

A SEGMENTAL KINEMATIC APPROACH TO REHABILITATION

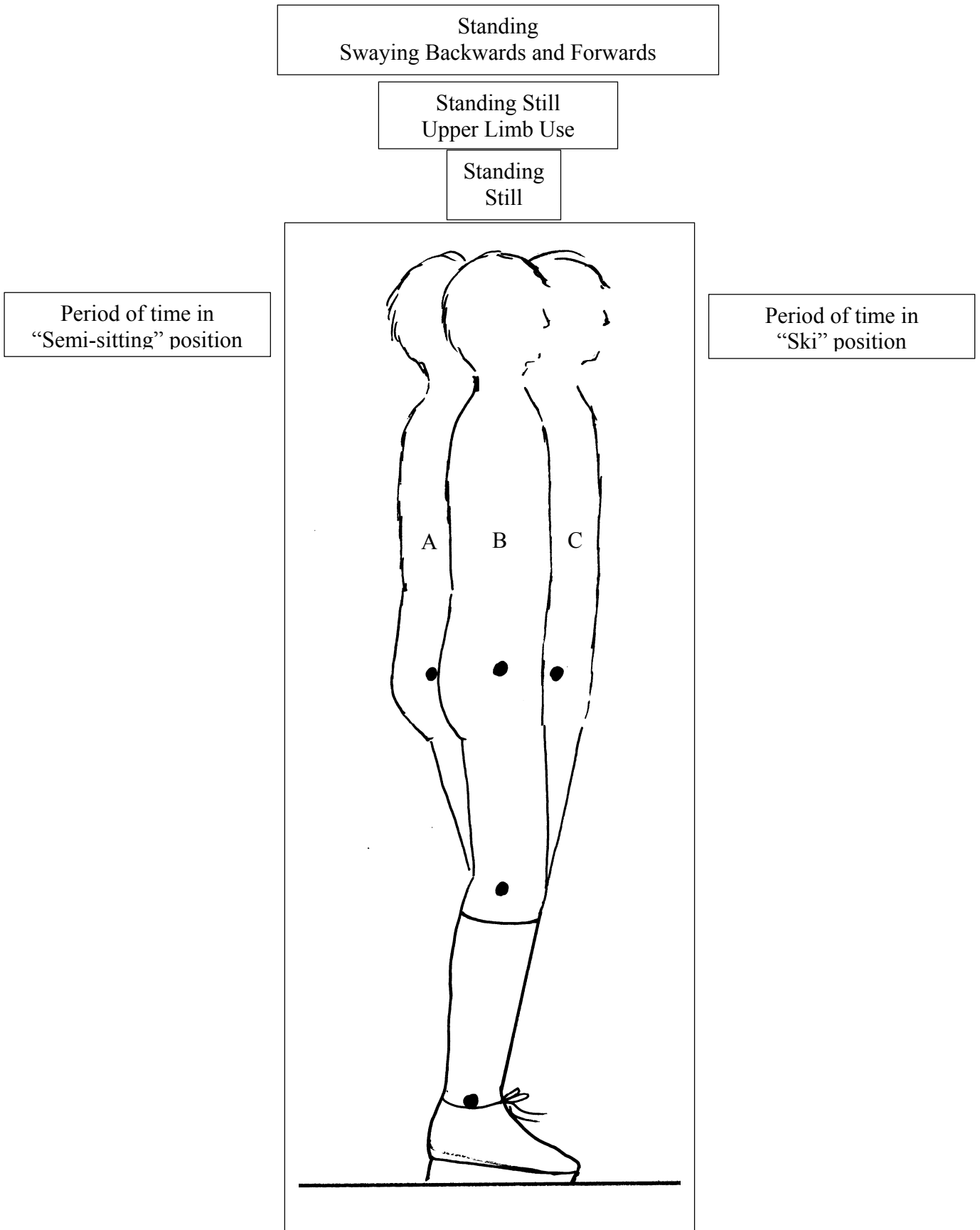
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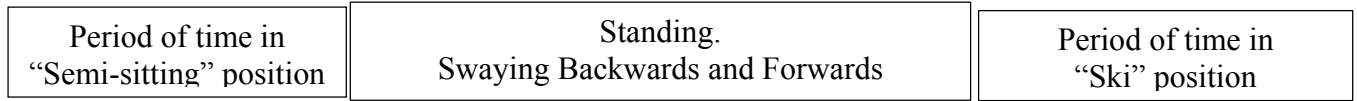
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ONE STANDING EXERCISE TO PRODUCE MULTIPLE THERAPIES



