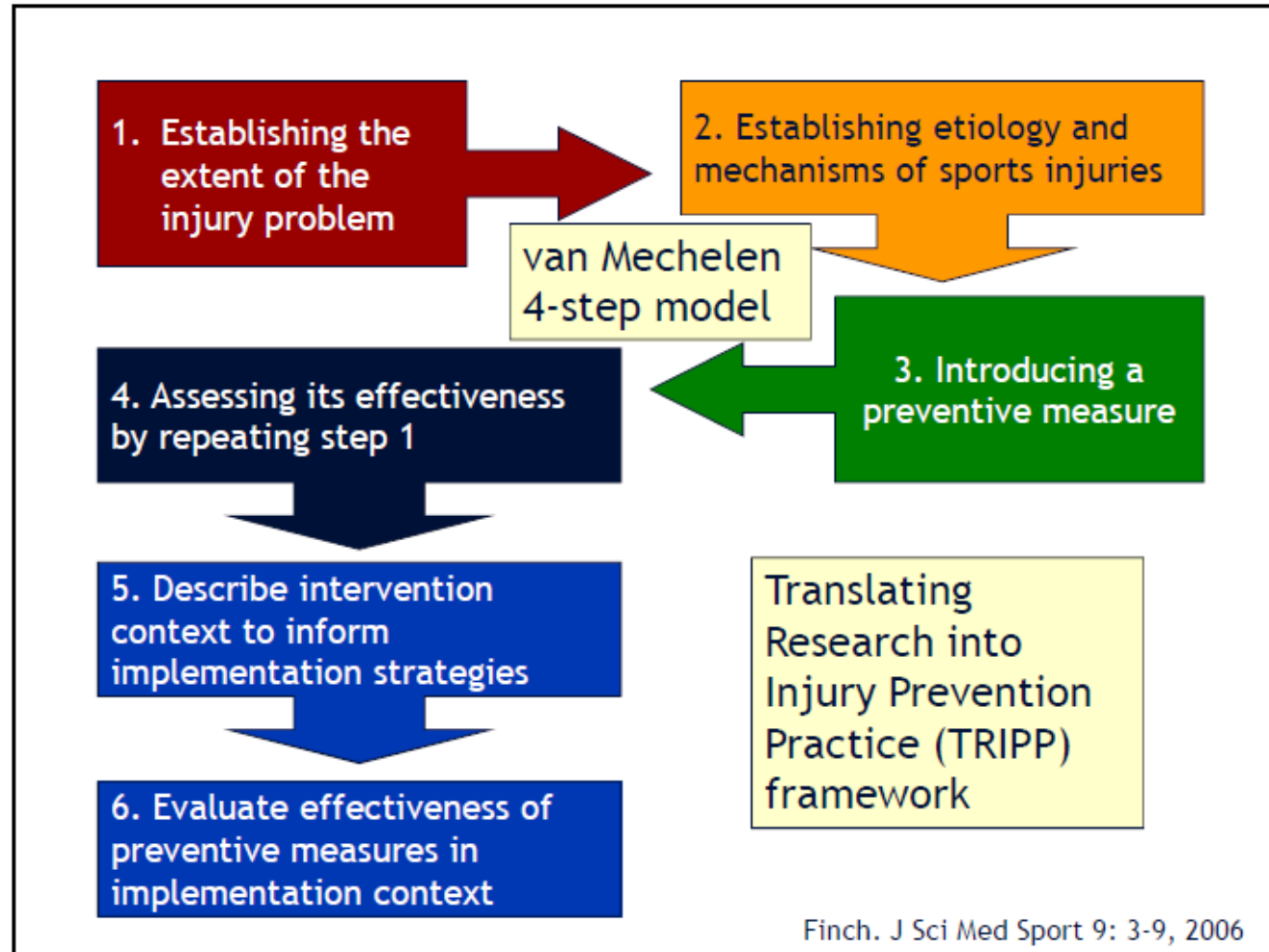
Team Physiotherapist

Elite Women National Boxing Team

# Why prevent injuries?

- Health is a priority
- Performance enhancement
- Economical aspects

# Injury Prevention Model:



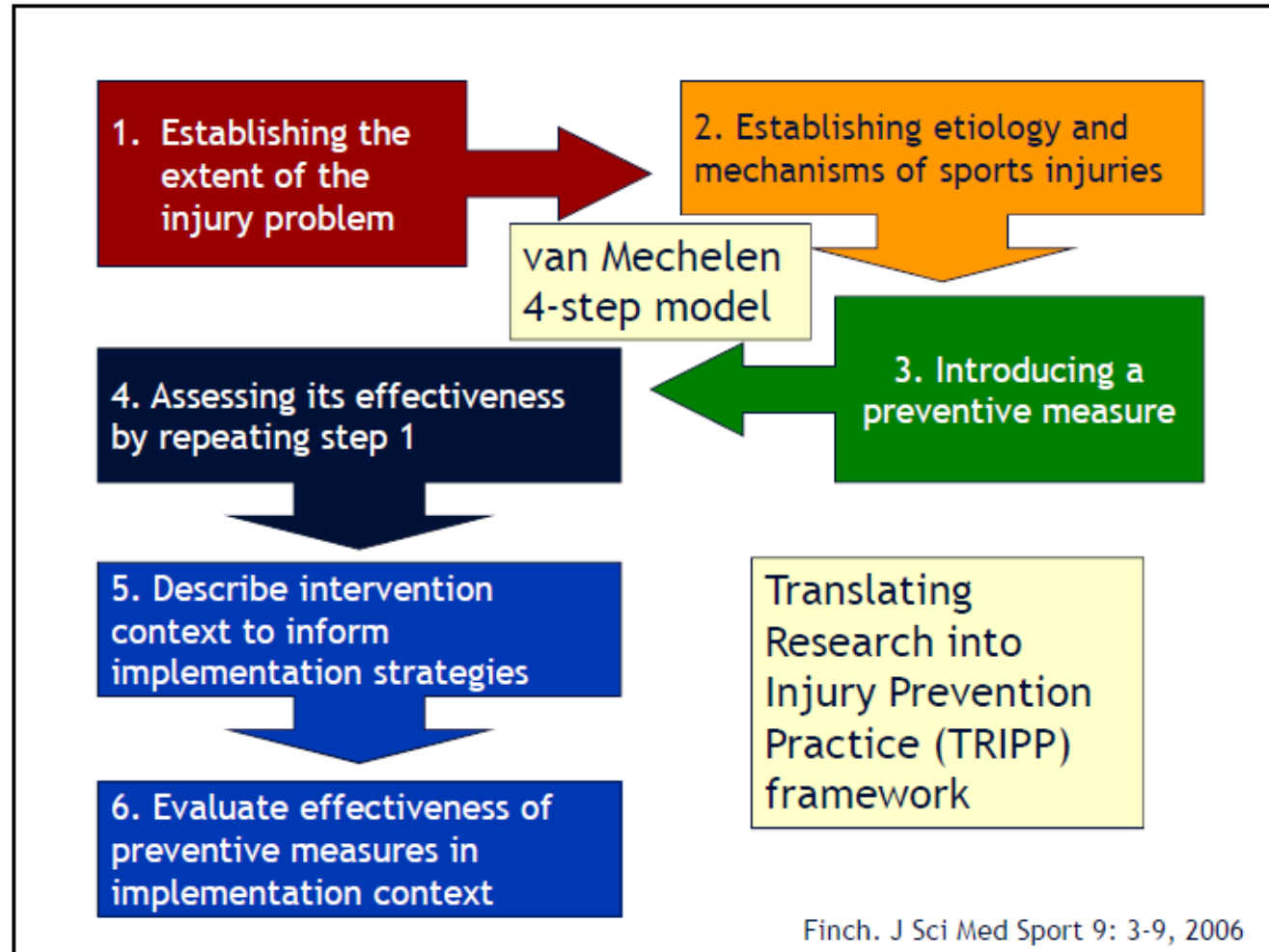
# Prevalence of injury

OLYMPIC	No. of athletes	No. of injuries	Boxing
2008- Beijing	10,977	1055	15%
2012-London	10,568	1361	27%
2016-Rio	11,274	1101	30% (Rank 2)

# Prevalence of injury

- Type of injury: Laceration/Abrasion (44%) > Contusion(bone/muscle) (18%) > Concussion (7%)
- Injured area : Head (65%) > Upper limb (21%) > Lower limb
- Punch type: Hook, straight, upper-cut
- Cause: Dehydration, poor posture (scapular dyskinesia, biomechanics), faulty technique
- Defeated boxers had thrice as injury as the winners

# Injury Prevention Model:



# Injury prevention: Levels

1. Primary (Avoid injury): pre-participation evaluation, **physiological aspects of the sport**, biomechanical, techniques, gear/equipment, play safe, follow rules, posture, **injury prevention programs**
2. Secondary (Early diagnosis and treatment): Do not ignore/hide the signs and symptoms, regular assessment
3. Tertiary (Preventing re-injury): Rehabilitation should be targeted towards reduction and correction of existing disability causing the injury.

