2026 Philippine Clinical Practice Guidelines on the Screening and Management of Clubfoot in Children

26 March 2026

Guideline Development Group

Steering Committee

Czar Louie L. Gaston, MD, FPOA - Chair
Department of Orthopaedics, University of the Philippines Manila - Philippine General Hospital
Orthopedic Surgery

Juanito S. Javier, MD, MChOrth, FPOA
Philippine National Clubfoot Council
Orthopedic Surgery

Lorna Ramos-Abad, MD, FPPS
Department of Pediatrics, College of Medicine, University of the Philippines Manila
Pediatric Endocrinology

Joycie Eulah H. Abiera, MD, FPARM
Department of Rehabilitation Medicine, University of the Philippines Manila - Philippine General Hospital
Rehabilitation Medicine

Maria Melanie Liberty B. Alcausin, MD, FPPS
Institute of Human Genetics, National Institutes of Health, University of the Philippines Manila
Pediatrics - Clinical Genetics

Maria Cristina V. Mosende, RSW, PGDip BM, MDM
Philippine National Clubfoot Council
Program Management and Monitoring and Evaluation

Guideline Panel

Hyacinth G. Babag, PTRP
Physical Therapist and Site Coordinator of Benguet General Hospital Clubfoot Clinic
Physical Therapy; Baguio and Benguet

Lourdes V. Calotes-Castillo, MD, DPPS, FCNSP, FPNA
Department of Pediatrics and Neurosciences, Philippine General Hospital
Pediatric Neurology, Manila

Monalisa L. Lim-Dungca, MD, FPARM
Department of Rehabilitation Medicine, Philippine General Hospital and Philippine Children's Medical Center
Physical and Rehabilitation Medicine; Manila, Quezon City, Tarlac City

Arnaldo Songcayaon Favila Jr., MD, FPOA, FPSS
BAHATALA Rehabilitation Centre
Orthopedic Surgery; Puerto Princesa City, Palawan

Rosalyn P. Flores, MD, FPOA, FPCS
Pediatric Orthopaedic Society of the Philippines, University of the Philippines - Philippine General Hospital, University of Santo Tomas Hospital
Orthopedic Surgery (Pediatric Orthopedics; Ilizarov and Limb Deformity Surgery); Manila

Rechelle G. Labay
Parent, Patient Advocate; Quezon City

Jean Pierre F. Leung, MD, FPOA
Philippine Orthopaedic Association; Benguet General Hospital Clubfoot Clinic
Pediatric Orthopedics and Spine Surgery

Ebner Bon G. Maceda, MD, FPPS
Institute of Human Genetics, National Institutes of Health, University of the Philippines Manila; Division of Clinical and Metabolic Genetics, Department of Pediatrics, Philippine General Hospital
Pediatrics; Clinical Genetics; NCR; Nationwide

Jeremieh C. Nisperos, RSW
Clinical Genetics and Research Unit, National Institutes of Health University of the Philippines Manila, Philippines
Medical Social Service, Social Worker; Manila

Japhet Gerard Regidor, CPO, MHCM
University of the East Ramon Magsaysay Memorial Medical Center, Inc.
Orthotics / Bracing; Quezon City

Michael Shaun B. Ritualo, MD, FPOA
Patient Advocate
General and Pediatric Orthopedic Surgery; Quezon City

Sitti Khadija U. Salabi, MD, DFM
Philippine Academy of Family Physicians

Maria Anna Morales-Tugano, MD, FPPS, DPSNbM
Philippine Society of Newborn Medicine

Technical Working Group

Aldrich Ivan Lois D. Burog, MD, MSc (cand.)
Technical Lead

Miguel Gaston M. Agcaoili, RND
Hannah Haile P. Almenario, MD, MPM
Howell Henrian G. Bayona, PhD, MSc, RSLP
Ian Theodore G. Cabaluna, RPh, MD, GDip, MSc
Ericka Louise C. Gilo, RN
Anna Angelica Macalalad-Josue, MD, FPCP, FPCEDM
Karl Jeffrey E. Murillo, MD, DPCP
Dan Louie Renz P. Tating, MS(cand), RN
Jayson M. Villavicencio, MD, FPCP

Guideline Panel Meeting Facilitator

Theodore Joseph J. Ablaza, MD, DPPS

Administrative Staff

Maria Pamela Tagle
Foundation for the Advancement of Clinical Epidemiology, Inc. (FACE)

Gerardo II S. Evan
Patient Support and Navigator
Philippine NGO Council on Population, Health, and Welfare Inc.

External Reviewers

Carlo Emmanuel J. Sumpaico, MD, FPOA
Mary Ruth A. Padua, MD, FPOA
Pepito E. Dela Peña, MD, FPCP, FPCEDM

Conflict of Interest Review Committee

Nathaniel Orillaza Jr., MD, FPOA
Elizabeth Paz-Pacheco, MDFPCP, FPCEDM, FACE
Edward Wang, MD, MSc

Disclaimer and Contact Information

This Clinical Practice Guideline (CPG) is intended to assist policymakers, healthcare providers, and program implementers in the screening, diagnosis, management, monitoring, and follow-up of clubfoot in infants and children in the Philippines. Healthcare professionals and institutions involved in child health and musculoskeletal care at the primary, secondary, and tertiary levels—including midwives, nurses, physicians, allied health professionals, hospitals, professional societies, and government agencies—may use this CPG to inform clinical practice, program planning, and the development of local policies aimed at improving outcomes for children with clubfoot.

The evidence summaries used in this CPG are based on the best available scientific evidence at the time of its formulation. As such, certain aspects of the recommended screening, diagnostic, or treatment interventions may not be fully addressed by the included studies, reflecting existing gaps in the evidence base.

This CPG does not aim to comprehensively address all congenital musculoskeletal conditions. Rather, it provides recommendations on priority areas of clubfoot care where clinical practice varies and decision-making may be uncertain. While adherence to this guideline is encouraged to promote standardized and evidence-informed care, it is not intended to replace clinical judgment. Healthcare providers should continue to consider individual patient circumstances, caregiver preferences, and local resource availability when applying the recommendations.

Payors and policymakers, including hospital administrators and employers, should not use this guideline as the sole basis for evaluating insurance claims, reimbursement decisions, or coverage determinations. Likewise, the recommendations should not be interpreted as rigid rules or legal standards of care.

While every effort has been made to ensure the accuracy and relevance of the information presented, the authors and endorsing organizations assume no responsibility for any adverse outcomes or damages resulting from the application of this guideline in clinical practice.

Contact Information

For inquiries or clarifications regarding the output or development process of this CPG, you may contact us through email at **philnationalclubfootcouncil@gmail.com**.

How to cite:

2026 Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children

Acknowledgments

The **2026 Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children** would not have been possible without the collective leadership, expertise, and commitment of numerous individuals and institutions dedicated to improving outcomes for children with clubfoot in the Philippines.

We extend our sincere appreciation to the **Steering Committee** of the Guideline Development Group, composed of **Dr. Czar Louie L. Gaston**, **Dr. Juanito S. Javier**, **Dr. Lorna Ramos-Abad**, **Dr. Joycie Eulah H. Abiera**, **Dr. Maria Melanie Liberty B. Alcausin**, and **Ms. Maria Cristina Mosende**, for providing overall direction, governance, and strategic oversight throughout the guideline development process.

We gratefully acknowledge the invaluable contributions of the **Guideline Panel**, whose multidisciplinary perspectives ensured the clinical relevance, feasibility, and patient-centeredness of the recommendations. The panel included **Ms. Hyacinth G. Babag**, **Dr. Lourdes V. Calotes-Castillo**, **Dr. Monalisa L. Lim-Dungca**, **Dr. Arnaldo Songcayaon Favila Jr.**, **Dr. Rosalyn P. Flores**, **Ms. Rechelle G. Labay**, **Dr. Jean Pierre F. Leung**, **Dr. Ebner Bon G. Maceda**, **Mr. Jeremieh C. Nisperos**, **Mr. Japhet Gerard Regidor**, **Dr. Michael Shaun B. Ritualo**, **Dr. Sitti Khadija U. Salabi**, and **Dr. Maria Anna Morales-Tugano**.

We also recognize the **Technical Working Group**, led by **Dr. Aldrich Ivan Lois D. Burog** (Technical Lead), and composed of **Mr. Miguel Gaston M. Agcaoili**, **Dr. Hannah Haile P. Almenario**, **Dr. Howell Henrian G. Bayona**, **Dr. Ian Theodore G. Cabaluna**, **Ericka Louise C. Gilo**, **Dr. Anna Angelica Macalalad-Josue**, **Dr. Karl Jeffrey E. Murillo**, **Dan Louie Renz P. Tating**, and **Dr. Jayson M. Villavicencio**, whose rigorous evidence synthesis, GRADE assessments, and manuscript development formed the scientific foundation of this guideline. We acknowledge **Dr. Theodore Joseph J. Ablaza** for serving as **Guideline Panel Meeting Facilitator**, ensuring structured deliberations and transparent consensus-building during the en banc meeting.

We thank the **External Reviewers**, **Dr. Carlo Emmanuel J. Sumpaico**, **Dr. Pepito dela Peña, Dr. Mary Ruth A. Padua**, for their independent appraisal and constructive feedback, which strengthened the methodological rigor, clarity, and applicability of the recommendations. We also express our appreciation to the **Conflict of Interest Review Committee**, composed of **Dr. Nathaniel Orillaza Jr.**, **Dr. Elizabeth Paz-Pacheco**, and **Dr. Edward Wang**, whose independent oversight safeguarded the transparency and integrity of the guideline development process.
We gratefully acknowledge the **administrative and operational support** provided by **Ms. Maria Pamela Tagle** and the **Foundation for the Advancement of Clinical Epidemiology, Inc. (FACE)**, as well as **Mr. Gerardo II S. Evan**, who served as **Patient Support and Navigator**, of the **Philippine NGO Council on Population, Health, and Welfare, Inc.**

We further acknowledge the institutional support of **MiracleFeet**, the **Philippine National Clubfoot Council**, and the **Philippine NGO Council on Population, Health, and Welfare, Inc.**, whose shared commitment to strengthening health systems and expanding access to quality clubfoot care made this work possible.

Finally, we recognize the dedication of frontline healthcare providers and public health professionals across the country who continue to care for children with clubfoot under diverse and often challenging conditions. It is our hope that this guideline will serve as a practical, evidence-informed resource to support their efforts in improving the screening, management, and long-term outcomes of children with clubfoot in the Philippines.

Participating Societies, Organizations, Agencies, and Institutions

Philippine Orthopaedic Association

Philippine National Clubfoot Council

Philippine National Clubfoot Program

Philippine Pediatric Society

Pediatric Orthopaedic Society of the Philippines

Philippine Academy of Family Physicians

Philippine Society of Newborn Medicine

Child Neurology Society, Philippines, Inc.

Philippine Academy of Rehabilitation Medicine

Foundation for the Advancement of Clinical Epidemiology, Inc.

MiracleFeet

Table of Contents

List of Tables and Figures

Executive Summary

Clubfoot continues to threaten the mobility, function, and quality of life of infants and children in the Philippines. This CPG for clubfoot aims to provide evidence-based recommendations to healthcare professionals, policymakers, and public health officials regarding the screening and management of clubfoot among children. This updated Clinical Practice Guideline was developed to address key areas of uncertainty and practice variation identified through stakeholder consultation and systematic evidence review. The guideline focuses on ten priority questions spanning the continuum of care—from routine newborn screening and early conservative management to treatment escalation, relapse management, and long-term monitoring. By applying a transparent, rigorous methodology aligned with Department of Health standards and the GRADE Evidence-to-Decision framework, these guidelines aim to provide clear, actionable recommendations that balance evidence, feasibility, equity, and patient and caregiver values.

The Philippine National Clubfoot Council (PNCC) commissioned the Foundation for the Advancement of Clinical Epidemiology to review all relevant scientific literature and shepherd the completion of a Clinical Practice Guidelines on Clubfoot Management in the country. The group strictly stuck to the guides and parameters set by the country's Department of Health in the construction of a CPG. Membership in the different committees were rigorously vetted to minimize if not eliminate completely biases and conflicts of interest. The consensus panel consisted of representatives from many societies and organizations with stake in clubfoot treatment. Parent advocate, patient advocate, physical therapist, social worker and orthotist were also part of the panel. These steps were taken to ensure that the output would be useful and acceptable to all.

Evidence review experts conducted systematic reviews of current best available evidence and assessed the certainty of evidence using the GRADE approach. A multidisciplinary guideline panel formulated the recommendations during an en banc, face-to-face guideline panel meeting. When high-quality evidence was lacking but guidance was warranted, good practice statements were provided. The absence of large randomized controlled trials—largely infeasible for clubfoot given its congenital nature, established effectiveness of conservative treatment, and ethical and logistical constraints of long-term randomization—contributed to most bodies of evidence being rated as low or very low certainty. Recommendations were tailored specifically to the Philippine healthcare context, considering resource constraints and population-specific factors.

This CPG presents recommendations addressing ten (10) priority guideline questions on screening, treatment, monitoring, and relapse management of clubfoot. A total of ten (10) guideline recommendations were issued, comprising nine (9) strong recommendations and one (1) weak recommendation, alongside nine (9) Good Practice Statements formulated in areas where direct comparative evidence was limited but guidance is necessary for safe and effective practice and the panel has high confidence that the desirable effects clearly outweigh the undesirable effects, despite the absence of direct evidence suitable for formal grading. In addition, one (1) consensus statement was issued to highlight an identified system-level gap related to locally produced foot abduction braces.

The guideline highlights key research gaps, including the need for high-quality local data and operational research to evaluate the effectiveness, feasibility, and implementation of recommended interventions. Despite limitations in the evidence base, the guideline provides comprehensive, contextually appropriate recommendations to inform clinical and public health responses to clubfoot in Filipino children.

This CPG offers standardized, evidence-informed guidance for managing clubfoot in the Philippines. The guideline will be updated as new evidence emerges or as significant changes in disease trends or epidemiology occur, to ensure continued relevance, scientific accuracy, and responsiveness to public health needs.

Table 1. Summary of Recommendations from the 2026 Philippine Clinical Practice Guidelines on the Screening and Management of Clubfoot in Children.

No.	Recommendations	Certainty of Evidence	Strength of Recommendation
Routine screening for foot deformities *Q1: Should routine screening for foot deformities (e.g., clubfoot) be conducted for all newborns by primary care providers, such as midwives, nurses, pediatricians, and family physicians?*			
1.1	We recommend routine newborn screening* for foot deformities by physical examination of primary care providers. ***Remarks:*** *Screening should be performed using a standardized checklist as part of the Philippine Expanded Newborn Screening Program. Imaging studies are not required.*	⊕◯◯◯ Very Low	Strong
1.2	Primary care providers should be trained regarding the proper recognition and referral pathways for clubfoot treatment. Referral centers (i.e., clubfoot clinics) should be accessible, available, and affordable.	None	Good Practice Statement
Ponseti method vs. conservative non-Ponseti methods *Q2: Should the Ponseti method be used instead of conservative non-Ponseti methods to improve clinical and functional outcomes among infants with clubfoot?*			
2.1	We recommend that the Ponseti Method be performed as the first line treatment among children under two years of age with clubfoot.	⊕◯◯◯ Very Low	Strong
2.2	A multidisciplinary team (e.g., surgeons, primary care providers, physiotherapists, nurses, social workers, physiatrists, caregivers, orthotists, site coordinators) is recommended for a successful clubfoot clinic.	None	Good Practice Statement
Structured parental education and compliance strategies *Q3: Should we implement structured parental education and compliance strategies as part of conservative management (e.g., Ponseti method) in children with idiopathic clubfoot?*			
3	We recommend the implementation of a culturally appropriate, structured parental and key stakeholder* education and compliance strategies as part of conservative management in children with idiopathic clubfoot. ***Remarks:*** *Key stakeholders include municipal health workers, primary care physicians, barangay health workers, patient caregivers, midwives, nurses, social workers.*	⊕◯◯◯ Very Low	Strong
Foot abduction braces *Q4: Should locally produced braces, compared to commercial (branded) braces, be used in patients with idiopathic clubfoot?*			
4.1	We recommend the use of either locally produced or commercially available foot abduction braces to maintain	⊕◯◯◯ Very Low	Strong

No.	Recommendations	Certainty of Evidence	Strength of Recommendation
	correction after Ponseti casting with or without tenotomy until the child is five years of age.		
4.2	Compliance with the recommended bracing regimen is more important than the type* of foot abduction brace in preventing recurrence of the clubfoot deformity. **refers to the source of manufacture (commercially produced or locally fabricated), provided that the brace meets the essential functional requirements of an effective foot abduction brace, including the ability to maintain appropriate external rotation and abduction, a bilateral connection with a bar of adequate rigidity and length, and secure fixation of the feet. Braces that do not meet these minimum functional requirements are not considered acceptable, regardless of their origin*	None	Good Practice Statement
4.3	There is an identified gap both in knowledge, skills, and availability for locally produced foot abduction braces requiring further research, training, and additional resource allocation.	None	Consensus Statement
Casting within 4 weeks of birth *Q5: Should infants with idiopathic clubfoot undergo casting within 4 weeks of birth or upon diagnosis as part of initial conservative (non-surgical) management?*			
5	We recommend early* initiation of Ponseti treatment once infants are diagnosed with idiopathic clubfoot. ***Remarks:*** *Less than 3 months of age or with a foot size that can fit the smallest available brace.*	⊕◯◯◯ Very Low	Strong
Percutaneous tenotomy following Ponseti casting *Q6: Should percutaneous tenotomy be performed in those eligible following completion of Ponseti casting among patients with idiopathic clubfoot?*			
6.1	We recommend doing percutaneous tenotomy following completion of Ponseti casting among patients with idiopathic clubfoot who meet all the following clinical indications: (1) inability to achieve ankle dorsiflexion of at least 15°, (2) fully covered lateral head of the talus; (3) foot abduction of at least 50°; (4) heel in neutral or valgus.	⊕⊕◯◯ Low	Strong
6.2	If the patient is able to achieve at least 15 degrees of ankle dorsiflexion and fulfills criteria (2) to (4), the patient may proceed with bracing but with close follow-up. If the aforementioned criteria are not met, the patient should be re-evaluated.	None	Good Practice Statement
Outpatient percutaneous tenotomy *Q7: Should outpatient percutaneous tenotomy be offered as an alternative to operating room-based tenotomy in patients with clubfoot?*			
7.1	We recommend doing percutaneous Achilles tenotomy under local anesthesia. However, general anesthesia may be	⊕◯◯◯ Very Low	Strong

