XVI edición Jornadas de Actualización en Prótesis y Ortesis
Granada 19 al 21 febrero
ORTOGRA 2025

Ortesis, sillas de ruedas y productos de apoyo en el daño cerebral

ESTHER DUARTE. Hospital del Mar, Barcelona

CONSECUENCIAS DE LAS ALTERACIONES DE LA MARCHA

- Pérdida de **independencia** (Van de Port 2006)
- Restricciones de la **participación** (Sommerfeld 2001, Alzahrani 2011)
- **Institucionalización**:

PTJ: Physical Therapy & Rehabilitation Journal | *Physical Therapy*, 2022;102:1–9
https://doi.org/10.1093/ptj/pzab246
Advance access publication date October 23, 2021
Original Research

Prevalence of Walking Limitation After Acute Stroke and Its Impact on Discharge to Home

Dennis R. Louie, PT, PhD[1,2], Lisa A. Simpson, OT, MSc[1,2], W. Ben Mortenson, OT, PhD[2,3], Thalia S. Field, MD, MHSc[4,5], Jennifer Yao, MD[6,7], Janice J. Eng, PT/OT, PhD[2,8,*]

- Cohorte 487 adultos con 1º episodio de ictus
- Al ingreso: 44.1%: algún grado de déficit motor en la Ei
- Los pacientes con capacidad de marcha (asist o no) mayor probabilidad de alta a domicilio (OR = 9.48, 95% CI= 6.11 -14.92)

Rehabilitation Research Program
Coastal Health Research Institute, Vancouver, Canada, 2022

DEFICIENCIAS DAÑO CEREBRAL

-parálisis
-alt tono muscular
-alt sensibilidad
-equilibrio
-negligencia
-apraxia
-dismetría
-alts cognitivas
-otras (cardiovascular…)

alteración de la marcha

Table 1
Effect of hemiparesis on spatiotemporal gait parameters

Walking velocity (m/s)	Decreased
Stride length (m)	Decreased
Step length (m)	Decreased
Cadence (steps/min)	Decreased
Paretic single-stance duration (s)	Decreased
Double-stance duration (s)	Increased
Paretic stance duration (s)	Decreased
Paretic swing duration (s)	Increased

Table 2
Effect of hemiparesis on kinematic gait parameters

Pelvis	
Tilt	Increased
Hip	
Flexion at heel strike	Decreased
Flexion at midswing	Decreased
Extension at preswing	Decreased
Knee	
Flexion at heel strike	Decreased
Flexion in swing	Decreased
Extension in stance	Increased
Ankle	
Dorsiflexion at heel strike	Decreased
Plantar flexion in swing	Increased
Inversion in swing	Increased

Sheffler, L. R., & Chae, J. (2015). *Hemiparetic Gait. Physical Medicine and Rehabilitation Clinics of North America, 26(4), 611–623.*

OBJETIVOS DE LA ORTETIZACIÓN

- Control postural
- Reducción de la fatiga muscular
- Prevención de complicaciones
- Optimizar la función
- Facilitación de la marcha
- Adaptación a las necesidades individuales
- Mejorar la coordinación y equilibrio
- Independencia funcional
- Facilitar la integración del paciente

Ortesis extremidad inferior

del griego orthosis “poner recto, enderezar”

DEF: aparatos médicos aplicados a o alrededor de un segmento corporal que reduce las deficiencias o alteraciones funcionales
“aparatos que suplen funciones”

Classificación Harris 1973: acrónimos con las iniciales de las articulaciones: FO / AFO / KAFO / HKFO

Condiciones:
•poco peso
•confort y aceptación
•prescripción individualizada

“Reticencias”
Cosmética
Atrofia por desuso del TA
Impedir la recuperación del patrón de marcha






