



# Draft Best Practice Guidance for Developing Exercise and Fitness after Stroke (EAS) Services in Community Settings

## Project group

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## Introduction

The project group were commissioned by the Scottish Government's National Advisory Committee on Stroke to scope the current provision of exercise after stroke services in Scotland and to draw up best practice guidelines to guide future service development and to standardise practice.

## Recommendations

There is a growing body of evidence that exercise training, particularly cardiorespiratory training, improves physical function, fitness and quality of life after stroke. National guidelines (Intercollegiate Stroke Working Party 2008, SIGN 2008) the Department of Health's National Stroke Strategy (2007) and the Scottish

Government's Better Heart Disease and Stroke Care Action Plan (2009) all recommend that stroke survivors should be offered the opportunity to participate in exercise. A multidisciplinary group of experts in Exercise after Stroke have written the following recommendations based on: evidence from the Cochrane review of physical fitness training for stroke patients (Saunders et al. 2009), their own randomised controlled trial (Mead et al. 2007), in-depth analysis of the content and organisation of existing services in Scotland, plus relevant guidelines and occupational standards. These core recommendations could be applied across the full range of UK Exercise after Stroke (EAS) services.

### Key elements of good practice for Exercise after Stroke services

- **Governance:** The service is overseen/supported by a multidisciplinary working group consisting of local stakeholder organisations, service users and Stroke Managed Clinical Network representatives. For charity groups this would be the existing committee. (For more detail, see [1.1.1](#)).
- **Referral** Robust mechanisms are in place to ensure exercise professionals receive appropriate medical information (see section [3.2](#)) about stroke survivors who wish to exercise (in most cases this will be through a referral system in line with Department of Health's (2001) National Quality Assurance Framework for Exercise Referral Systems)
- **Pre-exercise assessment:** Stroke survivors who wish to exercise are assessed by a health professional to determine whether they have any absolute contraindications to exercise (see [Absolute contra-indications](#))
- **Instructor training:** Exercise professionals who work with stroke survivors have appropriate training. This would be a nationally recognised qualification that fully maps to the National Occupational Standard Unit D516 Design, agree and adapt a physical activity programme with adults after stroke, it should be endorsed by Skillsactive and recognised by the Register of Exercise Professional's (REPs) at Level 4 as providing the Stroke Specialist Exercise Instructor Category of Registration. (link to sections on REPs and Skills Active). Currently the Exercise after Stroke course delivered by Later Life Training (<http://www.laterlifetraining.co.uk/ExerciseAfterStroke.html>) is the

only university validated, Skills Active endorsed and REPS recognised Level 4 qualification in the UK that is supported by all the key NGOs in this field.

Other competency based-training is available although these courses do not lead to recognised qualifications.

- **Content:** The exercise programme contains a high proportion of cardiorespiratory walking training. This type of training has the strongest evidence of improving functional outcomes for stroke survivors (Saunders et al. 2009; Wevers et al. 2009).
- **Record keeping:** Exercise after Stroke (EAS) services collect a minimum data set of participant's Community Health Index number, referral information, attendance records and maintain records of all adverse events experienced by participants.

### Suggested good practice

Areas wishing to develop a new exercise after stroke service may benefit from more detailed suggestions for service structure and process. The following good practice suggestions are based on our comprehensive examination of all existing models of exercise after stroke service delivery in Scotland and mapped as closely as possible to research evidence, including meta-analyses of randomised controlled trials. After each suggestion a description of the rationale behind it is given.

The evidence base for Exercise after Stroke is growing rapidly but in aspects such as the exact frequency and intensity of exercise, evidence is sparse at present. Realistically, the research evidence base is unlikely ever to be sufficiently comprehensive to support decisions about all aspects of service delivery and organisation. Therefore, some recommendations are based on expert consensus guided by the clinical reasoning and experience of the guideline development group. We also build upon knowledge of service models that have been demonstrated in practice to be feasible and acceptable to stroke survivors.

The current practice in Exercise after Stroke across Scotland has developed through multidisciplinary expert consensus and processes of extended piloting and

development within the services. We have collected and built on this information to produce this guidance document so that other regions developing such services can learn from these leaders in the field of Exercise after Stroke.

The Scottish Government's Better Heart Disease and Stroke Care action plan supports collaboration between health boards and leisure services to develop Exercise after Stroke services. It is likely that many new services will be developed over the coming years. These services will primarily be aimed at promoting physical activity in ambulatory stroke survivors. This is because most research to date has been conducted with ambulatory participants and we have evidence that exercise interventions will be beneficial for this group. We know that there are large numbers of ambulatory stroke survivors in the community who have the capacity to be more active and improve their physical fitness given appropriate support. These good practice suggestions aim to support the development of safe, effective person-centred services for these participants. It is likely that services will need to evolve to provide exercise after stroke for non-ambulatory participants as the evidence base becomes stronger.

