Implementing aerobic exercise with clinical populations: Where do I start?

Innovations in Balance Mobility and Fitness
THE LINK TO CLINICAL PRACTICE
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Objectives

At the end of the session, participants will be able to:

• Describe the risks and benefits of aerobic exercise and physical activity, and discuss its relevance to rehabilitation within neurological and older adult populations

• Understand best practice guidelines with respect to exercise screening and prescription for neurological populations and older adults

• Identify clinical tools and processes of care that will support the implementation of aerobic exercise into practice
What barriers have you experienced implementing aerobic exercise?
Is aerobic exercise a rehab priority?
Important for CVD Risk

Adapted from Williams 2001
Increased effort for physical activity

Onset or increase of disability

Develop secondary conditions

Physical inactivity

Important for function

Adapted from Rimmer and Wang 2005
Fitness levels are not enough

Figure 2 from Ploughman and Kelly 2016
Can exercise help? Yes it can!

Cochrane Review n=58 trials
- 28 aerobic training studies
- 17 mixed training
- 13 resistance training

- n=2797 participants
- Aerobic, mixed training improves walking speed, endurance, fitness

Saunders et al 2016
Exercise can support functional goals
But is it safe? What about cardiovascular risk?
Exercise pre-participation health screening

Updated ACSM recommendations

Current level of physical activity

Hx of CV, metabolic, renal disease AND Signs or Sx

Desired exercise intensity

AEROBICS

Aerobic Exercise Recommendations to Optimize Best Practices in Care after Stroke

Mackay-Lyons et al 2013

AEROBICS e-Learning module
Mackay-Lyons & Thornton
www.Strokengine.ca
Screening: What information do I need?

AEROBICS suggests:

• Assessment of contraindications to exercise testing and training
• General patient information: demographics, medical history, cardiac history, seizure history, diabetes control, presence of anemia, lifestyle habits
• Evaluation of level of motor recovery, mobility, balance, swallowing status, and ability to express pain or distress and follow instructions for safe participation in an exercise program
### ACSM contraindications to exercise

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent change in resting ECG suggesting ischemia, MI (within 2d) or other acute cardiac event</td>
<td>Left main coronary stenosis</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>Moderate stenotic valvular heart disease</td>
</tr>
<tr>
<td>Uncontrolled cardiac dysrhythmias causing symptoms or hemodynamic compromise</td>
<td>Electrolyte abnormalities</td>
</tr>
<tr>
<td>Symptomatic severe aortic stenosis</td>
<td>Severe HTN at rest (i.e. &gt;200/110mmHg)</td>
</tr>
<tr>
<td>Uncontrolled symptomatic heart failure</td>
<td>Tachy- or bradydysrhythmia</td>
</tr>
<tr>
<td>Acute pulmonary embolus or infarction</td>
<td>Hypertrophic cardiomyopathy and other forms of outflow tract obstruction</td>
</tr>
<tr>
<td>Acute myocarditis or pericarditis</td>
<td>Neuromuscular, MSK, or rheumatoid disorders exacerbated by exercise</td>
</tr>
<tr>
<td>Suspected or known dissecting aneurysm</td>
<td>High-degree AV block</td>
</tr>
<tr>
<td>Acute systemic infection</td>
<td>Ventricular aneurysm</td>
</tr>
</tbody>
</table>

ACSM 2014, Box 3.5
What information do I need? Our experiences

Etiology & mechanism of stroke
- Ischemic? Haemmorhagic?
- Carotid stenosis? Dissection?
- Cardioembolic?

Cardiac history/ diagnostics
- Resting ECG findings
- Holter monitor reports
- Echocardiograms

Medications – e.g. beta blockers?

Diabetes
- blood glucose levels & stability

Blood pressure & heart rate trends

*Possible BP restrictions during exercise e.g 160/90 or 140/90

Cause? Atrial fib? On beta blockers? Therapeutic INR?

Normal / abnormal ECG?