No.	Recommendations	Certainty of Evidence	Strength of Recommendation
	considered for children over six months of age or at the discretion of the surgeon.		
7.2	Performing successful outpatient percutaneous Achilles tenotomy under local anesthesia requires proper pre-operative counseling, adequate training of the surgical team, and an adequately equipped facility.	None	Good Practice Statement
Casting or surgery for children with clubfoot older than 4 years old *Q8: Should children with clubfoot who are older than 4 years undergo casting (e.g., Ponseti method or other casting techniques) or proceed directly (i.e., outright) to surgical management?*			
8.1	We suggest children with untreated idiopathic clubfoot older than two years undergo a trial of serial casting using the principles of the Ponseti method before considering subsequent surgical management.	⊕◯◯◯ Very Low	Weak
8.2	In this age group, treatment is not limited to casting or surgery but should include physiotherapy and consideration for use of age-appropriate orthosis.	None	Good Practice Statement
Routine monitoring using clinical scoring systems *Q9: Should patients with idiopathic clubfoot be routinely monitored using clinical scoring systems such as Pirani scoring system during and after treatment?*			
9.1	We recommend routine monitoring using the Pirani scoring system among children with idiopathic clubfoot during and after treatment.	⊕◯◯◯ Very Low	Strong
9.2	Frequency of monitoring ● During serial casting – weekly monitoring ● At start of bracing – then monthly for 3 months ● During part time bracing – every 3 months until completion of treatment ● Yearly until skeletal maturity (18 years of age)	None	Good Practice Statement
9.3	Include measurement of the foot abduction and ankle dorsiflexion angles during the whole treatment period.	None	Good Practice Statement
Repeat Ponseti casting or surgery for relapse *Q10: Should we repeat Ponseti treatment or surgical management among children with idiopathic clubfoot who had recurrence of deformity after completion of Ponseti treatment?*			
10.1	We recommend performing repeat Ponseti treatment among children with idiopathic clubfoot who had recurrence of deformity after completion of Ponseti treatment.	⊕◯◯◯ Very Low	Strong
10.2	● Conduct regular monitoring visits throughout and after the clubfoot treatment process. ● Evaluate the causes of recurrence which may include:	None	Good Practice Statement

No.	Recommendations	Certainty of Evidence	Strength of Recommendation
	○ Technique-related factors: inappropriate manipulation and casting, incomplete tenotomy; and ○ Patient factors: brace noncompliance, and other possible non-idiopathic etiologies; ● Refer patients with recurrent clubfoot to an orthopedic subspecialist; ● Appropriately treat the identified deformities that have relapsed using the Ponseti method after careful assessment; ● Consider performing Achilles tenotomy, tibialis anterior tendon transfer, and other soft tissue procedures, if needed, after proper re-evaluation; ● Evaluate the need for orthosis and/or physiotherapy; ● Refer patients for additional multidisciplinary evaluation, as warranted.		

Chapter 1.
Introduction

Background

Clubfoot is one of the most frequently occurring congenital abnormalities. It is also one of the easiest to identify immediately after birth as the deformity of the foot is very obvious and easily recognizable, with the foot presenting as unusually twisted and turned inwards. If left untreated, it could lead to much disability, pain and mental health issues. Fortunately, if detected early enough, clubfoot can be treated easily and with expectation of good outcome.

Most are idiopathic or isolated birth defects at 80% and the rest are due to associated malformations, chromosomal abnormalities and known genetic syndromes, such as distal arthrogryposis (DA) and myelomeningocele.[1]

Globally, its prevalence is estimated to be 1.18 per 1000 live births, with the highest prevalence rate noted to be in Southeast Asia (1.8 per 1000 live births).[2] In the Philippines, the prevalence has not yet been firmly established. According to the Philippine Birth Defects Registry Project from 1999-2000, the incidence of clubfoot was at 3.8 per 10,000 live births.[3] Another local study estimated an incidence rate of 0.79 per 1000 live births.[4] However, no definitive newer studies are available to date. At best, one can estimate at least over 1,500 infants are born with clubfoot in the country every year.

The treatment of the many neglected and freshly detected clubfoot has seen much progress in the country over the years. Many clubfoot clinics using the Ponseti Method have already emerged throughout the Philippine archipelago. These clinics arose from the contributions of many groups and individuals on their own or with the support of a few local and international philanthropic foundations.

In 2024, stakeholders in clubfoot management coalesced to form the **Philippine National Clubfoot Council (PNCC)**. The council aims to guide, support and set direction for the treatment of clubfoot in the country. The council aims to ensure that quality treatment based on sound medical evidence is provided to each one of the clubfoot patients. One avenue to achieve this is to formulate a **Clinical Practice Guidelines (CPG) for the Management of Clubfoot** in the country. A grant for this effort was provided by **MiracleFeet**, an international foundation helping treat clubfoot patients in many underdeveloped countries.

It is hoped that these Clinical Practice Guidelines will be an integral factor in ensuring that all children with clubfoot will be provided with the best treatment we could offer.

Rationale for the CPG

Clubfoot remains a significant but highly treatable cause of childhood disability in the Philippines. While advances in conservative management such as the Ponseti method have transformed outcomes globally, substantial gaps persist in early detection, timely initiation of treatment, continuity of care, and long-term monitoring within the local health system. Despite the presence of multiple active clubfoot clinics and growing involvement of national and international partners, **a large proportion of Filipino children with clubfoot remain undiagnosed, untreated, or inadequately followed up**, particularly in geographically isolated and disadvantaged areas.

Existing international guidelines consistently endorse early screening and conservative management of clubfoot; however, their direct applicability to the Philippine context is limited. Differences in healthcare delivery, availability of trained providers, referral pathways, access to braces and orthotic services, caregiver adherence, and resource constraints necessitate locally contextualized guidance. Moreover, variations in practice have been observed across settings, including inconsistencies in newborn screening, timing of casting initiation, use of

modified versus standard Ponseti techniques, indications for percutaneous tenotomy, outpatient versus operating-room–based procedures, and approaches to relapse management. These variations contribute to inequities in care and potentially avoidable treatment failures.

Since earlier local efforts and informal practice standards were established, new evidence has emerged regarding diagnostic approaches, conservative treatment strategies, compliance-enhancing interventions, and monitoring tools for clubfoot management. In addition, stakeholder priorities have evolved, with increasing emphasis on structured parental education, multidisciplinary care models, use of locally produced braces, and standardized clinical scoring systems to guide treatment decisions and monitor outcomes. The formation of the Philippine National Clubfoot Council further underscores the need for a unified, evidence-informed framework to guide clinical practice, policy development, and program implementation nationwide.

Objectives of the Guideline

General Objective

To provide evidence-based, context-appropriate recommendations for the **screening, diagnosis, management, monitoring, and follow-up of clubfoot in children in the Philippines**, with the aim of improving early detection, treatment outcomes, functional mobility, and long-term quality of life, while reducing preventable disability and inequities in care.

Ultimately, the updated guidelines seek to standardize and strengthen clubfoot care in the Philippines, support frontline healthcare providers and referral centers in delivering timely and effective treatment, and reduce preventable disability among Filipino children.

Specific Objectives

Table 2. Specific Objectives of the CPG.

Domain	Objective
Screening and Early Detection	• To guide primary care providers in the routine screening of newborns for foot deformities, including clubfoot, through standardized physical examination. • To promote timely identification and referral of children with suspected clubfoot to appropriate levels of care.
Conservative Management	• To determine the effectiveness and safety of the Ponseti method as first-line treatment for children with clubfoot compared with other conservative non-Ponseti approaches. • To guide decisions on the timing of initiation of casting, particularly early treatment after birth or diagnosis.
Adjunctive Interventions and Treatment Optimization	• To evaluate the role of structured parental education and compliance strategies in improving adherence, reducing relapse, and enhancing treatment success. • To assess the effectiveness of locally produced versus commercially available foot abduction braces in maintaining correction after casting. • To provide guidance on the appropriate use of percutaneous Achilles tenotomy following Ponseti casting, including indications and clinical criteria.
Care Setting and Special	• To guide the provision of outpatient versus operating-room–based percutaneous tenotomy, considering patient safety, feasibility, and resource availability.

Domain	Objective
Populations	• To inform management strategies for older children with clubfoot, including the role of casting versus surgical management. • To support appropriate referral and multidisciplinary evaluation for children with suspected non-idiopathic clubfoot.
Monitoring, Relapse, and Long-term Care	• To recommend the use of structured clinical scoring systems, such as the Pirani score, for monitoring treatment response and outcomes during and after management. • To guide the management of relapsed or recurrent clubfoot, including the role of repeat Ponseti treatment versus surgical options.
Health System and Equity Considerations	• To promote standardized, equitable, and feasible clubfoot care pathways across diverse healthcare settings in the Philippines, including geographically isolated and disadvantaged areas. • To support clinicians, program managers, and policymakers in improving access to quality clubfoot care and reducing variations in practice.

Target Users and Institutions

Target Population

The guidelines apply to **newborns, infants, and children with suspected or confirmed clubfoot**, including idiopathic clubfoot and selected non-idiopathic forms requiring referral and multidisciplinary evaluation. The target population also includes **parents, caregivers, and families of children with clubfoot,** who play a critical role in treatment adherence, follow-up, and long-term outcomes.

Target Users of the CPG

- **Primary care providers**, such as midwives, nurses, barangay health workers, family physicians, and general practitioners, who are involved in newborn screening, early detection, counseling, and referral
- **Specialist clinicians**, including pediatric orthopedic surgeons, pediatricians, rehabilitation medicine physicians, neurologists, and other specialists involved in the diagnosis and management of clubfoot
- **Allied health professionals**, such as physical therapists, orthotists, social workers, and patient navigators, who support conservative management, bracing, rehabilitation, caregiver education, and continuity of care
- **Multidisciplinary clubfoot care teams** working in dedicated clubfoot clinics or referral centers
- **Public and private healthcare facilities** at the primary, secondary, and tertiary levels, including barangay health stations, rural health units, lying-in clinics, hospitals, and specialized clubfoot clinics
- **Local government units (LGUs)** and health offices involved in implementing newborn screening, referral systems, and child health programs
- **National government agencies**, including the Department of Health and related agencies involved in newborn screening, child health, and disability prevention
- **Non-government organizations (NGOs), professional societies, and partner institutions** engaged in clubfoot screening, treatment delivery, training, and service expansion

Use of the Guideline

While adherence to this guideline is encouraged to promote standardized, evidence-informed care, it is **not intended to replace clinical judgment**. Healthcare providers should continue to consider individual patient circumstances, caregiver preferences, resource availability, and local context when applying the recommendations. The guideline should not be used as the sole basis for legal action, reimbursement decisions, or denial of services, but rather as a tool to support high-quality, equitable care for children with clubfoot in the Philippines. While this CPG reflects the best available evidence, adhering to the recommendations may not always guarantee the best outcome. These guidelines are intended to support, not replace clinical judgment and individual discretion in making treatment decisions, while also taking into consideration patients' personal values and individual circumstances. Guidelines are not mandates and should not be interpreted as legal standards of care.

References

1. Gurnett CA, Boehm S, Connolly A, Reimschisel T, Dobbs MB. Impact of congenital talipes equinovarus etiology on treatment outcomes. *Develop Med Child Neuro*. 2008;50(7):498-502. doi:10.1111/j.1469-8749.2008.03016.x
2. Smythe T, Rotenberg S, Lavy C. The global birth prevalence of clubfoot: a systematic review and meta-analysis. *eClinicalMedicine*. 2023;63:102178. doi:10.1016/j.eclinm.2023.102178
3. Padilla- CD, Cutiongco EM, Sia JM. Birth defects ascertainment in the Philippines. *Southeast Asian J Trop Med Public Health*. 2003;34 Suppl 3:239-243.
4. Eusebio I, Sumpaico C. Results of Ponseti casting for Clubfoot in a tertiary public hospital. *Acta Medica Philippina*. 2021;55(3). doi:104.47895/amp.v55i3.1774

Chapter 2.
Guideline Development Methodology

Overview of the Guideline Development Process

Guideline Development Group Composition

The Guideline Development Group (GDG) for the **Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children** comprised a **Steering Committee (SC)**, **Technical Working Group (TWG)**, **Evidence Review Experts (EREs)**, a **Guideline Panel (GP)**, and an independent **Conflict of Interest Review Committee (COIRC)**.

The Steering Committee and Technical Working Group were convened at the outset to oversee the scope, direction, and methodological integrity of the guideline. The SC was responsible for nominating stakeholders to the Guideline Panel, ensuring representation from relevant clinical specialties, allied health professions, patient and caregiver perspectives, and other key stakeholders involved in clubfoot care. The Technical Lead recruited the Evidence Review Experts, who were tasked with conducting the systematic reviews and evidence syntheses for each prioritized guideline question.

Collectively, the GDG brought together clinicians, researchers, epidemiologists, rehabilitation specialists, allied health professionals, public health practitioners, and patient advocates, ensuring a coordinated, multidisciplinary, and transparent approach to guideline development that reflects the realities of clubfoot care in the Philippine setting.

Managing Conflicts of Interest

All members of the GDG completed and submitted a **Declaration of Conflicts of Interest (COI)** form and their **curriculum vitae** prior to participation in the guideline development process. These documents were reviewed by an independent Conflict of Interest Review Committee (COIRC), whose members were external to the GDG.

Identified conflicts of interest, whether financial or non-financial, were reviewed and appropriately managed in accordance with established procedures to safeguard the integrity, credibility, and objectivity of the guideline. The COIRC assessed the nature and relevance of declared interests and provided recommendations on participation, voting rights, and disclosure requirements.

Conflicts of interest were managed using a predefined classification system, as outlined in Chapter 5, to ensure transparency and minimize undue influence on the formulation of recommendations. Members with identified conflicts were permitted to contribute their expertise subject to the restrictions recommended by the COIRC.

Table 3. COI classification.

Level	Description
A	Allowed to participate without constraints
B	Allowed to participate but required to broadcast intellectual or non-financial COIs; such COIs would also be declared in writing in the CPG document
C	Cannot vote, but may still participate by sharing their expertise with the group
D	Disallowed to participate in the entire CPG development process or to particular questions addressed by it

Selection of Priority Topics and Guideline Questions

Priority topics for the **Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children** were identified through stakeholder consultation and review of existing gaps in clinical practice and service delivery. An initial set of draft clinical questions was reviewed and updated by the Steering Committee (SC) of the current Guideline Development Group (GDG), drawing on emerging evidence, local practice variation, and programmatic priorities in clubfoot care.

During the SC's initial meetings, clinical questions were refined using the **Population, Intervention, Comparator, and Outcome (PICO)** framework to guide the subsequent evidence review. These draft questions were then circulated to members of the Guideline Panel (GP) for feedback, during which panelists provided comments, suggested refinements, and identified outcomes they considered most critical for decision-making based on clinical relevance, feasibility, and patient and caregiver priorities.

With input from the Technical Leads and consideration of the GP's feedback, the SC finalized the set of guideline questions that formed the basis of the systematic evidence reviews and recommendation development for this CPG.

Table 4. List of guideline questions and PICO elements.