## *1. Structural/planning issues*

### *1.1 Working group*

1.1.1 Close multidisciplinary working is essential for the development of effective services. A Working Group consisting of representatives from all relevant organisations should be convened to oversee development of Exercise after Stroke services. The Working Group should include all local stakeholders in stroke service provision including: doctors, physiotherapists, occupational therapists, speech therapists, exercise professionals, service managers and service users.

Rationale – this is based on the experience of existing services

1.1.2 Members of the Stroke Managed Clinical Network should be part of the Working Group and be involved in planning new EAS services to ensure all sectors

are up to date with service development and to ensure that the service can be coordinated with the rest of the patient pathway.

Rationale - this is based on the experience of existing services –e.g. NHS Dumfries and Galloway,

### *1.2 Service level agreement*

1.2.1 Close links between the EAS services, physiotherapy teams and other health professionals are crucially important. At the inception of a new EAS service, a service level agreement should be developed between health and leisure services. This service level agreement will include on-going physiotherapy advice and input to the service in terms of workforce development and staff governance. This would include provision of specific advice from physiotherapists about how to manage co-morbid medical conditions and how to tailor exercises for individuals. This is in addition to the Working Group who provides overall direction to the development and oversees pathways into and out of the service.

Rationale - this recommendation is based on the experience of existing services – and highlights the importance of the positive working relationships they have developed with local physiotherapy teams.

### *1.3 EAS Service co-ordinator*

1.3.1 Service planning, liaison and publicising of services to potential referrers and participants requires dedicated time. Resources could be allocated for a service co-ordinator to perform these tasks.

Rationale –a model that works well for existing services. In the research literature, stroke survivors report not knowing where to exercise as being a barrier to exercise participation (Rimmer et al. 2008). Physiotherapists report they are uncertain whether the exercise professionals delivering exercise after stroke have sufficient training, knowledge and competence to work with these clients (Wiles et al. 2008).

Efficiently publicising the service to potential participants and informing referrers about the content of the service is important.

#### *1.4 Location*

1.4.1 When planning a new EAS service, transport is a central consideration. Lack of transport may constitute a significant barrier to exercise participation. Services will ideally be provided in accessible venues with good public transport links.

Rationale – existing services reported to us that transport was a barrier to participation for many stroke survivors.

In the research literature, lack of transport to venues is cited as a barrier to exercise participation (Rimmer et al. 2008).

### *2. Preparation / Risk assessment for exercise*

#### *2.1 Assessment during stroke care*

2.1.1 Where possible, inpatient and outpatient physiotherapy for ambulatory stroke survivors will include cardiovascular fitness training to improve physical fitness levels and directly assess response to exercise prior to referral to exercise after stroke services.

Best practice in this area is group, circuit-based, time limited (8-10 week) exercise sessions run by physiotherapists, nurses and assistants such as those run by Angus Community Health Partnership and NHS Dumfries and Galloway.

Alternatively, if group sessions are not possible in the local context, individual training on treadmill or cycle ergometer is desirable

Rationale – the majority of the high quality (RCT) evidence on exercise after stroke is from physiotherapist-lead interventions in rehabilitation settings. Research has

shown that cardiorespiratory training can improve physical fitness and can improve walking function (Saunders et al. 2009).

The Royal College of Physician's clinical guideline for Stroke ([http://www.rcplondon.ac.uk/pubs/books/stroke/stroke\\_guidelines\\_2ed.pdf](http://www.rcplondon.ac.uk/pubs/books/stroke/stroke_guidelines_2ed.pdf)) recommends in the rehabilitation section that patients should participate in cardiovascular training (aerobic activity).

2.1.3 Staff trained in basic resuscitation and in the use of a defibrillator should be accessible during these cardiorespiratory training sessions. Specific protocols, regular practice drills and checks on first aid supplies and resuscitation equipment should be in place.

Rationale –there is little research evidence regarding the appropriate level of resuscitation training required to work with this patient group -this recommendation is based on SIGN guideline 57 for cardiac rehabilitation (<http://www.sign.ac.uk/guidelines/fulltext/57/index.html>) as adequate for group exercise for low to moderate risk patients. The recommendation for protocols and practice drills is based on the experience of the project group.

2.1.4 It is also recommended that a procedure and protocol is in place for managing the remainder of the participants in the event of an adverse event.

Rationale: professional experience of the project group.

2.1.4 At the end of the physiotherapy-delivered cardiorespiratory training, eligible participants should be referred on to community exercise schemes –stroke specific where these exist.

Rationale –the evidence suggests that the benefits of short-term interventions are not retained (Mead, et al. 2007). Physical activity needs to be long-term health behaviour as described in Scotland's physical activity recommendations <http://www.scotland.gov.uk/Publications/2003/02/16324/17901>

2.1.5 In the event of there being no stroke specific exercise services, physiotherapists should liaise with the exercise referral coordinator and undertake

some interim training and work to identify funding for the Level 4 Cardiac rehabilitation & falls instructors or the Level 3 Exercise Referral instructors to be trained to deliver stroke specific sessions.