1900 → 1970 → 1975 → 2004 → 2007 → 2012 → 2016 → 2017 → 2019

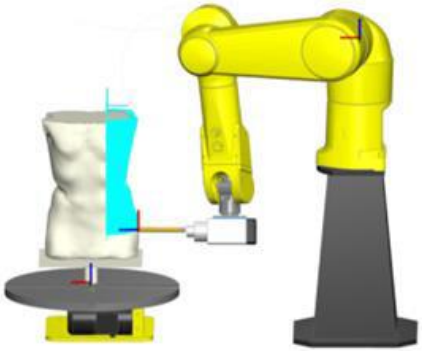


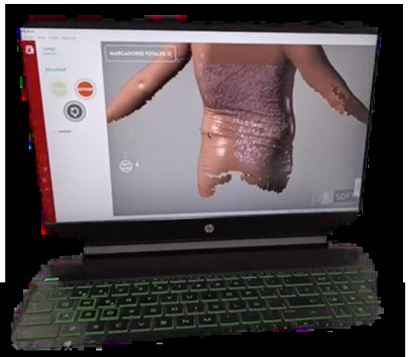


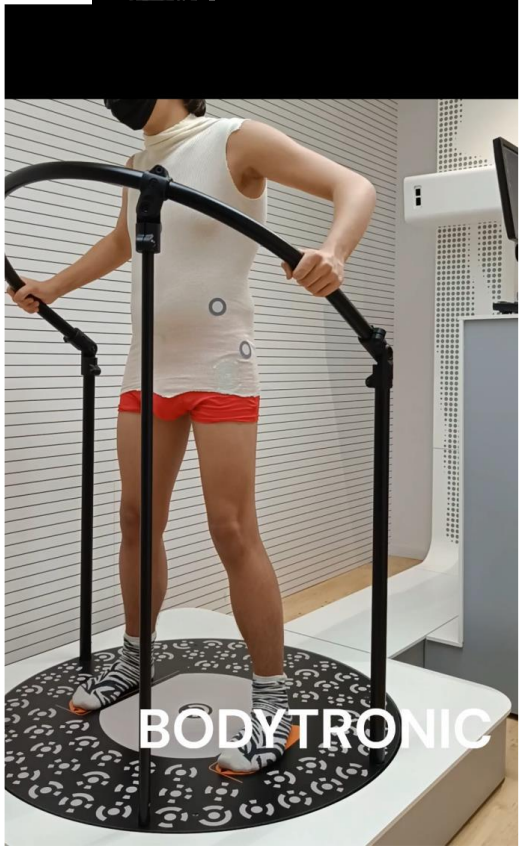

Imágenes cedidas por Ottobock.

