
PANat: Theoretical framework, clinical management and application of the Urias[®] Johnstone air splints.



1. Theoretical Framework

2. User Guide

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1. Theoretical framework and clinical management of PANat

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Summary

This document gives an overview of the theoretical framework and clinical management of PANat.

PANat: PRO-Active approach to Neurorehabilitation integrating Urias® Johnstone air splints and other therapy tools. PANat is a further development of the Johnstone concept. (Margaret Johnstone, FCSP 1919-2006)^[1]

In the 1970's Margaret Johnstone FCSP^[2-3] pioneered the use of air splints in active training of the hemiplegic limb in the severely impaired stroke patient. This concept has been updated by integrating contemporary principles of movement science and evidence based guidelines into the theoretical and practical framework of PANat. It incorporates low-tech therapy tools in training sessions developed by therapists and ideas of stroke patients to meet their specific needs.

Introduction

Movement is necessary for the individual to participate and enjoy life at home, in the community and workplace.

Many stroke patients with low sensory-motor recovery use the unaffected side to accomplish daily tasks; as such they reinforce failure to integrate the severely impaired hemiplegic limb into meaningful functional activity. As a consequence they may develop learned non-use, muscle stiffness, contractures and pain.

Studies have shown that using the air splint for repetitive and early stimulation in training the upper hemiplegic limb of the stroke patient, with pronounced muscle weakness or a severely paralyzed arm, can have an effective long lasting effect on motor function^[4-5].

Interventions encouraging specific and intensive training with the hemiplegic limbs are made possible by adapting the task and the environment using Urias® Johnstone air splints and other therapy tools (e.g. rocking chairs, PANat-Laptool¹)^[6-8] This adapted situation becomes a learning environment, to motivate patients to train selectively control of movements with their severely impaired hemiplegic limbs in a part task activity. This can then contribute over time to a better performance of the agreed upon goal task.

The PRO-Active approach is particularly suited to treat stroke patients with severe sensory motor impairments. Incorporating the principles of PANat using interventions with the hemiplegic limb that are repetitive, intensive and selective in all phases of stroke rehabilitation, is one method with the potential to enhance the mechanism of neuroplasticity and to promote effective and efficient goal-directed motor training. Emphasis is placed on giving the individual an opportunity for self-directed practice with the hemiplegic limbs both during and outside supervised therapy sessions and in the home setting.

¹ www.panat-laptool.ch

Theoretical Framework of PANat

The theoretical framework of PANat is based on the contemporary systems theory of motor control and motor learning^[9-16]. This theory suggests that movement patterns emerge as a result of the interaction of multiple processes and include intrinsic (perceptual, cognitive and motor processes within the individual) and extrinsic (interactions between the individual, the task and the environment) factors.

The principles of motor learning and cognitive science, contemporary understanding of the effects of impairments and secondary adaptations, biomechanics of functional activities and the clinical applications of neural plasticity are used to guide the treatment^[13].

Air splints and other therapy tools play an important role in training. The exercises, integrating the environment using externally focused instructions^[32] and adapting the task allow self-directed practice with the hemiplegic limbs. This problem solving process promotes planning, initiation and execution of the movement sequence with feedback in 'hands-off' situations. Self directed practice is therefore on-going in both supervised and unsupervised therapy sessions and at home.

Clinical Management

Clinical management with PANat evaluates the sensory-motor deficits caused by the stroke in the following way:^[16]

1. **Function task level:** What intervention goal or activity has been agreed upon with the patient?
2. **Strategy:** What is the movement strategy: restorative or compensational? (Activity/strategy level)
3. **Impairment:** What underlying resources and limitations cause the movement pattern?(sensory, motor and cognitive impairment- level)

The task is analyzed to give a baseline performance level. A training programme is set up incorporating the principles of motor learning^[17].

The rehabilitation process is guided by the theory of neuroplasticity^[18]. Motivation and commitment is encouraged by focusing on patient specific goal directed activities. The aim is to encourage repetitive, intensive and targeted training strategies of the hemiplegic side in a set task or part task activity in order to improve movement speed and force in the weaker movement pattern of the hemiplegic limbs. The acquired limb (part-) activity is then immediately linked back to the desired goal of the patient.

Integrating PANat into the rehabilitation process will incorporate patient centered goals and use task specific strategies to minimize compensatory movements that occur during functional activity. This is achieved by maintaining muscle flexibility and extensibility, strengthening weak muscles, stimulating muscle activity in a functional context and increasing sensory stimulation^[19].

The aim of training is to promote the quality and quantity of activities with the hemiparetic limbs, in uni- /bi-lateral and bimanual movements whilst preventing detrimental compensatory strategies. The choice of activity in the training session is based on the impairments that constrain the patient from performing or completing a task.

Exercises are performed with an increasing number of repetitions within a well structured and mostly closed environment. Variability is introduced into the training plan by changing the complexity of each task, altering the speed and/or the support surface, adjusting the lever effect with air splints or other therapy tools and introducing cognitive elements: e.g. dual tasking.

The appropriate choice and use of air splints and therapy tools may be used to reduce the complexity of multi-joint movements by limiting the 'degree of freedom of movement'^[20] of the joint during a specific activity. They promote selective motor control of the affected limb in a meaningful task and provide opportunities for repetition and high intensity training in either individual or group sessions. Finding a balance between 'hands-on' and 'hands-off' practice or self-directed training can improve the patient's ability to problem-solve.

The patient's goal and performance must be re-evaluated regularly and the therapeutic interventions modified to ensure they maximise their rehabilitation potential.

Air splints and other therapy tools can be used in all phases of rehabilitation from the acute stage to that of long term management. The emphasis within the training programme will vary from prevention and treatment of adaptive changes to mobilization and recruitment of muscle activity.

Sensory-motor deficits respond slowly to change, but the task and the setting can be structured in a learning environment to stimulate muscle groups needed to accomplish the planned activity.

Conclusion

Effective and efficient training for neurological patients in all phases of rehabilitation with severely impaired sensory-motor control is challenging. One aim of rehabilitation is to achieve effective motor behaviour. It is therefore essential that emphasis is also placed on intensive training and practice with the hemiplegic side throughout the rehabilitation process.