Rationale: professional experience of the project group.

2.1.6 Physiotherapists should explore barriers and motivators to exercise participation for each individual. Where participants are reluctant to engage in group exercise, other options for increasing activity levels should be explored.

Rationale - we know that the majority of community-dwelling stroke survivors are inactive (Rand et al. 2009; Moore et al. 2010). It is necessary to explore barriers to exercise in order to overcome this (as suggested by Gordon et al. 2004 in the American Heart Association recommendations on physical activity for stroke survivors and in Damush, et al. 2007; Mead, 2009). The optimum methods for promoting physical activity are not known. However we do know that repeated advice to be more active is probably not sufficient to change behaviour (Boysen, et al. 2009) -examination of individual barriers is probably required (as suggested by Gordon al. 2004).

### *3. Referral into the EAS service*

#### *3.1. Referral Responsibilities*

3.1.1 The service co-ordinator is the key contact for the EAS service. Their job is to organise referral and to ensure that the referral processes meet the standards outlined below.

Rationale –having a key individual with responsibility for referral processes will ensure accountability for their meeting the Department of Health's National Quality Assurance Framework for Exercise Referral Systems.

3.1.2 The standards and indicators set out in the Department of Health's National Quality Assurance Framework for Exercise Referral Systems [http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4079009.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4079009.pdf)

(Department of Health 2001) should be followed and these are summarised below.

3.1.3 In summary, patients who are referred to either a 'specialist' session (i.e. exclusively for patients post-stroke, delivered by a Level 4 EAS qualified instructor) or a general exercise referral session (i.e. for a range of patients with a low risk [of event during exercise] stratification) must be referred by their General Practitioner or Hospital Consultant or other pre-agreed health care professional e.g. Physiotherapist.

### ***3.2 Referral from a physiotherapist***

3.2.1 Referral to an EAS service should ideally be from a physiotherapist who has worked with the patient on their physical fitness. The physiotherapist will have assessed:

- **General medical and stroke medical history**
- **Information on any co-morbidity** that might contraindicate or restrict exercise e.g. ischaemic heart disease, heart failure, respiratory disease, poor circulation, uncontrolled epilepsy, joint replacements etc.
- **Medications and how these may restrict exercise ability**
- **Pain status:** stroke-related (central or shoulder), musculoskeletal or other
- **Joint active and passive range of motion** (particularly with relation to the risks associated with subluxed or poor control in shoulder movement – a common source of post stroke pain)
- **Tonal status**
- **Motor control:** coordination of joint stability, strength and power, protective reactions, movement involving single and multiple body segments, and functional activities.
- **Sensation and perception:** vision (including field deficits), hearing, touch, temperature, joint position sense (proprioception), perception of body schema and pain.
- **Balance** both in static and dynamic situations and recovery responses.
- **Gait** (walking ability), addressing both neurological and biomechanical aspects of gait. Ideally, this should include different variations of gait (i.e. slow, fast,

backward and side-stepping, turning, managing obstacles and stair climbing) in different environments (i.e. rough and smooth ground, flat ground and slopes, different lighting and noise conditions).

- **Functional abilities** (history and direct observations of functional tasks related to activities of daily living (ADLs),
- **Compensatory overuse of less affected side**
- **Activity history, current interests, preferences, means and readiness to exercise.** This must mean that the participant has agreed with the referring party that they are ready to exercise, are motivated enough to attempt a programme, and that they are able to attend the intended exercise programme times.
- **Communication:** the participant's ability to interpret and follow instructions and to communicate with the exercise instructor. This is particularly important when there is a history of receptive dysphasia or dementia. If a participant has expressive dysphasia, this may impair their ability to communicate with the exercise instructor during the sessions. It may be possible to allow a communicating assistant to attend for this sole purpose only if aphasia is a significant problem.
- **Cognitive status:** this should identify if there is any evidence of impaired insight, difficulties with body schema awareness, visuospatial inattention/neglect, and confusion.
- **Risk Assessment, Stratification and Management** based on all the above (ie at (i) low or (ii) medium to medium-high risk of adverse event during or following exercise. This will determine if the person can go to a generic or specialist exercise session. NB High risk patients should be exercising under the supervision of a physiotherapist.

Rationale –these recommendations are taken from the Skills Active national occupational standards (Unit D516 Design, agree and adapt a physical activity programme with adults after stroke) and the syllabus of the specialist Exercise after Stroke instructor training course.

3.2.2 In their referral to the EAS service, the physiotherapist should be able to give detailed information about what exercise would be appropriate for the individual.

Rationale –Skills Active standards (Unit D516 Design, agree and adapt a physical activity programme with adults after stroke) and the syllabus of the Specialist Exercise after Stroke instructor training course

### **3.3 Referral from another health professional**

3.3.1 Where the person has been discharged from physiotherapy for some time and the above information is not available, then the GP or other health professional should reassess the patient's suitability to exercise and importantly ascertain whether the proposed exercise class and instructor is appropriate.