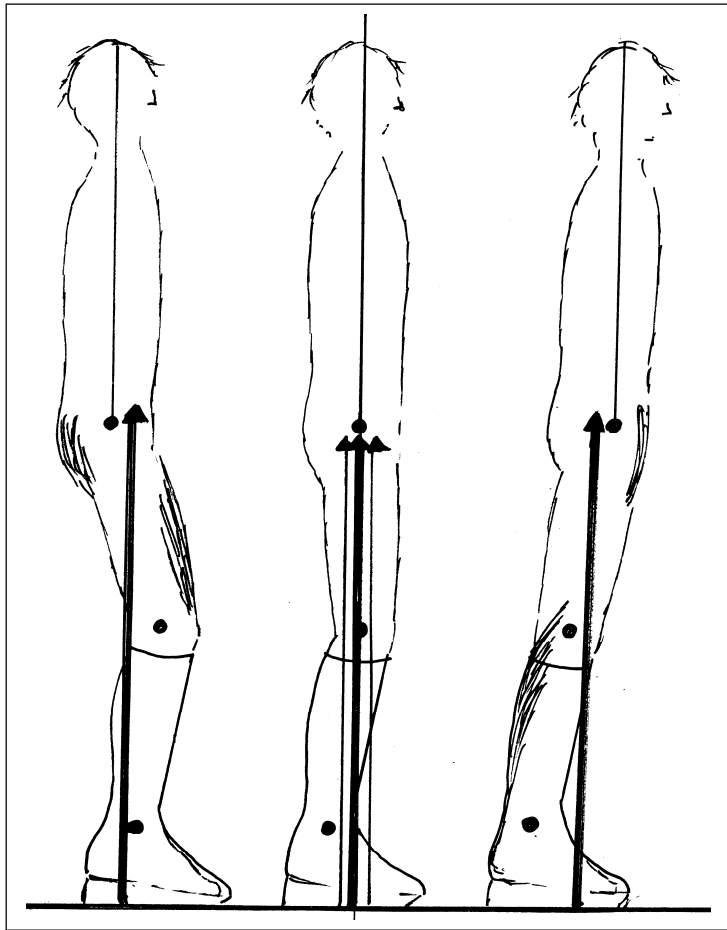
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Standing Still.
Upper Limb Use

Standing
Still



Balance
Moves CoM and PoA to rear of BoS

Strengthening
Knee Extensors
Hip Extensors
These muscles have to counteract the external knee and hip flexing moments, GRF aligned posterior to knee and anterior to hip

