Screening and Educational Intervention to Reduce the Risk of Medical Complications at Mass-Community Based Sports Events – Making Exercise SAFER

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Introductory remarks

1. The health benefits of participating in regular physical activity (exercise) are undisputed.

2. The health benefits of physical activity are very important in the prevention and treatment of a variety of chronic diseases of lifestyle (Non-communicable diseases – NCD’s).

3. Participating in moderate to high-intensity exercise can be associated with risk of acute medical complications during exercise.
What are there potential risks (“negative side effects”) of running (exercise)?

1. Medical complications
   • Acute cardiovascular event (cardiac arrest and sudden death)
   • Serious life-threatening medical complications
   • Minor medical complications
   • “Unmasking” underlying disease *
   • Long term health risks (? Cardiac)
   • ? Non adaptors / responders

2. Musculoskeletal complications
   • Acute injury
   • Long term risks (or benefits) to the musculoskeletal system
What is the risk of an acute medical complication during exercise?

1. Strong research focus on cardiac arrest and SCD
2. Media driven?
3. Screening is aimed at younger, elite athletes (PPE, PHE) (FIFA, IOC, Federations, etc.)
4. Few data on other serious life threatening medical conditions
5. Little consideration in other groups of older and “recreational athletes”
   - At risk recreational athletes participating in sports events (different ages)
   - At risk individuals that are given an exercise prescription (risk factors, existing chronic disease)
   - We have guidelines but are implemented?
Risk of acute medical complications during Community Based Mass Sports participation Events
Two Oceans races (21km and 56km) and Cape Town Cycle Tour (100km cycle)

<table>
<thead>
<tr>
<th></th>
<th>Two Oceans running</th>
<th>Cape Town Cycle tour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual race entrants</td>
<td>30 000</td>
<td>35 000</td>
</tr>
<tr>
<td>Risk of sudden death</td>
<td>1 / 30 000</td>
<td>?</td>
</tr>
<tr>
<td>Risk of a serious life-threatening medical incident</td>
<td>1 / 1785</td>
<td>1 / 2002</td>
</tr>
<tr>
<td>Risk of a medical incident (admission to race medical facility)</td>
<td>1 / 121</td>
<td>1 / 694</td>
</tr>
</tbody>
</table>
Summary on risk of a medical complication

1. Serious/life threatening medical conditions during races have not been consistently reported in the literature
2. The incidence of all medical complications in recreational distance runners is high (1/121 runners; 1/694 cyclists)
3. Serious life threatening complications (1/2000 participants) (similar in half and ultra-marathon runners and cyclists)

Is this an acceptable risk for a “medicine”?

Can the risk of medical complications during sports events be reduced?

Possible role of pre-event medical screening and education?
It is our responsibility to develop and implement “Strategies to reduce Adverse medical events For the ExerciseR”?
Introducing the (SAFER) studies
SAFER Pre-Race Medical Screening and Educational Intervention studies
Pre-screening for active individuals

**European guidelines**

- **ACTIVE**
  - Adult/senior
    - What activity?
      - Low intensity activity
        - Assessment of risk (self- or by non-physician)
          - Negative
          - Positive
            - Screening by physician
              - History
              - Phys. Exam.
              - Risk SCORE
              - Rest ECG
                - Negative
                - Positive
                  - Max exercise testing
                    - Negative
                    - Positive
                      - Further evaluation, appropriate treatment and individually prescribed PA
                      - Eligible for moderate/high exercise training
                      - Eligible for low intensity physical activity

**USA and Canadian guidelines**

- **PAR-Q & YOU**
  - (A Questionnaire for People Aged 15 to 69)

  - Regular physical activity is fun and healthy, and increasingly, more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

  - If you are planning to increase much more physical activity than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q+ will tell you if you should check with your doctor before you start. If you are over 65 years of age or if you are not used to being very active, check with your doctor.

  - Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

  - **YES to one or more questions**
    - Your doctor or a nurse said that you have a heart condition and that you should only do physical activity recommended by your doctor.
    - You feel pain in your chest when you do physical activity.
    - You have had heart attack pain when you were not doing physical activity.
    - Do you have any of the following conditions or do you ever have unexplained shortness of breath?
      - Angina
      - Arrhythmia
      - Heart valve disease
      - Heart failure
      - Congestive heart failure
      - Irregular heartbeat
      - Cardiomyopathy
      - Valve disease
      - A previous heart attack
      - Aortic stenosis
      - CHF
      - Mitral valve disease
      - Heart murmur
      - Heart disease
      - Hypertrophic cardiomyopathy
      - Aneurysm
      - Heart block
      - Mitral valve prolapse
      - Other heart condition
      - Thyroid disease
    - You have a bone or joint problem (for example, back, bone or joint) that could be made worse by a change in your physical activity.
    - You have any other reason why you should not do physical activity?