1	Should routine screening for foot deformities (e.g., clubfoot) be conducted for all newborns by primary care providers (i.e., such as midwives, nurses, pediatricians, and family physicians)?
Research Question: Among all newborns, how effective and safe is routine screening for foot deformities compared with no routine screening when conducted by primary care providers (e.g., midwives, nurses, pediatricians, family physicians) on the early detection of foot deformities (e.g., clubfoot)?	
P	newborns
I	Routine screening for foot deformities conducted by primary care providers (e.g., midwives, nurses, pediatricians, family physicians)
C	No routine screening
O	early detection of foot deformities (e.g., clubfoot) overdiagnosis/labeling

2	Should the Ponseti method be used instead of conservative non-Ponseti methods to improve clinical and functional outcomes among infants with clubfoot? Subquestions: Should the French functional method be used instead of the Ponseti method? Should the Kite method be used instead of the Ponseti method?
Research Question: Among infants with clubfoot, how effective is the Ponseti method compared with the Kite method or French functional method in reducing adverse events, relapse/recurrence rates, and improving clinical and functional outcomes?	
P	Infants with congenital talipes equinovarus (clubfoot)
I	Ponseti method

C	French functional method and Kite method
O	Relapse requiring surgery, safety (adverse events), treatment/correction rate, final functional outcomes, recurrence of deformity, Pirani score improvement, and complications

3	Should we implement structured parental education and compliance strategies as part of conservative management (e.g., Ponseti method) in children with idiopathic clubfoot?
Research Question: In children with idiopathic clubfoot, how effective is structured parental education and other strategies compared with no structured education/strategies to improve compliance on reducing relapse, treatment failure, and improving treatment success as part of conservative management (e.g., Ponseti method)?	
P	children with idiopathic clubfoot
I	structured parental education and compliance strategies as part of conservative management
C	Non-structured parental education and compliance strategies
O	improve compliance on reducing relapse, treatment failure, and improving treatment success as part of conservative management (e.g., Ponseti method)

4	Should locally produced braces, compared to commercial (branded) braces, be used in patients with idiopathic clubfoot?
Research Question: Among patients with idiopathic clubfoot, how effective are locally produced braces compared with commercial (branded) braces in reducing recurrence of deformity and improving outcomes such as brace adherence, caregiver satisfaction, and long-term function?	
P	patients with idiopathic clubfoot
I	locally produced braces (e.g., Steenbeek braces)
C	commercial (branded) braces
O	reduction in recurrence of deformity; improvement in brace adherence improvement in caregiver satisfaction improvement in long-term function

5	Should infants with idiopathic clubfoot undergo casting within 4 weeks of birth or upon diagnosis as part of initial conservative (non-surgical) management?
Research Question: Among infants with idiopathic clubfoot, how effective is casting initiated within 4 weeks of birth or upon diagnosis compared with casting initiated after 4 weeks on improving outcomes as part of initial conservative (non-surgical) management?	
P	infants with idiopathic clubfoot
I	casting initiated within 4 weeks of birth
C	casting initiated after 4 weeks of birth
O	improving outcomes as part of initial conservative (non-surgical) management

6	Should percutaneous tenotomy be performed among those eligible following completion of Ponseti casting among patients with idiopathic clubfoot?
Research Question: Among patients with idiopathic clubfoot who are eligible (by Pirani score (e.g., >1 Hindfoot score)) after completion of Ponseti casting, how effective is performing percutaneous tenotomy compared with not performing tenotomy in achieving successful correction, reducing relapse, and improving long-term functional outcomes?	
P	patients with idiopathic clubfoot who are eligible (by Pirani score (e.g., >1 Hindfoot score)) after completion of Ponseti casting
I	percutaneous tenotomy
C	Nonperformance of percutaneous tenotomy, or Z lengthening (open tenotomy), White Slide percutaneous lengthening
O	Successful correction Improvement in hindfoot Pirani score Increase in ankle dorsiflexion Increase in length of Achilles tendon Residual deformity after initial treatment completion Recurrence/relapse requiring further intervention Time to achieve full correction Gait function and mobility at follow-up Long-term foot function (strength, flexibility, endurance) Ankle/foot range of motion at follow-up (beyond dorsiflexion) Health-related quality of life (HrQOL) for the child and family Adverse events related to anesthesia/analgesia

7	Should outpatient percutaneous tenotomy be offered as an alternative to operating room-based tenotomy in patients with clubfoot?
Research Question: Among patients with clubfoot, what is the efficacy and safety of outpatient percutaneous tenotomy as an alternative to operating room-based tenotomy in terms of achieving successful correction and minimizing complications?	
P	Patients with clubfoot
I	Outpatient-based percutaneous tenotomy
C	OR-based percutaneous tenotomy
O	Efficacy and Safety outcomes: Proportions with complications, Proportion with repeat tenotomy

8	Should children with clubfoot who are older than 4 years undergo casting (e.g., Ponseti method or other casting techniques) or proceed directly (i.e., outright) to surgical management?
Research Question: Among children with clubfoot older than 4 years, how effective is casting (e.g., Ponseti method with percutaneous tenotomy or other casting techniques) compared with proceeding directly to surgical management in improving foot correction, functional outcomes, and reducing complications?	
P	Children with clubfoot older than 4 years old
I	Casting (e.g., Ponseti method with percutaneous tenotomy or other casting techniques)
C	Surgical management (surgical means gradual correction using Ilizarov, open posterior medial release, limited releases, and lengthening)

O	Foot correction, functional outcomes, reduction in complications

9	Should patients with idiopathic clubfoot be routinely monitored using clinical scoring systems such as Pirani scoring system during and after treatment?
Research Question: Among patients with idiopathic clubfoot, how effective is routine monitoring using clinical scoring systems (e.g. Pirani scores) compared with no structural monitoring in improving treatment assessment, and predicting outcomes during and after treatment?	
P	Patients with idiopathic clubfoot
I	Routine monitoring using clinical scoring systems (e.g. Pirani)
C	No structured monitoring (standard clinical observation without scoring tools; “eyeballing) or other clinical scoring system (e.g. Dimeglio)
O	Improved treatment assessment, better management decisions, improved prediction of outcomes

10	Should we repeat Ponseti casting or surgical management among children with idiopathic clubfoot who failed to achieve correction after initial Ponseti casting?
Research Question: Among children with idiopathic clubfoot who failed to achieve correction after initial Ponseti casting (i.e., persistent deformity despite completion of standard protocol), how effective and safe is Repeat Ponseti casting compared to Surgical management (open lengthening, Posteromedial Release) add to comparator- tendon transfers, Ilizarov method of gradual correction, osteotomies in terms of functional outcomes (e.g., mobility, gait), degree of correction achieved, recurrence rate, complications, need for further procedures?	
P	Children with idiopathic clubfoot who failed to achieve correction after initial Ponseti casting (i.e., persistent deformity despite completion of standard protocol)
I	Repeat Ponseti casting
C	Surgical management (open lengthening, Posteromedial Release) add to comparator- tendon transfers, Ilizarov method of gradual correction, osteotomies
O	Functional outcomes (e.g., mobility, gait), degree of correction achieved, recurrence rate, complications, need for further procedures

Evidence Synthesis

Guideline Development Approach

This Clinical Practice Guideline applied the **GRADE-ADOLOPMENT** approach, which integrates the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) framework with processes for guideline adoption, adaptation, and de novo development. This approach was used to systematically appraise the certainty of evidence underlying existing recommendations and to determine their applicability in the Philippine context.

Existing recommendations were reviewed and, where appropriate, adapted by considering factors such as disease burden, patient and caregiver values and preferences, resource availability, feasibility, and equity. When existing guidance was unavailable, insufficient, or not applicable to the local setting, recommendations were developed **de novo** using the GRADE methodology to address the prioritized clinical questions.

Detailed information on the corresponding PICO elements, search strategies, characteristics of included studies, risk-of-bias assessments, and GRADE Evidence Profiles is provided in **Annex**.

Search Methods and Strategies

Published local and international clinical practice guidelines related to the screening and management of clubfoot were identified through searches of electronic databases and guideline repositories, including MEDLINE via PubMed, the Guidelines International Network (G-I-N), the National Guideline Clearinghouse, and organization-specific repositories. The methodological quality of identified guidelines was appraised using the Appraisal of Guidelines for Research and Evaluation (AGREE II) instrument, and guidelines that met predefined quality criteria were considered for adoption or adaptation.

Comprehensive and systematic literature searches were conducted across international guideline databases (e.g., Guidelines International Network, United Kingdom National Institute for Health and Care Excellence), local guideline repositories (e.g., Department of Health website and HERDIN), websites of relevant international and local specialty societies, and electronic bibliographic databases (e.g., MEDLINE, CENTRAL, EMBASE, ClinicalTrials.gov, and Google Scholar). Searches used a combination of controlled vocabulary terms and free-text keywords corresponding to the PICO elements for each guideline question.

When available, high-quality and up-to-date systematic reviews (i.e., with search dates within the preceding 2 years) were used as the primary body of evidence to inform guideline recommendations and were updated as necessary to ensure currency and relevance.

Eligibility Criteria

Eligibility criteria for study inclusion and exclusion were defined and tailored for each guideline question to ensure that the evidence reviewed was directly relevant to the clinical question being addressed. For questions related to interventions, randomized controlled trials (RCTs) and systematic reviews of RCTs were prioritized. In instances where RCTs were unavailable or insufficient, non-randomized studies of interventions (NRSIs), including observational cohort studies and quasi-randomized trials, were considered. For diagnostic and screening-related questions, cohort and cross-sectional study designs were primarily sought to evaluate diagnostic accuracy and clinical outcomes.

Data Extraction

Summaries of the evidence underpinning each recommendation were systematically extracted, including information on study design, sample size, results, and key limitations. Where existing clinical practice guidelines were used as sources of evidence, the context and rationale supporting each recommendation were documented, including any underlying assumptions, value judgments, and contextual considerations identified by the original guideline developers.

For guideline questions that required a de novo systematic review, data were extracted on study participants, study design, interventions, comparators, primary and secondary outcomes, and relevant report characteristics. When feasible, raw data used to generate effect estimates were extracted directly from individual studies to support quantitative synthesis.

Assessment of Study Quality or Risk of Bias

Critical appraisal and risk of bias assessments of the included studies were conducted independently by **at least two Evidence Review Experts (EREs)**. Discrepancies in assessments were resolved through discussion, with involvement of a third reviewer when necessary. These assessments informed judgments on the internal validity of individual studies and contributed to the overall appraisal of the certainty of evidence.

The following validated tools were used according to study design:

- The **Cochrane Risk of Bias tool 2 (RoB 2)** for randomized controlled trials and other intervention studies;
- The **Newcastle–Ottawa Scale (NOS)** or the **ROBINS-I** tool for observational studies; and
- The **QUADAS-2** tool for studies evaluating diagnostic accuracy.

Synthesis

Before initiating any de novo systematic literature search, the evidence bases underpinning existing local and international clinical practice guidelines that had been appraised as being of acceptable methodological quality were reviewed and updated. Evidence reviews were conducted by Evidence Review Experts (EREs), who identified and independently critically appraised relevant primary studies and systematic reviews.

For each guideline question, one primary ERE was assigned to lead the evidence synthesis. Additional independent reviewers, including the Technical Lead, Assistant Technical Lead, or another ERE, participated in full-text screening and appraisal to ensure methodological rigor and consistency. In instances where no published systematic reviews were available, meta-analyses were undertaken by pooling data from relevant studies, where appropriate.

Pooled effect estimates were calculated using RevMan version 5.0 or R version 4.4.1, as applicable. Evidence summaries describing the balance of benefits and harms of each intervention or diagnostic test were prepared by the Technical Working Group and distributed to the Guideline Panel to support informed deliberation and formulation of recommendations.

Determining the Certainty of Evidence

The **GRADE (Grading of Recommendations, Assessment, Development, and Evaluation)** approach was used to assess the overall certainty of the evidence for the effects of interventions and diagnostic strategies. The overall certainty of evidence for each guideline question was determined based on the **lowest certainty rating among the critical and important outcomes** prioritized for decision-making.

The classification of outcomes as **critical, important, or relevant** was determined by the multi-sectoral Guideline Panel prior to the completion of the evidence synthesis. This ensured that judgments regarding certainty of evidence reflected outcomes considered most meaningful to patients, caregivers, clinicians, and other stakeholders.

The initial certainty of evidence was rated as **high** for randomized controlled trials and **low** for non-randomized studies of interventions (NRSIs), including observational studies, case series, and case reports. Certainty ratings for randomized trials were downgraded based on concerns related to risk of bias, inconsistency, indirectness, imprecision, or publication bias. Conversely, certainty ratings for NRSIs and observational studies were upgraded when there was evidence of a large magnitude of effect, a dose–response gradient, or when all plausible confounding would likely reduce an observed effect.

Formulation of the Recommendations

Evidence-to-Decision (ETD) Frameworks

The evidence gathered for each guideline question was systematically translated into recommendations using the **GRADE Evidence-to-Decision (EtD) Framework**. This process involved structured consideration of key domains, including certainty of evidence, balance of benefits and harms, patient and caregiver values and preferences, resource use, feasibility, acceptability, and equity.

To ensure that diverse perspectives were incorporated, each member of the Guideline Panel completed an EtD form for every guideline question prior to the en banc meeting. Responses were collated, and the most frequently selected judgments for each domain were summarized to inform consensus-building. Final recommendations were refined through panel deliberations, with explicit attention to ensuring a transparent and coherent link between the evidence summaries and the resulting recommendation statements.

Consensus Building Process

Evidence summaries and completed Evidence-to-Decision (EtD) forms were circulated to all members of the Guideline Panel (GP) prior to deliberations. An in-person, en banc GP meeting was convened on **5–6 August 2025** to finalize the recommendations. For each guideline question, the assigned Evidence Review Expert presented the corresponding evidence summary and addressed questions or concerns raised by panel members. An experienced technical facilitator moderated the discussions to ensure systematic review of the evidence and a structured consensus-building process.

Panel members with a declared conflict-of-interest (COI) rating of **A, B, or C** were permitted to participate in discussions and ask clarifying questions related to the evidence and relevant clinical or contextual considerations. However, only members with **A or B COI ratings** were eligible to vote on the recommendations.
For each recommendation, eligible panel members voted sequentially on:

1. **Direction of the recommendation** (for, against, or abstain);
2. **Strength of the recommendation** (strong or weak); and
3. **Wording** of the recommendation statement.

Consensus was defined as **at least 75% agreement** among voting GP members. If consensus was not achieved, panelists provided their rationale, followed by subsequent rounds of discussion and re-voting. Up to **three rounds of voting** were permitted to reach consensus.

In situations where direct evidence was lacking or only indirect evidence was available, but the panel judged that the intervention was very likely to result in more benefit than harm, a **Good Practice Statement** was formulated. Good Practice Statements were not assigned a certainty-of-evidence rating and were not graded as strong or weak recommendations.

Implications of strong and weak recommendations

A **strong recommendation** was issued when the Guideline Panel judged that the desirable effects of an intervention clearly outweighed the undesirable effects, or vice versa. Such recommendations indicate that most

informed patients and caregivers would choose the recommended course of action, and that clinicians and policymakers can adopt the recommendation as a standard of care in most clinical situations.

A **weak recommendation** was issued when there was uncertainty due to limited or low-certainty evidence, unclear trade-offs between benefits and harms, or when the magnitude of expected benefit was likely to vary across patient values, preferences, or clinical contexts. Weak recommendations reflect uncertainty in the evidence rather than a lack of importance and still represent actionable guidance.

Weak recommendations should not be interpreted as a reason to delay implementation, policy development, reimbursement, or coverage decisions. Standardized wording was used to distinguish recommendation strength, with phrases such as **"we recommend"** indicating strong recommendations and **"we suggest"** indicating weak recommendations.

Incorporation of Preferences and Values

Information on patient, caregiver, and stakeholder preferences and values was incorporated throughout the guideline development process through (a) search and inclusion of evidence from published local and international qualitative studies and surveys, (b) direct input from patients, patient advocates, and members of the Guideline Panel, which included clinicians, allied health professionals, and patient and caregiver advocates with lived experience in clubfoot care.

In addition, given the central role of parents and caregivers in conservative management (i.e., treatment adherence, bracing, and long-term follow-up), the panel placed emphasis on outcomes valued by families, such as functional mobility, pain-free ambulation, treatment burden, accessibility of services, and affordability of care. Perspectives from frontline healthcare providers also highlighted system-level factors influencing preferences, including availability of trained personnel, referral pathways, and feasibility of delivering care in resource-limited and geographically isolated settings.

Where direct empirical evidence on preferences and values was limited, judgments were informed by the collective clinical and programmatic experience of panel members across diverse healthcare settings in the Philippines. These judgments were further refined through structured deliberations using the Evidence-to-Decision framework and through feedback from external reviewers. This approach ensured that the resulting recommendations reflect not only the best available evidence but also the values, priorities, and contextual realities of patients, caregivers, providers, and other stakeholders involved in clubfoot care.

External Review

External review of the Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children was conducted using two complementary approaches: (1) formal guideline appraisal using the **AGREE-REX instrument**, and (2) **structured stakeholder feedback**.

AGREE-REX Appraisal

Three external reviewers were invited to independently evaluate the guideline. Reviewers represented a range of perspectives, including guideline methodology experts, clinical specialists, Department of Health (DOH) representatives, and other relevant stakeholders. The reviewers assessed the guideline's methodological rigor, clarity of presentation, acceptability, feasibility, and applicability to the Philippine setting.

The AGREE-REX (Appraisal of Guidelines Research and Evaluation – Recommendations Excellence) instrument was used to guide the appraisal of the recommendations. This tool comprises nine items that evaluate key domains, including:

- the clarity and appropriateness of the guideline purpose;
- consideration of local applicability;
- quality and use of the supporting evidence; and
- integration of the values and preferences of patients or populations, target users, and decision-makers.

Stakeholder Feedback

In parallel with the AGREE-REX appraisal, stakeholder feedback was solicited to capture practical and contextual considerations relevant to implementation. Stakeholders included clinicians involved in clubfoot care across different levels of the health system, representatives from professional societies, program implementers, and other relevant partners. Feedback focused on the clinical relevance, feasibility, acceptability, and clarity of the recommendations, as well as potential implementation challenges in diverse care settings.

As part of this process, the Clinical Practice Guideline was presented during a stakeholder feedback session held in conjunction with the 76th Annual Philippine Orthopaedic Association Convention on 20 November 2025 at the EDSA Shangri-La Hotel. The presentation provided an opportunity for open discussion and clarification of the guideline recommendations. No specific comments, objections, or questions were raised during the session, and no substantive revisions were requested based on this stakeholder feedback activity.

Incorporation of Feedback and Finalization

Feedback from both the AGREE-REX appraisal and stakeholder review was systematically collated, and key areas for improvement were identified. The guideline was subsequently revised by the **Steering Committee, Technical Writer, and Technical Leads**, incorporating methodological, editorial, and contextual refinements based on the external input.

Following completion of the external review and incorporation of revisions, the guideline was submitted to the **DOH Clearinghouse** for formal review and approval. After publication and dissemination through the DOH website and participating medical society platforms, comments and suggestions from end-users will be gathered to inform future updates or revisions of the guideline, as necessary.

Chapter 3.
Evidence and Recommendations

Guideline Question 1.

Routine screening for foot deformities

Should routine screening for foot deformities (e.g., clubfoot) be conducted for all newborns by primary care providers, such as midwives, nurses, pediatricians, and family physicians?