# Injury prevention

1. ASSESSMENT
2. TRAINING and TECHNIQUE
3. EQUIPMENT



# Pre-participation evaluation

1. Medical status
2. Musculo-skeletal (posture, flags)
3. Physiological (aerobic capacity)
4. Strength and conditioning
5. Nutritional status
6. Mental health

# Physiological aspects in injury prevention

- Boxing is 70-80% aerobic, 20-30 % anaerobic
- Primary goal is to increase lactic acid tolerance and improve  $VO_2$  max

	Indian boxer	Britain
$VO_2$ max (ml/Kg/min)	49.8	63.8
Blood lactate(mMol/L)	8.24	13.5

- High altitude training
- Interval training with short rest period

(Luke et al, 2011)

# Musculoskeletal screening for injury prevention

- Questionnaires:
  - Red flag: Individual rehab with a time frame
  - Yellow flag: Load management with time frame
  - Green flag: Prevention program

# Injury Prevention Program

- **Warm-up**
  - Structured, sport specific
  - Focussed towards improving joint movements and joint control in various movements
- **Resistance training**
  - Focussed towards improving muscular strength, power, speed, endurance and general motor performance
  - Resistant towards sports-related injuries

# Injury Prevention Program

- Boxing is an **explosive** sport
- Slow is not always good
- Strength training must be ballistic : plyometrics, medicine ball drills, **explosive** training with weights or jumps
- Machine, free weights, core, functional training
- Functional training exercises (e.g. exercises with trunk rotations in boxing stance position), functional cable machines

# Injury Prevention Program

- Neuromuscular training:
  - An integrated NMT enhances physical fitness and motor competence
  - Prevents aggregation of neuro-muscular deficits
- Cool-down (active):
  - Blood-lactate recovery (peripheral)
  - Reduces neuro-muscular fatigue (central)

# EQUIPMENT

- Head-gear/chest and groin protectors
- Gloves
- Bandaging
- Mouth-guard
- Footwear

# EQUIPMENT





# Preventing common boxing injuries

- **Head:**
  - Concussion (90%)
  - Whiplash (higher the weight, higher is the punch force)
  - Head gear
  - ASBC suggestion to bring back head-gears in men
  - Neck strengthening exercises



# Preventing common boxing injuries

- Dental:
  - Tooth/jaw fracture, TMJ injury
  - Mouth guard (shock absorption and other properties, teeth clench, mouth closed)
  - First used in boxing in 1920s followed by other sports
  - Facial muscle exercises