Rationale - Department of Health's National Quality Assurance Framework for Exercise Referral Systems

[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4079009.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4079009.pdf)

3.3.2 The local Working Group will decide on the appropriate health professionals to identify eligible participants, inform them about the service and make referrals. Whether this would be physiotherapists, stroke liaison nurses, GPs and/or Practice nurses will depend on local circumstances.

Rationale –this will depend on local circumstances and needs to be determined on a service by service basis.

3.3.3 The referring health care professional has several key responsibilities to fulfil:

- a. **To identify pathologies** which are present, and ensure that they (and their medications) are accurately and clearly communicated to the exercise practitioner;
- b. **To highlight any way these may influence the safety or comfort of everyday physical activity** e.g. susceptibility to angina or postural hypotension;

c. **To review the patient's current medication and identify any medications that may influence the safety and comfort of physical activity;**

d. **To educate the stroke survivor in the early recognition of symptoms** which might indicate that a part or the whole of the exercise programme was, in some way, unsuitable to them at that time. For example, patients with osteoarthritic knees should be taught to recognise and respect an increase in pain, stiffness or swelling, and stroke patients who experience a severe increase in their habitual level of resting muscle tone should be instructed to consult the exercise professional about the problem and only continue to exercise if the exercise can be appropriately tailored to resolve the problem/adverse effect.

e. **To monitor and review the participants' progress.**

Rationale- Department of Health's National Quality Assurance Framework for Exercise Referral Systems

[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4079009.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4079009.pdf)

3.3.4 The referring health professional will evaluate the person's suitability for exercise against these absolute and relative contra indications to exercise (see box below). The main contraindications to exercise are unstable heart disease.

Absolute and relative contra-indications (American College of Sports Medicine 2010; Dinan 2001; Mead , et al. 2007)

<b>Absolute contra-indications</b>
<ul style="list-style-type: none"><li>• Recent electrocardiogram changes suggesting recent myocardial infarction (heart attack)</li><li>• Significant drop in blood pressure during exercise</li><li>• severe stenotic or regurgitant valvular heart disease ( the valves of the heart that allow blood to flow in only one direction do not work properly)</li><li>• Uncontrolled arrhythmia (irregular heart beat), hypertension (high blood</li></ul>

pressure) and/or diabetes (condition in which blood sugar levels are poorly controlled)

- Unstable angina (chest/ arm pain on effort)
- Third degree heart block (prevents co-ordinated pumping of the different sections of the heart) or acute progressive heart failure.
- Acute aortic dissection (tear in the wall of a major blood vessel)
- Acute myocarditis (inflammation of heart muscle ) or pericarditis (inflammation of sac round the heart)
- Acute pulmonary embolus (blockage of an artery in the lungs) or pulmonary infarction (blockage in the lungs)
- Deep venous thrombosis (blood clot in a vein that is deep inside the body)
- Extreme obesity, with weight exceeding the recommendations or the equipment capacity (usually >159kg [350 lb.])
- Suspected or known dissecting aneurysm (abnormal widening or ballooning of a portion of an artery due to weakness in the wall of the blood vessel).
- Acute infections.
- Uncontrolled visual or vestibular disturbances
- Recent injurious fall without medical assessment

#### Relative contra-indications (i.e. cautions)

- Cardiomyopathy
- Moderate stenotic valvular heart disease
- Complex ventricular ectopy
- Uncontrolled metabolic disease.
- Left main coronary artery stenosis
- Electrolyte imbalance
- Systolic blood pressure >200 mm Hg
- Diastolic blood pressure >110 mm Hg

- Tachyarrhythmias or bradyarrhythmias (fast or slow heart rate)
- High degree atrio-ventricular block
- Mental or physical impairment leading to inability to exercise safely and adequately
- Uncontrolled metabolic disease (diabetes, thyrotoxicosis =excess production of thyroxine, or myxedema =low levels of thyroxine)
- Chronic infectious disease (mononucleosis, hepatitis, AIDS).

3.3.6 The EAS service co-coordinators will publicise the service to referrers. They will ensure referrers are aware of the service inclusion criteria and the content of the service through provision of clear written materials and through personal visits to referrers. Below is an example of EAS service inclusion criteria (as used by Angus CHP)

- Able to sit in any seat independently (time unlimited)
- Able to mobilise more than 5m with or without a walking aid, independently or supervised
- In cases where the participant has aphasia, communication strategies in place to allow participation
- No unstable angina/ acute heart failure
- No ongoing cardiac arrhythmia
- Resting Heart Rate maximum of 100 bpm
- Blood pressure maximum 180 systolic, 100 diastolic
- Tinetti score minimum 12 / 28

Rationale – existing services highlight publicising the service and networking with potential referrers as being a very important aspect of service development.