Recommendations		Certainty of evidence	Strength of Recommendation
1.1	We recommend routine newborn screening* for foot deformities by physical examination of primary care providers. ***Remarks:*** *Screening should be performed using a standardized checklist as part of the Philippine Expanded Newborn Screening Program. Imaging studies are not required.*	⊕◯◯◯ Very Low	Strong
1.2	Primary care providers should be trained regarding the proper recognition and referral pathways for clubfoot treatment. Referral centers (i.e., clubfoot clinics) should be accessible, available, and affordable.	None	Good Practice Statement

Guideline Panel Considerations

Justification

Direct evidence on newborn screening for clubfoot is limited, and the certainty of evidence is very low. However, the panel judged that the potential benefits of early detection strongly outweigh the minimal harms. Clubfoot is visible at birth, easily detected by physical examination, and treatment outcomes are markedly improved when managed early with conservative methods such as the Ponseti technique. False positives are expected to be rare, and the consequences are minor, as confirmation can be easily made by physicians during follow-up. Conversely, missed cases pose significant risks of delayed treatment, lifelong disability, and higher treatment costs. Given the archipelagic geography of the Philippines and the presence of geographically isolated and disadvantaged areas (GIDA), the panel emphasized that early recognition at the first point of care is critical.

The panel issued a Good Practice Statement to highlight that screening on its own may not be sufficient—proper training among screeners, timely referral, and having accessible, affordable clubfoot treatment centers are essential. The existing Early Detection and Referral (EDR) modules may be expanded to include the use of Curved lateral border, Adducted forefoot, Varus hindfoot, Equinus deformity (CAVE) checklist as part of training and capacity building. Ensuring complete referral documentation (including caregiver contact numbers) and close LGU coordination were emphasized by the panel.

Implementation considerations

Routine screening can be integrated into the Philippine Expanded Newborn Screening (ENS) Program, which already covers about 95% of infants nationwide. The program currently pilots birth defect surveillance (e.g., cleft lip/palate, neural tube defects). The addition of clubfoot into this screening program appears feasible given its visibility and ease of diagnosis. However, the pilot project has just been completed in 3 regions; nationwide implementation is expected to be launched in mid-2026. Clubfoot screening should be supported by training of midwives, nurses, family physicians, and community health workers using a simple tool such as the CAVE checklist, ideally accompanied by illustrations and clear instructions.

Referral pathways need to be strengthened to ensure timely access to care. Infants identified in lying-in clinics or rural facilities should be linked directly to tertiary hospitals or accredited clubfoot clinics. Current gaps include limited geographic coverage of specialized clinics (about 60 active centers for over 90 priority areas) and challenges with inter-hospital referrals. Engagement of local government units (LGUs), NGOs, and programs such as MiracleFeet can help expand coverage and sustain services.

Equity, feasibility, and acceptability

This recommendation is highly feasible within the ENS framework and acceptable to providers and families. Equity would be improved by making early detection available to all newborns, particularly in underserved and rural communities. Parents also expressed preference for having infants with suspected clubfoot seen by pediatric orthopedic specialists, underscoring the importance of strengthening referral networks.

Structured education was judged to improve equity by supporting families in GIDA and resource-limited settings where follow-up is difficult. Acceptability is expected to be high among providers and families, particularly when local language and cultural context are considered.

Key Findings

- **Characteristics of the evidence:** Indirect evidence was obtained from a cross-sectional diagnostic accuracy study of 1,214 newborn feet and several observational studies (range: n=93 to 1,484 children) on treatment outcomes.
- **Accuracy of screening:** Structured screening using a validated checklist improved diagnostic accuracy compared to unstructured assessment, reducing false positives and missed cases.
- **Efficacy and safety:** Evidence from treatment cohorts suggests that early detection and referral may lead to better functional outcomes and less complex treatment, although recurrence rates did not differ consistently with age at treatment initiation. Screening may reduce harms such as overdiagnosis when structured tools are used, but the evidence is limited.
- **Certainty of evidence:** Low for diagnostic accuracy and very low for functional outcomes, recurrence, and treatment complexity. Critical outcomes such as long-term quality of life and cost-effectiveness of screening were not directly assessed. Thus, while structured screening may enhance early detection with potential benefits in timely management, the balance of benefits and harms remains highly uncertain due to limited and indirect evidence.

Background

Clubfoot, or congenital talipes equinovarus (CTEV), are among the most common musculoskeletal birth defects.[1] It has a global birth prevalence of 1.18 per 1000 births with the highest prevalence rates occurring in low- and middle-income countries.[2] Still, just about 1 in 5 children born with clubfoot in low- to middle-income countries currently receive the treatment.[3] In the Philippines, a rise in the estimate from 2700 to 3133 of children are

affected by clubfoot each year, with one baby born with the condition every three hours.[4,5] Yet, despite being highly treatable, 70% remain untreated, highlighting the urgent need for early detection and accessible care.[4]

The condition may present as an isolated idiopathic foot deformity or as a component of broader anatomical or genetic anomalies, in which case it is classified as syndromic.[6] Although this can be discovered through prenatal ultrasonography, a thorough physical examination of the newborn is still warranted to confirm the diagnosis.[6,7] The deformity comprises four components known by the acronym CAVE: cavus (a high medial longitudinal arch of the midfoot), adductus (medial deviation of the forefoot), varus (inversion of the heel), and equinus (plantarflexion of the hindfoot) that are not correctible with gentle manipulation.[6]

Once diagnosed, the deformity can be corrected using the Ponseti treatment method, ideally initiated within the first 1 to 3 weeks of birth.[6] The Ponseti method, when started early and followed consistently, corrects over 95% of idiopathic clubfoot cases with relapses requiring additional casting or tendon transfer. Though best outcomes occur with early treatment, older children can still benefit, through correction may need more invasive procedures.[3] More importantly, if left untreated, the condition may cause the patient to have lifelong painful feet that often severely limit activity.

Clubfoot screening does not require specialized screening tools and can be reliably identified through physical examination by trained healthcare providers. In low-income countries, primary care providers are often the first to assess newborns and are essential to early detection efforts. Primary care providers (PCP), including midwives, nurses, pediatricians, and family physicians, are often the first to examine newborns and thus play a key role in early detection particularly in low-income countries. Locally, efforts to strengthen birth defect surveillance (BDS) began as early as 2023 with the expansion of the Newborn Screening Program to include BDS, integrating early clubfoot screening within the first 28 days of life.[8] This is supported by a nonprofit organization (NPO)-led initiative that initially trained 90 frontline health workers to enhance early detection and management, with the long-term goal of transitioning to sustainable, government-led care.

This review explores whether current evidence supports the implementation of routine newborn foot screening by primary care providers, through physical examination, as a safe and effective strategy for early detection of foot deformities.

Summary of the Evidence

Characteristics of included studies

There was no direct head-to-head evidence evaluating efficacy and safety of routine screening versus no routine screening for foot deformities in newborns by primary care providers. The following studies, while indirect, were included to provide additional insights to the utility of screening newborns for foot deformities.

A cross-sectional study in Malaysia compared unstructured clinical assessment with structured screening using the validated Neonatal Clubfoot Screening Checklist (NCSC) to support non–orthopedic-trained healthcare providers in postnatal detection of clubfoot.[9] A total of 1,214 newborn feet were examined—602 assessed with the structured checklist and 612 through unstructured screening—with all findings confirmed by orthopedic experts. Reported outcomes included sensitivity, specificity, and positive and negative predictive values for each screening approach.

Although this does not directly address the optimal timing of screening, the availability of effective, low-risk treatment for clubfoot underscores the potential value of early detection. The remaining included studies were predominantly observational and involved children diagnosed with CTEV who were managed using the Ponseti

method in tertiary or specialized clinics in Bangladesh, Saudi Arabia, and Nigeria.[10-12] None of these studies had a comparator group. The longitudinal study in Bangladesh followed 93 participants (54.8% presenting within the first month of life) for up to 10 visits after the bracing period, assessing four functional outcomes: standing, squatting, walking, and running.[10] The retrospective study conducted in Saudi Arabia evaluated the treatment outcomes and any complications including recurrence rate observed in 89 children with clubfoot.[11] Although no formal comparative studies of early versus delayed Ponseti treatment were identified, delayed treatment is generally thought to pose greater challenges, including more complex management and increased likelihood of surgical intervention. The prospective Nigerian study enrolled 67 children (mean age 31.6 months) to identify factors associated with treatment complexity, focusing on the number of casts required for correction.[12] Additionally, a systematic review of observational studies synthesized prognostic factors linked to poorer correction rates, increased casts required, and higher recurrence risk, such as higher initial Pirani or Dimeglio scores, delayed presentation, bilateral involvement, and non-idiopathic etiology.[13]

Efficacy Outcomes

Diagnostic accuracy (1 study, n=1214 newborn feet, low certainty)

In a population of 1,000 newborns with an estimated 0.2% prevalence of clubfoot, the structured screening approach using the NCSC would result in 2 positive test results, all of which would be true positives, and 998 negative test results, all of which would be true negative.[9] This resulted in no false positives or false negatives. In contrast, unstructured screening would yield 59 positive test results, of which only 1 would be a true positive and 58 would be false positives. Among the 941 negative test results, 1 would be a false negative and 941 would be true negatives. These findings reflect the improved diagnostic accuracy of the structured approach, with 100% sensitivity and specificity, compared to the unstructured approach, which had a sensitivity of 66.67% and a specificity of 94.16%. However, the study did not assess the long-term outcomes of these newborns. The certainty of evidence was rated as low due to serious risk of bias, primarily because the orthopedic experts were not blinded to the findings of the non-orthopedic screeners, and indirectness, as the study did not include an unscreened population for comparison.

Functional Outcomes (1 study, n=93 participants, very low certainty)

Based on the Bangladeshi longitudinal study[10], all of the 93 participants were able to perform four key functional activities (standing, squatting, walking, and running) by 5 years of age from a baseline of 16%. Although the study demonstrates favorable outcomes following early referral and consistent follow-up, it did not describe any formal screening process nor involve primary care providers such as midwives, nurses, or family physicians. The certainty of evidence was rated as very low due to serious concerns regarding risk of bias (selection bias) from a single-arm study, indirectness, and imprecision arising from the inability to compute effect estimates.

Recurrence (18 studies unpooled, n=1484 participants, very low certainty)

According to a systematic review and meta-analysis of observational studies, among participants successfully treated with the Ponseti method, initiating treatment after 3 months of age was not associated with a higher recurrence rate. Likewise, in a retrospective review in Saudi Arabia evaluating outcomes of clubfoot management of 89 patients in a tertiary hospital, 96.6% of patients were successfully treated with only 3.4% recurrence rate in the short-term follow up conducted. There was no association between age of patients and recurrence of deformity after treatment. In this cohort, all participants had already been diagnosed and treated, and the findings do not directly assess the impact of routine newborn screening by primary care providers on earlier detection or improved outcomes. Although the findings are insufficient to determine whether early screening has additional benefit in recurrence prevention, the studies did not include outcomes that could reflect potential

benefits of early screening, such as reduced need for surgical intervention or prevention of neglected presentations. The certainty of evidence was rated very low because of serious risk of bias (selection, detection, and reporting bias), indirectness, and imprecision.

Treatment complexity: number of casts (>/10) (1 study, n=67 participants, very low certainty of evidence)

According to a prospective study in Nigeria of 67 children with mean age of 31.6 months treated according to the Ponseti method, logistic regression indicated that each additional month in age increased the relative risk of requiring ≥10 casting sessions by a factor of 1.03. Another finding is that presence of callosity, which is considered a feature of a complicated, untreated and neglected clubfoot or areas of thickened skin due to weight-bearing or pressure on the foot, was strongly associated with more difficult correction (11.8 times greater odds of requiring ≥10 casting sessions). This finding suggests that delayed identification may lead to more complex and prolonged treatment, indirectly supporting the value of early detection through screening to facilitate more efficient management. The certainty of evidence however was downgraded to very low due to serious risk of bias, indirectness, and imprecision.

Safety Outcomes

Overdiagnosis and Missed Diagnosis (1 study, n=1214 newborn feet, low certainty)

Unstructured screening approach had 58 false positive results and missed 1 true case of clubfoot out of 941 feet who tested negative.[9] Currently, there are no formal studies assessing the potential harms of screening, such as the consequences of overdiagnosing CTEV. However, the study highlights that with adequate training and the use of structured tools like the NCSC, primary care providers can achieve accurate identification of clubfoot, with no observed false positives or false negatives. This may help minimize unnecessary referrals, reduce the burden on orthopedic services, and avoid the anxiety associated with incorrect positive diagnoses. The certainty of evidence is rated as low due to serious risk of bias and indirectness.

Table Q1.1. GRADE Summary of Findings Table: Diagnostic accuracy of clubfoot screening by primary care providers.

Outcome	Basis	Sn Estimate (95% CI)	Sp Estimate (95% CI)	Estimate of effect per 1000 (prevalence 0.2%)		LR+	LR-	Certainty of evidence
	No. and type of studies, total participants			# diagnosed	# missed			
Clubfoot detection (Structured questionnaire)	1 cross-sectional study (n=612 feet)	1	1	2	0	≥ 26	0	⊕⊕◯◯ LOW[a,b]
		(0.16 to 1.00)	(0.99 to 1.00)	(0 to 2)	(0 to 2)	(26.4 to very high)	(0 to 0.85)	
Clubfoot detection (Unstructured)	1 cross-sectional study (n=602 feet)	0.66	0.94	1	1	11.4	0.35	⊕⊕◯◯ LOW
		(0.09 to 0.99)	(0.91 to 0.96)	(0 to 2)	(0 to 2)	(1.17 to 24.2)	(0.0009 to 0.99)	

Sn: sensitivity; Sp: specificity; LR+: positive likelihood ratio; LR-: negative likelihood ratio
[a] serious risk of bias; [b] serious indirectness

Table Q1.2. GRADE Summary of Findings Table: Efficacy of management linked to clubfoot screening.

Outcomes	Basis	Absolute Effects	Interpretation	Certainty
Functional outcomes	1 observational study, n=93	A longitudinal study in Bangladesh (n=93) reported that by age five, 100% of children treated with the Ponseti method for clubfoot could perform all key functional tasks (standing, squatting, walking, and running), up from 16% at baseline. The study did not involve or describe routine screening by primary care providers	Benefit	⊕◯◯◯ VERY LOW[a,b,c]
Recurrence	18 observational studies, n=1484	Most included studies did not find a significant association between later treatment (>3 months) and recurrence of clubfoot, except for one study.	Inconclusive	⊕◯◯◯ VERY LOW[a,b,c]
Treatment complexity (Number of casts >/10)	1 observational study, n=67	A study of 67 children (mean age 31.6 months) treated with the Ponseti method, found callosity (OR = 8.87, 95% CI: 1.08–73.20) and high Pirani score (OR = 3.49) were significantly associated with needing ≥10 casts. Older age showed a modest non-significant effect (OR = 1.03, 95% CI: 0.99–1.07).	Benefit	⊕◯◯◯ VERY LOW[a,b,c]

[a] serious RoB; [b] serious indirectness; [c] serious imprecision

Certainty of the Evidence

For the diagnostic accuracy study, the overall certainty of evidence was low due to serious risk of bias, particularly performance bias, and concerns of indirectness due to absence of an unscreened control group. The overall certainty of evidence for efficacy outcomes from management using the Ponseti method was rated as very low due to serious risk of bias, including selection, detection, and attrition bias. Additional factors contributing to the very low certainty include the absence of a control arm, indirectness, and imprecision resulting from the inability to compute effect estimates.

Other Considerations

Resource implications

Studies focusing in low to middle-income countries have consistently supported the low cost and high cost-effectiveness of clubfoot treatment using the Ponseti approach. A 2023 cost-utility analysis conducted in Indonesia demonstrated an estimated cost per quality-adjusted life years (QALY) gained at IDR 68,406 (around USD 4.30) for clubfoot treatment.[15] A 2016 study by Grimes and colleagues using data from the NPO CURE Clubfoot across 12 sub-Saharan African countries, estimated the average cost of Ponseti treatment at USD 167 per patient, averting 7.42 (disability-adjusted life years) DALYs, with a cost-effectiveness ratio of USD 22.46 per DALY averted, less than a tenth of the cost of many other treatment modalities used in low-resource settings.[16]

A 2022 impact report by MiracleFeet, a NPO involved in global clubfoot management, also presented the high cost-effectiveness of early clubfoot treatment. This highlights their low upfront cost of USD 500 per child with a projected high return of investment estimated to be at USD 120,000 more over their lifetime compared to untreated clubfoot children.[17] Timely intervention leads to long-term positive global socioeconomic outcomes, and improved quality of life as reported by patients and their families according to this document. In the Philippines, the involvement of NPO and its close partnership with the government, particularly in expanding access and ensuring continuity of care, may further support and sustain the cost-effectiveness of clubfoot management.

