

CP FOUNDATION
CP CONNECT
ORTHOTIC MANAGEMENT
BEST PRACTICE ACROSS THE LIFESPAN

PANEL DISCUSSION 27th May 2026

HANDOUTS

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Dip. Lower Limb Orthotic Biomechanics

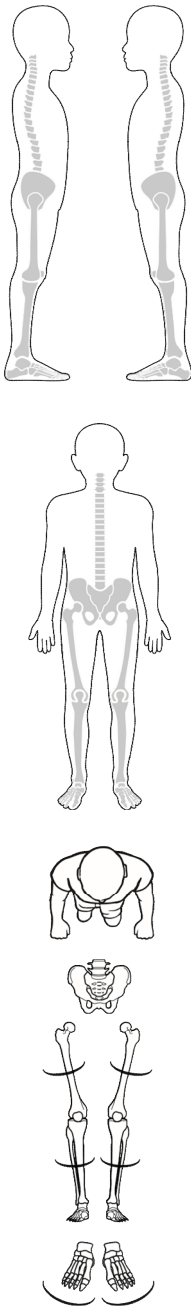
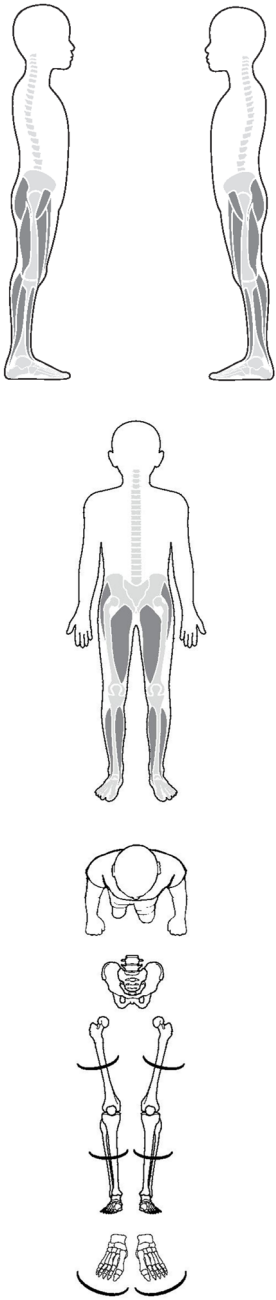
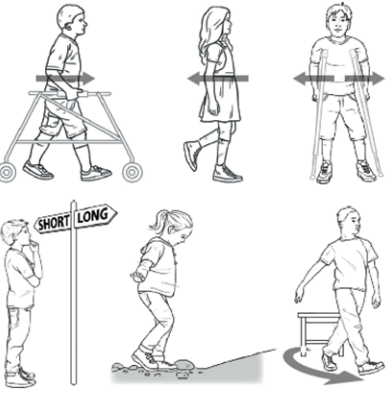
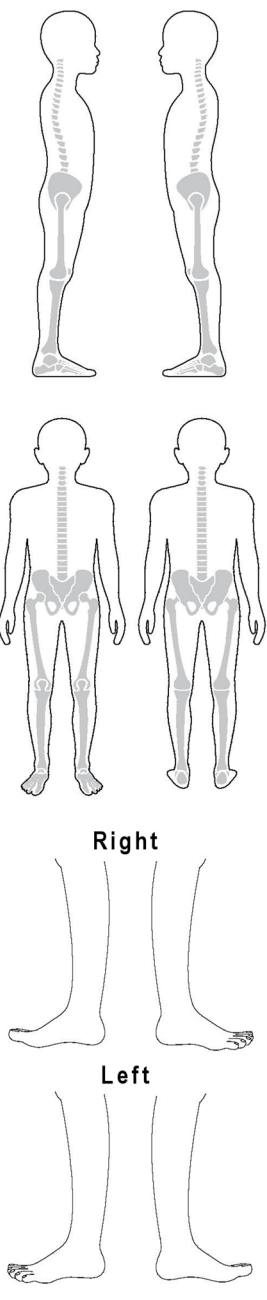
Dip. Clinical Gait Analysis

MBE awarded for services to children with disability.