The PRO-Active approach is well incorporated into different phases of the rehabilitation process; it integrates current dynamic systems theory of motor control and motor learning, is evidence based on sensory motor training^[4,5,19,28], promotes early involvement of the carers and enables autonomous training.

Motor learning after stroke is a life-long process. Therapists integrating PANat into stroke rehabilitation incorporate strategies that can help to treat motor behaviour with compensatory strategies that occurs during functional tasks. This is achieved on an impairment level by strengthening weak muscles, maintaining muscle flexibility and extensibility, stimulating muscle activity in a functional context and increasing sensory stimulation. On a behavioural level it is achieved by incorporating intensive and repetitive practice using external focus instructions and feedback during 'hands-on/-off' training. This can be practiced when severe sensory, motor, cognitive and perceptual problems are present.

In addition, the judicious use of the air splints and therapy tools help to reduce the complexity of multi-joint movements during training, and enhance self-controlled and targeted motor control within meaningful activities. Time spent in self-directed training with the hemiplegic limbs in all phases of rehabilitation is increased.

In this approach stroke patients and their carers are encouraged and coached to be proactive in managing their ongoing rehabilitation. All together they address the specific problems or limitations caused by stroke and continuously update the treatment programme.

Practical examples can be looked at

- *In the PANat User guide*
- *in the Poster – presented in Leuven, Belgium in 2006: Promoting 'Force to use it' - Strategies of the Hemiplegic Limbs of a Patient with Severely Impaired Motor Control Following Stroke: A Case Report. Cox Steck G., Signer S.*
- *in the article in NOT: "Independent, repetitive arm motor training in severe hemiparesis using the Johnstone Air Splint / Selbsttatiges, repetitives Armmotoriktraining bei ausgeprägter Hemiparese mit den Johnstone-Luftpolsterschienen nach PANat* / Traitement autonome et repetitif de la motricite du bras lors d'une hemiplegie prononcee, a l'aide de les attelles gonflables de Johnstone d'apres PANat." Wälder F. 2008*

PRO-Active - What is in the word?

PRO-Active approach to Neurorehabilitation integrating air splints* and other therapy tools (PANat)

*Urias® Johnstone air splints

PRO-Active: Summarizes the clinical management process of PANat

PRO: The decision making process and clinical reasoning to justify the use of air splints and other therapy tools. (Who, what and why)

Active: The training programme is based upon the principles of contemporary motor learning theories. (How)

P: Pathology

PANat is primarily for stroke rehabilitation. It can also be used for other neurological problems e.g. multiple sclerosis and acquired brain injury. The objective and emphasis of the treatment will depend on the diagnosis.

R: Reframe

The International Classification of Functioning and Health (ICF)^[21] is used as the underlying structure to reframe the problems relating to pathology or diagnosis. Activities, participation and quality of life (enablement) and underlying impairments (disablement) are taken into account.

The Upper Motor Neurone Syndrome (UMNS) is used to understand the relationship of primary motor impairments to secondary motor impairments and their relationship to disability after stroke.

O: Objectives

Goal setting is used as a motivational technique to enable the patient to understand why training is necessary^[22-23].

- What is the patient's goal?
- What are the therapy objectives to meet this goal?

A: Acquisition of skills

The guidelines for acquisition of skills are integrated in the training programme^[15].

Emphasis is placed on the initial or cognitive phase of skill acquisition. Using the severely motor impaired limb to learn a task in an adaptive situation is comparable to learning a new task.

c: carers

An integral part of PANat is the education of carers, family members and friends in understanding and managing the disease process. Through training they develop skills to continue long term rehabilitation in the home and to minimize anxiety, boost confidence and facilitate a successful discharge home and social reintegration.^[24]

t: training

Training after damage to the CNS has been shown to improve functional return^[15]. The aim is to maximize recovery and prevent compensatory strategies. Integrating PANat into the rehabilitation process enables the therapist to initiate early specific training to activate the appropriate muscle groups in a goal-directed, task oriented context.

Evidence-based guidelines for training are incorporated into the programme^[13,16,31].

i: intensity

PANat allows intensive, repetitive, focused, self-directed movements of the hemi paretic arm, and the leg with integration of the trunk by patients with severely impaired motor control. Air splints and tools can be applied by all members of the team and carers. This allows on-going sensory-motor training at weekends or in the home setting. Training can also be practiced in group sessions to encourage efficient use of time and resources^[25-26].

v: variation

The air splints and tools are used as a part of the environment to constrain and promote quality of movement in meaningful activities or goals^[6-8]. This enables task modification or part task in an activity and makes repetition in multiple variations possible. External focus is used as a form of feedback and instruction.

e: evidence

How effective has the intervention been for these patients? Progress must be continuously re-assessed; the choice of assessment tool will depend on what is being evaluated.

- Quantitative methods measure statistics (how much).
- Qualitative methods assess planning and adaptive behavioural changes^[27].
- Individual objective measures show changes in performance over time.

Johnstone air splints

The Urias® Johnstone air splints were specifically developed and designed since 1966 for training stroke patients with severely impaired motor control. The choice of air splint or therapy tool is dependent on the level of motor recovery, performance capability of the patient and the specific task or activity.

When training according to PANat-principles ONLY the Urias® Johnstone air splints are recommended for following reasons:

- Margaret Johnstone and other PANat instructors designed a variety of air splints to fit the different training programmes
- The material of the Johnstone air splints is made from flexible PVC (according to European standards), double-layered and transparent. The air splints are designed to be inflated by mouth to a maximum pressure of 40 mm Hg and for training the stroke patient with severely impaired motor control.

For further information of application and some practical examples of use of the air splints, please read the user guide^[6].

Self-directed training ('hands-off')

Self-directed training combined with air splints promotes autonomous practice, incorporating repetitive and intensive training strategies of the hemiplegic limbs in a defined activity. The starting position for any activity must be in accordance with the level of motor recovery and functional ability of the patient.

Therapeutic assistance is required to position the patient, mobilize joints and soft tissue prior to applying air splints 'hands-on', and in setting up the task to enhance the learning environment. The task, environment and exercise sequence are adapted to promote an autonomous, problem solving process of planning, initiation, carry through, completion and evaluation of the movement sequence 'hands-off'. The aim of training is to promote the quality and quantity of functional activities of the hemiparetic limbs in uni/bi-lateral and bimanual movements whilst preventing detrimental compensatory strategies. The choice of activity in the session is based on the impairments that constrain the patient from performing or completing a task.