Equity and feasibility

Clubfoot screening strategy can promote health equity by reaching out populations that are at risk for missed or delayed diagnosis, particularly in low-resource settings. As with any screening program, its effectiveness depends on the presence of a functional referral and management system to ensure timely access to appropriate care. In a study of caregivers in an African clubfoot programs, six major obstacles were reported by more than half of the mothers: unawareness of treatment availability (77%), distance from treatment centers (71%), competing responsibilities limiting time for treatment (67%), financial constraints (65%), lack of awareness that the condition is treatable (64%), and limited understanding of the condition's severity (57%).[19] Implementing routine screening is feasible in low-resource-settings, and as exemplified by the study by Sahdi and colleagues, health workers without orthopedic specialization can be taught the proper way of diagnosing common foot deformities.[9]

In the Philippines, MiracleFeet, an NGO together with the PNCC joins the national initiative to integrate clubfoot detection and treatment into the country's Expanded Newborn Screening Program. This includes training primary care providers, structured referral system and data tracking, and advocacy for policy changes by PhilHealth in the financial support for clubfoot treatment.[20]

Stakeholder values, preferences, and acceptability

Evidence suggests that both caregivers and healthcare providers highly value the outcomes associated with early clubfoot treatment, particularly improvements in mobility, pain relief, and functional independence. In a qualitative study conducted in Ghana, caregivers emphasized the importance of accessing timely treatment to avoid disability and stigma, expressing strong preference for interventions that restore walking ability and allow normal participation in daily life. Parents reported valuing outcomes such as walking, self-care, and reduced pain, which are outcomes that significantly improved following Ponseti treatment.[18]

The acceptability of the Ponseti method is high where treatment is accessible. In the same 2022 impact report by MiracleFeet, 97% of parents felt their child's quality of life improved after treatment.[17] The intervention is perceived as safe, effective, and low-cost. However, in lower-resource settings, barriers to acceptability include high cost of treatment, specially withdrawal of NGO support and high indirect cost, long travel distance, long hours spent at the treatment facility, non-availability of clubfoot treatment services, late reporting of clients for treatment, and non-compliance of parents or caregivers with treatment protocols.[18] These factors limit access and may affect adherence and perceived acceptability, particularly in low-resource settings.

References (Q1)

1. Mousafeiris V, Dreyer MA, Thomas A. Pediatric foot alignment deformities. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Aug 10. Available from: https://www.ncbi.nlm.nih.gov/books/NBK592393/

2. Smythe T, Rotenberg S, Lavy C. The global birth prevalence of clubfoot: a systematic review and meta-analysis. *EClinicalMedicine*. 2023 Aug 30;63:102178. doi:10.1016/j.eclinm.2023.102178.

3. Clinton Health Access Initiative. *Preventing lifelong impairment: access to clubfoot treatment in low- and middle-income countries* [Internet]. London: Global Disability Innovation Hub; 2021 Jul. Available from: https://at2030.org

4. Seven in 10 Filipino children born with clubfoot remain untreated. Daily Guardian (Manila). 2024 Jun 11; [Internet]. Available from: https://dailyguardian.com.ph/seven-in-10-filipino-children-born-with-clubfoot-remain-untreated/

5. MiracleFeet. Philippines [Internet]. MiracleFeet; [cited 2025 Jun 25]. Available from: https://www.miraclefeet.org/countries/philippines

6. Cady R, Hennessey TA, Schwend RM; American Academy of Pediatrics, Section on Orthopaedics. Diagnosis and treatment of idiopathic congenital clubfoot. *Pediatrics*. 2022 Jan;149(1):e2021055555. doi:10.1542/peds.2021-055555.

7. Besselaar AT, Sakkers RJB, Schuppers HA, Witbreuk MMEH, Zeegers EVCM, Visser JD, et al. Guideline on the diagnosis and treatment of primary idiopathic clubfoot. *Acta Orthop*. 2017 Jun;88(3):305–9.

8. Walani S. Q&A with Salimah Walani: leveraging newborn screening to improve access to clubfoot treatment [Internet]. MiracleFeet; 2024 May 22 [cited 2025 Jun 25]. Available from: https://www.miraclefeet.org/stories/qa-with-salimah-walani-leveraging-newborn-screening-to-improve-access-to-clubfoot-treatment

9. Sahdi H, Prabaharan R, Cheah WL, et al. Development and validation of the Newborn Clubfoot Screening Checklist to improve the detection of postnatal congenital talipes equinovarus among newborns by non-orthopaedic-trained healthcare workers in Sarawak General Hospital: A cross-sectional prospective study. Malays Fam Physician. 2024 Nov 29;19:68. doi: 10.51866/oa.697.

10. Khan MJ, Banik PC, Mondal R, Hoque MF, Zaman S, Hawlader MDH. Functional outcomes of Ponseti method among children with congenital clubfoot: a healthcare facility-based longitudinal study. J Xiangya Med. 2021;6:21. doi:10.21037/jxym-21-15.

11. Kardm SM, Al Zomia AS, Alqahtani AA,, et al. Congenital talipes equinovarus management and outcomes: the experiences of pediatric tertiary centers in Abha, Saudi Arabia. Cureus. 2023 Aug 10;15(8):e43264. doi:10.7759/cureus.43264.

12. Dim EM, Edagha IA, Peter AI, Nottidge TE, Ubaha A, Essien A, et al. Late presentation and early treatment outcome among subjects in a new clubfoot program of a Nigerian hospital. *Orthop Case Rep*. 2023;2(1). doi:10.31579/2835-8465/011.

13. van Schelven H, Moerman S, van der Steen M, Besselaar AT, Greve C. Prognostic factors for recurrent idiopathic clubfoot deformity: a systematic literature review and meta-analysis. *Acta Orthop*. 2022;93:11-28. doi:10.1080/17453674.2021.1982576.

14. Weckemann V, Alexander A, Oyenyi J, Muzaffar M, Deakin R. Congenital foot deformities local guideline. Worcester Acute Hospitals NHS Trust; 2024 Jun 19. Report No.: WAHT-KD-015.

15. Zubaidi MN, Pribadi F. Cost-Utility Analysis of CTEV Treatment by Ponseti Method in Siaga Utama Orthopedic Hospital. J Aisyah J Ilmu Kesehatan. 2023;8(3):1055–64. Available from: https://www.researchgate.net/publication/375643600

16. Grimes CE, Holmer H, Maraka J, Ayana B, Hansen L, Lavy CBD. Cost-effectiveness of club-foot treatment in low-income and middle-income countries by the Ponseti method. BMJ Glob Health. 2016;1(1):e000023. doi:10.1136/bmjgh-2015-000023

17. MiracleFeet. The Case for Clubfoot: Fiscal Year 2022 Final Report [Internet]. Chapel Hill (NC): MiracleFeet; 2023 Jan [cited 2025 Aug 7]. Available from: https://www.miraclefeet.org/wp-content/uploads/2023/01/Case-For-Clubfoot_FY22_Final_01232023.pdf

18. Agoalikum S, Acheampong E, Bredu-Darkwa P, Bonah S. The perspectives of caregivers and health service providers on barriers to clubfoot management in peri-urban health facility in Ghana. *J Child Orthop*. 2024;18(4):450-7. doi:10.1177/18632521241262630.

19. Wydick B, Camacho G, Piraino P. Hope Walks: the impact of clubfoot treatment on human flourishing in Ethiopia. Working paper. University of San Francisco; 2024 Nov 12.

20. Vallido C, Otoo E. A new era for clubfoot care in the Philippines: early detection, access, and integration [Internet]. Chapel Hill (NC): MiracleFeet; 2025 Jun 2 [cited 2025 Aug 9]. Available from: https://www.miraclefeet.org/stories/a-new-era-for-clubfoot-care-in-the-philippines-early-detection-access-and-integration

Guideline Question 2.

Ponseti method vs. conservative non-Ponseti methods

Should the Ponseti method be used instead of conservative non-Ponseti methods to improve clinical and functional outcomes among infants with clubfoot?

Recommendations		Certainty of evidence	Strength of Recommendation
2.1	We recommend that the Ponseti Method be performed as the first line treatment among children under two years of age with clubfoot.	⊕◯◯◯ Very Low	Strong
2.2	A multidisciplinary team (e.g., surgeons, primary care providers, physiotherapists, nurses, social workers, physiatrists, caregivers, orthotists, site coordinators) is recommended for a successful clubfoot clinic.	None	Good Practice Statement

Guideline Panel Considerations

Justification

The Ponseti method is recognized as the gold standard for clubfoot management worldwide and is already the standard of care in the Philippines. Compared with the Kite and French functional methods (FFM), evidence from 12 studies (5 RCTs and 7 cohort studies) suggests that the Ponseti method probably reduces relapse requiring surgery, increases correction rates, and may improve functional outcomes and Pirani scores, although the certainty of this evidence is very low. In contrast, the Kite method corrects deformity more slowly and is often applied incorrectly, while the French functional method is resource-intensive, requiring months of daily taping and physiotherapy, and is not commonly practiced locally.

The panel emphasized that even with very low certainty evidence, the balance of benefits, cost-effectiveness, and feasibility favors the Ponseti method. The potential harms of surgery, particularly in infants, also reinforce the need for non-operative correction as first-line treatment. Although a minority of patients (e.g., those with limited access to follow-up or with neurodevelopmental disabilities) may not tolerate Ponseti, the method remains the most effective and scalable option.

Implementation Considerations

Since the early 2000's , Ponseti training programs led by the Pediatric Orthopaedic Society of the Philippines and MiracleFeet, have produced over 500 trained practitioners across partner clinics. Standardized curricula, introduced since 2018, ensure quality and uniformity, although variations in practice still exist across hospitals. Social workers play a critical role in supporting families, addressing compliance challenges, and linking them with resources. Multidisciplinary teams are feasible even in provincial settings, as shown by successful examples in Palawan and other regions. Physical therapists, with their background in anatomy and physiology, adapt well to Ponseti training, though most clinics remain surgeon-led.

Accessibility remains a challenge in GIDAs. The panel agreed that scaling up provincial clubfoot clinics, supported by referral networks from district to regional hospitals, is essential to improve early detection and management. Resource-wise, parts of the Ponseti method are already covered by PhilHealth (i.e., casting, tenotomy, and bracing packages), but broader coverage and sustainability require further support. Further local research is needed to evaluate outcomes of Ponseti treatment in diverse settings, assess the impact of training standardization, and explore adaptations of the method to improve access in resource-limited areas.

Key Findings

- **Characteristics of the evidence:** A total of 12 studies met the inclusion criteria, including five randomized controlled trials comparing the Ponseti method (PM) and the Kite method (KM), and seven cohort studies comparing PM and the French functional method (FFM) among infants with idiopathic clubfoot.
- **Ponseti method vs. French functional method:** Compared to FFM, PM probably reduces relapse requiring surgery and may increase correction rates but the possibility of no difference cannot be excluded. PM also may improve final functional outcomes and Pirani scores. However, the evidence remains uncertain as to whether PM further reduces relapse rates overall. The certainty of the evidence is very low.
- **Ponseti method vs. Kite method:** Among children with idiopathic clubfoot, the PM compared to KM probably reduces relapse requiring surgery. PM may increase correction rates. PM may result in Pirani score improvement and reduction in relapse rate, but the possibility of no difference cannot be excluded. There is also very low certainty evidence regarding its effect on complication rates. Overall, the certainty of the evidence is very low.

Background

Infants with clubfoot have been treated through serial manipulative correction of the feet. Surgical procedures were introduced in the 1800s, although many surgeons advocated moving back to conservative treatment of clubfoot.[3] Modern conservative methods were introduced in the 1900s, including the Kite method, which corrects the clubfeet by abducting the foot at the midtarsal joint, with the surgeon's thumb pressing on the lateral side of the foot near the calcaneocuboid joint.[4] Another conservative treatment was introduced by Masse, called the French functional method, which is typically done by a physiotherapist. It involves daily manipulation of the clubfeet, stimulating the muscles around the foot, and temporarily immobilizing the foot with adhesive taping to maintain the reduction achieved through passive manipulation.[5]

The Ponseti method was first introduced in 1963 and became more popular in the 1990s. It involves sequential manipulation and weekly casting to gradually correct the clubfeet, followed by percutaneous Achilles tenotomy if needed, and bracing to maintain correction.[6] Different groups have identified the Ponseti method as the gold standard or first-line treatment for clubfoot.[7,8,9,10]

Hence, this evidence summary aims to assess whether the Ponseti method is effective or equivalent to the Kite method and the French functional method in improving functional and clinical outcomes.

Summary of the Evidence

Characteristics of included studies

Twelve studies met the inclusion criteria for this evidence summary: 7 studies comparing the Ponseti method (PM) with the French functional method (FFM).[11,12,13,14,15,16,17]

Efficacy Outcomes

Ponseti method vs. French functional method

Relapse requiring surgery (3 cohort studies, N = 881 clubfeet, very low certainty of evidence)

Pooled analysis of 3 cohort studies from the United States of America (USA) and France[14,15,17] reported that the PM group was less likely to relapse and require surgery compared to those treated with the FFM (RR 0.70, 95% CI 0.56, 0.88; I^2 = 44%). The certainty of evidence is downgraded to very low due to risk of bias.

Correction rate (7 cohort studies, N = 1,374 clubfeet, very low certainty of evidence)

Pooled analysis of 7 cohort studies from the USA, France, and India[11–17] showed little to no difference in correction rates between PM and FFM (RR 1.06, 95% CI 1.00, 1.12). The certainty of evidence is downgraded to very low due to risk of bias, inconsistency, and imprecision.

Final functional outcome: Good and excellent results (3 cohort studies, N = 705 clubfeet, very low certainty of evidence)

Pooled analysis of 3 studies[13,15,17] indicated that the PM group was likely to achieve good or excellent outcomes compared to the patients treated with FFM (RR 1.09, 95% CI 1.01, 1.18; I^2 = 90%). The certainty of evidence is downgraded to very low due to risk of bias and inconsistency.

Relapse rate (2 cohort studies, N = 455 clubfeet, very low certainty of evidence)

Pooled analysis of 2 studies[11,17] showed that relapse was less common with the PM group compared to the FFM group (RR 0.89, 95% CI 0.65, 1.21), but results were not statistically significant. The certainty of evidence is downgraded to very low due to risk of bias, inconsistency, and imprecision.

Pirani score improvement (1 cohort study, N = 90 clubfeet, very low certainty of evidence)

A prospective cohort study from India[11] demonstrated greater improvement in Pirani scores among the PM group compared with the FFM group (MD 0.60, 95% CI 0.46, 0.74). The certainty of evidence is downgraded to very low due to risk of bias.

Ponseti method vs. Kite method

Relapse requiring surgery (3 randomized controlled trials, N = 281 clubfeet, moderate certainty of evidence)

Pooled analysis of 4 RCTs from India and Albania[19,21,22] showed that PM reduced the risk for relapse requiring surgery compared to KM (RR 0.30, 95% CI 0.17, 0.52; I2 = 20%). The certainty of evidence is downgraded to moderate due to risk of bias.

Correction rate (4 randomized controlled trials, N = 422 clubfeet, moderate certainty of evidence)

Pooled analysis of 4 RCTs conducted in India, Albania, and Brazil[18,19,21,22] showed higher correction rates in the PM group than the KM group (RR 1.20, 95% CI 1.08, 1.35; I^2 = 0%). The certainty of evidence is downgraded to moderate due to risk of bias.

Relapse rate (3 randomized controlled trials, N = 246 clubfeet, low certainty of evidence)

Pooled analysis of 3 RCTs from India and Albania[19,21,22] favored PM in reducing relapse rates compared to KM, though the difference was not statistically significant (RR 0.67, 95% CI 0.39, 1.14; I^2 = 0%). The certainty of evidence was downgraded to low due to risk of bias and imprecision.

Pirani score improvement (1 randomized controlled trial, N = 60 clubfeet, very low certainty of evidence)

One RCT from Nepal[20] presented that PM showed greater improvement in Pirani scores than KM (MD 1.36, 95% CI 0.32, 2.40), though the difference was not statistically significant. The certainty of evidence was downgraded to very low due to risk of bias and imprecision.

Complications (1 randomized controlled trial, N = 60 clubfeet, very low certainty of evidence)

In Nepal, one RCT[20] observed lower complications from the PM group than the KM group (RR 0.76, 95% CI 0.14, 4.22), which mainly included skin irritation and ulceration. However, the difference was not statistically significant. The certainty of evidence was downgraded to very low due to risk of bias and imprecision.

Table Q2.1. GRADE Summary of Findings: Ponseti method vs. French functional method.

Outcomes	Basis	Effect Estimate	95% CI	Interpretation	Certainty of evidence
Relapse requiring surgery *Follow-up: 4.2-5.4 years*	3 cohort studies (N = 881)	RR 0.70	0.56, 0.88	Favors the Ponseti method	⊕⊕⊕◯ Moderate[a]
Correction rate *Follow-up: 1-10.2 years*	7 cohort studies (N = 1,374 clubfeet)	RR 1.06	1.00, 1.12	Inconclusive	⊕◯◯◯ Very low[a,b,c]
Final functional outcome: Good and excellent results *Follow-up: 4.2-6 years*	3 cohort studies (N = 705 clubfeet)	RR 1.09	1.01, 1.18	Favors the Ponseti method	⊕◯◯◯ Very low[a,b,c]
Relapse rate *Follow-up: 1-4.2 years*	2 cohort studies (N = 455)	RR 0.89	0.65, 1.21	Inconclusive	⊕◯◯◯ Very low[a,b,c]
Pirani score improvement *Follow-up: 1 year*	1 cohort study (N = 90 clubfeet)	MD 0.60	0.46, 0.74	Favors the Ponseti method	⊕◯◯◯ Very low[a,c]

RR, risk ratio; **CI**, 95% confidence interval
[a] serious risk of bias; [b] serious inconsistency; [c] serious imprecision

Table Q2.2. GRADE Summary of Findings: Ponseti method vs. Kite method.