>2020

Evolución ortopedia





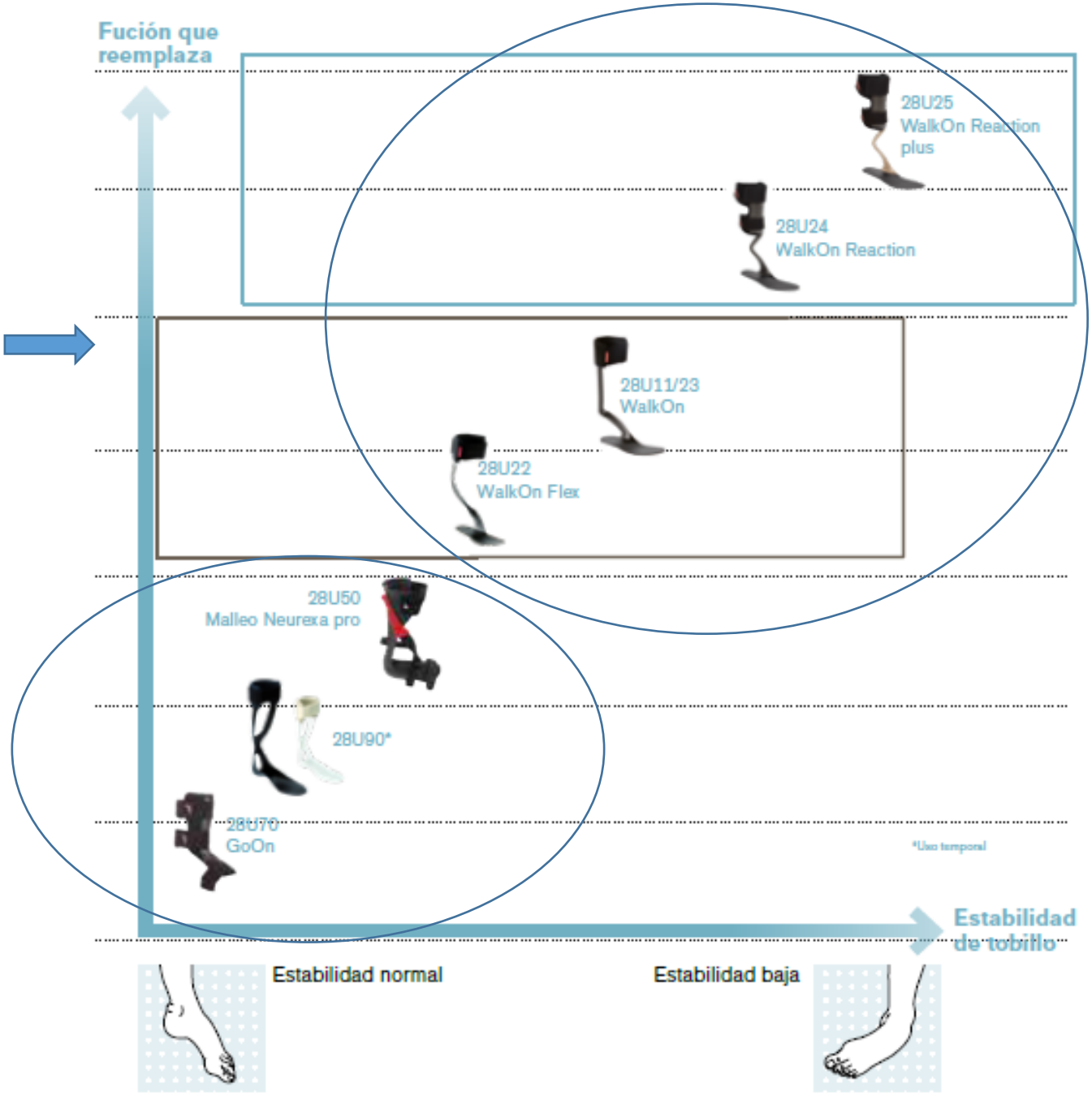


Robots de fresado
Nuevos materiales
Novedades e agilización de los procesos de toma de medidas: rapidez, precisión, comodidad e higiene

AFO prefabricadas

Antiequinos de carbono
Familia Walk On

Antiequinos
convencionales



AFO prefabricadas

Antiequino convencional – Go On

Soporte leve para la dorsiflexión
Sin espasticidad

Imágenes cedidas por Ottobock.

AFO prefabricadas

28U90 de Ottobock

Rancho de los Amigos de Orliman

AFO prefabricadas

Antiequino convencional – Malleo Neurexa Pro (Dina Ankle)

Pie equino y **varo**
Espasticidad leve / moderada

using a Dyna ankle orthosis **improved static balance and increased double stride length**, but had no acute effect on dynamic balance, body sways, weight distribution and other gait parameters.

Acute Effects of Dyna Ankle Orthosis Use on Balance and Gait in Stroke Patients.
Çankaya et al 2018

Imágenes cedidas por Ottobock.

