International
Paralympic Committee

Return to play guidelines following acute illness

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Presentation Outline

1. How common is acute illness in Summer Paralympic athletes?
2. What are the common systems affected by acute illness in Paralympic athletes?
3. What are the consequences and possible medical complications of acute illness during exercise?
4. What are the guidelines for return to play (RTP) during (and after) acute illness?

How common is illness at Summer Paralympic Games?

Original article

Illness and injury in athletes during the competition period at the London 2012 Paralympic Games: development and implementation of a web-based surveillance system (WEB-IISS) for team medical staff

Wayne Derman,[1,2] Martin Schwellnus,[1,2] Esme Jordaan,[3] Cheri A Blauwet,[4,5] Carolyn Emery,[6,7] Pia Pit-Grosheide,[5] Norma-Angelica Patino Marques,[5,8] Oriol Martinez-Ferrer,[5,9] Jaap Stomphorst,[5,10] Peter Van de Vliet,[5,11] Nick Webborn,[12] Stuart E Willick[5,13]

Original article

Factors associated with illness in athletes participating in the London 2012 Paralympic Games: a prospective cohort study involving 49 910 athlete-days

Martin Schwellnus,[1,2] Wayne Derman,[1,2] Esme Jordaan,[3] Cheri A Blauwet,[4,5] Carolyn Emery,[6,7] Pia Pit-Grosheide,[5] Norma-Angelica Patino Marques,[8,5] Oriol Martinez-Ferrer,[5,9] Jaap Stomphorst,[10,5] Peter Van de Vliet,[5,11] Nick Webborn,[12] Stuart E Willick,[5,13]

Incidence of illness

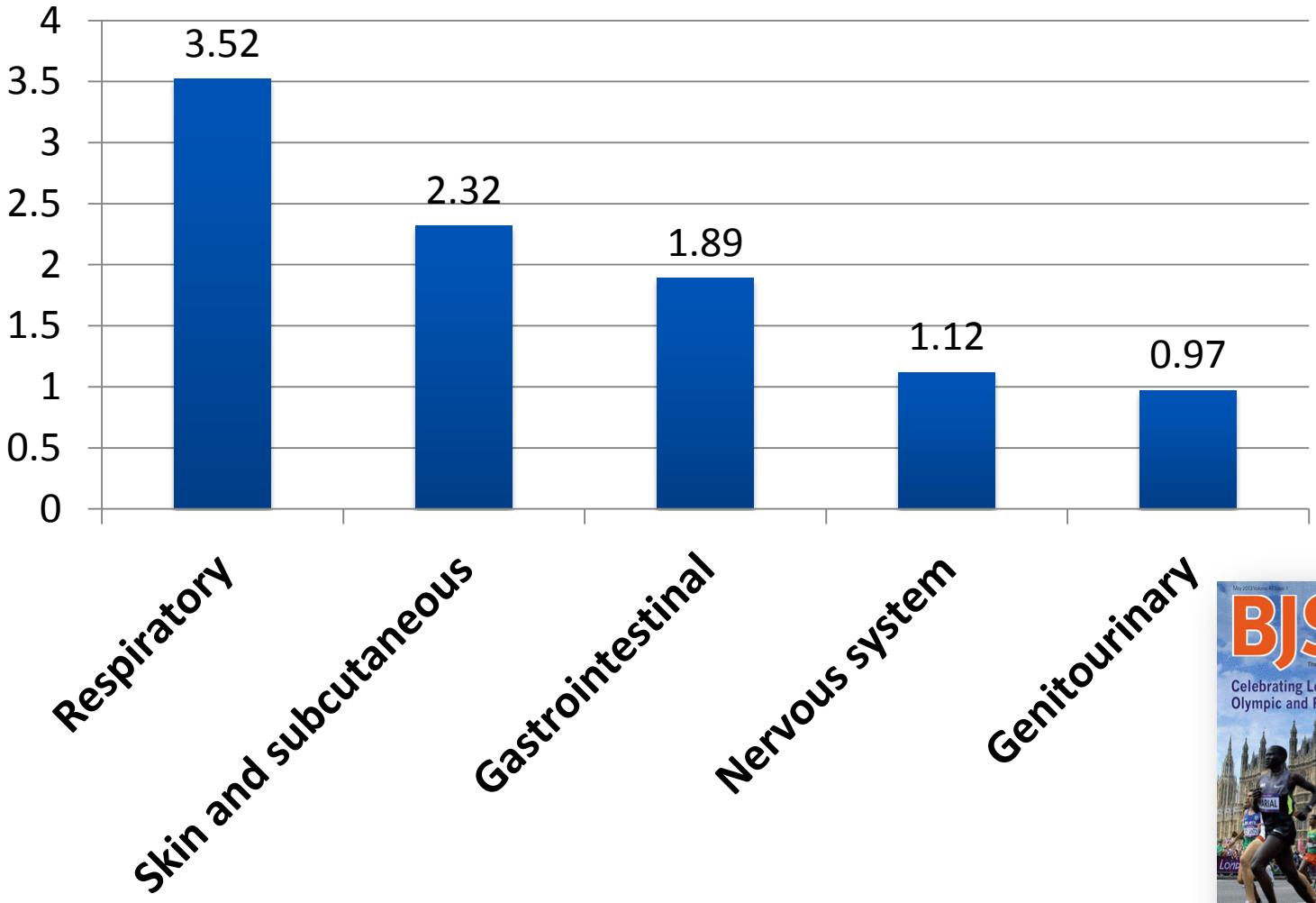
14.2% athletes
13.2 per 1000 athlete days
1 per 75 athlete days