Heart rate may be blunted when exercising

Ok to proceed? e.g. 5.4 – 13.9 /16.7 mmol/L

What should I expect as ‘usual’ resting values?
Exercise stress test

BUT

Only 3% of PTs surveyed across Canada agree that “symptom-limited stress test is essential to screen for safety”

Chart review

Patient-selected intensity/ general response to exercise

Doyle and MacKay-Lyons 2013; Nathoo et al, 2018
Exercise stress test vs submaximal tests

AEROBICS Best Practice Recommendation:

- *Exercise stress test* should be an integral component of pre-participation screening after stroke or TIA

HOWEVER, *submaximal test* may be an option if:
- Targeted intensity of training in <45% predicted HRR AND
- Participant is without symptoms or known history of cardiovascular disease and has normal resting ECG

Level of Evidence: C (Expert Opinion)

Mackay-Lyons 2012 AEROBICS Best Practice Recommendations
Cardiovascular risk stratification tools

Aerobic Exercise Screening
Stratification Tool

<table>
<thead>
<tr>
<th>CARDIAC Diagnoses, Conditions, Signs &amp; Symptoms</th>
<th>Do Not Exercise</th>
<th>CPET</th>
<th>Submax With ECG</th>
<th>Submax Without ECG</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2 days or asymptomatic</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 days – 1 week; asymptomatic</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td>Mobilization/Physiotherapy</td>
</tr>
<tr>
<td>1 week - 4 weeks; asymptomatic</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 weeks – 12 weeks; asymptomatic</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td>Physician Supervised submax or CPET.</td>
</tr>
<tr>
<td>&gt;12 weeks; asymptomatic</td>
<td></td>
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</tbody>
</table>

Arrhythmias or Conduction Disorders

| Uncontrolled cardiac arrhythmias; symptomatic or hemodynamic compromise | ✔ | | | | |
| Atrial flutter | ✔ | | As soon as stable INR.  |
| Atrial Fibrillation | ✔ | | As soon as stable INR.  |
| Atrial Fibrillation with recent cardioversion | ✔ | ✔ | Wait 4 weeks to do submax; 4-6 weeks for full CPET. |
| Heart block (2nd or 3rd degree) | Relative | ✔ | | Consult cardiac teams. |
| Heart block (1st degree) | | ✔ | | |
| Bundle branch block | ❍(*) | | | | If new onset: Consult with physician. Cardiac workup necessary, could be due to ischemic event. If Chronic: Left BBB: physician supervised submax or peak effort CPET Right BBB: submax with ECG physician likely not required |

Consult your physician & teams to determine risk/benefit

Stratification by CVD Risk

- Do not Exercise
- Exercise Stress Test/Physician supervised
  - Submaximal test with ECG/No physician supervision
  - Submaximal test without ECG
Conservative stop-test thresholds

- **HR** target
  - 60-70% predicted max or 45% HRR

OR

- **RPE\textsubscript{Borg}** reaches 5/10 ("strong")

- Abnormal HR or BP response
- Signs or symptoms
- Fatigue i.e. unable to maintain cadence, requests to stop
Can the Submax safely inform exercise?

- 227 exercise tests reviewed for *exercise-induced changes on ECG*
  - 32 days post stroke; 37% w CVD
- 2% (5 of 227) exhibited ST depression $\geq$ 1mm suggestive of ischemia
- Using Submax ‘*stop test*’ criteria, exercise training intensities did *not* exceed the HR associated with abnormality onset
- Submax without ECG but *with monitoring* and *conservative HR and RPE endpoints* may facilitate safe participation in exercise early post-stroke
- Symptom-limited exercise testing with ECG may still be warranted for individuals if progressing to higher intensities
How do I start people training?
How do I know it's enough?
How do I start training?

- AEROBICS (Aerobic Exercise Recommendations to Optimize Best Practices In Care after Stroke)

- Reflect on if our patients are meeting them?
Where do I start?

- **AEROBICS** Best Practice Recommendations
  - Frequency at least 3 days a week
  - TIME - for greater than 20 minutes
  - Intensity - individual basis (low, moderate, high)
  - Type/Mode – a variety can be used – task specific recommended
  - Training programs should be minimum 8 weeks though ideally for ever
Challenges!

Lessons learned at Toronto Rehab
Exercise training: Mind the gap

A group training model

GOLD STANDARD

- AEROBICS Guidelines

CURRENT PRACTICE

- Challenges
  - Time
  - Prioritizing functional goals for return to home
  - Supervision for different functional levels
  - Staffing
  - Efficiency
  - Rehab Intensity
Aerobic group training model

- Toronto Rehab Group Model
• Individual plan/prescription based on submaximal aerobic exercise assessment or cardiopulmonary exercise test
Aerobic group training model

- Delivered in a group setting
- Mix of Outpatients and Inpatients
- Supervision and progression by a Physiotherapist
- Assistance from Kinesiology Co-op students
How do I know its enough?

- Blood pressure pre/post
- HR, RPE
- Level/resistance/speed/wattage
- Machine used, HR monitor used
- Special considerations
How do I know it’s enough?

- Objective monitoring & tracking
- Supports Progression:
  - Time or intervals
  - Resistance level or speed
  - Equipment used, HR monitor used
Other benefits of monitoring?