3.3.7 A specimen referral form as used by Angus Community Health Partnership is provided in the Appendix.

3.3.8 Once it has been acknowledged by the GP or physiotherapist that the client may be referred for exercise and that the proposed exercises and programme are suitable, the responsibility for the design and delivery of the exercise programme and the monitoring of the individual's response to the exercise passes to the exercise

professional. This transfer of responsibility includes the fitness centre operator ie to ensure that there are adequate systems in place to support the process of patient referral (secure records/confidentiality etc) and to ensure the instructors are properly qualified and sufficiently experienced to design, deliver and progress exercise to this patient group and to meet the conditions of their insurance cover.

3.3.9 Any change in the participant's medical status and they should be referred back to the health care professional for further assessment before continuing with their exercise programme.

Rationale – National Quality Assurance Framework for Exercise Referral Systems

#### *4. Structure of the EAS service*

4.1.1 Where possible Exercise after Stroke Services should be delivered in a group format rather than individual gym sessions.

Rationale - participants report benefits from the social aspect of the group (Carin-Levy, et al. 2009; Reed, et al. 2010) and it is likely to be more cost effective.

4.1.2 Exercise groups should have a maximum of 1:8 instructors to participants, although this of course depends to some extent on case mix and the length of time participants have been exercising regularly.

Rationale – Current recommendations in the Exercise after stroke instructor course

4.1.3 Exercise after Stroke services should be on-going, not time limited, services as long term behaviour change is required and the majority of stroke patients are not suitable for mainstream exercise provision.

Rationale – evidence for low retention of cardiovascular training effects after training finishes (Mead, et al. 2007) The Scottish Government's recommendations for physical activity in older adults and National Quality Assurance Framework for Exercise Referral Systems

4.1.4 Ideally, an EAS service will be part of a larger patient pathway that begins at in- or outpatient treatment for stroke and covers the full range of physical activity options available in the local community. Patients will be assessed at entry to the physical activity pathway and reassessed regularly by the exercise instructor to ensure that they are exercising at an appropriate level.

Rationale –current good practice –for example, one service has mapped out the patient pathway through their services so that patients can enter at a level appropriate to them and move through the system: from tiered intake classes (3 levels) to maintenance classes and then on to mainstream exercise if this is appropriate.

Although life long participation in exercise is recommended in clinical guidelines (e.g. SIGN 108 <http://www.sign.ac.uk/guidelines/fulltext/108/index.html>). There is little research evidence on how this can be achieved. More research is needed in this area.

4.1.5 Exercise instructors should be able to signpost participants back to their GP or other appropriate health professional, should the patient's performance deteriorate beyond reasonable expectations.

Rationale: professional experience of the project group

## *4.2. Instructor training*

4.2.1 Appropriate training is required for exercise instructors working with patients after stroke. Instructors should have the QMU/UE Level 4 Specialist Instructor 'Exercise and Fitness Training After Stroke' qualification (endorsed by Skills Active) and be registered in this specialist field at Level 4 on REPs (link to sections on REPS and SkillsActive). The Exercise and Fitness training after Stroke course delivered by Later Life Training (<http://www.laterlifetraining.co.uk/ExerciseAfterStroke.html>) is accredited by QMU (SHE Level 2 (undergraduate) and Scottish Credit and Qualifications Framework: Level 8) is the only endorsed qualification in this specialist field. Instructors working with stroke patients must have this endorsed qualification to validate their insurance.

Rationale – Scottish Credit and Qualifications Framework Partnership (2006).  
<http://www.scqf.org.uk/AbouttheFramework/Overview-of-Framework.aspx>

4.2.2 The ARNI Trust (<http://www.arni.uk.com/>) delivers the ARNI 'Functional Training After Stroke' course which aims to give instructors experience of how to work with stroke survivors on the performance of functional tasks. The ARNI course is distinct in its content and outcomes from the QMU/UE course but complementary. This course is eclectic in its approach and employs novel and experiential strategies. A core asset is that it has been developed by a stroke survivor and has been well received by other stroke survivors. There are plans to evaluate the course in the near future.

### *4.3. Content of sessions in EAS services*

4.3.1. Before joining the first exercise session, each participant will have a half-hour appointment with the exercise instructor for: pre-exercise assessment, information exchange and recording of baseline measures.(see 5.1.2) Extra time should be allowed when scheduling this pre-exercise session for patients new to the service, to accommodate practicalities such as getting through sport centre reception, finding a locker etc.

Rationale –current practice and the professional experience of the project group.

4.3.2 Each participant will be given an individualised exercise program (adapted for stroke patients and tailored to the individual) designed by the specialist exercise instructor.

Rationale –current practice e.g. Angus CHP, NHS Dumfries and Galloway

4.3.3 The individualised exercise program will be formulated with reference to the referral information (including the patient's risk stratification-see referrer's responsibilities 3.2.1), the instructor's assessment of the participant and the participant's personal goals for exercise.