Severely impaired motor control

The patients most appropriate for this training are those whose symptoms range from no selective movement to pronounced weakness with minimal of muscle activity. This approach should be considered for those patients who have developed secondary negative musculoskeletal and neurological behaviours (soft-tissue contractures). The Chedoke McMaster Stroke assessment^[29] would classify this patient group on the impairment inventory: Stages 1-4. These patients and particularly those with no selective movements and with cognitive impairment have difficulty participating in evidence based training methods such as Constrained Induced Movement Therapy^[30].

Degrees of freedom of movement: N.A. Bernstein^[21]

This refers to a motor control problem in how to co-ordinate and regulate movement (in the body). The process of mastering co-ordination and control of movement is managed by reducing the degree of freedom of movement of a specific joint or a limb thus preventing inappropriate movement.

External Focus of attention^[32]

External focus of attention is the focus that is directed at the effect of one's movement in relation to the environment.

PANat therapists structure the environment with visual, auditive and tactile cues to enable quality of movement for strokes with severely impaired motor control. Air splints and therapy tools can be used in the training session for additional external focus of attention.

Author's comments

This document will be reviewed regularly and any changes will be acknowledged as the scientific framework for movement analysis, motor control and motor learning in rehabilitation evolves and clinical expertise develops. It is recommended that clinical trials are undertaken to assess and evaluate the clinical response to the use of PANat with this client group.

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2. Application of the Urias[®] Johnstone air splints used in PANat

USER GUIDE

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www.panat.info

The Urias® Johnstone air splints are manufactured by Arden Medical Limited. <http://www.arden-medical.com>

Johnstone air splints were primarily designed for the stroke patient with moderate to severely impaired motor control of movement. They provide an effective and efficient method for training.

The user guide **only** includes general information and instructions for application and handling of the air splints. Sample exercises are given to help develop your own exercise programmes. Responsibility of treatment is guided by the skilled therapists. The overall aim is to encourage and motivate active training as part of a task activity with the underused hemiplegic side and to discourage learned disuse with its negative consequences. Air splints can be used in combination with other low cost easy to use tools thus allowing a greater intensity and variety of training.

The air splints were developed by physiotherapists Margaret Johnstone and Ann Thorp as a rehabilitation aid for those with stroke and multiple sclerosis. Their ideas have been updated and PANat was launched in January 2007 to reflect the development of the underlying theoretical assumptions and therapeutic uses of these air splints.

To be effective it is essential that the air splints are applied and used as directed by this user guide.

A number of research articles have used the air splints as passive resting tools applied in positions and postures that may have a negative outcome on training and potential recovery (e.g. Poole, 1990; Kwakkel, 1999, Platz, 2009). This is contrary to the aims and use of the air splints as practiced by the PANat group.

With correct application and use of the air splints, the following advantages can be observed:

Advantages of use

1. Biomechanical

- To prevent secondary impairments of muscle shortening and loss of elasticity in muscles (e.g. myofascia) and connective tissue (e.g. capsule joints).
- To minimise undesirable muscle activity by maintaining joint alignment and limiting the degree of freedom of movement in multi-joint movements. This is especially important in the early stages of skill acquisition.
- To strengthen muscle groups in functional activities/tasks, by allowing safe pain free early static or dynamic weight bearing.
- To encourage general fitness and strength, enabling the client to increase the time spent in training.
- To promote self-directed exercises in a safe and controlled environment, allowing the client to progress more quickly, from independent hands-on training to active problem solving hands-off situations.

2. Sensory

- To promote proprioceptive stimulation by weight bearing or limb loading on the extremities in various activities and postural sets.
- To have added sensory input with intermittent pneumatic compression in combination with the air splints (tactile and proprioceptive).

For further information on theoretical background and courses please contact the following address: www.panat.info

General information

The URIAS® orally inflated air splints are made from specially developed PVC. Based on the principles of PANat, monitoring change and increasing awareness of the hemiplegic side are important aspects when integrating specific air splints into the individual's rehabilitation programme. Nurses and carers are taught how to apply the air splints and support the client out of therapy sessions and at home.

With each air splint the following procedures apply:

- Preparation prior to air splint application
- Application
- Sample exercises: use these to develop your own exercise programmes.
- Removal
- Contra-indications / Precautions

1. Available Urias® Johnstone air splints for adults

for the upper limb		for the lower limb	
Long Arm air splint	70 cm ~ Ref: 70-002-0 80 cm ~ Ref: 70-001-0	Foot air splint	Ref: 70-008-0
Long Arm air splint (double chamber) *	70 cm ~ Ref: 70-102-0 80 cm ~ Ref: 70-101-0	Foot air splint (double chamber)	Ref: 70-108-0
Half Arm air splint	53 cm ~ Ref: 70-003-0	Leg air splint (double chamber)	60 cm ~ Ref: 70-007-0 70 cm ~ Ref: 70-006-0 80 cm ~ Ref: 80-006-0
Half Arm air splint (double chamber) *	53 cm ~ Ref: 70-103-0	Leg & Foot air splint for resting (MS patients)	Ref: 71-002-0
Elbow air splint	40 cm ~ Ref: 70-004-0	Leg & Foot air splint for standing (MS patients)	Ref: 70-012-0
Hand air splint (double chamber)	20 cm ~ Ref: 70-005-0	XL – Bariatric air splints	
		XL Arm air splint (double chamber)	70 cm ~ Ref: 70-112-0 80 cm ~ Ref: 70-111-0
Hand & Wrist air splint (double chamber) - larger hand -	30 cm ~ Ref: 70-009-0	XL Leg and Foot air splint for resting	Ref: 71-111-0
Finger air splint (one sided single chamber) *	15 cm ~ Ref: 70-109-S	XL Leg and Foot air splint for standing	Ref: 71-012-0
Finger air splint (double chamber)	15 cm ~ Ref: 70-109-0	XL Leg gaiter (double chamber)	60 cm ~ Ref: 70-017-0 70 cm ~ Ref: 70-016-0

* Not included in the user guide

2. Indications

- Stroke patients with moderate to severely impaired motor control.
- Patients with soft tissue shortening of skeletal muscle.