Outcomes	Basis	Effect Estimate	95% CI	Interpretation	Certainty of evidence
Relapse requiring surgery *Follow-up: 2-3 years*	3 RCTs (N = 281 clubfeet)	RR 0.30	0.17, 0.52	Favors the Ponseti method	⊕◯◯◯ Low[a,b]
Correction rate *Follow-up: ~2-3 years*	4 RCTs (N = 422 clubfeet)	RR 1.20	1.08, 1.35	Favors the Ponseti method	⊕⊕◯◯ Low[a,b]
Relapse rate *Follow-up: ~1 -3 years*	3 RCTs (N = 246 clubfeet)	RR 0.67	0.39, 1.14	Inconclusive	⊕⊕◯◯ Low[a,b]
Pirani score improvement *Follow-up: 2.5 months*	1 RCT (N = 60 clubfeet)	MD 1.36	0.32, 2.40	Inconclusive	⊕◯◯◯ Very low[a,c]
Complications *Follow-up: 2.5 months*	1 RCT (N = 64 patients)	RR 0.76	0.14, 4.22	Inconclusive	⊕◯◯◯ Very low[a,c]

RR, risk ratio; **CI**, 95% confidence interval
[a] serious risk of bias; [b] serious imprecision; [d] very serious imprecision

Certainty of the Evidence

Ponseti method vs. Kite method

The evidence on 2 efficacy outcomes favored PM over KM, with higher correction rates and lower relapse rates requiring surgery. There is inconclusive evidence to suggest that PM is more effective in reducing relapse rates, improving Pirani score, and reducing complication rates. The overall certainty of evidence was rated as very low, as all included RCTs were small and methodological limitations were observed, including unclear or high risk of bias in randomization and allocation, lack of blinding, absence of pre-specified trial protocols, and imprecision due to the small number of events and limited sample sizes.

Ponseti method vs. French functional method

The evidence on four efficacy outcomes showed that PM was associated with lower relapse requiring surgery, better final functional outcomes (good and excellent results), and greater improvement in Pirani scores compared with the FFM. For the correction rate, the pooled analysis suggested little to no difference between the two methods. Evidence on overall relapse rates was inconclusive. The certainty of the evidence was rated as very low due to methodological limitations, including unclear or high risk of bias in several studies, heterogeneity in follow-up durations, and imprecision.

Other Considerations

Resource Implications

A study from Brazil compared 5 children treated with KM + posteromedial release with 5 children treated with PM. There were fewer casts (mean 4.8 vs. 11.2), avoided major surgeries, and shortened the treatment duration (average 55.6 days vs. 225.8 days) in the PM group, which led to a substantial reduction in hospital resource use. Direct hospital costs with KM + surgery protocol included pre- and post-operative casts, professional fees for surgery, inpatient stay, and orthopedic shoes, which amounted to R$947.76 per clubfoot, or R$1,895.52 for both

clubfeet. On the other hand, costs for PM included serial casts, professional fee for percutaneous Achilles tenotomy, anesthesia, and orthoses, amounting to R$340.34 per clubfoot, or R$680.68 for both clubfeet.[23]

Table Q2.3. Estimated costs of surgical procedures for clubfoot.

Protocol[a]	2005 Brazilian Real (R$)	2025 R$ inflation-adj. ×2.999[c]	2025 Philippine Peso (₱) Equivalent ₱10.5038/BRL[d]
KM + Surgery (per clubfoot)	R$947.76	R$2,842.31	₱29,686.57
KM + Surgery (both clubfeet)	R$1,895.52	R$5,684.63	₱59,373.14
PM (per foot)	R$340.34	R$1,020.67	₱10,727.70
PM (both feet)	R$680.68	R$2,041.35	₱21,455.39

[a]Ferreira, R. C., Stival, W. N., & Junior, A. E. (2007). Comparison of hospital costs and duration of treatment with two different clubfoot protocols. *Iowa Orthopaedic Journal, 31*, 53–58. https://www.researchgate.net/publication/51808497
[c]World Bank. (2024). *Inflation, consumer prices (annual %) – Brazil [Data set].* World Development Indicators. Retrieved from https://data.worldbank.org. Note: The multiplier ×2.999 was derived by compounding Brazil's annual CPI inflation rates from 2005–2024 (≈ 190% cumulative increase).
[d]OANDA. (2025, August 30). *Historical exchange rates: Brazilian real (BRL) to Philippine peso (PHP).* Retrieved from https://www.oanda.com

Stakeholder values, preferences, and acceptability

PM was identified to be the most widely recognized conservative method for clubfoot treatment in Kenya since it produces good outcomes with low relapse, especially when initiated early. Its reliance on plaster of Paris, which is locally available, made it cost-effective. It was reported that PM is easy to learn, allowing physicians, physiotherapists, and other allied health staff to implement it. In contrast, KM was identified to be a conservative method used by healthcare providers if they are not provided with training on the implementation of PM. While some patients with clubfoot improve from this method, it relies on multiple castings, leading to increased hospital costs. With regard to FFM, limited healthcare providers are aware of this method, and among those who are aware of this method perceive it as impractical, time-consuming, and costly. As a result, no infants with clubfoot in the study were treated with this method.[24]

Similarly, healthcare providers in Zimbabwe who had prior experience with KM felt that PM was more effective in treating clubfoot. The opinions and impressions of the clinicians confirm that the PM should be considered a standard treatment of clubfoot.[9]

Equity and feasibility

In terms of service delivery, longer travel duration from residence to treatment centers correlated strongly with delays in treatment initiation for clubfoot. Such delays contributed to higher rates of neglected clubfoot ($\rho = 0.741$, $P < 0.001$). Early notification of treatment options for clubfoot to caregivers has been associated with earlier treatment ($\rho s = -0.44$, $P < 0.01$). In contrast, when parents received these treatment options later in the life of the child is associated with a later start of treatment ($\rho s = 0.50$, $P < 0.001$). When caregivers stated that they would have no reason to postpone the treatment, other than a more urgent medical problem to be treated first, this was related to a significantly earlier start of the treatment ($\rho s = -0.584$, $P < 0.001$).[25]

Concerning health financing and governance, the percentage of family income spent on treatment correlated with delayed initiation ($\rho = 0.643$, $p = 0.001$), and even if these were subsidized, indirect costs (missed work, travel

expenses) were substantial. Dependence on charity for transport also delayed treatment (ρ = 0.373, p = 0.007).[25] In contrast, private car ownership (ρs = −0.357, p = 0.010) and higher annual income (ρ = −0.324, p = 0.020) supported earlier access. Broader system-level issues, such as weak interprofessional cooperation, limited Ministry of Health support for NGO-led services, and the absence of strong local leadership, have also been reported as hindrances.[26]

With regard to health programs, a hub-and-spoke model in the United Kingdom reported that while complication rates were higher in peripheral (spoke) sites, all patients achieved correction using the Ponseti method, supporting the model's feasibility.[27] Ponseti Clubfoot Program in the U.S. was associated with decreased recurrence rates and improved adherence to care pathways.[28] In low- and middle-income countries, short training courses on PM improved practitioner competence and service capacity.[29]

References (Q2)

1. Barrie A, Varacallo MA. Clubfoot [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Updated 2023 Aug 7 [cited 2025 Jul 20]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK551574/

2. Smythe T, Rotenberg S, Lavy C. The global birth prevalence of clubfoot: a systematic review and meta-analysis. *EClinicalMedicine*. 2023 Aug 30;63:102178. Available from: https://doi.org/10.1016/j.eclinm.2023.102178

3. Dobbs MB, Morcuende JA, Gurnett CA, Ponseti IV. Treatment of idiopathic clubfoot: an historical review. *Iowa Orthop J*. 2000;20:59–64.

4. Kite JH. The treatment of congenital clubfeet. J Am Med Assoc [Internet]. 1932 Oct 1;99(14):1156. Available from: https://doi.org/10.1001/jama.1932.02740660034008

5. Masse P. Functional method of treatment of clubfoot (translated from French). In: Carlioz H, Opus JG, editors. Cahier d'enseignement de la SOFCOT: le pied bot varus equin. Paris: Expansion Scientifique; 1977. p. 351–6.

6. Ponseti IV. Congenital clubfoot: fundamentals of treatment. Oxford: Oxford University Press; 1996.

7. Gelfer Y, Davis N, Blanco J, Buckingham R, Trees A, Mavrotas J, Tennant S, Theologis T. Attaining a British consensus on managing idiopathic congenital talipes equinovarus up to walking age. *Bone Joint J*. 2022;104-B(6):758-64. Available from: https://doi.org/10.1302/0301-620x.104b6.bjj-2021-1687.r1

8. Besselaar AT, Sakkers RJB, Schuppers HA, Witbreuk MMEH, Zeegers EVCM, Visser JD, Boekestijn RA, Margés SD, van der Steen MC, Burger KNJ. Guideline on the diagnosis and treatment of primary idiopathic clubfoot. *Acta Orthop*. 2017;88(3):305–9. Available from: https://doi.org/10.1080/17453674.2017.1294416

9. Shabtai L, Specht SC, Herzenberg JE. Worldwide spread of the Ponseti method for clubfoot. *World J Orthop*. 2014;5(5):585–90. Available from: https://doi.org/10.5312/wjo.v5.i5.585

10. Association nationale des kinésithérapeutes salariés. Physiotherapy and orthopaedic treatment for isolated congenital foot deformity during the first six months of life. Saint-Denis La Plaine Cedex (FR): ANAES, Guidelines Department; 2004.

11. Goyal RK, Goyani RK. Comparative study of Ponseti method versus French functional method in the treatment of idiopathic clubfoot. *J Popul Ther Clin Pharmaco*l. 2022;29(4):4953–7. Available from: https://doi.org/10.53555/vzszh024

12. Jeans KA, Karol LA, Erdman AL, Stevens WR. Functional outcomes following treatment for clubfoot. *J Bone Joint Surg Am*. 2018;100(23):2015–23. Available from: https://doi.org/10.2106/jbjs.18.00317

13. El Batti SE, Solla F, Clément J, Rosello O, Oborocianu I, Chau E, Rampal V. Initial treatment of congenital idiopathic clubfoot: prognostic factors. *Orthop Traumatol Surg Res*. 2016;102(8):1081–5. Available from: https://doi.org/10.1016/j.otsr.2016.07.012

14. Jeans KA, Erdman AL, Jo C, Karol LA. A longitudinal review of gait following treatment for idiopathic clubfoot: gait analysis at 2 and 5 years of age. *J Pediatr Orthop*. 2016;36(6):565–71. Available from: https://doi.org/10.1097/bpo.0000000000000515

15. Chotel F, Parot R, Seringe R, Berard J, Wicart P. Comparative study: Ponseti method versus French physiotherapy for initial treatment of idiopathic clubfoot deformity. *J Pediatr Orthop*. 2011;31(3):320–5. Available from: https://doi.org/10.1097/bpo.0b013e31820f77ba

16. Gottschalk HP, Karol LA, Jeans KA. Gait analysis of children treated for moderate clubfoot with physical therapy versus the Ponseti cast technique. *J Pediatr Orthop*. 2010;30(3):235–9. Available from: https://doi.org/10.1097/bpo.0b013e3181d3cba8

17. Richards BS, Faulks S, Rathjen KE, Karol LA, Johnston CE, Jones SA. A comparison of two nonoperative methods of idiopathic clubfoot correction: the Ponseti method and the French functional (physiotherapy) method. *J Bone Joint Surg Am*. 2008;90(11):2313–21. Available from: https://doi.org/10.2106/jbjs.g.01621

18. Garcia LC, de Jesus LR, de Oliveira Trindade M, Filho FCG, Pinheiro ML, de Sá RJP. Evaluation of Kite and Ponseti methods in the treatment of idiopathic congenital clubfoot. *Acta Ortop Bras*. 2018;26(6):366–9. Available from: https://doi.org/10.1590/1413-785220182606183925

19. Selmani E. Is Ponseti's method superior to Kite's for clubfoot treatment? *Eur Orthop Traumatol*. 2012;3(3):183–7. Available from: https://doi.org/10.1007/s12570-012-0116-8

20. Rijal R, Shrestha BP, Singh GK, Singh M, Nepal P, Khanal GP, Rai P. Comparison of Ponseti and Kite's method of treatment for idiopathic clubfoot. *Indian J Orthop*. 2010;44(2):202–7. Available from: https://doi.org/10.4103/0019-5413.61941

21. Sanghvi A, Mittal V. Conservative management of idiopathic clubfoot: Kite versus Ponseti method. *J Orthop Surg (Hong Kong)*. 2009;17(1):67–71. Available from: https://doi.org/10.1177/230949900901700115

22. Sud A, Tiwari A, Sharma D, Kapoor S. Ponseti's vs. Kite's method in the treatment of clubfoot: a prospective randomised study. *Int Orthop*. 2008;32(3):409–13. Available from: https://doi.org/10.1007/s00264-007-0332-y

23. Ferreira RC, Stival WN, Junior AE. Comparison of hospital costs and duration of treatment with two different clubfoot protocols. *Iowa Orthop J*. 2011;31:53–8.

24. Kingau NW, Anthea R, Mlenzana N. Perceptions regarding medical management of Clubfoot in Kenya. *International Journal of Physical Medicine & Rehabilitation*. 2015 Jan 1;03(06). Available from: https://doi.org/10.4172/2329-9096.1000309

25. van Wijck SF, Oomen AM, van der Heide HJ. Feasibility and barriers of treating clubfeet in four countries. *Int Orthop*. 2015;*39*(12):2415–22. https://doi.org/10.1007/s00264-015-2783-x

26. Drew S, Gooberman-Hill R, Lavy C. What factors impact on the implementation of clubfoot treatment services in low and middle-income countries?: a narrative synthesis of existing qualitative studies. *BMC Musculoskelet Disord*. 2018;19:72. https://doi.org/10.1186/s12891-018-1984-z

27. Hussain SA, Russell A, Cavanagh SE, Bridgens A, Gelfer Y. A 'Hub and Spoke' Shared Care initiative for CTEV Ponseti service. *Bone Jt Open*. 2023;*4*(11):865–72. https://doi.org/10.1302/2633-1462.411.BJO-2023-0076.R1

28. Carry PM, Graham S, Whalen K, Burke D, Baschal R, Holmes KS, et al**.** Implementation of a Ponseti Clubfoot Program Decreases Major Surgery: A Quality Improvement Initiative. *Pediatr Qual Saf*. 2020;*5*(6):e362. https://doi.org/10.1097/pq9.0000000000000362

29. Sheik-Ali S, Navarro SM, Keil E, Lavy C. The role of clubfoot training programmes in low- and middle-income countries: a systematic review. *Trop Doct*. 2020;50(4):291–9. https://doi.org/10.1177/0049475520931343

Guideline Question 3.

Structured parental education and compliance strategies

Should we implement structured parental education and compliance strategies as part of conservative management (e.g., Ponseti method) in children with idiopathic clubfoot?

	Recommendation	Certainty of evidence	Strength of Recommendation
3	We recommend the implementation of a culturally appropriate, structured parental and key stakeholder* education and compliance strategies as part of conservative management in children with idiopathic clubfoot. ***Remarks:*** *Key stakeholders include municipal health workers, primary care physicians, barangay health workers, patient caregivers, midwives, nurses, social workers.*	⊕◯◯◯ Very Low	Strong

Guideline Panel Considerations

Justification

The panel unanimously judged the desirable consequences to outweigh potential harms or burdens. Local experience supports the effectiveness of structured messaging through translated materials, ready-made PowerPoint slides, brochures, and pictorial aids. Clinicians emphasized that consistent, structured education helps reinforce provider recommendations, particularly when other family members or relatives encourage parents to discontinue brace use prematurely. Twelve of thirteen panelists voted for a strong recommendation, citing the high importance of education in ensuring treatment adherence in an archipelagic setting with many geographically isolated and disadvantaged areas (GIDA) and poor health-seeking behaviors. One panelist favored a weak recommendation given the very low certainty of evidence.

Implementation considerations

Educational interventions should be culturally and linguistically tailored, especially for indigenous populations. Effectiveness may be enhanced by involving social workers, barangay health workers (BHWs), municipal health officers, and primary care physicians in the development of teaching materials. Engagement of caregivers and local government units (LGUs) was also considered critical. Use of visual aids such as graphs and pictures can facilitate comprehension.

Resource considerations

The Philippine Clubfoot Program already provides training and materials, which can be leveraged to minimize costs. Developing a standardized set of base slides and educational content, as proposed by the Council, may

further reduce resource needs. Dissemination through social media and other tri-media platforms was also identified as a feasible strategy.

Equity and acceptability

Structured education was judged to improve equity by supporting families in GIDA and resource-limited settings where follow-up is difficult. Acceptability is expected to be high among providers and families, particularly when local language and cultural context are considered.

Research priorities

Further studies are needed to establish effective and culturally appropriate strategies for parental education, particularly in the Philippine setting. Documentation of outcomes from local practice and provider training initiatives is encouraged.

Key Findings

- **Characteristics of the evidence:** Two (2) non-randomized studies, a retrospective comparative study (n = 242) and a pre–post interventional study (n = 30) evaluated the effectiveness of structured parental education and communication strategies to improve adherence to Ponseti treatment for idiopathic clubfoot.
- **Efficacy and safety:** Parental education interventions were associated with improved clinical outcomes, including reduced recurrence of deformity and greater improvement in Pirani scores. Improvements were also observed in process outcomes such as caregiver self-efficacy, understanding of the bracing protocol, and skills in brace application. Reported brace compliance was higher in the intervention group, although the difference was not statistically significant. No harms were reported in either study.
- **Certainty of evidence:** Very low due to serious risk of bias and imprecision. Key limitations included use of historical and uncontrolled comparators, small sample sizes, and subjective outcome measures. Confidence intervals were not reported. No studies assessed long-term functional outcomes or cost-effectiveness. No evidence was identified from the Philippines.

Background

The Ponseti method, which involves a sequence of manipulations, casting, and bracing over several months or years, has become the gold standard accepted treatment for managing idiopathic clubfoot.[3–5] It has been shown to be cost - effective and easy to implement but requires strong engagement from the parents. Non–adherence to the prescribed treatment protocol, leads to a 5 to 183 times increased risk of relapse of the deformity.[6]

Parental understanding and engagement are one of the key determinants of treatment adherence.[7] Considering that Ponseti treatment requires sustained commitment from both the child and their parents/caregivers, identifying effective strategies that support parental understanding and adherence is as crucial as ensuring access to care. Structured education and compliance interventions play a key role in helping families remain engaged and successfully complete the full course of treatment.[7]

Summary of the Evidence

Characteristics of included studies

We included two non-randomized studies in this review, with a total of 99 parents of children with idiopathic clubfoot. Both studies were conducted in the United States and focused on interventions designed to enhance parental education and communication during conservative clubfoot treatment using the Ponseti method.