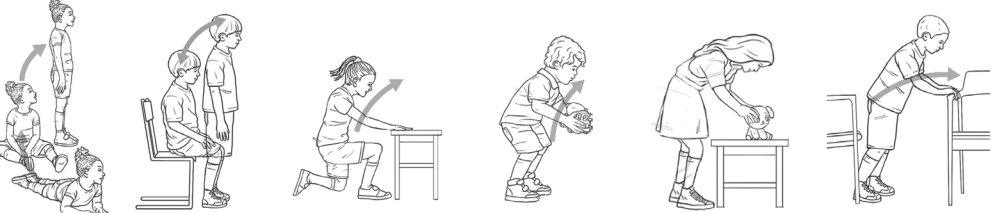


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- Goal Setting Pictorial Tool 2 pages
- Dosage Tool
- Segment Proportion Chart
- OSKAR Algorithms
 - Optimal Segment Kinematics & Alignment approach to Rehabilitation
 - Algorithm 1- Designing, Aligning, Tuning AFO Footwear Combinations
 - Algorithm 2- Dorsiflexion free or fixed AFO
 - Algorithm 3- Ankle Angle
 - Algorithm 4- MTP Joints free or fixed
- Reference List

GOAL AND OUTCOME OPTIONS FOR CHILDREN RECEIVING ANKLE-FOOT ORTHOSIS MANAGEMENT

BONES, JOINTS, LIGAMENTS	MUSCLE, TENDON	MOTOR CONTROL, LEARNING & DEVELOPMENT OF STANDING & WALKING *	FUNCTIONING: ACTIVITIES & PARTICIPATION * Part A - WALKING	PAIN, SKIN & TISSUES																								
		<p>Stand Still Stand Sway Stand Sway</p> <p>Step Stand Stepping</p> <p>Full Gait Cycle</p> <p>Motor Learning</p>	 <p>* Assistive Devices</p> <table border="1"> <thead> <tr> <th>Home</th> <th>School</th> <th>Outside</th> </tr> </thead> <tbody> <tr> <td>Stick I S A</td> <td>Stick I S A</td> <td>Stick I S A</td> </tr> <tr> <td>Crutch I S A</td> <td>Crutch I S A</td> <td>Crutch I S A</td> </tr> <tr> <td>Multi-tip I S A</td> <td>Multi-tip I S A</td> <td>Multi-tip I S A</td> </tr> <tr> <td>Frame I S A</td> <td>Frame I S A</td> <td>Frame I S A</td> </tr> <tr> <td>Rolator I S A</td> <td>Rolator I S A</td> <td>Rolator I S A</td> </tr> </tbody> </table> <p>Step length (left) Stride length Foot progression angle</p> <p>(right)</p> <p>SPEED Efficiency Energy Endurance</p> <p>* Stepping</p> <table border="1"> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>* Full Gait Cycle</p> <table border="1"> <tr> <td></td> <td></td> <td></td> </tr> </table>	Home	School	Outside	Stick I S A	Stick I S A	Stick I S A	Crutch I S A	Crutch I S A	Crutch I S A	Multi-tip I S A	Multi-tip I S A	Multi-tip I S A	Frame I S A	Frame I S A	Frame I S A	Rolator I S A	Rolator I S A	Rolator I S A							 <p>Right</p> <p>Left</p>
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GOAL AND OUTCOME OPTIONS FOR CHILDREN RECEIVING ANKLE-FOOT ORTHOSIS MANAGEMENT

	<p>FUNCTIONING: ACTIVITIES & PARTICIPATION * Part B</p>	<p>OTHER GOALS / NOTES</p>
<p>MAINTAIN BODY POSITION</p>		
<p>CHANGE BODY POSITION TRANSFER</p>		
<p>MOVING AROUND</p> <p>Assistive devices – notate on page 1, column 4</p>		
<p>SELF CARE UPPER LIMB</p> <p>SPORTS, ART, CRAFTS, HOBBIES, SOCIALIZING. MENTAL FUNCTIONS, RELATIONSHIPS</p>		