3. Contraindications

- Deep vein thrombus diagnosed or suspected.
- Acute lung oedema.

4. Precautions

- Small broken areas of skin should be covered with a dressing; the air splint can then be applied.
- Jewellery should be removed from practitioner and client before air splint application.
- A thin cotton sleeve should cover the client's limb while the air splint is in use as a protection against sweat rash. This is not necessary for the hand, fingers and toes.
- Pressure should never exceed 40 mm Hg. Pressure should be read when the limb is at rest.
- The air splint should not be worn in direct sunlight. Strong sunlight through the plastic may cause a burn to the skin.
- The limb must be passively mobilised before and after application of the air splint.
- No air splint should be left on for more than 45 minutes, but should be taken off and reapplied and the treatment session continued.
- Never use for overnight positioning.
- Dispose of air splints in the household waste. Do not burn or incinerate.

5. Inflation of air splints

- The air splints should be orally inflated. The warm air from the lungs ensures the air splint is well fitting and comfortable giving an even pressure over the limb.
- If the client experiences any pain the air splint must be removed and reapplied.
- Inflation pressure should be checked by a manometer and must not exceed 40 mm Hg at rest (use a 10 cm connection between splint valve and manometer).

Electric/mechanical pumps to blow up air splints are not recommended, as the advantages of blowing up by mouth are lost (see above). For hygienic purposes filters with a personal mouthpiece are used.

6. Care of air splints / storage

- New air splints should be inflated with the zip open to ensure that the two layers of plastic separate. After fully inflating the air splint, the valve should be opened and the air splint rolled up to force all the air out. The air splint is then straightened and is ready for use.
- When not in use, the air splint should be stored flat, or hung up so that the inflation tube hangs downwards to ensure there is no strain at the junction of the inflation tube and the air splint. This inflation tube must never be used to handle or carry the air splint.
- To clean the air splints wipe them over with a mild disinfectant, then dry with a towel. If necessary the valve may be disconnected and washed and the inflation tube cleaned with a test tube brush dipped in a mild disinfectant, allowed to dry and then reassembled.
- Air splints should be stored at room temperature (+10 degrees).
- A personal detachable mouthpiece for inflation is recommended. This is easily fitted to the inflation tube,
- Many clients prefer to have their own air splints and when necessary, carers and family members are taught to use them by the therapist.

7. Accessories

- Thin cotton sleeve
- Mouth piece; disposable filter bottle

1. Mouth Piece		REF 75-000-0
2. Filter Bottle		REF 75-011-0

1. **Mouth piece** - a personal detachable mouth piece is easily fitted and carried in the user's pocket. This can be washed as necessary.
2. **Disposable filter bottle** - contains crystals which absorb excess moisture. This is fitted to the inflation tube and when detached, carried in the user's pocket. When the granules turn from orange to white (clear) the bottle must be discarded.

For the sake of clarity, throughout the text, the patient is referred to as 'he'.

Long Arm air splint - 70 cm and 80 cm

Aims of Use:

- For active and passive mobilisation of the extended arm without pain in all ranges of movement.
- For the prevention and treatment of soft tissue contractures in the shoulder, elbow, wrist and fingers.
- To enable early weight bearing of the upper limb in a physiological position.

Preparation

Starting position: Supine (lying on the back) with both arms supported on pillows to ensure symmetrical postural alignment. The choice of air splint (70 cm or 80 cm) will depend on the length of the hemiplegic arm. Passive movements of the shoulder girdle and arm are carried out, at the same time muscle pliability and joint range are assessed.



Passively mobilise, realign and support the scapula to permit accurate positioning of the shoulder and arm.



Carefully bring the extended arm into outward rotation, flexion and abduction. Encourage the client to turn his head to the affected side to watch and follow the movements of the arm and hand.



Support the upper arm / hand and mobilise the elbow. Shoulder joint is in 60° flexion and rotation is neutral.



Mobilise the wrist into dorsal extension. The metacarpals are individually mobilised and the palm is rounded and flattened. The thumb and each finger are passively lengthened. Form the hand into a fist, then stretch it out.



Ensure the arm is adequately supported on pillows. Put the cotton sleeve on your own arm (the right arm if it is the client's right arm). A hand shake hold is used to correctly support the hemiplegic hand.



Apply the cotton sleeve; this is to prevent skin irritation. Cover the entire arm but leave the hand free.

Application of the air splint

1



Close the zip. Put the air splint onto your arm (the right arm if it is the client's right arm). Take the client's hand in a handshake hold and draw the air splint over his arm.

- The shoulder is outwardly rotated, elbow extended, wrist in 10° extension, the thumb is abducted (outward and straight) and the fingers are straight.
- The zip lies parallel to the 5th finger.
- The client turns his head and looks towards the hemiplegic hand.

2



The air splint is drawn up the arm to leave a space of 3 fingers' width from the axilla.

3



Place the inflation tube in your mouth. This leaves both hands free to maintain the position of the limb in the air splint.

Abduct the thumb applying light pressure over the thenar eminence (base of 1st metacarpal). Hold it in this position during inflation.

The fingers are straight and held together - **not apart**. The wrist is supported in approx 10° dorsal extension. Both of your hands are needed to keep the client's hand in the optimal position.

4



Leave a space of 6-8 cm from the finger tips to the open end of the air splint: this ensures even pressure over the arm and hand.

5



Correct position.

Sample exercises

Use these to develop your own exercise programmes.



Pushing against the therapist's hand, a ball or the wall. Support the arm on pillows to maintain the neutral position of the shoulder.



The client moves the hemiplegic arm actively assisted by the non affected arm to an external focus (the markers on the wall).



Different activities (e.g. balancing a rubber ball on the air splint for x seconds) can be encouraged using the long arm air splint to stabilise the elbow, wrist and hand.

Removal of the air splint

1



- Open the valve to release the air. Encourage the client to help squeeze the air out of the air splint.
- Undo the zip. Ask the client to close his eyes and feel the changing pressure in the air splint on the arm.
- Take off the air splint.
- If active movement is present encourage the client to move his limb.