Rationale –current practice, ACSM (Durstine et al 2009) for the benefits of pre-exercise assessment in clinical populations and the SIGN guidelines for stroke

rehabilitation          recommend          person-centred          goal          setting  
(<http://www.sign.ac.uk/pdf/sign64.pdf>)

4.3.4 This program will include a plan for increasing physical activity in all aspects of the participant's life -not just within the context of the EAS service.

Rationale – The current internationally recognised physical activity recommendation for adults is that all adults should be moderately active on most days of the week. All exercise after stroke services in Scotland have a frequency of one session per week; this is more likely to be beneficial if supplemented with other appropriate activities and if the expert advice (e.g. posture) given in the exercise setting is applied to other types of physical activity.

4.3.5 Increasing physical activity on more than one day of the week should be an aim of the service

Rationale - All Randomised Controlled Trials of cardiovascular and mixed training for stroke survivors included in the updated Cochrane review of physical fitness training for stroke survivors are delivered at a frequency of 3 times per week or more. This may not be feasible in community settings but increasing physical activity on more than one day of the week should be an aim of the service.

4.3.6 Recommendations for session content

- Sessions should start with an **adapted warm up** to enhance circulation and mobility (15 to 20 minutes). Chair options should be provided for new patients and be available at the beginning of each session.

Rationale- STARTER trial (Mead et al. 2007) and Exercise After Stroke instructor course.

- The **training section** should begin with the aerobic/cardiac component which will be wholly or partly based on a circuit format. The circuit could include around ten stations and should include rhythmical large muscle group aerobic activities adapted for stroke patients e.g. walking, stepping, cycling and local muscular endurance activities e.g. ball.work i.e. trunk rotation / lifting and

lowering etc. Many of the activities in these options inherently involve functional coordination work which should be ensured within each session. An example is shown below (circuit based on the EAS course). Other examples of interventions used in research studies of exercise after stroke are shown here e.g. combinations of circuit and unison formats.

Rationale - the circuit model allows a wide range of different cardiovascular exercise activities without the necessity for large equipment. This is desirable because it allows transfer to other environments ie participants can be encouraged to practice at home. A circuit also allows cardiac options to be alternated with strength options. There is insufficient evidence to recommend particular content.

- The circuit should include functionally related activities. In particular, there should be an emphasis on walking training.

Rationale – evidence for improvement in function is task specific (van Peppen et al. (2004); French et al. (2009)) for example cycling does not improve walking ability only practicing walking improves walking outcomes. Training should focus on the most useful functions for activities of daily living.

- The training section should continue with strengthening activities that involve balance and co-ordination. It is recommended that these types of exercise are done in a unison format (versus circuit) to ensure that the instructor can closely monitor the participants' exercise technique and effort and can further tailor the exercise to the individual.

Rationale- STARTER trial (Mead et al. 2007)

- There should be 4-6 adapted strength exercises using a combination of body weight (e.g. sit to stand) and appropriate equipment (e.g. resistance bands and weighted bars) as resistance. As before, include functional activities wherever possible (e.g. lifting and lowering the weighted bar from a chair).

Rationale –professional experience of project group

- Dedicated balance exercises such as lateral stepping, and heel raises are recommended.

Rationale –professional experience of project group

- Sessions should end with an adapted cool down that includes some rhythmical activities to lower heart rate and some flexibility exercises.

Rationale –this protocol was used in the STARTER trial (Mead, et al. 2007) and was found to be effective. In addition, this is current practice for example in the Postural Stability Instructor course for older adults (including those with minor stroke issues) and ACSM guidelines.

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## **Example Exercise after Stroke session content**

### **Warm-Up**

- 1. circulation booster –march**
- 2. Shoulder rolls- progression –keep marching**
- 3. Circulation booster –march**
- 4. Side bends**
- 5. circulation booster- march**
- 6. Trunk twists**
- 7. circulation booster- march**
- 8. ankle activator – heels and toes- on spot**
- 9. circulation booster**
- 10. Stretches**

### **Main workout**

#### **Circuit**

- 1. Bike**
- 2. 2 ball raise**
- 3. shuttle walk**
- 4. wall press**
- 5. knee to hand**
- 6. step ups**

#### **Group resistance**

- 1. upper back strengthener**
- 2. sit to stand (lower body)**
- 3. back of arm strengthener (upper body)**
- 4. pole lift (lower body)**

## **Cool down**

- 1. Circulation lower/rewarm**
- 2. stretches –calf, chest, back of thigh and upward side**

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## *4.4 Programming variables*

4.4.1 The total **duration** of the aerobic / cardiac exercise training should increase from 15 minutes (week one) to 40 minutes by week 12.

Rationale –this protocol was used in the STARTER trial (Mead, et al. 2007) and was found to be effective. In addition, this is current practice for example in the Postural Stability Instructor course for older adults (including those with minor stroke issues).

4.4.2 The **intensity** of exercise should be moderate as opposed to low. This effort level is required for all components but will be adjusted according to health status on a session-by-session basis.