DOSAGE TOOL

The Dosage Tool is now published in

Owen E (2024) Paediatrics and Child Health 34(8): 249-256

DOSAGE TOOL					
	BONES & JOINTS	MUSCLES	MOTOR CONTROL STANDING & WALKING	ACTIVITIES & PARTICIPATION	PAIN TISSUES
FACTORS COMMON TO ALL COLUMNS	Pain. Age. Diagnosis: natural history, prognosis. Surgical or medical interventions: past, present, planned, prevention.				
FACTORS SPECIFIC TO A COLUMN	Bones, Joints selected. Bone age Bone ossification Segment Proportion: -Foot length for height -Leg length discrepancy. Effect on tissue viability	Muscles selected. Goals selected: length, strength, stiffness, selectivity and timing. Muscle quality: fatiguability, stiffness, length etc Dosage of non- weight bearing AFO.	Activities selected: -Standing -Walking: stepping, full gait cycle. Current standing & walking pattern. Co-morbidities – visual, vestibular, sensation etc Learning difficulty or disability.	Activities selected: For each activity: - ability to do activity with or without AFOFC - possibility of not achieving goals in other columns if AFOFC not worn. -potential for harm if AFOFC not worn.	Pain: -Area -Severity -Frequency Previous history Tissues: -Site at risk -Severity of tissue damage Previous history
IDEAL % TO ACHIEVE GOALS	%	%	%	%	%
AGREED % DAY, WEEK, YEAR	Consider: priorities across columns; environmental and personal contextual factors. %				

Table 2 – Dosage Tool for AFO Footwear Combination (AFOFC).

From: Owen E (2024) Paediatrics and Child Health 34(8): 249-256.

ACTUAL AND RELATIVE LENGTHS OF LOWER LIMB SEGMENTS BY AGE

Age	Height mm	Thigh mm	Shank mm	Foot mm	Equivalent Shoe size with no additions for growth etc	Whole leg mm	Sh/Th %	F/Th %	F/Sh %	F/Leg %
18-18.5 yrs	1718	417	406	252	38	823	97%	60%	62%	31%
17	1683	406	394	247	37	806	97%	61%	63%	31%
16	1685	409	404	249	37	813	99%	61%	62%	31%
15	1636	396	394	247	37	790	99%	62%	63%	31%
14	1594	388	384	244	37	772	99%	63%	64%	32%
13	1545	376	373	237	36	749	99%	63%	64%	32%
12	1486	363	364	232	35	727	100%	64%	64%	32%
11	1427	346	345	223	34	691	100%	64%	65%	32%
10	1376	328	327	216	32/33	655	100%	66%	66%	33%
9	1326	310	310	206	31	620	100%	66%	66%	33%
8	1264	292	292	197	30	584	100%	67%	67%	34%
7	1212	278	274	188	28	552	99%	68%	69%	34%
6	1145	257	257	176	26/27	514	100%	68%	68%	34%
5	1085	239	236	170	25/26	475	99%	71%	72%	36%
4	1014	218	216	160	24	434	99%	73%	74%	37%
2.5-3yrs	934	195	193	147	22	388	99%	75%	76%	38%
20-23m	825			125	19					
16-19m	790			120	18					
12-15m	737			116	17/18					
9-11m	730			107	16					
6-8m	687			99						
3-5m	633			90						
2m	555			81						

SEGMENT PROPORTION (1)

DEFINITIONS OF SEGMENT LENGTHS:

FOOT: Posterior of heel to end of toes

SHANK: Knee joint to ankle joint

THIGH: Hip Joint to knee joint

Source:

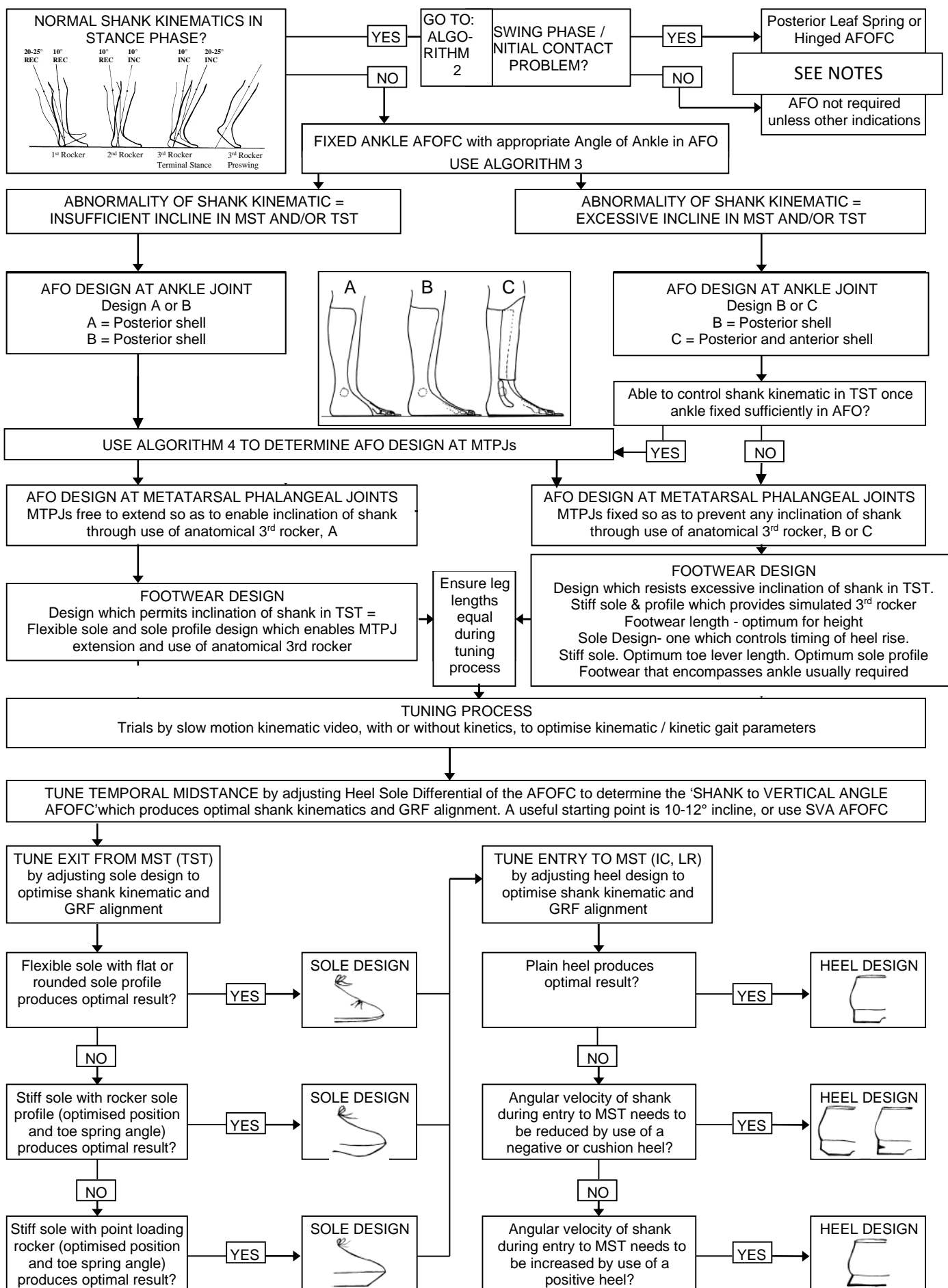
Owen E. (2016) Chapter 19. Normal Gait Kinematics and Kinetics, Table 19.1. In: Rahlin M. (Ed) Physical Therapy for Children with Cerebral Palsy. An Evidence Based Approach. SLACK Inc. Thigh, shank and foot measures are from Tilley AR (2002) "The measure of man and woman. Revised edition" John Wiley & Sons. New York. Shoe sizes and relative percentages are derived from raw data, from same source, by Elaine Owen.

The 'Shoe size' given in this chart is EU sizing. The size stated in each row is the equivalent EU size for the length of the foot, with no additions for growth etc. Conversion charts to UK or US sizes are available.