2



Passively mobilise all joints (see preparation for application).
Ask the client if he is aware of changes in feeling or in movement of the limb.

3



Following the removal of the air splint use a variety of objects to stimulate sensation and selective movement.

Precautions

- Do not apply the long arm air splint with the shoulder inwardly rotated.
- Do not apply the air splint into the axilla as this may cause pressure on the brachial plexus.
- **Never** pull the air splint off – deflate, open the zip; support the arm and hand and carefully draw off the air splint thus avoiding any potential trauma to the shoulder.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues.
To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

Half Arm air splint - 53 cm

Aims of Use:

- To control muscle stiffness and stabilise the wrist and fingers during training.
- To enable forearm propping in prone lying, sitting and standing.
- To prevent and treat soft tissue contractures in the forearm, wrist and fingers.

Preparation

Passive movements of the shoulder girdle and arm are carried out and at the same time muscle pliability and joint ranges are assessed.

1



The half arm air splint can be applied in lying, sitting and standing. In all positions passive movements of the shoulder girdle, arm, elbow and hand are carried out prior to application.

2



Carefully bring the extended arm into outward rotation, flexion and abduction. Encourage the client to turn his head to the affected side to watch and follow the movements of the arm and hand.

3



Support the arm / hand and mobilise the elbow. Make sure the elbow is mobilised to end range in both flexion and extension. Shoulder joint is in 60° flexion and rotation is neutral.

4



Mobilise the wrist into dorsal extension. The metacarpals are individually mobilised and the palm is rounded and flattened. Each finger is passively lengthened. Form the hand into a fist then stretch it out.

5



Ensure the arm is adequately supported on pillows. Put the cotton sleeve on your own arm (the right arm if it's the client's right arm). Take the hemiplegic hand in a hand shake hold.

6



Apply the cotton sleeve; this is to prevent skin irritation. Cover the forearm but leave the hand free.

Application in supine (lying on the back)

1



Close the zip. Put the air splint onto your arm (the right arm if it's the clients' right arm) then clasp the clients hand and draw it over their arm. The air splint should be at least 3 fingers width below the elbow, the zip lies alongside the 5th finger.

2



Place the inflation tube in your mouth; this leaves both hands free to maintain the position of the limb in the air splint.

3



Abduct the thumb applying light pressure over the thenar eminence (base of 1st metacarpal). Hold it in this position during inflation.

The fingers are straight and held together - not apart. The wrist is supported in approx 10° dorsal extension. Both of your hands are needed to keep the client's hand in the optimal position.

Application in the sitting

1



The zip is positioned alongside the 5th finger and extends up the forearm.

2



The air splint is applied approximately 3 fingers width below the elbow to allow unrestricted flexion of the joint during functional activities.

3



Leave a space of at least 6-8 cm from the finger tips to the open end of the air splint: this ensures even pressure over the arm and hand.

4



Direct the client's attention to the hand so he is aware of changes in feeling or in movement of the limb.

Sample exercises

Use these to develop your own exercise programmes.

Side-lying



Floor exercises with the half arm air splint in combination with various external foci: e.g. in side lying using markers to encourage different positions.

Prone-lying



Prior to rolling into prone lying always check range of movement, pain and the active stability of the shoulder. Roll into prone through the non plegic side. Place your hands around and underneath the hemiplegic shoulder to support it as the client rolls into prone and accepts weight through the forearm. The yellow band is used as an external focus so that the client knows where to place the elbow. The client drops his head to look at the yellow band then lifts his head to focus on various markers in front of him.

Sitting



The forearm is positioned with the thumb uppermost in the air splint. Insert a spoon into the air splint and place a marble or small ball on it. Turn the forearm outwards (supinate) to drop the ball into the bowl. Use different colours, sizes and number of balls to progress the exercise.

Removal of the air splint

- Open the valve to release the air. Encourage the client to help squeeze the air out of the air splint.
- Undo the zip. Ask the client to close his eyes and feel the change in pressure in the air splint on the arm.
- Take off the air splint.
- If active movement is present encourage the client to move his limb.
- Passively mobilise all joints (see preparation for application).
- Ask the client if he is aware of changes in feeling or in movement of the limb.

Sample exercises

Use these to develop your own exercise programmes.



Following the removal of the air splint use a variety of objects to stimulate sensation and selective movements.



Use a brush to stimulate sensation.



The finger tips are stimulated by drawing a rough towel under the forearm and palm of the hand.

Precautions

- Do not apply the half arm air splint with the palm face down (forearm pronated).
- Do not apply the air splint into the elbow crease. Space must be left to ensure full range of elbow flexion.
- **Never** pull the air splint off - always let the air out first. Open the zip; support the arm and hand and carefully draw off the air splint thus avoiding any potential trauma to the shoulder.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues. To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** turn onto the stomach with the shoulder inwardly rotated. **Always** roll into prone through the unaffected side. Ensure the hemiplegic shoulder is in outward rotation (external).
- **Never** use the air splints for positioning overnight.

Hand air splint (double chamber) - 20 cm

For the larger hand use the 30 cm hand/wrist air splint but do not cover the wrist.

Aims of Use:

- To maintain finger extension and thumb abduction to allow a firm weight bearing base for the hand.
- To maintain finger and thumb position in activities requiring an open hand.
- To assist weight bearing activities of the hand in sitting, standing and crawling.

Preparation

Ensure the client is sitting with weight evenly distributed through the buttocks and feet. The feet must be flat on the floor. Prior to application passive movements of the shoulder girdle and arm are carried out; at the same time muscle pliability and joint ranges are assessed. Direct the client's attention to the hand so he can watch and feel the movement.

1



Direct the client's attention to the hand so he can watch and feel the movement.

2



Mobilise the wrist into dorsal extension.

3



The metacarpals or hand bones are individually mobilised and the palm is rounded and flattened.

4



The thumb and each finger are passively lengthened. Form the hand into a fist then stretch it out.

5



Full range of movement of the hand including fist closure is checked daily.

6

Application of the air splint

1



The hand air splint is applied over the hand leaving the wrist free.
The seam must lie alongside the 5th finger.

2



The thumb is held in an outward position (abduction) and the fingers are straight (extension).