# Preventing common boxing injuries

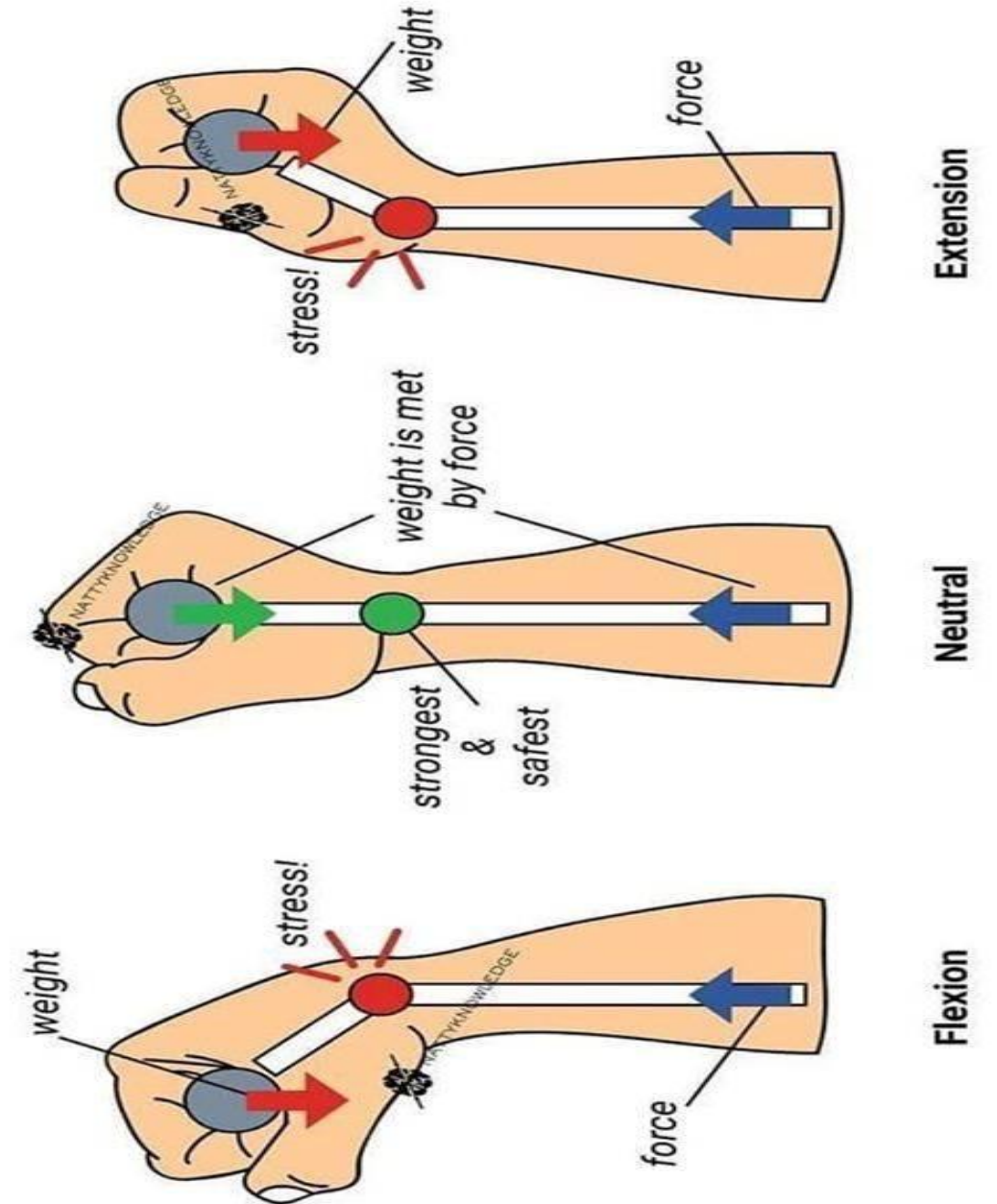
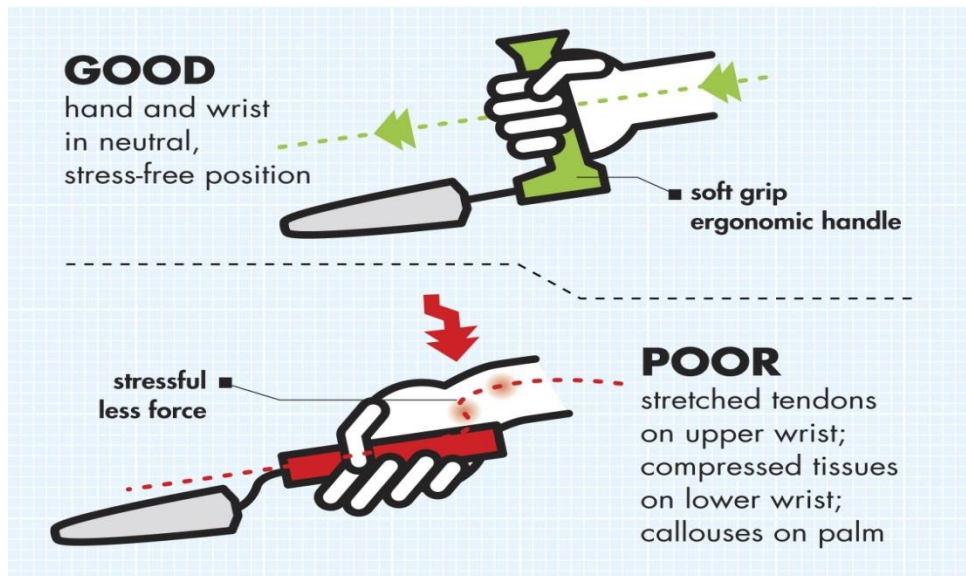


- Hand and wrist:
  - Carpal bossing (straight punch with wrist in flexion)
  - Boxer's knuckle (faulty hook technique)
  - Punching mechanics/wrist position/foam pads or thick bandage over knuckle during training/proper bandaging and wrapping
  - Absorb/diffuse detrimental forces



# Preventing common boxing injuries

- Hand and wrist:



# Preventing common boxing injuries

- Constant monitoring of pain, tenderness, disability
- Grip strength/Intrinsic muscle exercises/forearm exercises
- Push ups with wrapped fists
- Small muscles



# Preventing common boxing injuries

- Winners have stronger grip strength (58.2 kg) than non-winners



# Preventing common boxing injuries

- **Abdominal:**
  - Contusion, vital organs
  - Body punches
  - Abdominal strengthening exercises
  - Entire core
  - Protects internal organs, prevents muscle strain and contusions
  - Reduce chances of Knock outs through these punches