Rationale –there is little evidence in this area but the study by Rimmer et al. (2009) indicates that greater benefits accrue from shorter periods of moderate intensity exercise than longer periods of low intensity exercise.

4.4.3 The **frequency** of the session should be three times per week wherever possible (see 4.3.5)

Rationale: All Cochrane reviewed Randomised Controlled Trials including STARTER.

4.4.4 Participants should be given a copy of their individualised circuit i.e. which exercise and how many repetitions they should aim to be doing at each station of the circuit or of each unison exercise. These should be in pictorial as well as written form. Their current level of effort should also be clear.

Rationale –current practice, for example in NHS Dumfries and Galloway participants receive a leaflet with clear diagrams of the exercises to be performed at each station

4.4.5 On the reverse of this individualised circuit diagram there should be a space to encourage participants to record their progress (number of reps, time spent training) at each session and to record their BMI, blood pressure and heart rate if appropriate.

Rationale –current practice, for example in NHS Dumfries and Galloway they have devised an excellent sheet for recording such information.

4.4.6 After each session social interaction between participants should be facilitated –e.g. space to have tea, coffee and a chat.

Rationale - participants report benefits from the social aspect of the group (Carin-Levy, et al. 2009; Reed et al. 2010).

## *5. Outcome evaluation*

5.1.1 Most community-based EAS services do not currently routinely collect outcome data on physical health or functional outcomes due to resource constraints and because they want to keep the experience of stroke survivors as close to that of other service users as possible (ie a non-medical environment). However, collecting some data would allow a more robust case for the continued funding of these specialist stroke services to be developed and we would recommend the following:

Rationale –current practice

5.1.2 Services should maintain an electronic database of service user information. Useful information to record would be patient Community Health Index number, contact details, referral information, number of sessions attended.

Rationale –professional experience of project group

5.1.3 Information on adverse events should be in records specific to the Exercise after stroke sessions – not just in the venue's incident and accident book.

Rationale –professional experience of project group

5.1.4 Services should also consider developing academic partnerships for evaluation purposes. Possible outcomes to evaluate would be Blood Pressure, Body Mass Index, resting heart rate, 10m walk, EuroQoL and 'timed up and go' at eight weeks and then every six months.

Rationale –professional experience of project group

5.1.5 Follow up data will be shared with the referring health professional as a means of giving feedback and keeping in regular contact regarding the patient's progress.

Rationale –professional experience of project group

5.1.6 Data on participants will be held securely at the exercise venue and be processed in accordance with data protection legislation.

Rationale –professional experience of project group and National Quality Assurance Framework for Exercise Referral Systems

## Other Good Practice points

### 1. Improving recruitment/uptake

Uptake of exercise after stroke services may be facilitated if participants are accompanied to their first session. This is potentially a volunteer role –to collect and accompany participants to their first session

Rationale –current practice

### 2. In-service stroke awareness training

Provide stroke awareness training for frontline staff in the venues where the EAS classes will take place.

Rationale –current practice

### 3. Personal pre-session contact

Personal contact with patients before they join the class is important in allaying any anxieties and answering practical questions. Clear communication with participants is important with a detailed protocol for contacting participants prior to them entering the course. Participants receive written information and a phone call prior to attendance.

Rationale –current practice

### 4. Orthotics assessment

Participants are signposted back to the local orthotic department for orthotic review if their orthosis is interfering with exercises or causing discomfort during exercise or providing insufficient control of foot and ankle alignment.

Rationale – current practice

#### 5. Assistants

Services should consider inviting trainee exercise instructors and/or trainee physiotherapists to volunteer to assist at the sessions. This is good experience for them and also increases the support available to class participants. Note: These assistants do not affect the recommended ratio of participants to qualified instructors: they are supernumerary.

Rationale – current practice

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## References

- American College of Sports Medicine (2010). Guidelines for Exercise Testing and Prescription. (8<sup>th</sup> ed) Philadelphia, Pa, Lippincott Williams & Wilkins.
- Boysen, G., Krarup, L.-H., Zeng, X., Oskedra, A., Korv, J., Andersen, G., Gluud, C., Pedersen, A., Lindahl, M., Hansen, L., Winkel, P., Truelsen, T. & For the ExStroke Pilot Trial, G. (2009) ExStroke Pilot Trial of the effect of repeated instructions to improve physical activity after ischaemic stroke: a multinational randomised controlled clinical trial. *BMJ*, 339, b2810-.
- Carin-Levy G, Kendall M, Young A & Mead G E (2009) The psychosocial effects of exercise and relaxation classes for persons surviving a stroke. *Canadian Journal of Occupational Therapy*, 76, 73-76.
- Damush T M, Plue L, Bakas T, Schmid A & Williams L S (2007) Barriers and facilitators to exercise among stroke survivors. *Rehabilitation Nursing* 32, 253-60.
- Department of Health (2001). National Quality Assurance Framework for Exercise Referral Systems. London, Department of Health.  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4079009.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4079009.pdf)
- Department of Health (2007). National Stroke Strategy. London, Department of Health.
- Dinan, S. (2001). Physical activity for vulnerable older patients. Exercise prescription for patients. Harries M and Young A. London, Royal College of Physicians: 1-18.
- Durstine, J. L., Moore, G. E., Painter, P. L. & Roberts, S. O. (Eds.) (2009) *ACSM's Exercise Management for Persons With Chronic Diseases and Disabilities*, Champaign, IL, Human Kinetics.
- French, B., Thomas, L. H., Leathley, M. J., Sutton, C. J., Mcadam, J., Forster, A., Langhorne, P., Price, C. I. M., Walker, A. & Watkins, C. L. (2009) Repetitive Task Training for Improving Functional Ability After Stroke. *Stroke*, 40, e98-99.