3



Firmly inflate the chamber covering the back of the hand.
Then put a small amount of air into the lower chamber to allow a comfortable weight bearing base for the hand.
Some adjustment may be needed to balance the chambers to ensure the correct hand position for weight bearing.

Sample exercises

Use these to develop your own exercise programmes.

- Usually used in conjunction with the elbow splint.
- Can be used on the toes and forefoot to mobilise soft tissues and to encourage extension of the toes during functional activities.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to move his hand.
- Passively mobilise all joints (see preparation for application).
- Use various objects to stimulate sensation and selective movements of the hand.

Precautions

- **Never** over extend the metacarpal or interphalangeal joints (knuckles and fingers) as this may cause a flat non functional hand.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session they may be removed and reapplied if they are being used dynamically rather than as a tool to stretch soft tissues.
To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

Hand & Wrist air splint (double chamber) - 30 cm

This can be used as a hand air splint for the larger hand. See instructions for the hand air splint 20 cm.

Aims of use:

This air splint provides more support for the wrist and can be used as a hand air splint for the larger hand.

- To maintain finger and thumb position in activities requiring an open hand.
- To assist weight bearing activities of the larger hand in sitting, standing and crawling, when used as a hand air splint for the larger hand.

Preparation

Ensure the client is sitting with weight evenly distributed through the buttocks and feet. The feet must be flat on the floor. Prior to application passive movements of the shoulder girdle and arm are carried out; at the same time muscle pliability and joint ranges are assessed.



Direct the client's attention to the hand so he can watch and feel the movement.



Mobilise the wrist into dorsal extension.



The metacarpals or hand bones are individually mobilised and the palm is rounded and flattened.



The thumb and each finger are passively lengthened. Form the hand into a fist then stretch it out.



Full range of movement of the hand including fist closure is checked daily.

Application of the air splint

1



The air splint is applied over the hand and wrist. The thumb is held in an outward position (abduction) and the fingers are straight (extension). The seam must lie alongside the 5th finger.

2



Firmly inflate the chamber covering the back of the hand.

3



Then put a small amount of air into the lower chamber. Some adjustment may be needed to balance the chambers to ensure the correct hand position.

Sample exercises

Use these to develop your own exercise programmes.

- Usually used in conjunction with the elbow splint.
- Can be used on the toes and forefoot to mobilise soft tissues and to encourage extension of the toes during functional activities.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to move his hand.
- Passively mobilise all joints (see preparation for application).
- Use various objects to stimulate sensation and selective movements of the hand.

Precautions

- **Never** over extend the metacarpal or interphalangeal joints (knuckles and fingers) as this may cause a flat non functional hand.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session they may be removed and reapplied if they are being used dynamically rather than as a tool to stretch soft tissues.
To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

Elbow air splint - 40 cm

This air splint can be used in conjunction with the hand air splint 20 cm.

Aims of use:

- To stabilise the elbow.
- To allow selective flexion and extension. The hand may be supported in the hand air splint.
- To use in conjunction with the hand air splint, when there is insufficient stability in the elbow.
- Selective soft tissue mobilisation of the elbow.
- Can be slipped on or off over the hand air splint when required.

Preparation

1



Prior to application ensure the following movements are completed: shoulder protraction and external rotation, elbow wrist and finger flexion and extension.

2



Support the arm on a table; mobilise the elbow in flexion and extension.

3



Mobilise the wrist into dorsal extension. The metacarpals are individually mobilised and the palm is rounded and flattened. Each finger is passively lengthened. Form the hand into a fist then stretch it out.

Application of the air splint

1



First apply the hand air splint (see instruction for the hand air splint).

2



The elbow air splint is large enough to be put on over the inflated hand air splint.

3



Inflate the elbow air splint with the zip placed on the front (anterior aspect) of the elbow joint.

4



The arm is outwardly rotated (externally rotated) and positioned for weight bearing through the heel of the hand.

5



Gather the excess plastic into your hand so that the zip lies flat against the front of the client's elbow. Slowly release your grasp on the splint as it inflates. This ensures that a large cushion of air lies over the back of the elbow joint.

6



Correct position.

Sample exercises

Use these to develop your own exercise programmes.



The elbow air splint is used in combination with the hand air splint in various activities in weight bearing.



Markers are used as an external focus to enable reaching forward and up. This movement encourages weight bearing with rotation and extension on the hemiplegic arm and hand.



Variation of the same exercise in tandem standing with the leg air splint for support.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- If the client is standing ensure he is stable and in a good position prior to removing the splints.
- The elbow air splint can be removed before or after the hand air splint depending on the aim of the exercise/activity.
- If active movement is present encourage the client to move his limb.
- Passively mobilise all joints (see preparation for application).
- Ask the client if he is aware of changes in feeling or in movement of the limb.

Precautions

- Ensure the air splint zip is placed on the front (anterior) aspect of the elbow and then inflated.
- **Never** weight bare if the shoulder is internally rotated.
- **Never** pull the air splint off - always let the air out first. Open the zip; support the arm and hand and carefully draw off the air splint thus avoiding any potential trauma to the shoulder.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues. To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- For weight bearing exercises through the arm ensure the hemiplegic shoulder is in external (outward rotation).
- **Never** use the air splints for positioning overnight.

Finger air splint (one sided single chamber) - 15 cm

Aim of use:

- To maintain finger extension during functional activities of the hand (prehensile grip).
- To encourage exercises/activities with the open hand.
- To stimulate sensory awareness of the finger tips.

Preparation

Ensure the client is sitting with weight evenly distributed through the buttocks and feet. The feet must be flat on the floor. Prior to application passive movements of the shoulder girdle and arm are carried out; at the same time muscle pliability and joint ranges are assessed.

1



Direct the client's attention to the hand so he can watch and feel the movement.

2



Mobilise the wrist into dorsal extension.

3



The metacarpals or hand bones are individually mobilised and the palm is rounded and flattened.

4



The thumb and each finger are passively lengthened. Form the hand into a fist then stretch it out.

5



Full range of movement of the hand including fist closure is checked daily.

Application of the air splint

1



Apply this air splint over the fingers. The thumb is held in an outward position (abduction) and the fingers are straight (extension).

TIP!