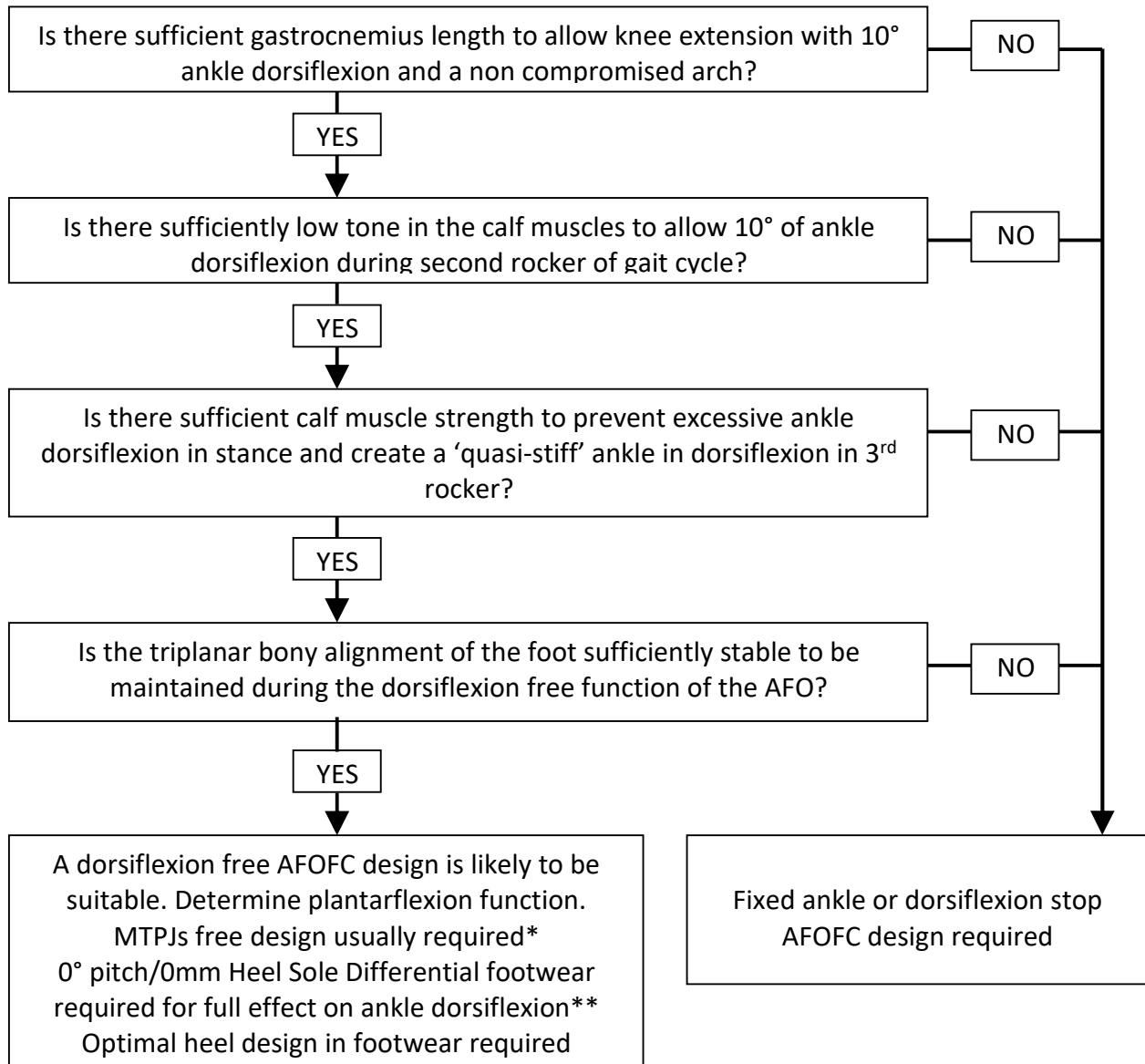
THIS CHART is AVAILABLE as a separate handout in the Portal, and it is Manual Part 5 Toolkit

ALGORITHM 1 DESIGNING ALIGNING AND TUNING AFOFCs

OWEN 2010 MODIFIED BY OWEN



**CLINICAL ALGORITHM 2
DORSIFLEXION FREE AFOFCS
BASED ON CALF MUSCLE LENGTH, STRENGTH,
STIFFNESS AND SKELETAL ALIGNMENT**



* An AFOFC with MTPJ free design is usually required, to allow MTPJ extension during third rocker, and patients who meet the criteria for a dorsiflexion free AFO usually meet the criteria for an MTPJ free design. If they do not a rocker sole profile is required on the footwear as restriction in MTPJ extension may produce excessive ankle dorsiflexion, a compensatory response required to enable normal shank kinematics if MTPJs are fixed and not compensated for by a rocker sole profile.

** To obtain 10-12° of ankle joint dorsiflexion in gait the dorsiflexion free AFO needs to be combined with footwear that has a 0mm Heel Sole Differential (HSD) or 0 degree pitch. For each degree of pitch in the footwear there will be a reduction of one degree of ankle dorsiflexion. This is because gait requires normal shank kinematics and ankle joint kinematics adjust to the pitch of the footwear to achieve this. In normal gait the shank is 10-12° inclined at the end of mid-stance. A 10-12° pitch in the footwear negates the need for ankle dorsiflexion to achieve this.