# Preventing common boxing injuries

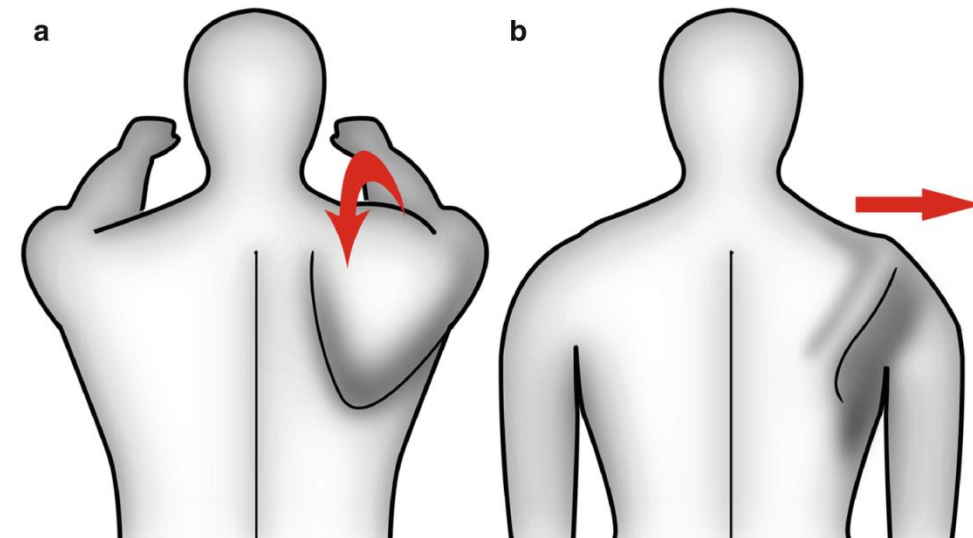
- Chest Protectors:





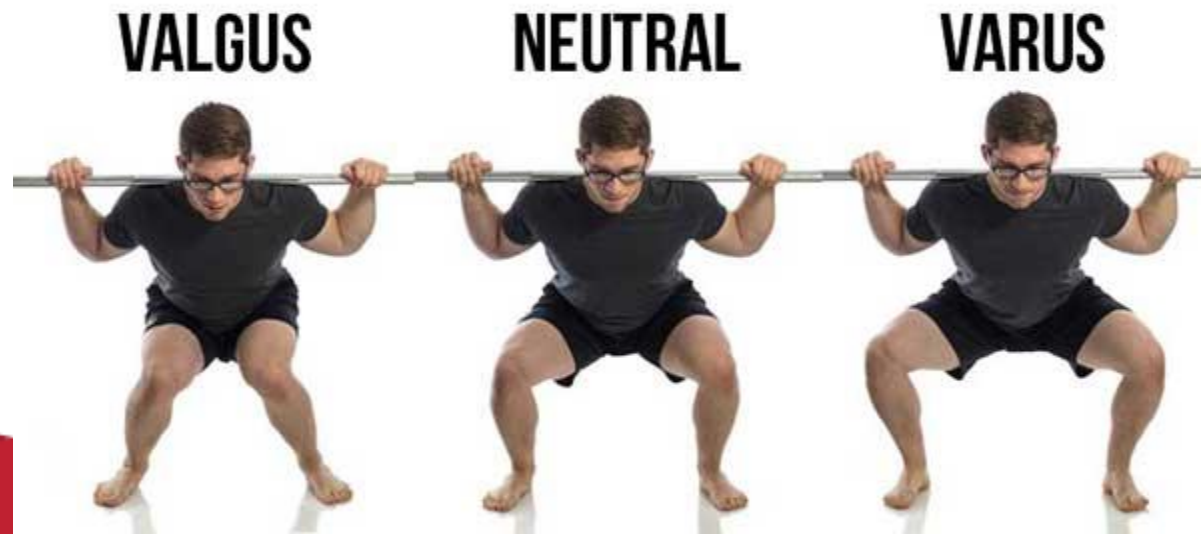
# Preventing common boxing injuries

- **Shoulder:**
  - Repetitive acceleration and deceleration during training due to repetitive punching (bag)
  - Prehab for rotator cuff and scapular stabilizers

