BLUF:

- A well-structured and periodised load carriage conditioning program can reduce the negative impacts of carrying load and optimise operational performance

Introduction

- Tactical operators are required to carry load as part of their occupation
- Carrying these loads can place the operators at risk through reducing occupational task performance and causing injury
When you get shot at, you move as fast as you can...but it wasn’t very fast. You are just tired. So tired.

Justin Kalentis, US Army, wounded in Afghanistan, discussing the loads they were carrying quoted in The Seattle Times (14 Feb 11)

Risks Associated with Load Carriage

- Injuries: Associated with a variety of injuries (from skin blistering to muscle, ligament, tendon, bone and nervous system injuries)

Risks Associated with Load Carriage

- Decrements in performance:
  - ↓ Mobility (Park et al., 2008:2010; Ruby et al., 2003)

RISKS ASSOCIATED WITH LOAD CARRIAGE

- Decrements in performance:
  - ↓ Mobility (Park et al., 2008:2010; Ruby et al., 2003)

Australian Fire Season 2013 – Firestorm moved at speeds of up to 31-37 mi/h
RISKS ASSOCIATED WITH LOAD CARRIAGE

- Decrements in performance:
  - Mobility
    - Impacts not new
    - Assyrian Spearmen (Orr, 2010)
    - Impacted on battle tactics in major conflicts (Lothian, 1921)

  - Lethality
RISKS ASSOCIATED WITH LOAD CARRIAGE

• Decrement in performance:
  – ↓ Lethality
    • ↓ Grenade throw distance (Harper et al., 1997; Knapik et al., 1990-1991)

RISKS ASSOCIATED WITH LOAD CARRIAGE

• Decrement in performance:
  – ↓ Lethality
    • Ave soldier grenade throw distance = 40m

A. Lethal Radius - 6 metres
B. Casualty Radius - 15 metres
C. Danger Radius - 30 metres

Risks Associated with Load Carriage

• Decrement in performance:
  – ↓ Mobility + ↓ Lethality
• Decrements in performance:
  – Pandorph et al., (2002) 4 Step Over hurdles at 6.3m had time increase from 5.4s-6.8s (+1.4s) = 14 rds from AK47 on full automatic

Risks Associated with Load Carriage

• Decrements in performance:
  – ↓ Attention to task
  – ↓ Alertness: Attention to task: Response to stimuli (Johnson et al., 1999; May et al., 2009; Mahoney et al., 2007)

• The IED?
Risks Associated with Load Carriage

- Decrements in performance:
  - The IED? (Would they notice?)

Load Carriage Conditioning

- Concept is not new (Flavius Vegetius Renatus - Epitoma rei militaris)

Formal Load Carriage Conditioning

Orr et al. (2010)

- Initial literature search identified 8,053 papers.
- Further 36 papers gathered from colleagues.
- 8089 papers reduced to 214 papers following implementation of exclusion criteria
- Secondary literature search reduced papers to seven original research papers, one conference paper and four secondary source papers (military reports, journal articles).
F.I.T.T Formula (Frequency, Intensity, Time & Type)

- **F.** 10-14 days per load carriage session
- **I.** To loads required (Last decade 40-50kg) at the speeds and over the terrains required
- **T.** Duration of load carriage operations
- **T.** Load carriage preferable, but combined resistance and cardio may be of some benefit

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### Load Carriage Conditioning

**Knapik et al., (2012)**

- **Method:** Review of several literature databases
- **Results:** 11 Publications from 10 original studies
- **Discussion:**
  - Substantial trg effect with Progressive RT combined with Aerobic trg (3x4/52)
  - Effects greater when LC added specifically
  - Field based training (inc LC) also very effective
  - RT or Aerobic trg alone had varying effects

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### Load Carriage Conditioning

Considering Intensity – Gender / Fitness differences for same given task

Load Carriage Conditioning
Integrated Periodisation

• Informal conditioning
  – Load carriage conditioning as a supplement to everyday tasks
Load Carriage Conditioning

• Informal conditioning - can be used to counter
  – Limited training time
    • Patrol Order/Fighting Order – Mondays

Load Carriage Conditioning

• Informal conditioning - can be used to counter
  – Specific negative impacts associated with load carriage task performance

Load Carriage Conditioning

• Informal conditioning - but must consider what’s next.
Take Home:

To improve load carriage performance and reduce the risks associated with load carriage (including injury and reduced tactical performance) a well designed and progressive LC program (including both formal and informal conditioning) is needed.

This program would include specific LC events, preferably every 7-14 days, progressing to meet with occupational requirements while consider other elements of workplace requirements.

References:

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