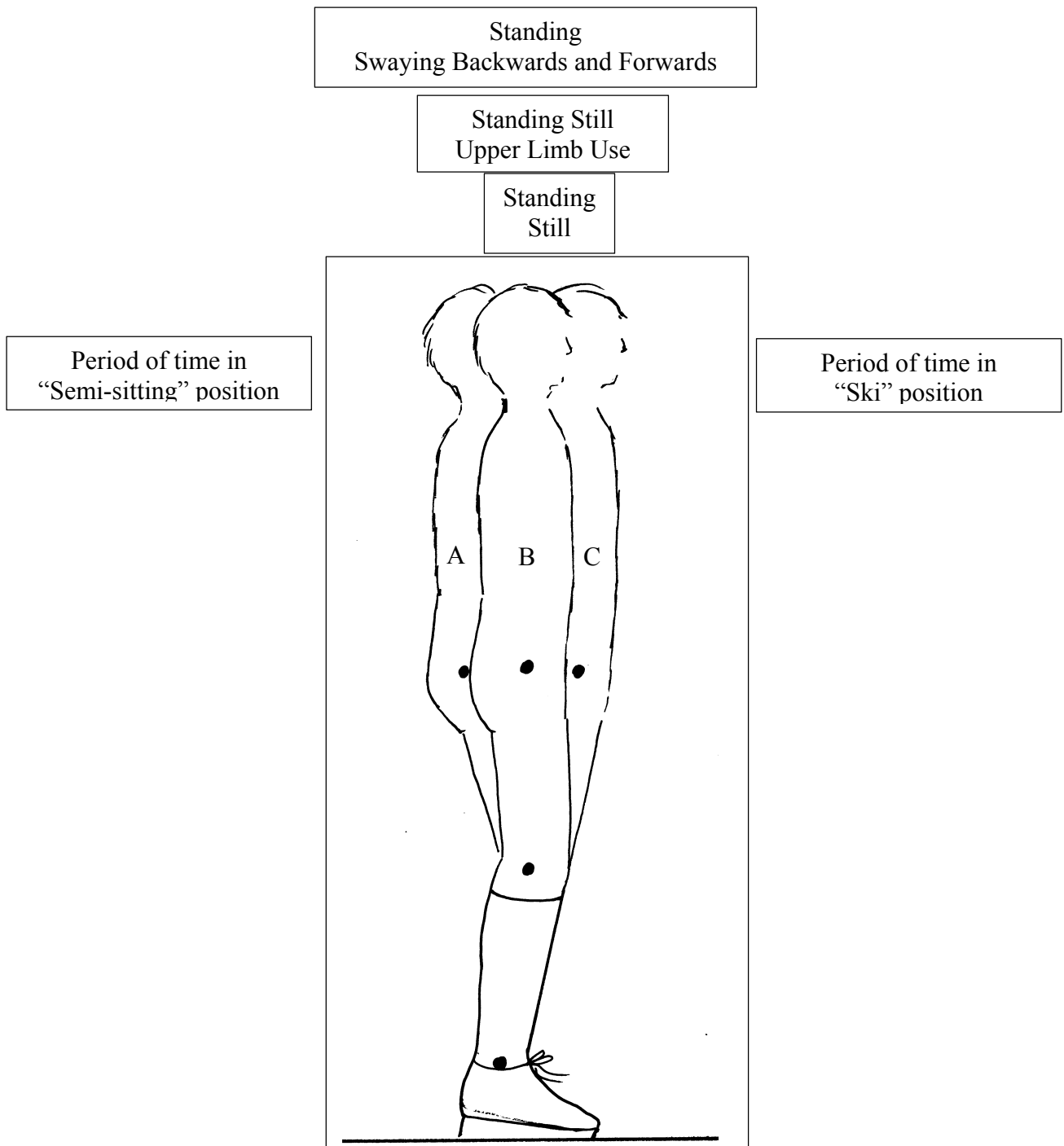
Balance
Perturbation moves the GRF slightly forwards and backwards from its initial alignment that is PoA in the centre of the BoS and through the knee and hip joints. This produces balance training while maintaining GRF in the central area of the BoS and switching moment direction at knee and hip.

Balance
Moves CoM and PoA to rear of BoS

Stretching
Knee to extension
Hip to extension
Gastrocnemius
External knee and hip extending moments, GRF aligned anterior to knee and posterior to hip