  - **NO to all questions**
    - No change needed. You are encouraged to photocopy the PAR-Q+ but only if you use the entire form.
    - If you have any questions, please call your doctor. If your doctor says you can start increasing your physical activity, you may also increase your activity level. However, if your doctor recommends that you do not do physical activity, you should not do so.

  - If you have any reason to doubt your answer, you should seek medical advice before starting any new activity.

  - For more information or to order a PAR-Q+ form, please visit the website.

Individual runner login
(At registration 4-6 months prior to the race)
Medical Questionnaire (Part 1 of 13)

Medical information required during race entry process

In 2012 and 2013 the Old Mutual Two Oceans Marathon Medical Team conducted an online medical questionnaire that was completed by approximately 25 000 participants. Every year, more than 700 runners receive medical care at the medical facilities – both on the route, as well as at the medical tent at the finish. By reviewing the results of the completed pre-race online questionnaires, we were able to pre-plan for the necessary medical care and ensure sufficient staff and facilities were available.

The preliminary results from the 2012/2013 races show there were significant reductions in the incidence of all medical admissions to our medical facility. More importantly, there was a very significant decrease in serious, life-threatening medical complications.

Following this success, we have upgraded our goal and the present focus is to further prevent as many medical events as possible in order to make this not only the most beautiful but also the safest race on the running calendar.

Due to the successful implementation of the questionnaire and the information it yielded in the last two years, the Medical Team in conjunction with the event organisers decided to continue making this medical questionnaire a part of the registration process for 2014. The questionnaire is therefore included in the online registration process for completion by all runners.

The medical questionnaire consists of a series of yes/no questions relating to your medical history, previous medical complications during races or training and common running injuries. If you are healthy and have no injuries, it will take approximately 5 minutes to complete (a bit longer if there are medical details you need to enter). In the interests of your health and safety, the medical team may contact you before or after the race for further information about any medical conditions or injuries you may have.

Please take the necessary time and care to complete this section of the entry form as accurately as possible. In addition, at the end of this questionnaire, we will also ask you to consider that the medical information be used for on-going medical research so that we can continue with our effort to improve medical care and race safety.
(13) Have you ever suffered from any heart or blood vessel conditions, including heart attack, undiagnosed chest pain, coronary artery bypass operation, angioplasty (balloon), heart failure, heart transplant, cardiac arrhythmia (abnormal heart beat), rheumatic fever, heart murmur, cardiomyopathy, myocarditis, use of a pacemaker or inherited heart defect?
### Medical Questionnaire (Part 3 of 13)

**Questionnaire Progress:**

**(12)** Are you aware or have you ever been diagnosed with any risk factors for heart or blood vessel disease, including high blood cholesterol, a family member with heart disease, cigarette smoking, lack of physical activity, high blood pressure, being overweight or having diabetes mellitus (sugar sickness)?

- **Yes**
- **No**

**(12.a)** Please tick all of the appropriate condition(s) that you suffer or have suffered from:

- High blood pressure
- **High blood cholesterol**
- Cigarette smoking
- Obesity (overweight)
- Diabetes mellitus
- History of heart disease in close family members (father, mother, brothers or sisters - before they turned 50 years old)
Symptoms of CVD

Medical Questionnaire (Part 5 of 13)

Questionnaire Progress:

Do you currently suffer from any symptoms of heart or blood vessel disease including swollen ankles, abnormal shortness of breath (with exercise), chronic dry cough, palpitations, chest pain, pain (or discomfort) in the neck, jaw, or arms at rest or during exercise, dizziness, fainting spells, and/or calf pain when running/walking?

[Yes] [No]
PAR-Q / AHA/ACSM
What % runners “failed” the screening criteria for pre-exercise medical assessment? (n = 15 778)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>All runners</th>
<th>Half marathon</th>
<th>Full 56km marathon</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Runners who “failed” the criteria and require medical assessment</td>
<td>31.3%</td>
<td>11.4%</td>
<td>33.3%</td>
</tr>
<tr>
<td>1 in 9 runners that start the race require medical clearance (PAR-Q)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 in 3 runners that start the race require medical clearance (AHA/ACSM)</td>
<td></td>
<td></td>
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</tbody>
</table>