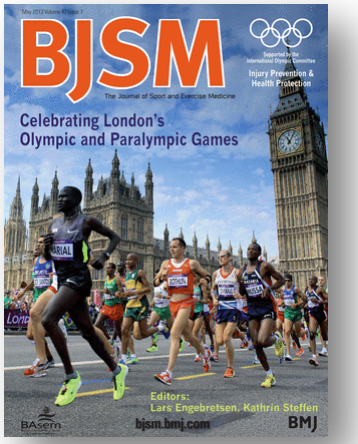
Team size	New illness frequency
25	One athlete every 3rd day
38	One athlete every 2nd day
75	One athlete every day
150	Two athletes every day

Summer Olympic Games:
7% Illness

Summer Paralympic Games:
14.2% Illness

Illness by system affected
(per 1000 player days)





Effects of acute infections on exercise performance

System	Influence
Musculoskeletal	• Muscle wasting (decrease in protein content) • Decrease in muscle strength (isometric and isotonic) • Decrease in muscle endurance • Mitochondrial abnormalities
Cardiovascular	• Decrease in aerobic exercise capacity • Increase in heart rate at submaximal exercise intensity • Decrease in stroke volume → Decrease in cardiac output
Neurological	• Impairs motor coordination • Decreased neuromuscular transmission
Metabolic	• Catabolism of muscle protein • Increased uptake of amino acids in the liver and other organs • Decrease in muscle enzyme activity • Decreased levels of serum fatty acids • Decreased mobilisation of fatty acids from the fat deports • Increase in the proportion of energy arriving from CHO metabolism • Higher lactate levels at all stages during a graded exercise test • Increase in glucagon, growth hormone and cortisol • Hyper-insulinaemia • Decrease in oxygen uptake • Inability to maintain euglycaemia

Dick N, Diehl, J; Sports Health, 6(3), 2015
Van Tonder, A: MPhil Sport and Exercise Medicine dissertation 2015

Acute self reported illness negatively affects exercise performance

(Did not finish rate - % athletes started)

Clinical point

1. Athletes with any symptoms of an acute pre-competition illness had a 1.6 X greater chance of not completing the event
2. Athletes with symptoms of an acute systemic pre-competition illness had a 1.9 X greater chance of not completing the event

Van Tonder A, Schwellnus M, Swanevelder S, et al: BJSM 2016

Physician diagnosed acute systemic illness affects exercise performance

(Did not finish rate - % athletes started)

Clinical point

1. Athletes with diagnosed systemic illness > 24 hours before the event had a 5 X greater chance of not completing the event
2. Athletes with diagnosed systemic illness < 24 hours before the even had a 7 X greater chance of not completing the event

*: Significantly different from CON group

Gordon L, Schwellnus M, et al: (in preparation)

