Canadian model for supporting the Paralympic Coach in the daily training environment

Mike Frogley; Bruce Craven; Dr. Jared Fletcher; Dr. Judy Goss; Dr. Jon Kolb
Canadian model for supporting the Paralympic Coach in the daily training environment

Performance Enhancement Team (PET)

Integrated Support Team (IST)
Integrated Support Team (IST)
Purpose of the IST

• Work with the Coach and Technical Leadership
• Integrate the most effective Sport Science & Sports Medicine into the periodized framework of the Yearly Training Plan
• Training, Competition, Recovery, Rehabilitation
• Adjust to the quadrennial plan leading to the Paralympic Games.
Goal of the Integrated Support Team

To have healthy, fit athletes with a solid psychological platform, on the starting line.
Where do our Paralympic Athletes come from...

- Congenital vs Acquired

- Accidental vs Planned

- Stable vs Progressive
What are your Goals?

Shauna Ryan
2008 Paralympics in Goalball
2016 Paralympics in Cycling
Athlete Development

An athlete’s adaptation bears the imprint of the type of exercise systematically used in training/treatment.

Arnold Boldt
- 1976 Paralympiad High Jump
- 2012 Paralympics Cycling
Performance Excellence
Goldsmith (2003), Groves (2011)

The ability to maintain TECHNICAL EXCELLENCE

– at SPEED
– under PRESSURE
– when FATIGUED
– with the WILL TO WIN

We are what we repeatedly do. Excellence then, \textit{is not an act but a habit.}  
- Aristotle -
Health First

• Baseline multi-discipline health assessment in collaboration and relationship to performance assessment
• Individual health status and performance status monitored based on analysis of “within subject variation” vs “between subject variation”
• Individual Health and Performance case management within the IST...development of an Individual Performance Plan (IPP)
Health First

• Health Education
  – ADL’s and Sport
  – Multi-factorial aspects of stressors impacting health based on disability
    • Physical, Emotional, Environmental, Travel

• Early detection through monitoring and early intervention by appropriate provider

• Open honest communication is the key
Health First

- Health responses to training and how differ between individuals and classifications
  - Medical, Physiological, Psychological
- Bowel and Bladder (monitor and communicate change)
- Skin Conditions (monitor and communicate change)
- Changes in medications (OTC and Prescription)
- Changes in muscle tone
- Changes in nerve pain
- ADL and impact on recovery (seasonal)
  - Impact of training fatigue on ADL and daily energy expenditure
Health First – Acquired Injuries

- Initial recovery from injury
- Clearance to start training … major//minor injuries
- Acceptance of changes
  - What’s Lost – What’s Changed – What Remains
- Classification relative to sport
  - Eligible Impairment
  - Minimum Disability Criteria
  - Technical Assessment for sport and ADL’s
- Previous Training History
  - Training Loads
  - Training Adaptations
Mobility – Stability - Skill

• Mobility
  – Quantity and Quality
  – Active//Passive ROM
  – Spasticity//Tone//Stiffness issues

• Stability
  – Internal stability … cortical vs brainstem control
  – External stability … bracing/rods

• Mobility on Stability
  – Changes in mobility with changes in stability
    (internal//external) … classification impact

• Skill
  – Development with respect to changes in mobility//stability
Mechanical Loading

GRAVITY

MUSCULAR FORCES

a)

b)

c)
Mechanical Changes
Gravity and Muscles

• Impact of changes in muscle function
  – Changes in muscle function
  – Changes in muscle Tone of muscle function
  – Gravitational loading changes
    • Standing/Sitting posture
  – Muscle trainability with respect to cortical control versus brain stem/mid brain influence
Training and Injury

• Planning for interventions and planning for impact in loading and recovery strategy
• Monitor Acute/Chronic load and recovery strategy to ensure optimal loading and monitor signs & symptoms of altered mechanical loading on tissue
What coaches need from Sports Science (Foster et al. IJSPP, 2017)

1. Evaluate athlete potential

2. To evaluate the athlete’s current status

3. To evaluate how the athlete is responding to training

4. To measure progress, that is translatable into performance
Response to training

Week 0
Week 8

Heart Rate (bpm)

Speed (m/s)

0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50

100 110 120 130 140 150 160 170 180 190 200
Response to training

Week 0

Week 8

Heart Rate (bpm) vs. Speed (m/s)
Performance evaluation:
Female S10, 1 year prior to Paralympics

\[ \Delta \text{Test Performance} \]
2.2%
-1.3%

\[ \Delta \text{Race Performance} \]
2.2%
-1.3%
Bridge the gap between science and practice: knowledge transfer

Verhagen et al., BJSM, 2014.
Example from Canadian Para-swim team

**Competition Warm-up**

- **Gap time**
  - **43±5 mins**
  - **41±9 mins**

### Timeline - Day 2 Finals

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Experimental Warm-up (EWU):
- Higher muscle temperature
- Less muscle fatigue
- Greater performance
Turning theory into practice

- Passive heating
- Remain active
- *Without fatigue*
0.8% (0.5s) improvement

Swim warm up
Best time (%)

No Heat               Heat

*p<0.002
Fatigue present during recovery is called low-frequency fatigue (LFF)
Is LFF present in our athletes?

LFF:
Long-lasting
Reduced maximum
Optimal recovery?
• Does low-frequency fatigue differ between sport classes?
• Does low-frequency fatigue relate to other objective and/or subjective markers of fatigue in athletes?
• Can we use this information to guide training prescription?
Coach: “Is athlete ready to train?”

Subjective Questionnaire

Peripheral Questionnaire

Central Questionnaire

Effort Perception

RPE, sRPE

Cardiovascular Training heart rate

Neurological
Summary

• Sport physiologists attempt to:
  • Synthesize data regarding:
    • Athlete adaptation/response to training
    • Athlete capabilities and limitations
  • Bring research theory into practice
  • Communicate that information to the coach, in a way he/she can understand

• Challenges:
  • Performing the research in decentralized program
  • Disseminating the knowledge to the home program
Canadian IST Model: The process of building the IST

Provide the vision for the program
The process of building the IST

Determine the style of play or athlete you want
The process of building the IST

Outline the key elements that you want
Technical

- Review and analysis of skills to improve and raise the foundation of your basketball game to an international level.

Tactical

- Review and analysis of patterns and decisions to improve and raise the foundation of your basketball game to an international level.
Mental
• Improve ability of athlete to achieve ideal performance state through enhanced self awareness and other skills

Physical
• Prepare an athlete to meet the physical demands of wheelchair basketball at the international level

Health
• Assess, treat, and run preventative programming to allow the athlete to train and compete in the best health as possible

Nutrition
• Help the athlete acquire the necessary energy to compete at the international level

Equipment
• Develop enhanced technique for certain skills to minimize injury risks and maximize desired skill
The process of building the IST

Meet with each IST member to establish outcomes, measures and plans
The process of building the IST

Meet with the whole group to align the plans
Canadian IST Model: The Coaches Role

Establish a clear vision, style and elements
Canadian IST Model: The Coaches Role

Provide the outcome for each element
Canadian IST Model: The Coaches Role

Let each IST be the expert in their area
Canadian IST Model: The Coaches Role

Connect the different areas
Canadian IST Model: The Coaches Role

Encourage creativity in achieving the outcome and in coming up with new ideas
Canadian IST Model: The Coaches Role

Balance long-term baking and short term fixes
Canadian IST Model: The Coaches Role

Remember they are a team and they are part of the team so develop them with that in mind.
CANADA