To stop the fingers sliding out of the air splint and to minimise movement of the fingers within it, insert a small piece of non slip material under the fingers prior to inflation.

2



Hold the thumb in abduction whilst inflating the air splint to ensure a functional position of the hand.

Sample exercises

Use these to develop your own exercise programmes.



Use various objects to stimulate sensation and the intrinsic muscles of the open hand and finger tips.

Pulling plasticine



Holding cards.



Sensory training of the open hand with different materials and textures.



Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to move their hand.
- Passively mobilise all joints (see preparation for application).
- Use various objects to stimulate sensation and selective movements of the hand.

Precautions

- **Never** over extend the metacarpal or interphalangeal joints (knuckles and fingers) as this may cause a flat non functional hand.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues.
To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

Foot air splint

Aims of use:

- To support the weak ankle during **non weight bearing** activities.
- To enhance heel strike in lying (e.g. bridging).
- Use in chair to floor transfers to minimise injury to the foot and maintain alignment of the heel, forefoot and toes.

Preparation

1



Mobilise the ankle joint by sliding the foot backwards and forwards. Ensure the heel and sole of the foot are flat on the floor. Direct the client's attention to the movement.

2



Mobilise the forefoot.

3



Gently mobilise the small muscles of the foot (intrinsic muscles and plantar fascia). The toes are passively lengthened.

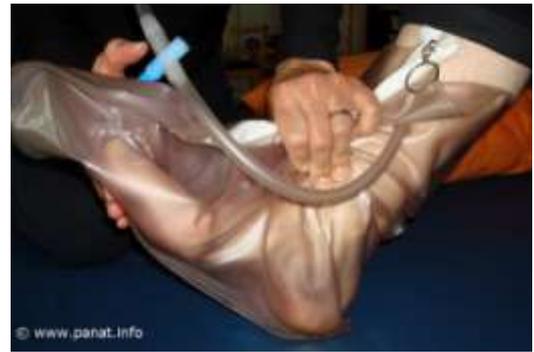
Application of the air splint

1



Bend the knee to ensure the heel is firmly embedded in the point of the air splint. Gather the excess fabric into your hands and direct the pressure backwards towards the heel.

2



Maintain the foot in a neutral position with pressure on the heel and inflate.

3



Correct position. The heel is firmly embedded in the point of the air splint and the ankle is at 90°.

Sample exercises

Use these to develop your own exercise programmes.

1



A useful air splint for all forms of bed/floor exercises.

It protects, stabilises and maintains the position of the ankle, foot and toes allowing heel strike.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to feel the heel on the base of support.
- Passively mobilise all joints (see preparation for application).
- Use various objects to stimulate sensation and selective movements of the toes (a brush, a rag or ice).

Precautions

- Do not allow air under the heel.
- **Never** walk or weight bear in standing with the single chamber foot air splint.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues.
- **Never** use the air splints for positioning overnight.

Foot air splint (double chamber)

Aims of use:

- To stabilise the ankle joint during dynamic weight bearing exercise/activity.
- To stabilise the ankle joint and maintain alignment of the forefoot during balance, walking (slow/fast) and jumping.
- To encourage heel strike in gait.
- To maintain foot/ankle position thus limiting the likelihood of injury during gait.

Preparation

1



Place the foot in a functional position. Ensure the heel and sole of the foot are flat on the floor. Direct the client's attention to the movement.

2



Mobilise the ankle joint by sliding the foot backwards and forwards. Use a rag or towel to reduce friction, so as to mobilise the foot joint.

3



Gently mobilise the small muscles of the foot (intrinsic muscles and plantar fascia). The toes are passively lengthened.

Application of the air splint

1



Put on shoes before applying the double chamber foot air splint (small broad heel and soft sole).

In sitting (hip, knee and ankle are at 90°) support ankle joint and apply the DC boot air splint over the shoe. Ensure the heel is firmly embedded in the corner of the air splint.

2



Gather the excess fabric into your hands and direct the pressure backwards towards the heel. Maintain the foot in a neutral position with pressure on the heel and inflate the **outer chamber first**.

3



Inflate the inner chamber. Some adjustment may be needed to balance the air in the chambers to ensure the correct foot position for weight bearing.

Sample exercises

Use these to develop your own exercise programmes.



Use to encourage rhythmical foot tapping.



Gait re-education and practise.



Tandem standing.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to feel the heel on the base of support.
- Passively mobilise all joints (see preparation for application).
- Use various objects to stimulate sensation and selective movements of the toes (a brush, a rag or ice)

Precautions

- Do not apply to the bare foot. This air splint was made to be applied over the shoe.
- Do not apply over shoes with sharp edges as this may damage the air splint.
- **Never** allow activities in weight bearing or gait if the foot is not correctly aligned
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session they may be removed and reapplied if they are being used dynamically rather than as a tool to stretch soft tissues.
- **Never** use the air splints for positioning overnight.

Leg air splint (double chamber) - 60 cm, 70 cm and 80 cm

Never walk in this air splint.

Aims of use:

- To support and stabilise the hemiplegic leg in standing (weight bearing and limb loading).
- To assist in trunk alignment and to maintain both heels on the floor in standing.
- To enable the following activities: squats, weight transfer from side to side, single leg stance and side stepping.
- To stretch Soleus and Gastrocnemius.

Preparation

1



Mobilise the trunk prior to standing.

2



Mobilise the ankle joint by sliding the foot backwards and forwards. Ensure the heel and sole of the foot are flat on the floor.
Direct the client's attention to the movement.

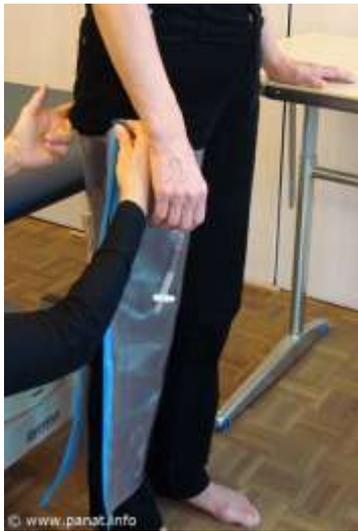
3



Mobilise the forefoot.
Gently mobilise the small muscles of the foot (intrinsic muscles and plantar fascia). The toes are passively lengthened.