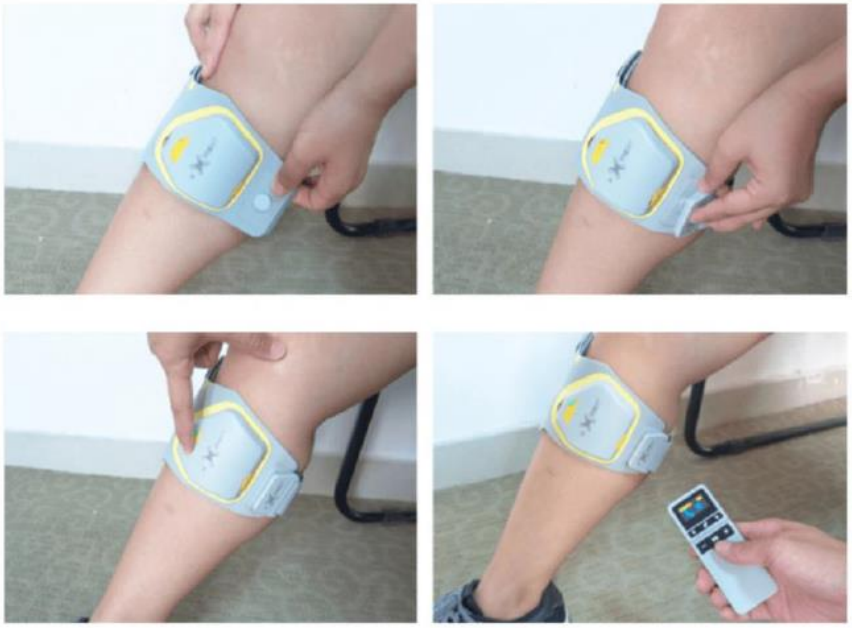
www.ortoiberica.com

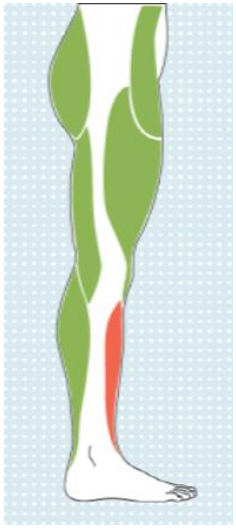
push
braces

PRIM

FES

Espasticidad leve-moderada





Shin HE, Kim M, Lee D, Jang JY, Soh Y, Yun DH, Kim S, Yang J, Kim MK, Lee H, Won CW. Therapeutic Effects of Functional Electrical Stimulation on Physical Performance and Muscle Strength in Post-stroke Older Adults: A Review. Ann Geriatr Med Res. 2022 Mar;26(1):16-24.

Evidencia científica AFO

Mejoria del coste energético de la marcha (Daryabor 2018)

Mejoria funcional de la marcha (equilibrio, FAC, 6-m walkimng test. Motricity Index). No evidencia de superioridad diferentes diseños (Ramstrand 2010, Daryabor 2021,)

Mejoría velocidad de marcha, cadencia, longitud paso y zancada
(Daryabor 2021
Buena aceptación y satisfacción ((Swinnen 2017, Tyson 2009)
… el efecto solo ocurre mientras se lleva la AFO (Tyson 2013)
Pero… baja adherencia (63%) MacMonagle 2024

For stroke survivors, individually fitted lower limb orthoses may be used to minimize limitations in walking ability. Improvement in walking will only occur **while the orthosis is being worn**. (Daryabor et al. (2021)[449]; Wada et al. 2021
Ankle-foot orthoses should be used on selected patients with foot drop following **proper assessment and with follow-up** to verify its effectiveness [Evidence Level: A]. CSBP 2023

Stroke FOUNDATION

Canadian Stroke Best Practices

The quality of systematic reviews/meta-analyses assessing the effects of ankle–foot orthosis on clinical outcomes in stroke patients: A methodological systematic review

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Abstract

Background and Aims: Given the importance of systematic reviews (SRs) for practitioners, researchers, and policymakers, it is essential to assess them to ensure robust methodology and reliable results before applying them. The purpose of this methodological study was to assess the methodological and reporting quality of recently published SRs and/or meta-analyses (MAs) evaluating the effects of ankle–foot orthoses (AFOs) on clinical outcomes in stroke survivors.