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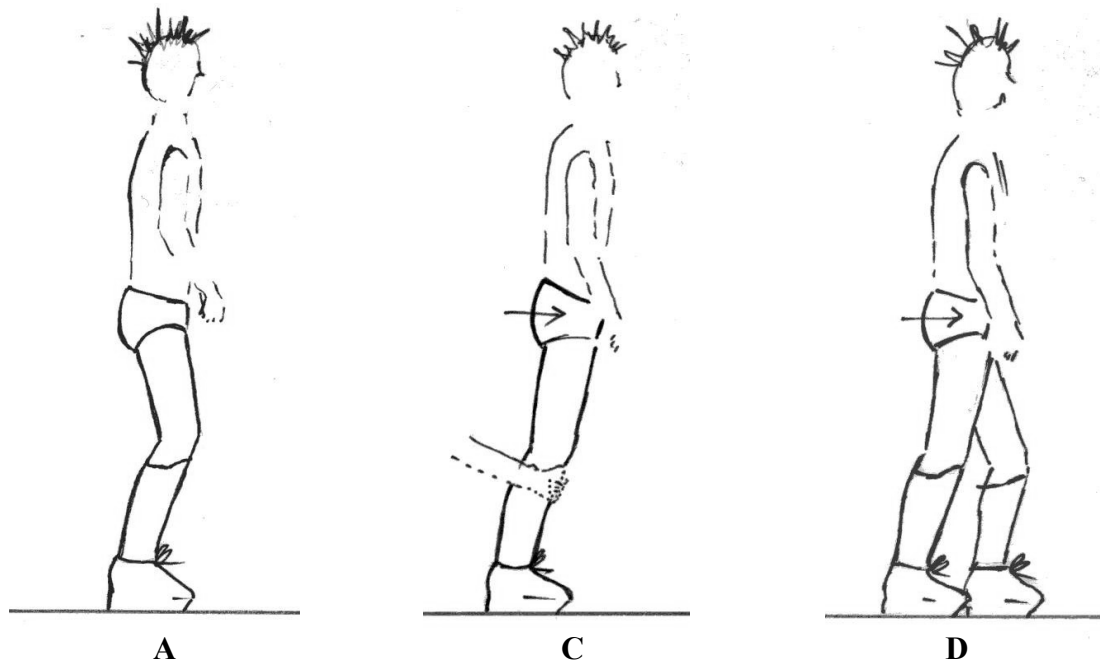
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The Shank to Vertical Angle (SVA) alignment of the AFOFC will have been optimised by the therapist/orthotist. They will have chosen one that enables the thigh to become inclined. The design of the footwear will have also been optimised in regard to pitch, stiffness and profile, so that optimum heel and toe lever lengths are available for the exercise. Some children/adults will be able to do the exercise without physical help, as they will be able to keep the foot in total contact with the floor surface and therefore maintain the SVA that has been set for the exercise. Some children/adults will need some assistance to do this, either from equipment or from a person holding the upper shank as shown in figure B opposite.

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A B C

In standing, encourage the child to translate the trunk anteriorly and posteriorly, moving the thigh from a reclined to vertical and inclined position. Sustain A, B and C positions for the time set by therapist, repeating for the frequency set by therapist. Then progress to swaying between A and C, with the rhythm and timing set by therapist.

The trunk ideally needs to remain vertical but if this is not possible this needs to be accepted and worked towards once the child has mastered the swaying and any obstructions to achieving vertical trunk alignment are reduced, for example joint ranges are increased.

Physical prompts:

The child may need support at the top of the shanks, to maintain the contact of the whole foot with the floor and the optimised SVA, as illustrated in C above. Physical prompts can be gradually reduced, or faded, as the child becomes more proficient at the exercise. For example if a strong hold is required initially it can be reduced gradually, to reach finally just a finger prompt and then no physical prompt at all.

Verbal prompts:

It is useful to use verbal prompts such as 'ski' 'tuck bottom' for C; 'sit or 'little sit' for A; 'bottom forward, bottom back', at the required rhythm, for the swaying part of the exercise.

D

Step standing and stepping, with or without physical and verbal prompts as described above. Prompts can be reduced or faded as progress is made.

Encourage small steps with the stance leg moving from an temporal MST position to an 40% GC position; foot can remain horizontal and in full contact with the floor, shank inclined, thigh inclined, when achieved the GRF will be aligned anterior to the knee and posterior to the hip, providing stabilising knee and hip extending moments.

Refs: Owen E 2002, 2004, 2005, 2014a, 2014b, 2016a, 2016b