Potential medical complications of an acute infective illness during exercise

System	Complication
Cardiovascular	Viral myocarditis Myopericarditis Dysrhythmias Sudden cardiac death
Neuromuscular	Rhabdomyolysis with or without acute renal failure Joint, ligament and tendon injuries due to impaired motor coordination, reduced muscle strength and endurance
Respiratory system	Bronchial hyper-reactivity
Others	Affects on fluid homeostasis (ADH production reduced in fever, fluid loss with fever) Post-viral fatigue syndrome Increased duration and severity of symptoms of illness Ruptured spleen (IM) Heatstroke Disease transmission to other athletes

Dick N, Diehl, J; Sports Health, 6(3), 2015
Van Tonder, A: MPhil Sport and Exercise Medicine dissertation 2015

Pre-event acute illness increases the risk of medical complications

Clinical point

Athletes with any pre-event acute illness, who chose to start the event, had a 2.3 X greater risk of developing a medical complication during the event

*: Significantly different from control

Gordon L, Schwellnus M, et al: (in preparation)

What are the return to play guidelines for athletes with acute illness? Historical approach

1. "Neck check': First described in 1993 (Eichner)
2. Clinical tool: Based on an abbreviated medical history and findings of a clinical examination
3. Main criteria
   - Symptoms above the 'neck':
     Limited return to sport (submaximal exercise and re-evaluate)
   - Symptoms below the neck or systemic symptoms:
     No sport and re-evaluate
4. Never been systematically studied or validated

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SPORTS SCIENCE EXCHANGE

CONTAGIOUS INFECTIONS IN COMPETITIVE SPORTS

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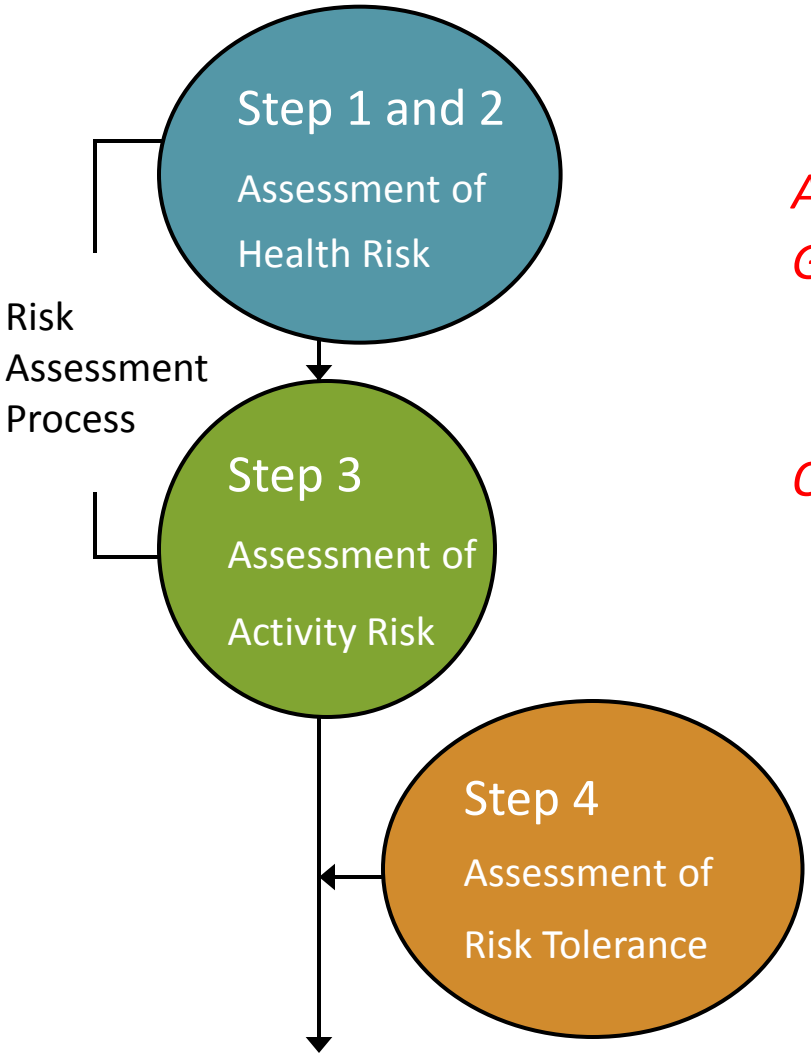
KEY POINTS