Methods: PubMed, Scopus, Web of Science, Embase, ProQuest, CENTRAL, REHABDATA, and PEDro were searched. The research team applied A Measurement Tool to Assess Systematic Reviews 2 (AMSTAR-2) tool and Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist for evaluating the reporting and methodological quality, respectively, and the ROBIS tool was used to evaluate the risk of bias (RoB) in the included reviews. The quality of the evidence was also judged using the (Grades of Recommendation, Assessment, Development and Evaluation) GRADE method.

Results: In final, 14 SRs/MAs met inclusion criteria. Evaluation of methodological quality using the AMSTAR-2 tool demonstrated that the overall quality of included reviews was mostly "critically low" or "low," except for two studies that were "high." In addition, the findings showed that the mean score of the reporting quality of the included reviews based on the PRISMA criteria was 24.9, down from 42. In accordance with the overall evaluation applying the ROBIS tool, 14.3% of the review studies were evaluated as high RoB, 64.3% were evaluated as unclear RoB, and 21.4% were evaluated as low RoB. Regarding the level of evidence quality, the GRADE results indicated that the evidence quality of the included reviews was unsatisfactory.

Conclusion: This study showed that although the reporting quality of recently published SR/MAs evaluating the clinical effects of AFOs in stroke survivors was moderate, the methodological quality of almost all reviews was suboptimal.

14SRs/MAs

the reporting quality of recently published SR/Mas evaluating the clinical effects of AFOs in stroke survivors was moderate, the methodological quality of almost all reviews was suboptimal.

Health Sci Rep. 2023

Antiequinos de carbono
Familia Walk On

Effects of carbon versus plastic ankle foot orthoses on gait outcomes and energy cost in patients with chronic stroke.
Rimaud et al. J Rehabil Med. 2024

KNEE-ANKLE FOOT ORTHOSIS IN STROKE (KAFO)

J. Phys. Ther. Sci. 33: 322–328, 2021

The Journal of Physical Therapy Science

Original Article

Knee joint movement and muscle activity changes in stroke hemiplegic patients on continuous use of knee-ankle-foot orthosis with adjustable knee joint

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[1)] *Funabashi Municipal Rehabilitation Hospital: 4-26-1 Natsumidai, Funabashi, Chiba 273-0866, Japan*

KAFOs provide better support to the knee joint compared with AFOs and are therefore effective for standing and walking practice in stroke patients who have difficulty with weight bearing (worse lower limb motor control)

Interruptor de tres vías
Esto permite al usuario elegir entre los ajustes de "movimiento libre", "bloqueado" y "modo FreeWalk"

ORTESIS EXTREMIDAD SUPERIOR

Tyson SF, Kent RM. The effect of upper limb orthotics after stroke: a systematic review. NeuroRehabilitation. 2011;28(1):29-36..

For stroke survivors at risk of developing contracture who are receiving comprehensive, active therapy the **routine use of splints** or stretch of the arm or leg muscles is not recommended. (Harvey et al 2017

Demeco A et al. The Upper Limb Orthosis in the Rehabilitation of Stroke Patients: The Role of 3D Printing. Bioengineering (Basel). 2023 Oct 27;10(11):1256.

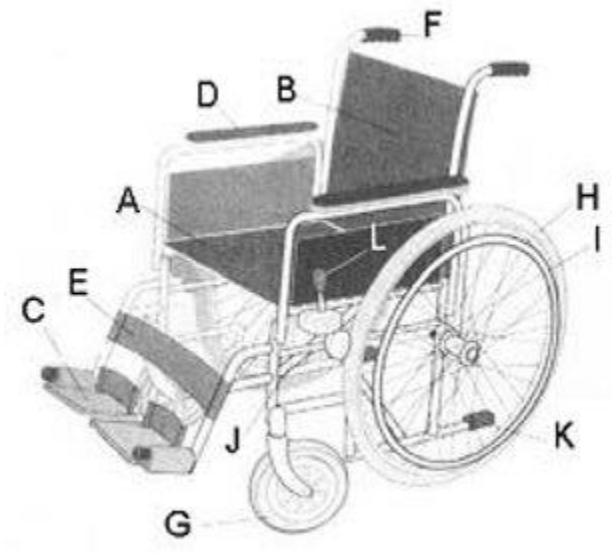
Canadian Stroke Best Practices

Functional dynamic orthoses may be offered to patients to facilitate repetitive task-specific training [Evidence Level B].