- Gordon, N. F., Gulanick, M., Costa, F., Fletcher, G., Franklin, B. A., Roth, E. J. & Shephard, T. (2004) Physical Activity and Exercise Recommendations for Stroke Survivors: An American Heart Association Scientific Statement From the Council on Clinical Cardiology, Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention; the Council on Cardiovascular Nursing; the Council on Nutrition, Physical Activity, and Metabolism; and the Stroke Council. *Circulation*, 109, 2031-2041.
- Intercollegiate Stroke Working Party (2008) *National clinical guideline for stroke*, London, Royal College of Physicians
- Mead G, Greig C A, Cunningham I, Lewis S J, Dinan S & Fitzsimons C. (2007) A STroke: A Randomised Trial of Exercise or Relaxation (STARTER) *Journal of the American Geriatrics Society* 55, 892-9.
- Mead G.E (2009). "Exercise after stroke." *British Medical Journal* **339**(jul28\_1): b2795-.
- Moore, J. L., Roth, E. J., Killian, C. & Hornby, T. G. (2010) Locomotor Training Improves Daily Stepping Activity and Gait Efficiency in Individuals Poststroke Who Have Reached a "Plateau" in Recovery. *Stroke*, 41, 129-135.
- Rand D, Eng J J, Tang P-F, Jeng J-S & Hung C (2009) How active are people with stroke? Use of accelerometers to assess physical activity. *Stroke*, 40, 163-8.
- Reed M, Harrington R, Duggan A. & Wood V. A (2010) Meeting stroke survivors' perceived needs: a qualitative study of a community-based exercise and education scheme. *Clinical Rehabilitation*, 24, 16-25.
- Rimmer J H, Wang E & Smith D (2008) Barriers associated with exercise and community access for individuals with stroke. *Journal of Rehabilitation Research and Development*, 45, 315-322.
- Rimmer, J. H., Rauworth, A. E., Wang, E. C., Nicola, T. L. & Hill, B. (2009) A preliminary study to examine the effects of aerobic and therapeutic (nonaerobic) exercise on cardiorespiratory fitness and coronary risk reduction in stroke survivors. *Archives of Physical Medicine & Rehabilitation*, 90, 407-12.
- Saunders D H, Greig Ca, Mead G E & Young A (2009) Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews* Issue 4, DOI: 10.1002/14651858.CD003316.

Scottish Government (2009). Better Heart Disease and Stroke Care Action Plan.  
Edinburgh, Scottish Government.

Scottish Intercollegiate Guidelines Network (SIGN) (2008). Management of patients with stroke or TIA: assessment, investigation, immediate management and secondary prevention: a national clinical guideline no.108. Edinburgh, SIGN.  
<http://www.sign.ac.uk/guidelines/fulltext/108/index.html>

SkillsActive. Unit D516 Design, agree and adapt a physical activity programme with adults after Stroke. National Occupational Standards Level 4 Physical activity and health  
[http://www.skillsactive.com/assets/0000/1228/D516Design\\_agree\\_and\\_adapt\\_a\\_physical\\_activity\\_programme\\_with\\_adults\\_after\\_Stroke\\_Final\\_Mar07.pdf](http://www.skillsactive.com/assets/0000/1228/D516Design_agree_and_adapt_a_physical_activity_programme_with_adults_after_Stroke_Final_Mar07.pdf) (accessed 7th April 2010)

Van Peppen R P, Kwakkel G, Wood-Dauphinee S , Hendriks H J, Van Der Wees P J & Dekker, J. (2004) The impact of physical therapy on functional outcomes after stroke: what's the evidence? *Clinical Rehabilitation*, 18, 833-62.

Wevers L, Van De Port I, Vermue M, Mead G, & Kwakkel G, (2009) Effects of Task-Oriented Circuit Class Training on Walking Competency After Stroke A Systematic Review. *Stroke*, 40, 2450-2459.

Wiles, R, Demain, S, Robison, J, Kileff, J, Ellis-Hill, C. & Mcpherson, K. (2008) Exercise on prescription schemes for stroke patients post-discharge from physiotherapy. *Disability and Rehabilitation*, 30, 1966-1975.