1. Exercise can change blood levels, proportions, and functions of white blood cells, especially natural killer cells. These changes are generally modest and brief, but they may have clinical importance.
2. Whether exercise helps or harms immunity or increases the chance of acquiring upper respiratory tract infection (URTI) or other infections is still debated, but may depend on the stress level involved.
3. The risk today of contracting HIV through competitive sports is next to zero, although a theoretical risk exists for wrestling and certain other "blood sports."
4. Prevention of infections among athletes hinges on common sense, good hygiene, prudent immunization, wise training, and "universal precautions."
5. A practical gauge for the athlete with URTI is the "neck check," wherein symptoms below the neck should preclude strenuous exercise, whereas those above the neck may be less serious.

2016 Modified StARRT Framework for RTP Following Acute Illness (Modified from Shrier I, BJSM 2015)

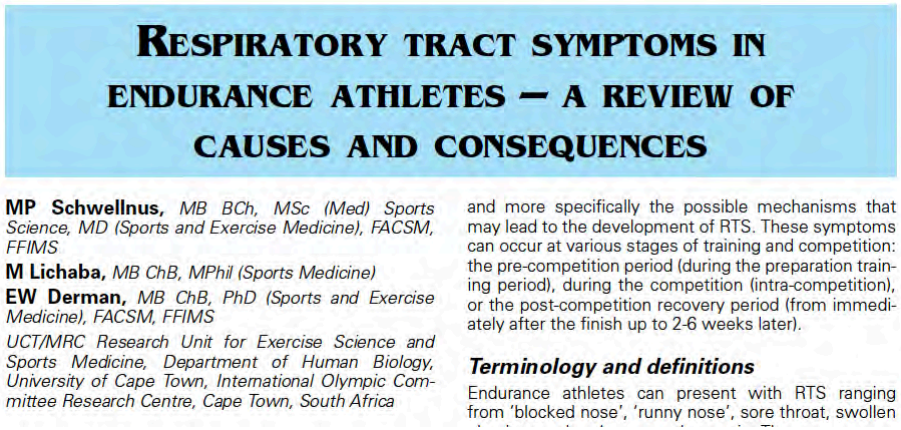


Accurate diagnosis and
General Athlete Health Risk

Organ System Stresses

Step 1: Make an accurate diagnosis!!!
What is the causes of the acute respiratory tract illness (RTI) in athletes?

a. Infective (viral, bacterial, fungal, other)
b. Allergies
c. Physical factors related to increased air movement during exercise
   (cold, dry air, increased air turbulence, mouth-breathing, and inhaled physical or chemical irritants)
d. Other diseases



RESPIRATORY TRACT SYMPTOMS IN ENDURANCE ATHLETES — A REVIEW OF CAUSES AND CONSEQUENCES

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and more specifically the possible mechanisms that may lead to the development of RTS. These symptoms can occur at various stages of training and competition: the pre-competition period (during the preparation training period), during the competition (intra-competition), or the post-competition recovery period (from immediately after the finish up to 2-6 weeks later).

Terminology and definitions

Endurance athletes can present with RTS ranging from 'blocked nose', 'runny nose', sore throat, swollen

Schwellnus M, et al; Current Allergy & Clinical Immunology, June 2010; 23 (2)

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Return to play after acute infectious disease in football players