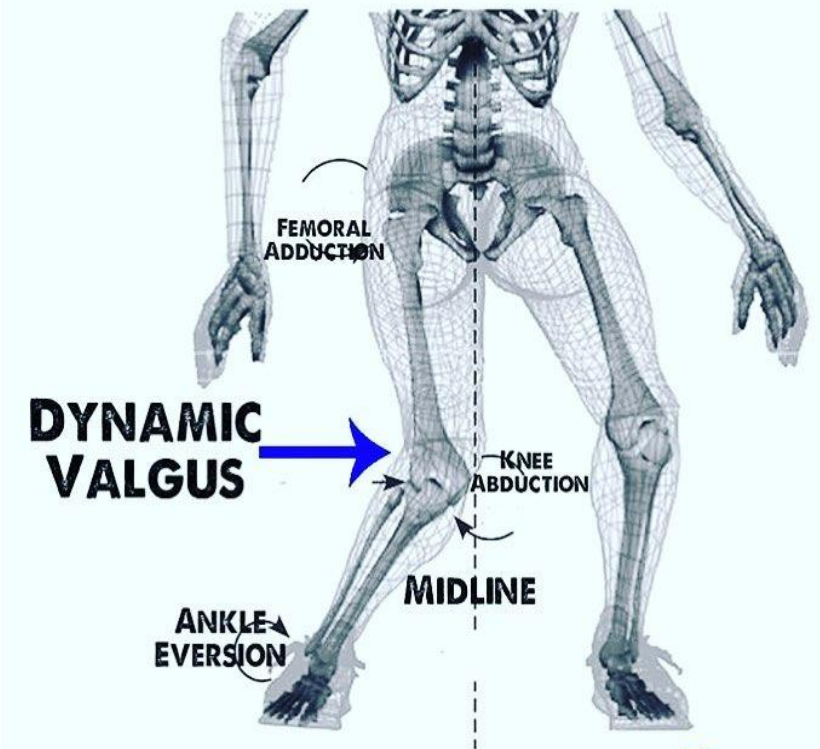


# Preventing common boxing injuries

- Lower limb:
- Knee/Ankle
  - ACL/Meniscus/Ankle sprain
  - Knee Valgus correction



## SQUATS: CONTROLLING KNEE COLLAPSE



# Preventing common boxing injuries

- **FIFA 11+**
- Footwear, duration of use, optimally tight shoe lace
- Barefoot training
- Balance exercises (NMT)

# Preventing lower limb injuries



**FIFA 11+**

**PART 1 - RUNNING EXERCISES - 8 MINUTES**

- 1 RUNNING STRAIGHT AHEAD
- 2 RUNNING HIP OUT
- 3 RUNNING HIP IN
- 4 RUNNING CIRCLING PARTNER
- 5 RUNNING SHOULDER CONTACT
- 6 RUNNING QUICK FORWARDS & BACKWARDS

**PART 2 - STRENGTH · PLYOMETRICS · BALANCE - 10 MINUTES**

**LEVEL 1**

- 7 THE BENCH STATIC
- 8 SIDEWAYS BENCH STATIC
- 9 HAMSTRINGS BEGINNER
- 10 SINGLE-LEG STANCE HOLD THE BALL
- 11 SQUATS WITH TOE RAISE
- 12 JUMPING VERTICAL JUMPS

**LEVEL 2**

- 7 THE BENCH ALTERNATE LEGS
- 8 SIDEWAYS BENCH RAISE & LOWER HIP
- 9 HAMSTRINGS INTERMEDIATE
- 10 SINGLE-LEG STANCE THROWING BALL WITH PARTNER
- 11 SQUATS WALKING LUNGES
- 12 JUMPING LATERAL JUMPS

**LEVEL 3**

- 7 THE BENCH ONE LEG LIFT AND HOLD
- 8 SIDEWAYS BENCH WITH LEG LIFT
- 9 HAMSTRINGS ADVANCED
- 10 SINGLE-LEG STANCE TEST YOUR PARTNER
- 11 SQUATS ONE-LEG SQUATS
- 12 JUMPING BOX JUMPS