SILLAS DE RUEDAS

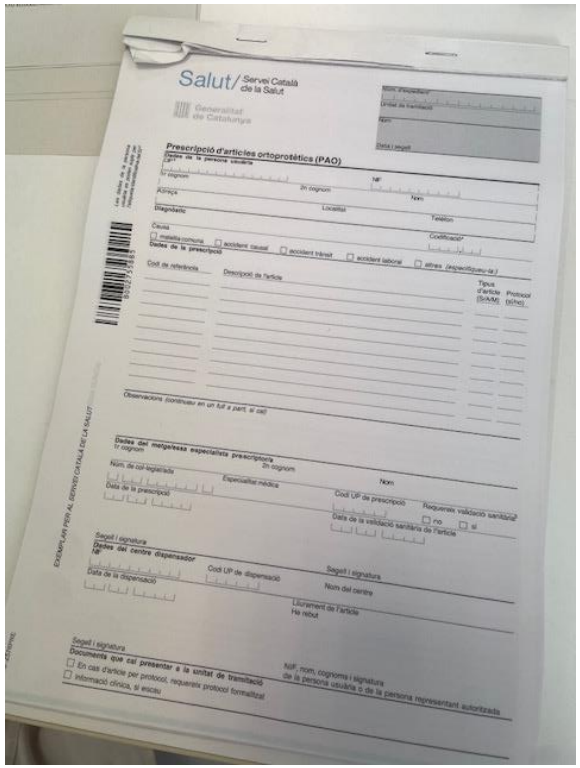
SILLAS DE RUEDAS

Autopropulsables
No autopropulsables
Eléctricas
Mixtas
Funciones especiales: basculantes, bipedestadores



Asiento
Respaldo
Reposabrazos
Reposapiés

Orden SND/44/2022, de 27 de enero, por la que se actualiza, en lo relativo al catálogo común de prótesis externas de miembro superior y miembro inferior, ortoprótesis para agenesias, sillas de ruedas, ortesis y productos para la terapia del linfedema, el Anexo VI del Real Decreto 1030/2006, de 15 de septiembre, por el que se establece la cartera de servicios comunes del Sistema Nacional de Salud y el procedimiento para su actualización.



Cartera de servicios comunes de prestación ortoprotésica

- Catàleg de prestacions ortoprotètiques a càrrec del Servei Català de la Salut (Set 24)
- Catálogo General Ortoprotésico de Andalucía (Jun 22)
- PRESTACIÓN ORTOPROTÉSICA AMBULATORIA SERGAS (2013)

.....

PRODUCTOS DE APOYO
TRANSFERENCIAS

Catálogo de
Productos de Apoyo

Facilitar la tarea, NO COMPLICARLA!!!
Práctica y dinámica.
Evitar un gasto energético.
Ergonómico.
Prevención de posibles lesiones al personal sanitario y/o cuidadoras.
Entrenamiento al personal o familia.

PRODUCTOS DE APOYO
BAÑO

Elevadores wc.
Barras i asideros.
Sillas y tablas de bañera.
Taburetes y asientos.
Sillas de ruedas para la higien
Sistemas mecánicos.
Sistemas ayuda.

PRODUCTOS DE APOYO
ALIMENTACIÓN


Habitació
Altres
Llum
Porta
Llum Lavabo
Pujar persiana
Baixar persiana
Tancar finestra
Obrir finestra
Pasa

REFLEXIONES FINALES…..

- Prescripción (Tec Ort)
- Individualización
- Evaluación personalizada
- Diseño
- Adiestramiento en su manejo
- Actualización
- Consideraciones éticas