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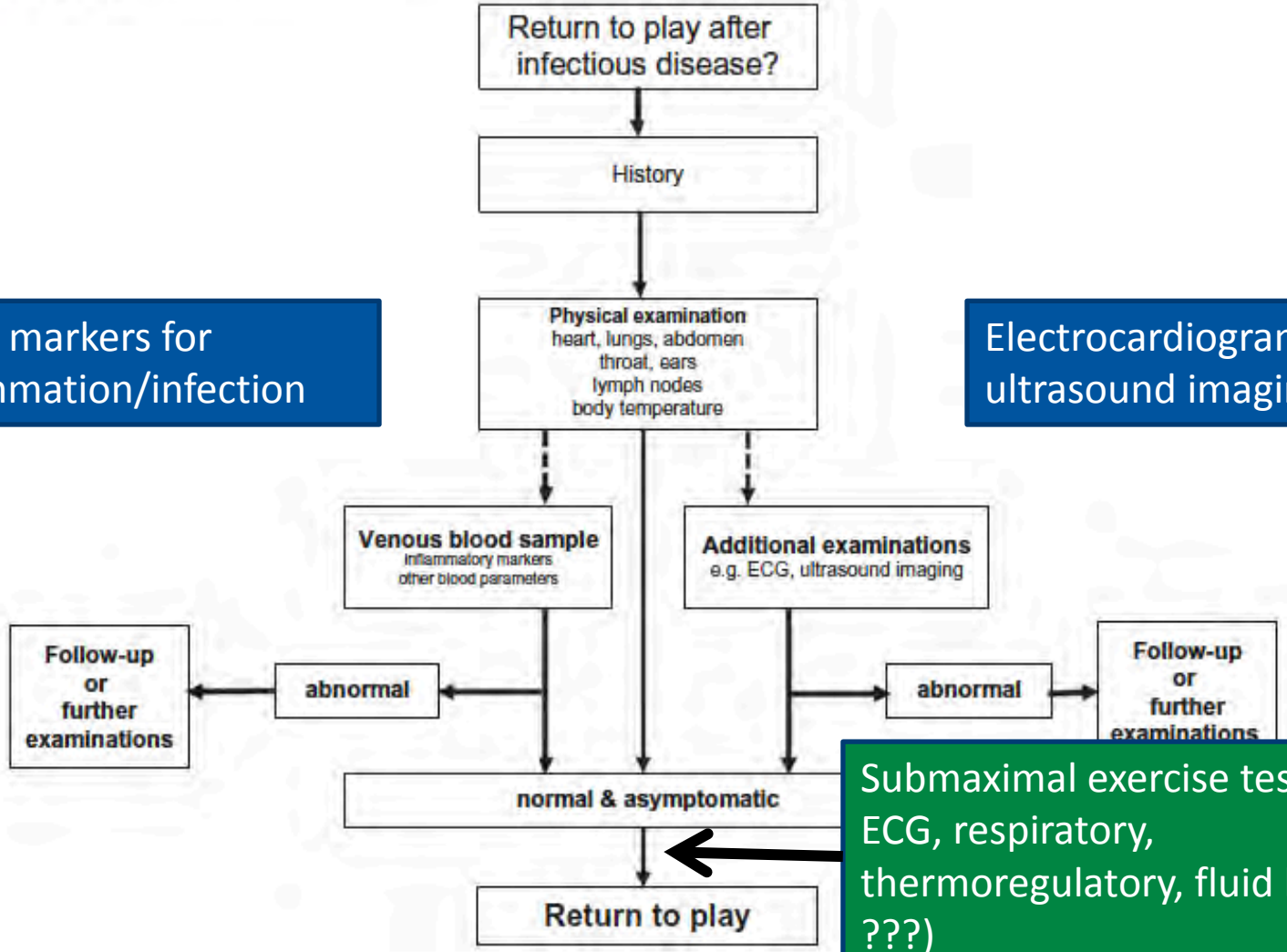
Published online: 01 May 2014.

Blood markers for inflammation/infection

Electrocardiogram / ultrasound imaging



Submaximal exercise test (HR, ? ECG, respiratory, thermoregulatory, fluid balance, ???)

Step 2: Assessment of Health Risk

Risk of medical complications of an acute infective illness during exercise – depends on accurate diagnosis!