**PART 3 - RUNNING EXERCISES - 2 MINUTES**

- 13 RUNNING ACROSS THE PITCH
- 14 RUNNING BOUNDING
- 15 RUNNING PLANT & CUT

# Injury prevention in Female Boxers

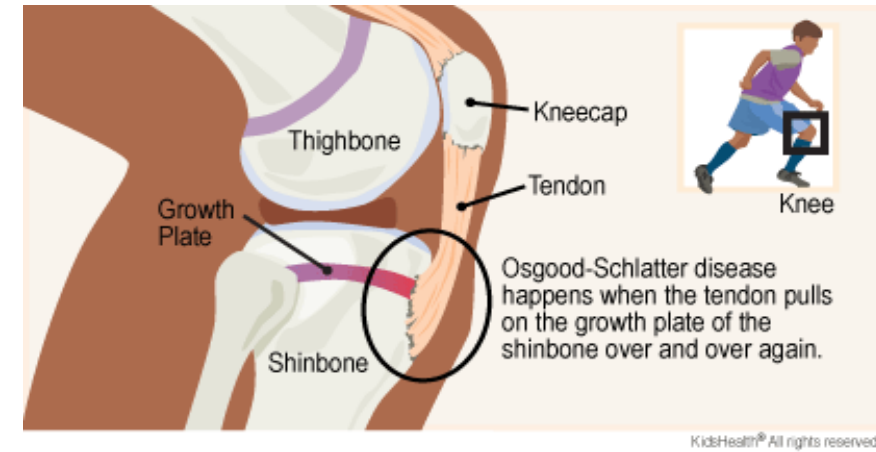
- Female athletic triad:
  - Low energy availability/Menstrual dysfunction/Low bone density
- Post pregnancy
  - Ligaments laxity
- Early diagnosis by close monitoring
- Mammary glands
- Chest-protector

(Rauh et al, 2014, Int. JI. of Sports PT)



# Injury prevention in Adolescents

- Growth spurts
- 'too much, too soon' or 'too little, too late'
- Load management
- Role of parents
- Recognize the injury risks
- Trust the coach
- Injury management



## Load management

Training load

2. Gradually adapt capacity to handle load

Capacity to handle load

1. Reduce the load

# Injury prevention in Adolescents

## IOC CONSENSUS STATEMENT ON LOAD IN SPORT AND RISK OF INJURY: HOW MUCH IS TOO MUCH?

### PRESCRIBING TRAINING AND COMPETITION LOAD

Reference: by Soligard et al., BJSM 2016

Designed by @YLMSportScience



**1** Limit weekly increases of their training load to less than 10%, or maintain an acute:chronic load ratio within a range of 0.8 to 1.3, to stay in positive adaptation and thus reduce the risk of injuries

**2** In football, playing two matches, compared to one match per week increases the risk of injury. In these circumstances, consider using squad rotation to prevent large increases in match loads for individual players



**4** Variation in an athlete's psychological stressors should also guide the prescription of training and/or competition loads

**3** Load should always be prescribed on an individual and flexible basis, as there is large intra- and inter-individual variation in the timeframe of response and adaptation to load



**5** Coaches and support staff must schedule adequate recovery, particularly after intensive training periods, competitions and travel, including nutrition and hydration, sleep and rest, active rest, relaxation strategies and emotional support

**6** Sports governing bodies must consider the health of the athletes, and hence, the competition load when planning their event calendars

# Injury prevention in Boxing Coaches

- Warm-up (sparring partners/punching pad training)
- Stretching of smaller muscles
- Head gear





### 1. Prone neck strength

3 x 8-16 repetitions

- Purpose: To strengthen the neck
- Lie on a bench with your head over the edge
- Slowly lower and raise your head
- 4 seconds per repetition
- 3 x 8-16 repetitions



### 2. Supine neck strength

3 x 8-16 repetitions

- Purpose: To strengthen the neck
- Lie on a bench with your head hanging over the edge
- Slowly raise and lower your head
- 4 seconds per repetition
- 3 x 8-16 repetitions



### 3. Shoulder stability

3 x 60 seconds

- Purpose: To increase shoulder strength and stability
- Kneel on all fours
- Keep your back straight
- Lift one arm up at a time, stretching out overhead
- Stabilize the shoulder on the weightbearing arm
- 3 x 60 seconds



### 4. Forearm strength 2

3 x 8-16 repetitions

- Purpose: To strengthen the forearm muscles
- Start with palm of your hands facing upwards
- Flex your wrist upwards and return slowly down
- Partner provides resistance
- 3 x 8-16 repetitions



### 5. Forearm strength 1

3 x 8-16 repetitions

- Purpose: To strengthen the forearm muscles
- Start with palm of your hands downwards
- Flex your wrist upwards and return slowly down
- Partner provides resistance
- 3 x 8-16 repetitions



### 6. Diagonal arm pull

3 x 30 sec

- Purpose: To improve shoulder stability
- Keep your feet stable
- Pull your partner's arms diagonally and rotate trunk
- Provide resistance to your partner's pull
- Your partner pushes you forwards and pulls you backwards
- 3 x 30 sec



### 7. Core stability

3 x 8-10 repetitions

- Purpose: To increase core stability
- Hold on to partner's legs
- Rotate legs, partner gives pushes in different directions
- Resist the movement and go back to start position
- 3 x 8-10 repetitions