The first study by Seegmiller et al. (2016) was a one-group pre–post intervention study involving 30 parents.[8] The intervention was a structured two-session educational bracing program delivered during routine clinical visits. It used educational brochures, the "teach-back" method, and a practice doll to enhance parental skills and confidence in brace application. Outcomes assessed were parental self-efficacy, understanding of the importance of adherence, and skills improvement in applying the brace.

The second study by Morin et al. (2014) was a retrospective comparative study including 69 infants (104 clubfeet) in the treatment group and 100 infants (138 clubfeet) in the historical control group.[9] The intervention involved a revised, culturally sensitive communication protocol emphasizing positive reinforcement, avoidance of judgmental or negative language, and consistent education throughout treatment. Outcomes included Pirani score improvement, recurrence rate, and caregiver-reported brace compliance.

While both studies aimed to improve adherence-related outcomes, they differed in design, implementation context, and outcome measures. Seegmiller's study focused on immediate post-intervention changes within the same group, while Morin's study compared outcomes across two cohorts to assess long-term treatment success.

Efficacy Outcomes

Recurrence of deformity (1 retrospective comparative study, N = 242 clubfeet, low certainty)

A pooled analysis was not conducted due to differences in study design and population. Only the Morin et al. 2014 study assessed recurrence rates and found a markedly lower recurrence in the intervention group (2.9%) compared to a historical control group (18.1%). This corresponds to a relative risk of 0.11 with a 95% CI of 0.03 to 0.44. The confidence interval suggests a precise and clinically meaningful reduction in recurrence associated with a culturally sensitive communication strategy. However, the certainty of this evidence is low, primarily due to limitations in study design, including the use of a historical control group and risk of residual confounding.

Pirani score improvement (1 retrospective comparative study, N = 242 clubfeet, low certainty)

Morin et al., 2014 reported a greater mean improvement in Pirani scores in the intervention group (mean difference of 0.5 points), with a 95% CI of 0.21 to 0.79. This suggests a modest but clinically relevant improvement in deformity severity associated with the use of a culturally sensitive communication strategy. The confidence interval indicates the observed effect is unlikely due to chance and supports a potential benefit. However, due to the non-randomized study design, differences in baseline characteristics, and use of historical controls, the certainty of this evidence remains low.

Process Outcomes

Process outcomes measure how an intervention is implemented or received, such as understanding, knowledge, adherence behavior, or changes in caregiver confidence. They do not directly measure patient health status (like recurrence, pain, or mobility), but instead reflect proximal behaviors or knowledge expected to influence those outcomes.

Parental self-efficacy for adherence (1 pre-post study, N = 30 parents, very low certainty)

In the pre-post study by Seegmiller et al. (2016), 20 out of 30 parents (67%) reported increased confidence in their ability to adhere to the bracing protocol following participation in an educational intervention. The corresponding 95% CI was 0.49 to 0.81. While this suggests that structured education may enhance caregiver self-efficacy, the certainty of the evidence is very low, primarily due to the study's one-group pre-post design, small sample size, and reliance on subjective self-report measures without a control group.

Parental understanding of importance of adherence (1 pre-post study, N = 30 parents, very low certainty)

In the study by Seegmiller et al. (2016), 21 out of 30 parents reported improved understanding of the importance of adhering to the bracing protocol to prevent relapse following the educational intervention. The 95% CI was 0.51 to 0.85, indicating a likely beneficial effect. However, the certainty of this evidence is very low, due to limitations in study design, absence of a control group, small sample size, and the use of non-validated self-report measures.

Skills in brace application (1 pre-post study, N = 30 parents, very low certainty)

Following the intervention, 25 out of 30 parents (95% CI: 0.65 to 0.93) demonstrated increased confidence in correctly applying the brace, and 23 parents (95% CI: 0.58 to 0.90) improved in recognizing incorrect brace fit following the educational sessions. These self-reported improvements were corroborated by direct observations from health professionals during supervised practice. Despite the encouraging findings, the certainty of evidence is very low due to the study's one-group pre-post design, small sample size, and reliance on subjective outcome measures without validated assessment tools.

Caregiver-reported brace compliance (1 retrospective comparative study, N = 169 patients, low certainty)

In the retrospective study by Morin et al. (2014), caregiver-reported brace compliance was slightly higher in the intervention group (89.9%) compared to the historical control group (80%). While the point estimate suggests a potential benefit of the communication strategy, the overlapping confidence intervals indicate uncertainty in the true effect. Additionally, the reliance on self-report and the use of a historical control introduce potential bias. As a result, the certainty of evidence was rated as low.

Certainty of the Evidence

Both included studies had a serious overall risk of bias. The Seegmiller study used a pre - post design without a control group and relied on subjective, self-reported outcomes without blinding. Morin's study used a retrospective design with a historical control, raising concerns about baseline differences and unblinded outcome assessment. Neither study registered a protocol.

In addition to design limitations, both studies had small sample sizes and did not report confidence intervals, limiting the ability to assess the precision and reliability of the effect estimates. The small number of events and wide uncertainty around observed differences contributed to serious concerns about whether the true effect may differ substantially from the reported results. Because of these issues, the overall certainty of evidence across outcomes was rated as very low.

Table Q3. GRADE Summary of Findings: Effectiveness of structured parental education and communication strategies to improve adherence to Ponseti treatment.

Outcomes	Basis	Effect estimate	95% CI	Interpretation	Certainty of evidence
Recurrence of deformity *Follow up: ≥1 year (up to 2 years for most participants)*	1 retrospective comparative study (N = 242 clubfeet)	2.9% vs. 18.1% recurrence	(0.03 – 0.44)	Beneficial (Favors intervention)	⊕⊕◯◯ Low
Pirani score improvement *Follow up: ≥1 year (up to 2 years for most participants)*	1 retrospective comparative study (N = 242 clubfeet)	Mean score improvement: 4.0 vs. 3.5	(0.21 – 0.79)	Beneficial (Favors intervention)	⊕⊕◯◯ Low
Parental self-efficacy for adherence *Follow up: immediately post intervention*	1 pre-post study (N = 30 parents)	67% reported increased confidence	(0.49 – 0.81)	Beneficial (Favors intervention)	⊕◯◯◯ Very Low
Parental understanding of importance of adherence *Follow-up: immediately post intervention*	1 pre-post	70% reported improved understanding	(0.51 – 0.85)	Beneficial (Favors intervention)	⊕◯◯◯ Very Low
Skills in brace application *Follow-up: immediately post intervention*	1 pre-post study (N = 30 parents)	83% improved in application skills; 77% in fit recognition	(0.65 – 0.84)	Beneficial (Favors intervention)	⊕◯◯◯ Very Low
Caregiver reported brace compliance *Follow up: ≥1 year (up to 2 years for most participants)*	1 retrospective comparative study (N = 169 caregivers)	89.9% vs. 80.0% reported compliance	(0.95 – 1.32)	Inconclusive	⊕⊕◯◯ Low

Other Considerations

Resource implications

No published economic evaluations were found specifically assessing the cost or cost-effectiveness of structured parental education and compliance strategies in clubfoot treatment, including within the Philippines. International studies confirm that such interventions typically require minimal resources, mainly printed materials and staff time and yet may offer high value by improving adherence and reducing relapse.[10,11] Although these strategies have not been formally costed, their low resource demands and potential to reduce downstream treatment costs suggest they are likely affordable and feasible in low- and middle-income settings like the Philippines.

Stakeholder values, preferences, and acceptability

Structured education and supportive communication are consistently highlighted in the literature as valued by caregivers and essential to effective Ponseti treatment adherence. Caregivers consistently express a strong preference for receiving clear explanations, hands-on training, and emotional support, particularly during the bracing phase, which many identify as confusing and stressful.

A recent U.S.-based study[12] found that 91% of parents engage in discussions about clubfoot with their children, and 68% desired guidance from orthopedic providers, though only 18% had received such support. In Northern India, caregivers reported anxiety, confusion, and emotional strain upon diagnosis and throughout treatment. They highlighted the importance of early diagnosis, empathetic counseling, and consistent communication about treatment steps and expected outcomes.[13]

Similarly, a Malaysian study found that parents experienced social stigma and uncertainty about their child's future, but placed high value on trust in physicians and reassurance through structured, culturally sensitive communication.[14] These insights are echoed by caregivers in the UK, who emphasized the need for providers to address emotional responses, support decision-making, and offer long-term guidance.[15]

Overall, these findings indicate that structured parental education is acceptable and aligned with stakeholder preferences. It addresses caregiver information needs, emotional well-being, and motivation to adhere to treatment, and is supported by both caregivers and health professionals across diverse settings.

Equity and feasibility

Evidence from multiple studies indicates that structured parental education and compliance strategies, though acceptable and beneficial, face important equity and feasibility challenges in low- and middle-income settings. Common barriers include financial hardship, long travel distances, and lack of access to consistent provider communication. These disproportionately affect families with lower socio-economic status and those living in rural areas.[16]

In China, cultural and health literacy barriers, combined with limited training among providers, hindered effective delivery of parental guidance. The absence of standardized educational tools and language-appropriate materials further limited implementation. Similar system-level barriers were reported in a global review, including weak integration of clubfoot services, inadequate training, and lack of national protocols, all of which undermine scalability and sustainability of educational interventions.[17]

A 2022 scoping review further identified poverty as the most dominant cross-cutting barrier to compliance and retention in care, with additional challenges such as gender-based disparities, caregiver workload, and lack of social support. Facilitators included provider-led education, community engagement, and improved access to local follow-up services.[7]

Overall, while feasible in concept, implementation of parental education strategies requires attention to context-specific delivery barriers. Equity concerns can be mitigated through system-level investments in provider training, culturally adapted materials, and logistical support for families.

Addressing equity also requires recognizing the gendered nature of caregiving in the Philippines, where mothers and grandmothers are commonly responsible for completing treatment. Their disproportionate exposure to travel burden, time constraints, and limited financial autonomy underscores the need for gender-responsive service delivery models that reduce caregiver strain and support consistent follow-up.

References (Q3)

1. O'Shea RM, Sabatini CS. What is new in idiopathic clubfoot? Curr Rev Musculoskelet Med. 2016 Dec;9(4):470–7.

2. Patel DrS, Gadhavi DrM, Patel DrA, Taral DrJ, Poriya DrH. Results of ponseti method in congenital talipes equino varus children of more than 1.5 years of age. Natl J Clin Orthop. 2018 Oct 1;2(4):51–7.

3. Adegbehingbe OO, Adetiloye AJ, Adewole L, Ajodo DU, Bello N, Esan O, et al. Ponseti method treatment of neglected idiopathic clubfoot: Preliminary results of a multi-center study in Nigeria. World J Orthop. 2017 Aug 18;8(8):624–30.

4. Ganesan B, Luximon A, Al-Jumaily A, Balasankar SK, Naik GR. Ponseti method in the management of clubfoot under 2 years of age: A systematic review. PLOS ONE. 2017 June 20;12(6):e0178299.

5. Morcuende JA, Dolan LA, Dietz FR, Ponseti IV. Radical Reduction in the Rate of Extensive Corrective Surgery for Clubfoot Using the Ponseti Method. Pediatrics. 2004 Feb 1;113(2):376–80.

6. Zhao D, Liu J, Zhao L, Wu Z. Relapse of Clubfoot after Treatment with the Ponseti Method and the Function of the Foot Abduction Orthosis. Clin Orthop Surg. 2014;6(3):245.

7. Pigeolet M, Vital A, Daoud HA, Mita C, Corlew DS, Alkire BC. The impact of socio-economic factors on parental non-adherence to the Ponseti protocol for clubfoot treatment in low- and middle-income countries: A scoping review. eClinicalMedicine. 2022 June 1;48:101448.

8. Seegmiller L, Rebecca Burmeister, Paulsen-Miller M, Morcuende J. Bracing in Ponseti Clubfoot Treatment: Improving Parental Adherence Through an Innovative Health Education Intervention. Orthop Nurs. 2016 Mar;35(2):92–7.

9. Morin ML, Hoopes DM, Szalay EA. Positive Communication Paradigm Decreases Early Recurrence in Clubfoot Treatment. J Pediatr Orthop. 2014 Mar;34(2):219–22.

10. Harmer L, Rhatigan J. Clubfoot Care in Low-Income and Middle-Income Countries: From Clinical Innovation to a Public Health Program. World J Surg. 2014 Apr 1;38(4):839–48.

11. Owens MR, Brito-Silva F, Kirkland T, Moore CE, Davis KE, Patterson MA, et al. Prevalence and Social Determinants of Food Insecurity among College Students during the COVID-19 Pandemic. Nutrients. 2020 Aug;12(9).

12. Baskar D, Ngnepieba M, Paul P, Segovia NA, Frick S. Conversations About Congenital Clubfoot: Investigating How Parents Share Information About a Structural Diagnosis With Their Children. Cureus. 2023 Nov;15(11):e48576.

13. Kumari P, Kalyani VC, Sharma M, Singh V, Prashar AK, Patiyal N. LIVED EXPERIENCES OF PARENTS IN REARING CHILD WITH CLUBFOOT IN NORTHERN STATES OF INDIA: A QUALITATIVE STUDY. 2021;12.

14. Roslan NS, Abdul Halim S, Munajat I, Sulong S. Psychosocial Impacts of Idiopathic Clubfoot on Parents and Children: A Scoping Review Protocol. Healthcare. 2024 Sept 18;12(18):1871.

15. Pietrucin-Materek M, van Teijlingen ER, Barker S, Forrest Keenan K, Miedzybrodzka Z. Parenting a child with clubfoot: A qualitative study. Int J Orthop Trauma Nurs. 2011 Nov 1;15(4):176–84.

16. Bent MA, Jhun M, Beltran V, Fimbres B, Wren TAL. Social Disadvantage and Transportation Insecurity in Clubfoot Clinic. J Pediatr Orthop. 2025 Feb 1;45(2):e143–7.

17. Sheik-Ali S, Navarro SM, Shaikh H, Keil EJ, Johnson W, Lavy C. The Health Determinants of Accessibility to Clubfoot Treatment in LMICs: A Global Exploration of Barriers and Solutions. Int J Matern Child Health AIDS. 2021;10(2):241–50.

Guideline Question 4.

Foot abduction braces

Should locally produced braces, compared to commercial (branded) braces, be used in patients with idiopathic clubfoot?

Recommendations		Certainty of evidence	Strength of Recommendation
4.1	We recommend the use of either locally produced or commercially available foot abduction braces to maintain correction after Ponseti casting with or without tenotomy until the child is five years of age.	⊕◯◯◯ Very Low	Strong
4.2	Compliance with the recommended bracing regimen is more important than the type* of foot abduction brace in preventing recurrence of the clubfoot deformity. **refers to the source of manufacture (commercially produced or locally fabricated), provided that the brace meets the essential functional requirements of an effective foot abduction brace, including the ability to maintain appropriate external rotation and abduction, a bilateral connection with a bar of adequate rigidity and length, and secure fixation of the feet. Braces that do not meet these minimum functional requirements are not considered acceptable, regardless of their origin*	None	Good Practice Statement
4.3	There is an identified gap both in knowledge, skills, and availability for locally produced foot abduction braces requiring further research, training, and additional resource allocation.	None	Consensus Statement

Remarks:
The recommended bracing regimen is 23 hours per day for the first 12 weeks, followed by 12–16 hours daily during naps and nighttime until five years of age.

Guideline Panel Considerations

Justification

Direct comparative evidence between locally produced and commercial FABs is limited, with very low certainty. However, the panel judged that success of bracing is primarily determined by adherence to the bracing protocol rather than by brace type. Both locally produced and commercial FABs can effectively prevent recurrence when compliance is maintained.

The panel unanimously voted in favor of recommending either brace type, prioritizing accessibility, affordability, and sustainability of supply. This decision reflects the current Philippine context where brace availability is limited, importation is costly, and local innovation (e.g., Steenbeek braces, 3D-printed models) has already shown feasibility in some regions. By supporting the use of locally produced braces, the recommendation also aims to stimulate further development, research, and investment in local production.

Implementation considerations

In the Philippine setting, availability and affordability remain the primary challenges to brace use. Commercial braces, such as Mitchell Ponseti® AFOs and MiracleFeet®, are often imported and subject to high customs fees, while locally produced braces are more affordable (₱1,000–3,500 per unit) and have been successfully used in some areas, often with NGO support. However, production and supply are limited, with only a few accredited local producers, creating concerns about sustainability. Expanding local manufacturing capacity whether in centralized or regional bracing centers could improve access, provided that braces are produced in multiple sizes and with shorter turnaround times to meet patient needs.

Training of prosthetics and orthotics professionals, as well as primary care providers, is also necessary to ensure proper brace application, monitoring, and patient support. Patients report that brace compliance is the main challenge rather than complications, and factors such as comfort, ease of use, and appearance influence acceptability. To reduce costs, braces are sometimes reused or rented, but safeguards must be in place to ensure safety and durability. Locally produced braces may also improve equity by reducing costs and reliance on imports, particularly in GIDAs. Finally, research is needed to compare locally produced and commercial braces in terms of outcomes, cost-effectiveness, and scalability, with ongoing work from institutions such as University of the East Ramon Magsaysay Memorial Medical Center expected to fill this gap.