System	Complication
Cardiovascular	Viral myocarditis Myopericarditis Dysrhythmias Sudden cardiac death
Neuromuscular	Rhabdomyolysis with or without acute renal failure Joint, ligament and tendon injuries due to impaired motor coordination, reduced muscle strength and endurance
Respiratory system	Bronchial hyper-reactivity
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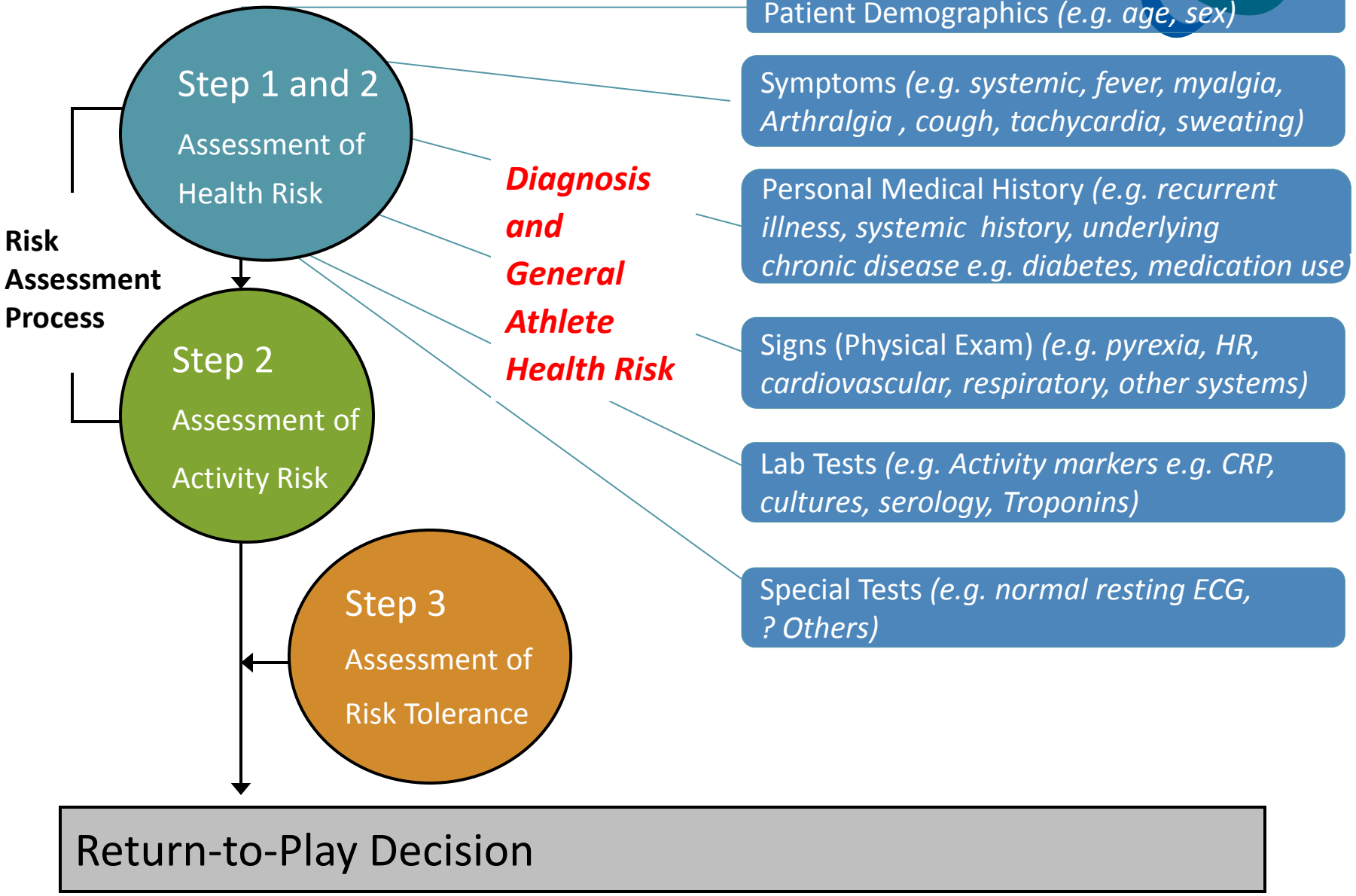
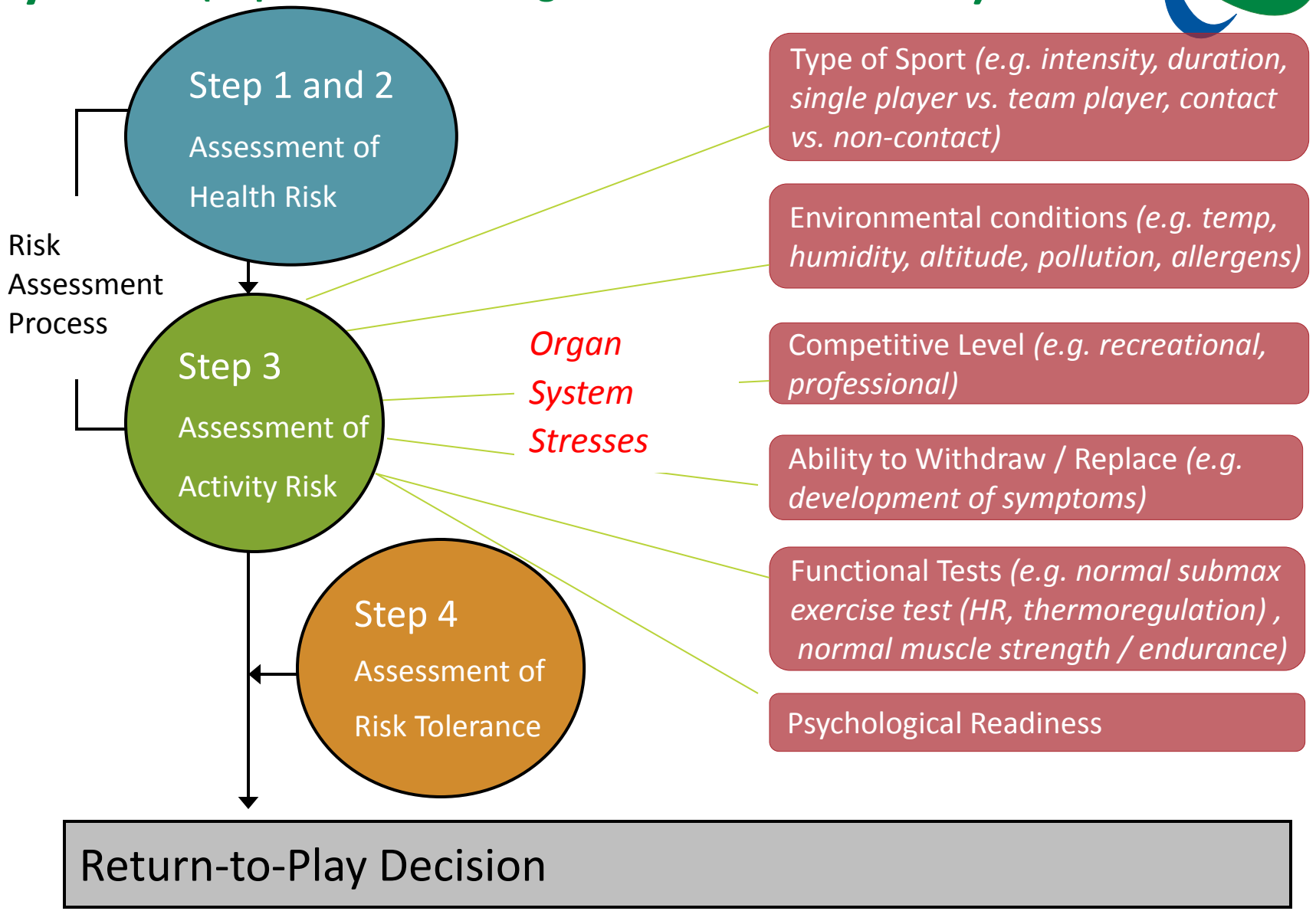
Van Tonder, A: MPhil Sport and Exercise Medicine dissertation 2015

Step 2: Assessment of Health Risk (Diagnosed acute illness)



Step 2: Assessment of Activity Risk on Organ Systems (depends on the diagnosis of the acute illness)



Summary

1. How common is illness? (vs. injury) – As common as injury
2. Type of illness and causes? Respiratory > 50%, ? mostly infections and allergies
3. Potential complications during exercise:
   - Effects on performance – Reduced (number of mechanisms)
   - Medical complications – Higher rate / potentially life threatening (myocarditis, heat stroke, renal)
4. Return to play
   - ☐ Step 1: Accurate diagnosis
   - ☐ Step 2: Determine athlete health risk (NB systemic signs and symptoms, activity markers, ECG) (need more science)
   - ☐ Step 3: Determine activity risk (organ systems at risk during activity) (suggest gradual return by using special performance tests) (need more science)
   - ☐ Step 4: Determine risk tolerance

Paralympic.org

Thank you for your attention