### 8. Neck strength against wall

3 x 30 seconds

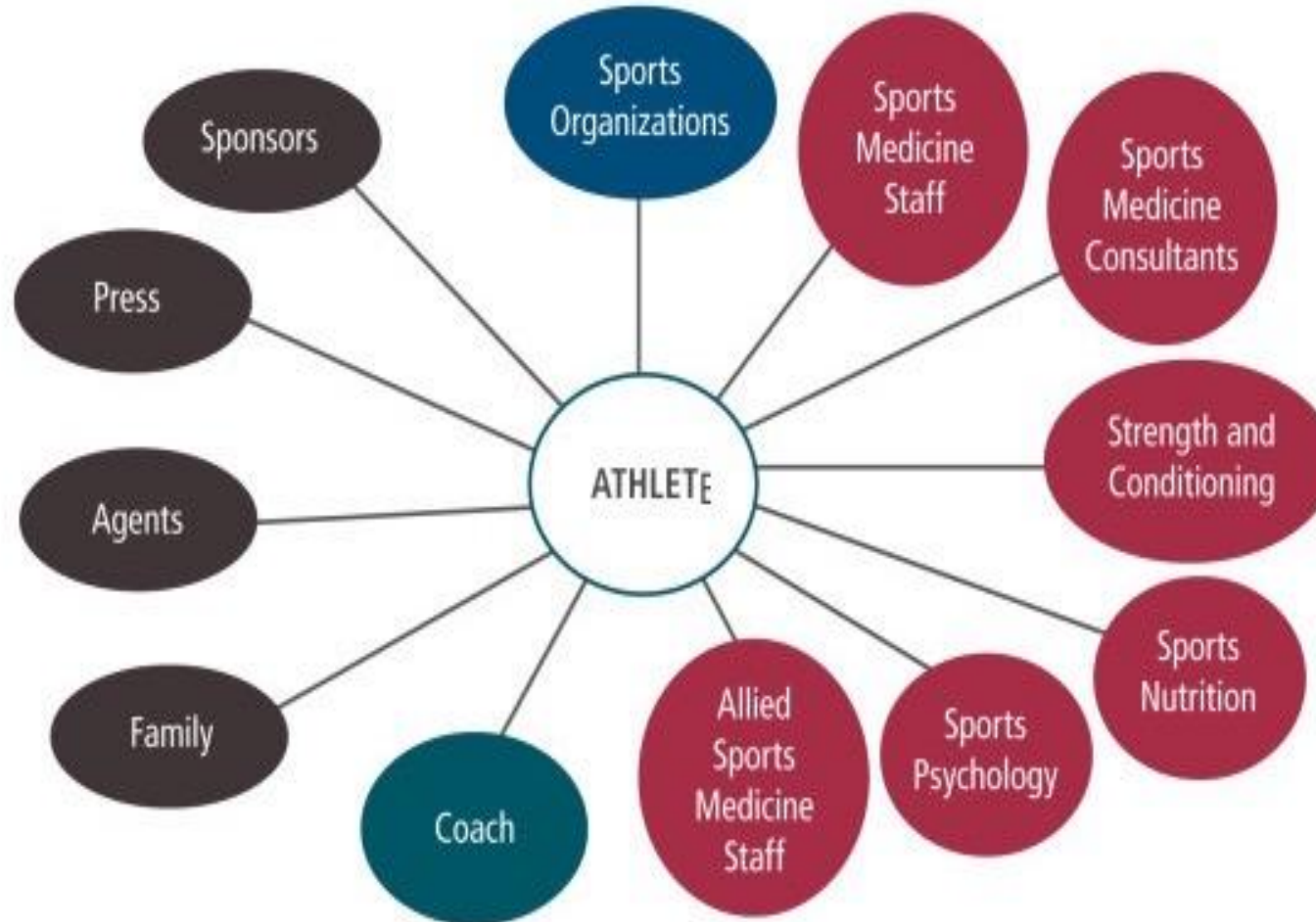
- Purpose: To strengthen the neck
- Stand 1 m from a wall, leaning on your forehead
- Flex and extend your neck by going up and down on your toes
- Progression: Increase distance from wall, or perform exercise facing the other way
- Remember to use non-slip shoes
- 3 x 30 seconds



## Multi-disciplinary approach

- Due to the complex systems involved in the nature of injuries, the responsibility for injury risk prevention and/or management cannot lie solely within a single domain of professional practice.
- Interdisciplinary collaboration between technical/tactical coaches, strength and conditioning coaches, team doctors, physical therapists and sport scientists is likely to have a meaningful impact on injury risk.

# Multi-disciplinary approach of injury prevention



Intellectuals solve problems, Geniuses prevent them...

(Albert Einstein)

**THANK YOU 😊**