Application of the air splint

1



Apply the air splint with the client in standing; the feet are parallel and approximately 10 cm apart. Put the air splint on over a covered leg (cotton sleeve or thin trouser leg) and close the zip. The top of the leg air splint is as high up the leg and under the seat bone as possible.

Ensure the air splint is comfortable in between the legs and that the catheter if present, is attached to the non plegic leg.

2



Adjust the zip so that it runs down the centre of the outside of the leg (in line with the trousers seam) with one chamber behind the leg, the other in front.

3



Firmly inflate the back chamber; as it expands, weight is transferred onto the affected foot bringing the heel down onto the floor and slightly bending (flexing) the knee.

4



Put a small amount of air into the front chamber to cushion the kneecap (patella) and to stabilise the pressure around the knee.

Sample exercises

Use these to develop your own exercise programmes.



Stance phase of gait.



Dynamic weight bearing exercises e.g. side stepping, selective movements with the non plegic leg, single leg stance and squats.



Other air splints can be combined in training e.g. dynamic weight bearing exercises for the shoulder and leg using the half arm air splint and the leg gaiter.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- If active movement is present encourage the client to actively stabilise the leg whilst the air splint is deflating.
- Passively mobilise all joints (see preparation for application).

Precautions

- **Never** walk in the leg air splint (side stepping is allowed) as it produces an abnormal gait pattern.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splint on for more than 30-45 minutes. Within the course of a treatment session it may be removed and reapplied if it is being used dynamically rather than as a tool to stretch soft tissues.
- **Never** use the air splints for positioning overnight.

Leg & Foot air splint for resting (specially designed for patients with Multiple Sclerosis)

Never walk in this air splint.

Aims of use:

- To maintain muscle length and elasticity and reduce the risk of adaptive soft tissue changes in the lower limbs.
- To treat adaptive changes and/or flexor withdrawal, apply the leg and foot splint twice a day for 30 minutes.

Preparation

Starting position: Supine (lying on the back) with both legs supported on pillows to ensure symmetrical postural alignment.

1



Apply a comfortable pressure with your hands to mobilise the joints and soft tissues of the leg. The movements are slow and rhythmical.

2



Passively mobilise the leg ensuring all movements are pain free.

Application

1



Put the open air splint on over a covered leg (cotton sleeve or thin trouser leg) the foot is left uncovered.

Ensure the heel is firmly embedded in the point of the air splint.

Close the zip.

Gather the excess fabric into your hands to maintain the ankle and foot in a neutral position.

2



Inflate.

As the air fills the air splint; slowly release your grasp on the excess fabric around the ankle joint.

This allows the foot to maintain correct alignment in the air splint.

3



The air splint may be applied to one or both legs depending on client's presenting problem and underlying pathology.

Sample exercises

Use these to develop your own exercise programmes.



Selective trunk movements in long sitting. One or both legs are encased in the air splints.
→ Rolling the ball forward and back.

Removal of the air splint

- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- Ask the client if he is aware of changes in sensation or in movement of the limb.
- Remove the air splint.
- Passively mobilise all joints (see preparation for application) and re-evaluate the response to stretch reflex sensitivity.

Precautions / Not to do with the Leg and Foot air splint for resting

- **Never stand** in the leg and foot air splint for resting as it will burst.
- **Never** use a manual pump to inflate this splint.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splints on for more than 30-45 minutes. If necessary take off and re-apply. To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

Leg & Foot air splint for standing (specially designed for patients with Multiple Sclerosis)

Never walk forward or backwards in this air splint, side stepping only is permitted.

Aims of use:

- To maintain muscle length and elasticity and reduce the risk of adaptive soft tissue changes in the lower limbs.
- To promote standing and improve balance.
- To support and stabilise the legs in standing (weight bearing and limb loading).
- To assist in trunk alignment and to maintain both heels on the floor in standing.
- To enable the following activities: squats, weight transfer from side to side, single leg stance and side stepping.

Preparation

Starting position: in sitting with a back support for the client if necessary.

In sitting:

- Ensure symmetrical postural alignment.
- Apply a comfortable pressure with your hands to mobilise the joints and soft tissues of the leg. The movements are slow and rhythmical.

Application

Put the open air splint on over the shoe (soft sole with a broad low heel) and covered leg (cotton sleeve or thin trouser leg).
Ensure the heel is firmly embedded in the point of the air splint.
Close the zip.
Gather the excess fabric into your hands to maintain the ankle and foot in a neutral position.



Inflate.
As the air fills the air splint, slowly release your grasp on the excess fabric around the ankle joint. This allows the foot to maintain the correct alignment in the air splint.

This may be used as a resting air splint.
The air splint may be applied to one or both legs depending on the client's presenting problems and underlying pathology.

Sample exercises

Use these to develop your own exercise programmes.



- Sit to prone standing
- Sit to stand
- Standing with upper limb activities
- Knee squats

Removal of the air splint

- Remove in standing if the client is safe; otherwise sit to take it off.
- Inform the client that the air splint is to be removed.
- Deflate the air splint.
- Ask the client if he is aware of changes in sensation or in movement of the limb.
- Open the zip and remove the air splint.
- Passively mobilise all joints (see preparation for application) and re-evaluate the response to stretch reflex sensitivity.
- Depending on the problem and aim of the session practice the exercises again without air splints.

Precautions

- **Never** walk in the leg and foot air splint for standing (side stepping is allowed) as it produces an abnormal gait pattern.
- Ensure no air is under the heel when it is in the air splint.
- **Never** use a manual pump to inflate this splint.
- **Never** pull the air splint off - always let the air out first.
- Do not leave the air splints on for more than 30- 45 minutes. If necessary take off and re-apply. To mobilise tight muscle groups apply the air splint 2-3 times daily for 20 minutes.
- **Never** use the air splints for positioning overnight.

The main aim of this User Guide is to help you to correctly apply the Urias[®] Johnstone air splints as recommended by the group of PANat teachers.

The choice and usage of the air splints in a therapeutic setting will depend on your clinical reasoning and the therapist/patient goal.

The usage of the tools as part of an effective neurological rehabilitation program is the responsibility of the clinician.