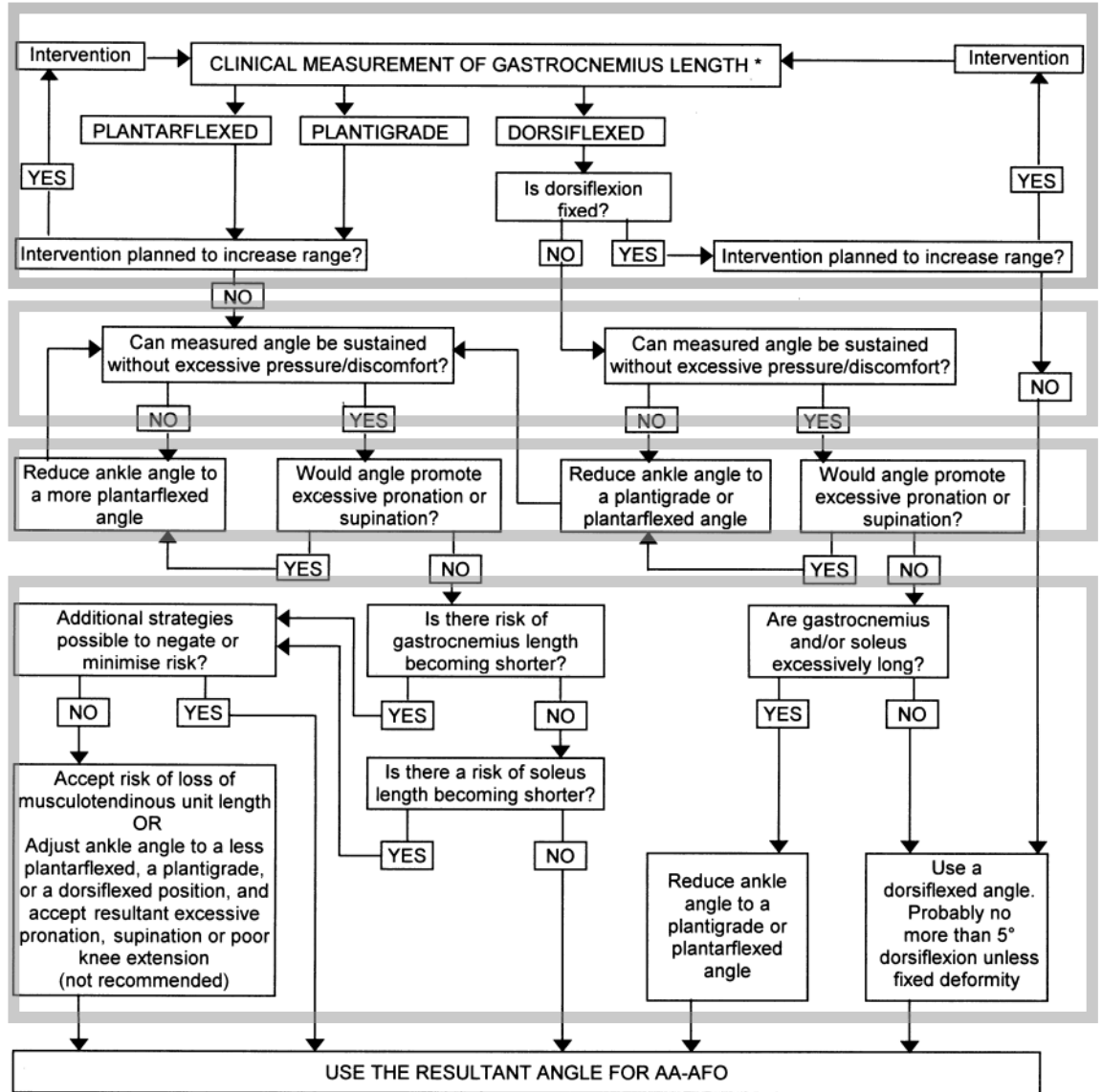
CLINICAL ALGORITHM 3 DETERMINING THE SAGITTAL ANGLE OF THE ANKLE IN AN AFOFC

STEP 1) CONSIDER THE LENGTH OF GASTROCNEMIUS & DORSIFLEXORS.