### Prevalence of “high risk” runners

**Existing cardiovascular disease = 2.3% (n=360)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
<th>Per 1000 runners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary artery disease</td>
<td>80</td>
<td>5.0</td>
</tr>
<tr>
<td>Myocardial infarct</td>
<td>31</td>
<td>2.0</td>
</tr>
<tr>
<td>Chest pain diagnosed as angina</td>
<td>22</td>
<td>1.4</td>
</tr>
<tr>
<td>CABG</td>
<td>19</td>
<td>1.2</td>
</tr>
<tr>
<td>Angioplasty</td>
<td>41</td>
<td>2.6</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>70</td>
<td>4.4</td>
</tr>
<tr>
<td>Pacemaker</td>
<td>6</td>
<td>0.4</td>
</tr>
<tr>
<td>Murmurs</td>
<td>98</td>
<td>6.2</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>11</td>
<td>0.7</td>
</tr>
</tbody>
</table>

1 in 43 runners that start the race have a history of existing cardiovascular disease

1 in 197 runners that start the race have a history of existing coronary artery disease
Pre-race Medical Screening

Prevalence of “intermediate risk” runners
e.g. Cardiovascular disease risk factors = 16.1% (n=2 544)

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Number</th>
<th>Per 1000 runners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>696</td>
<td>44.1</td>
</tr>
<tr>
<td>Smoking</td>
<td>335</td>
<td>21.2</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>921</td>
<td>58.4</td>
</tr>
<tr>
<td>Obesity</td>
<td>186</td>
<td>11.8</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>150</td>
<td>9.5</td>
</tr>
<tr>
<td>Positive family hx</td>
<td>658</td>
<td>41.7</td>
</tr>
</tbody>
</table>
Pre-race Medical Screening

Prevalence of “intermediate risk” runners
Other potential risk factors for medical complications

1 in 7 runners – history of respiratory disease
1 in 26 runners – history of metabolic/endocrine disease
1 in 22 runners – history GIT disease
1 in 24 runners – history of CNS disease
1 in 9 runners – history of use of medication before or during a race
Pre-race Medical Screening

Acute pre-race illness screening
What % runners had systemic symptoms or “failed” the “neck check”? (n = 7 035)

- Any symptoms
- Failed "neck check"
- Systemic symptoms

1 in 5 runners have symptoms of acute pre-race illness
1 in 8 runners fail a pre-race “neck check”
1 in 13 runners have pre-race systemic symptoms of acute illness

Pre-Race SAFER Intervention Study
2012 - 2015

Does a pre-participation screening and educational intervention reduce medical complications during a race?
Pre-Race SAFER Intervention Study
2012 - 2015

Components of the SAFER intervention program:

1. Compulsory completion of a pre-participation medical questionnaire
2. Regular medical “newsletters”
3. Targeted pre-race email to all “high risk” and “intermediate risk” runners – given advice and / or obtain medical clearance
4. Targeted communication (text or email) to runners with acute pre-race illness – advice on participation guidelines with acute illness symptoms
Pre- vs. Post Screening (2008-2015) (Incidence of all medical complications)

Pre- vs. Post Screening (2008-2015)  
(Incidence of serious life threatening medical complications)

- Pre intervention (2008-2011): 
  - All races: 0.56 runners, 62% reduction
  - 56 Km race: 0.65 runners, 55% reduction
  - 21km race: 0.51 runners, 71% reduction

- Post intervention (2012-2015): 
  - All races: 0.21 runners
  - 56 Km race: 0.29 runners
  - 21km race: 0.15 runners

Pre- vs. Post Screening (2008-2015)  
(Incidence of serious cardiac medical complications)

Incidence per 1000 runners


<table>
<thead>
<tr>
<th>Race</th>
<th>Pre intervention</th>
<th>Post intervention</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>All races</td>
<td>0.12</td>
<td>0.05</td>
<td>58%</td>
</tr>
<tr>
<td>56 Km race</td>
<td>0.11</td>
<td>0.06</td>
<td>45%</td>
</tr>
<tr>
<td>21km race</td>
<td>0.13</td>
<td>0.04</td>
<td>69%</td>
</tr>
</tbody>
</table>

1. The health benefits of regular physical activity are undisputed - exercise should be prescribed to each individual

2. Exercise as a “drug” (medicine) has a different doses and administration routes

3. It is both an over-the-counter drug and a drug by prescription

4. There are potential negative “side effects” to exercise (NB: acute exercise sessions) including serious life-threatening adverse events

5. Exercise “prescription” should be individualised for special groups – role of screening and education
6. “Inappropriate” exercise prescription (self-administration) can put an individual at risk

7. Current screening tools - ? Require modification (need data)

8. Do not ignore inciting events (NB acute illness)

9. A pre-exercise screening and educational intervention program can significantly reduce medical complications in community based mass sports participation events

10. We need on-going research and the promotion of educational campaigns to reduce the risk of medical complications during exercise (SAFER)
Thank you for your attention