We’ve been able to catch issues and support medical management

• Has led to changes in care – BP meds, A fib
• Support Outpatients having medication issues
• Being able to field aerobic exercise specific questions
How do I keep it going?
Fitness as a continuum

**Goals**

- Early access to aerobic exercise
- Supporting long-term engagement

**Continuum**

**Inpatient** → **Fitness group** → **Outpatient** → **PROPEL** → **Community**

**Inpatient**

- Patients continue with fitness training across settings/services

**Fitness group**

- Implement processes to support transitions
  - Referrals include info on AE testing & training
  - Scheduling processes

**Outpatient**

- Support long-term exercise behaviours after discharge

**Community**

- Self-Management (community programs, Cardiac Rehab)
Preliminary Outcomes

- Fewer perceived barriers to exercise after rehabilitation
- Greater reported participation in physical activity at 6 weeks after discharge from outpatient stroke rehabilitation

Key Elements

- 6-week group program upon transition to outpatient rehab
- Exercise + additional group-based discussion
  - Education: benefits of exercise, personal exercise prescription, monitoring & progression
  - Identify personal barriers to exercise & strategies to facilitate participation
  - Develop individualized exercise plan for after discharge

Aim to equip people *during* their rehab with knowledge, skills & self-efficacy to be active *after* discharge

PRomoting Optimal Physical Exercise for Life : PROPEL

Explore links to Cardiovascular Rehab Programs

Resource for those with stroke:
• Risk Factor Modification and Exercise Following Stroke (TRI-REPS)

For more info:
http://www.uhn.ca/TorontoRehab/PatientsFamilies/Clinics_Tests/C RSP_Program/Pages/patient_referral.aspx
Taking it to the community

Explore links to community programs

[Image: UHN, McMaster, YMCA, UWaterloo]

https://www.uhn.ca/TorontoRehab/PatientsFamilies/Clinics_Tests/TIME

https://www.ymcahbb.ca/Programs/LiveWell/Fit-For-Function-LiveWell

https://pace.mcmaster.ca/PACE

https://www.uwaterloo.ca/centre-community-clinical-applied-research-excellence/
Where will you start in your setting?
Where can I learn more?
Local Implementation Plan

With regards to aerobic assessment and intervention after stroke:
• What can I continue to do?

• What can I do differently next week?

• What could fitness programming look like in my practice setting in 3 months?

• What are some steps that I can take to achieve the suggested changes above?
Consider barriers and enablers and implementation strategies to minimize barriers and enhance enablers, for example:

- Patient/client eligibility
- Other patient-specific factors
- Knowledge
- Skills
- Self-efficacy
- Tools (e.g. screening, testing, referral forms, training logs)
- Processes (who needs to do what and when?)
- Model of service delivery (e.g. individual vs group)
- Potential partners (e.g. managers, physicians, practice leads, cardiac rehab, community links)
- Organizational support
- Resources (staffing, equipment)
- Other:
Resources discussed in today’s workshop available at **UHN Mobility Innovations Centre website** including:

- CVD stratification tool
- Submax Exercise test protocol and test form
- Referral form, Training Logs, and more

[https://www.uhn.ca/TorontoRehab/PatientsFamilies/Clinics_Tests/Mobility_Innovations_Centre](https://www.uhn.ca/TorontoRehab/PatientsFamilies/Clinics_Tests/Mobility_Innovations_Centre)
AHA Statement

Resources available from the American Heart Association, such as:

AHA/ASA Scientific Statement

Physical Activity and Exercise Recommendations for Stroke Survivors

A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association

The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists.

Sandra A. Billinger, PT, PhD, FAHA, Chair; Ross Arena, PT, PhD, FAHA, Co-Chair; Julie Bernhardt, PT, PhD; Janice J. Eng, BSc, PT/OT, PhD; Barry A. Franklin, PhD, FAHA; Cheryl Mortag Johnson, OTR; Marilyn MacKay-Lyons, BSc, MScPT, PhD; Richard F. Macko, MD; Gillian E. Mead, MD, MA, FRCP; Elliot J. Roth, MD, FAHA; Marianne Shaughnessy, PhD, RN, CRNP; Ada Tang, PT, PhD; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Lifestyle and Cardiometabolic Health, Council on Epidemiology and Prevention, and Council on Clinical Cardiology

https://www.ahajournals.org/doi/abs/10.1161/str.0000000000000022
Patient and Clinician guides based on AEROBICS guidelines

Reviewed by clinicians and stroke survivors

Freely available in English and French at www.canadianstroke.ca
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