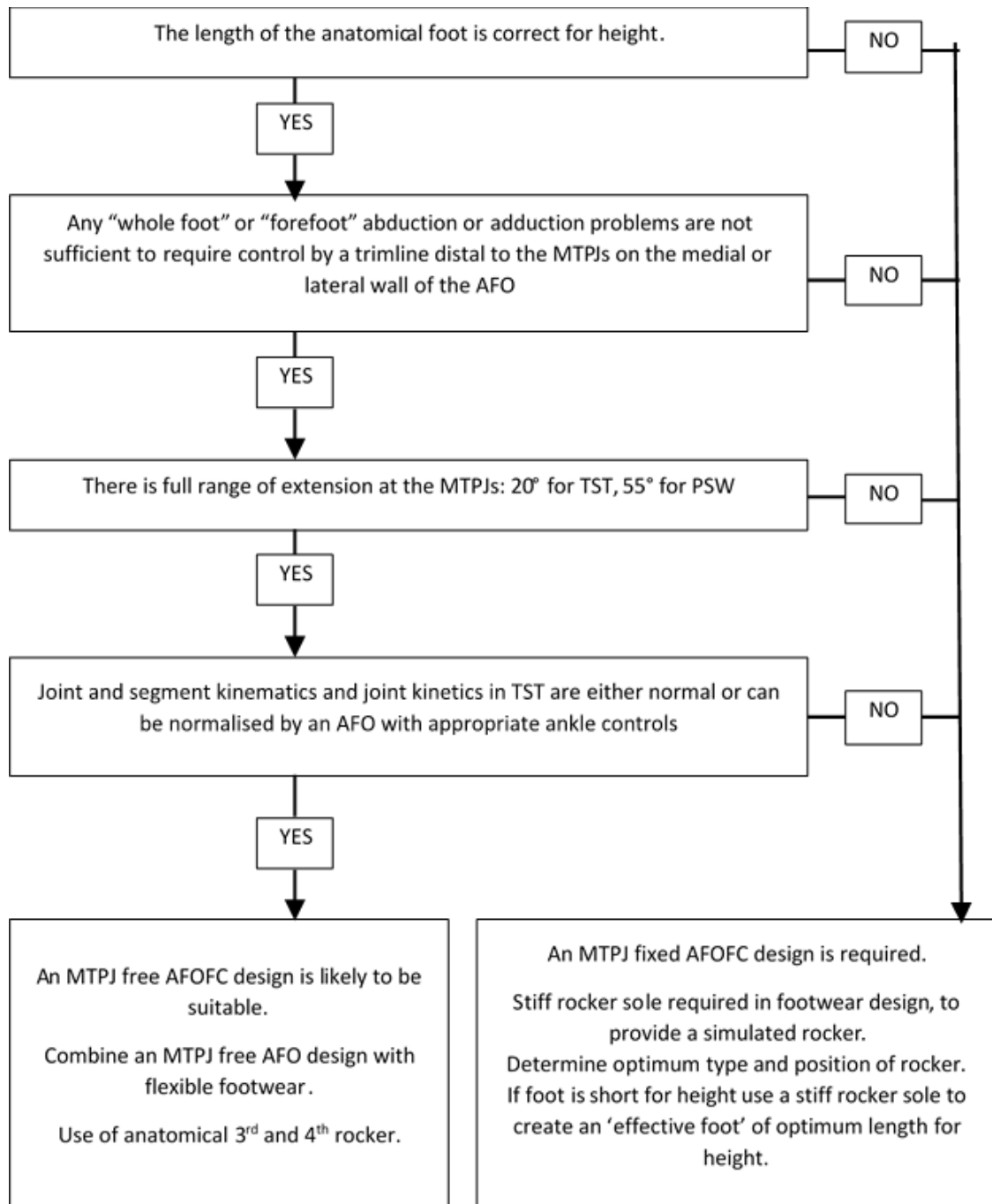
STEP 2) CONSIDER THE STIFFNESS OF GASTROCNEMIUS & DORSIFLEXORS.

STEP 3) CONSIDER THE TRIPLANAR BONY ALIGNMENT OF THE FOOT (FOOT POSTURE).

STEP 4) CONSIDER IF THERE IS A RISK OF LOSS OF LENGTH OR OVER-LENGTHENING OF GASTROCNEMIUS OR SOLEUS



CLINICAL ALGORITHM 4 DETERMINING MTPJ DESIGN FIXED / FREE



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