Key Findings

- **Characteristics of the evidence:** Five non-randomized studies from the USA, Israel, Brazil and Kenya assessed various foot abduction braces (FABs) in infants and children with idiopathic clubfoot after Ponseti treatment. Braces compared included traditional Denis Browne bars, newer dynamic designs (Dobbs, Mitchell), and the low-cost Steenbeek brace. All studies measured compliance, recurrence, and complications, with follow-up ranging from 6 months to over 7 years.
- **Benefits:** Newer dynamic or branded braces may reduce non-compliance and recurrence compared to traditional braces, but the evidence is very uncertain. Across studies, recurrence was closely linked to poor compliance, regardless of brace type. One study found no difference in functional scores or radiographic outcomes between Mitchell and traditional braces, highlighting that strong parental education and complete initial correction may matter more than brace design.
- **Risks:** Skin blisters and irritation were more common with traditional braces (≈20%) compared to dynamic braces (≈3–4%), although results varied and certainty was very low. The Steenbeek brace showed similar or slightly higher complication rates compared to dynamic braces.
- **Certainty of the evidence:** Very low certainty due to serious risk of bias, inherent study design limitations associated with NRSIs.

Background

Ponseti method initially involves gentle serial manipulation with weekly plaster casting over several weeks, often followed by a minor outpatient procedure to correct equinus. Long-term correction is maintained with a foot abduction brace (FAB) set at 60–70° abduction and at least 10–15° dorsiflexion, worn full-time for 3 months and then nightly until 4–5 years of age. These foot ankle orthotic devices are connected by a bar to provide the necessary external rotation to stretch the medial soft tissues. Whereas serial manipulation gradually elongates tissues, foot abduction braces facilitate stress relaxation (i.e., the tissue becoming less stiff while being held stretched) until tendons reach static equilibrium. When initiated in infancy, the technique achieves initial correction in about 95% of cases.[1,2]

Several FAB designs are now available, differing in both cost and features. Traditional braces typically use open-toe, high-top boots connected by a bar that may be fixed or adjustable (often referred to as a 'Denis Browne bar or splint'). Other low-cost braces include the Steenbeek brace which is made with local tools (e.g., leather sewing machine, metal-working equipment, welding tools) and materials (e.g,. Leather, lining, plywood, mild steel rod) as well as homemade braces consisting of wood or metal bar with shoes attached at recommended angles.[3] In contrast, newer designs incorporate features such as hinged attachments, alternative bar types, or ankle-foot orthoses, and are marketed as lighter, more comfortable, and allowing dynamic movement—though they come at a higher cost (e.g., USD 1,200 for Dobbs Dynamic Clubfoot Brace, USD 350 for Mitchell brace).[4,5]

There is a need to compare low-cost, locally designed foot abduction braces with commercial models, as access to expensive braces is limited in many settings especially in the Philippines. While local designs may improve affordability and equity, their effectiveness and safety are uncertain. Evaluating benefits and risks is essential to determine if they provide comparable outcomes in maintaining correction of deformity while minimizing complications or non-adherence to brace use.

Summary of the Evidence

Characteristics of included studies

Five studies (Chen 2007[4], Garg 2009[6], Hemo 2011[5], Lara 2017[7], Mang'oli 2014[8]) evaluated different foot abduction braces (FABs) for maintaining correction and preventing recurrence of idiopathic clubfoot after Ponseti treatment. Studies were performed in USA[4,6], Israel[5], Brazil[7], and Kenya[8]. Most studies focused on idiopathic clubfoot, with Chen 2007 including a mix of complex, syndromic, and myelodysplastic cases. Average ages of children at onset of treatment / study enrolment ranged from as early as 1.7 weeks[5], 2-3 months[6], 5 months[4], or 23 months[8]. Methodology also differed: Chen, Mang'oli, and Garg relied on historical controls, while Hemo allowed families to choose which brace they preferred, and Lara retrospectively analyzed two groups.

The interventions varied: Chen 2007, Garg 2009, and Lara 2017 compared the Dobbs dynamic brace (allowing leg motion, easier application) with the traditional Denis Browne (DB) bar; Hemo 2011 compared the Mitchell brace (detachable shoes, silicone inserts) with DB; Mangoli 2014 studied the locally produced, low-cost Steenbeek brace and compared results with data from Chen 2007. infants and children were prescribed similar brace wear protocols (≈23 hours/day for 3 months, then night/nap use until 3–4 years). The five studies consistently assessed outcomes related to parental compliance with brace wear, recurrence of clubfoot deformity, and complications, particularly skin issues, with follow-up periods ranging from at least 6 months up to more than 7 years.

Efficacy outcomes

Non-compliance

Four studies assess non-compliance to brace use, defined as not wearing the brace for the prescribed number of hours over the past ≥ 6 months[8], 12 months[5], or 2 years.[4,6] Risk for non-compliance may be lower among children using branded or newer braces compared to traditional ones (11.5% vs 25.6%; RR 3.36 [95%CI 2.06 to 5.49]).

Hemo (2011) reported that traditional braces were comparable to the more expensive Mitchell-Ponseti braces in terms of compliance, emphasizing that meticulous patient management, thorough parent education, and complete initial correction are more critical than the brace design itself.[5] In contrast, Chen (2007) and Garg (2009) linked higher noncompliance with traditional braces to skin blistering, difficulties with application and removal, and infant irritability from restricted leg motion. However, both studies relied on historical control groups for

traditional braces, where patient support and education may have been less comprehensive than in their prospective dynamic brace groups.[4,6]

Recurrence of deformity

Recurrence of deformity was assessed on clinical evaluation, usually followed by additional casting and manipulation or tenotomy. Based on 3 studies, the risk of recurrence may be lower among children given Dobbs dynamic braces compared to traditional braces with a Denis-Browne bar (12.4% vs 30.3%; RR 2.43 [95%CI 1.13 to 5.23]).[4-7]

Chen (2007) found that noncompliance with brace wear was the strongest predictor of recurrence (OR 27, 95% CI 2.2–326, p = 0.01).[4] Noncompliance was much higher with the traditional brace (41%) compared to the dynamic brace (7.1%). Among children who were fully compliant, no recurrences were observed in either group. However, recurrence was frequent among those who were noncompliant—76.2% (16/21) in the traditional brace group versus 50% (1/2) in the dynamic brace group. Similarly, Garg (2009) reported that recurrence was far more common in noncompliant children using the Dobbs dynamic brace (63.6%, 7/11) compared to compliant users (8.5%, 4/47).[6] Mang'oli (2014) also reported lower rates of improvement in foot deformity correction on follow-up visits among those who had been non-compliant to Steenbeek bracing (17/33 or 53%) versus those who had good compliance (179/190 or 94%).[8] Collectively, these findings show that compliance may be more important than brace type in preventing relapse.

Improvement in long-term function

Hemo 2011[5] found no differences between children who used branded (Mitchell-Ponseti brace) or traditional brace in terms of final total functional score after an average of 44 months follow-up. This score incorporated different parameters such as ankle and subtalar motion, heel and forefoot position during standing, gait pattern, shoe type worn, functional limitations, pain and parental satisfaction.[9] The final functional score was 138 for the Mitchell group and 139.8 for the traditional group (P=0.544).

In terms of radiographic outcomes after 2 years, both groups also did not significantly differ. The mean antero-posterior talocalcaneal angles were 29.8 ± 6.6° for the Mitchell-Ponseti brace group and 28° ± 4.7° for the traditional brace group (P=0.146). Mean lateral talocalcaneal angles in maximal dorsiflexion were 32.4 ± 8.2° for the Mitchell group and 35.6 ± 8.1° for the traditional brace group (P=0.262).[5]

Parental satisfaction

This outcome was not specifically assessed in included studies. In the Hemo 2011 study, parents who received either the traditional or branded braces stated that they would recommend the same brace that they had selected to others.[5]

Safety outcomes

Complications

Complications referred to skin lesions or blistering to the lower limb resulting from the brace use. Based on 4 studies[4,6-8] branded braces may be associated with lower risk of skin blisters (RR 3.99), although this effect was highly uncertain due to imprecision (95%CI 1.44 to 11.03) and risk of bias.

Specifically, Chen 2007 and Garg 2009 found less complications with Dobbs dynamic braces (3.6% and 3.4%)

compared to those using traditional Denis-Browne based braces (21.6% and 19.3%), while Lara 2017 reported no complications for either groups. Mang'oli 2014 reported a complication rate of 4.9% with Steenbeek braces compared to 3.6% in the historical control group that used Dobbs braces. Other types of complications (e.g., sleeping problems) were reported by Hemo 2011[5] but did not include actual rates for either group.

Table Q4.1. GRADE Summary of Findings Table: Locally produced braces vs. commercial braces.

Outcome № of participants (studies)	Relative effect (95% CI)	Anticipated absolute effects (95% CI)			Certainty	Plain language summary
		commercial (branded) braces	locally produced braces	Difference		
Brace non-compliance № of participants: 483 (4 non-randomised studies)	**RR 3.36** (2.06 to 5.49)	**11.5%** (15/131)	**25.6%** (90/352)	**270 more per 1,000 children** (121 to 514 more)	⊕◯◯◯ Very low	Locally produced braces may increase brace non-compliance but the evidence is very uncertain.
Recurrence of deformity / relapse № of participants: 237 (3 non-randomised studies)	**RR 2.43** (1.13 to 5.23)	**12.4%** (13/105)	**30.3%** (40/132)	**177 more per 1,000 children** (16 to 524 more)	⊕◯◯◯ Very low	Locally produced braces may increase recurrence of deformity / relapse but the evidence is very uncertain.
Complications assessed with: skin blistering № of participants: 473 (4 non-randomised studies)	**RR 3.99** (1.44 to 11.03)	**3.2%** (4/126)	**9.5%** (33/347)	**95 more per 1,000 children** (14 to 318 more)	⊕◯◯◯ Very low	Locally produced braces may increase complications but the evidence is very uncertain.
Total functional score assessed with: Ezra scale follow-up: range 44 months to 88 months № of participants: 277.8 (1 non-randomised study)	No differences between children who used branded (Mitchell-Ponseti brace) or traditional brace in terms of final total functional score. The final functional score was 138 for the Mitchell group and 139.8 for the traditional group (P=0.544).				⊕◯◯◯ Very low	Locally produced braces may not differ from branded braces in terms of impact on total functional score but the evidence is very uncertain.

CI: confidence interval; **RR:** risk ratio

Certainty of the Evidence

The overall certainty of evidence was rated *very low*. Due to the inherent study design limitations of NRSIs, initial certainty of evidence was low, and was further downgraded due to serious risk of bias and inconsistency for some outcomes. The included studies exhibited methodological weakness related to confounding bias owing to their reliance on historical control groups instead of concurrent control groups, selection bias associated with parents' self-selection of the type of brace in Hemo 2011 study or exclusion of non-compliant patients in the analysis in Lara 2017; as well as measurement bias due to lack of blinding for participants and assessors.

Other Considerations

Resource implications

No local cost effectiveness studies were found. Based on the included studies, the estimated costs for various foot abduction braces, including dynamic, traditional, and locally made options, are presented in Table Q4.2.

Table Q4.2. Cost estimates for different types of braces.

Brace Type	Component / Description	Estimated cost (in USD)
Dynamic / newer / child-friendly braces	Initial cost for dynamic orthosis system	$1,200
	Cost of dynamic bracing for 2 years	$4,200
	Articulating bar component	$110 – 200
	AFOs (shoes component of the dynamic system)	$257 – 1,000
	Mitchell-Ponseti brace	$350
Traditional / Denis Browne type braces	Initial cost for traditional brace system	$182
	Cost of traditional bracing for 2 years	$1,128
	Open-toe, high-top, straight-last shoes component	$45 – 100
	Denis Browne bar (solid)	$24 – 82
Locally made braces	Steenbeek foot abduction brace	< $10

These costs can vary, costs of branded braces are generally higher. Some sources provide total system cost (e.g., Chen 2007 for dynamic and traditional braces) and others break down costs by individual components (e.g., Garg 2009). Additionally, the actual cost to families can be offset by insurance reimbursement, which for dynamic orthoses was approximately $1000 per brace, and for traditional braces was $100 per brace, leaving out-of-pocket expenses of $200 and $82 respectively in one study. The Mitchell brace and DB braces were often privately purchased, with only a small percentage reimbursed by medical insurance. The rapid growth of an infant's foot means multiple pairs of shoes or orthotic shoes may be needed in the first year, adding to the overall cost. High recurrence rates would also drive up costs associated with more work days lost for parents, as they need to devote time for repeated manipulations and casting, as well as possible surgical costs.

Equity and feasibility

Several barriers must be addressed to ensure that treatment with bracing is completed and not interrupted. Access to abduction braces is a major equity concern. The cost of braces and difficulties in acquiring them have been reported as barriers in several settings.[11-13] Geographic disparities further exacerbate inequities, for example in Brazil where limited availability of stores capable of producing braces to the required standard creates additional financial and logistical challenges for families.[13]

In some contexts, such as Kenya, local solutions (e.g., training cobblers to manufacture braces) have been explored to reduce costs and improve availability.[11] However, feasibility concerns remain regarding consistency and quality standards in brace production.

A narrative review[10] of qualitative studies summarized the following barriers to successful implementation of bracing:

- **Lack of resources:** Limited access to essential supplies such as casting materials and abduction braces.
- **Working environment constraints:** Inadequate clinical space, with some facilities having to share treatment rooms with other clinics

- **Shortage of healthcare professionals:** Too few trained providers and insufficient time to deliver treatment, compounded by competing demands on clinicians, limited capacity.
- **Lack of training:** Inadequate training (e.g, nurses and midwives often failed to diagnose clubfoot at birth)
- **Financial constraints:** Underpinned many barriers, affecting access to materials, training, and service availability.
- **System-level challenges:** Failures in communication and coordination, including lack of awareness of available clinics, reduced timely access to care.

To address these barriers, it is necessary to increase availability of resources and materials, expand training programs for healthcare professionals, engage non-governmental organizations to provide financial support, and disseminate best practices to improve awareness and standardization of care.

Importance of assessing hip mobility and knee movement

A prospective cohort study involving 42 children who have been using Steenbeek FAB for ≥ 3 months found that it works best with the knees flexed.[14] This position maximizes foot abduction and soft tissue stretch, making parental education on encouraging knee flexion during bracing essential. The brace's effectiveness also depends on hip mechanics, requiring a minimum hip ROM of 52.2°, and is strongly influenced by tibial external rotation, which contributes 61% of apparent foot abduction. These findings underscore the importance of assessing hip mobility and teaching caregivers proper knee movement to optimize the corrective effect of the SFAB.

Parent related factors and parent's attitudes regarding clubfoot treatment and bracing

In a survey that assessed parental attitudes regarding clubfoot treatment, wearing braces and Achilles tenotomy raised the most questions, requiring additional information from both doctors and alternative sources. The possibility of errors and complications in wearing braces caused the greatest concern among parents, as well as possible relapses and the correctness of prescriptions during the rehabilitation treatment.[15] Another mixed method study describing the lived experiences of parents of children who used braces for clubfoot treatment showed that parents had a positive perception and appropriate practice on the use of corrective braces, but there were a few issues such as relapse due to non-adherence, financial burden, and traveling distance, and noticeably more, which need to be addressed.[16]

Low socioeconomic status, limited parental education, and practical difficulties with the Dennis Browne splint (e.g., application challenges, child discomfort, sleep disturbance) contributed to poor adherence and relapse.[17] Prolonged treatment, single parenting, and emotional stress were additional barriers to compliance.[18]

References (Q4)

1. Morcuende JA, Dolan LA, Dietz FR, Ponseti IV. Radical reduction in the rate of extensive corrective surgery for clubfoot using the Ponseti method. Pediatrics. 2004;113(2):376-380. doi:10.1542/peds.113.2.376

2. Ganesan B, Luximon A, Al-Jumaily A, Balasankar SK, Naik GR. Ponseti method in the management of clubfoot under 2 years of age: A systematic review. Nazarian A, ed. PLoS ONE. 2017;12(6):e0178299. doi:10.1371/journal.pone.0178299

3. Desai L, Oprescu F, DiMeo A, Morcuende JA. Bracing in the treatment of children with clubfoot: past, present, and future. Iowa Orthop J. 2010;30:15-23.

4. Chen RC, Gordon JE, Luhmann SJ, Schoenecker PL, Dobbs MB. A new dynamic foot abduction orthosis for clubfoot treatment. J Pediatr Orthop. 2007;27(5):522-528. doi:10.1097/bpo.0b013e318070cc19

5. Hemo Y, Segev E, Yavor A, Ovadia D, Wientroub S, Hayek S. The influence of brace type on the success rate of the Ponseti treatment protocol for idiopathic clubfoot. J Child Orthop. 2011;5(2):115-119. doi:10.1007/s11832-010-0321-3

6. Garg S, Porter K. Improved bracing compliance in children with clubfeet using a dynamic orthosis. J Child Orthop. 2009;3(4):271-276. doi:10.1007/s11832-009-0182-9

7. Lara LCR, Gil BL, Torres Filho LCDA, Santos TPSD. Comparison between two types of abduction orthotics in treating congenital clubfoot. Acta ortop bras. 2017;25(4):125-128. doi:10.1590/1413-785220172504155890

8. Mang'oli P, Theuri J, Kollmann T, MacDonald NE. Ponseti clubfoot management: Experience with the Steenbeek foot abduction brace. Paediatr Child Health. 2014;19(10):513-514. doi:10.1093/pch/19.10.513

9. Ezra. E, Hayek S, Gilai AN, Khermosh O, Wientroub S. Tibialis Anterior Tendon Transfer for Residual Dynamic Supination Deformity in Treated Club Feet: Journal of Pediatric Orthopaedics, Part B. 2000;9(3):207-211. doi:10.1097/01202412-200006000-00012

10. Drew S, Gooberman-Hill R, Lavy C. What factors impact on the implementation of clubfoot treatment services in low and middle-income countries?: a narrative synthesis of existing qualitative studies. BMC Musculoskelet Disord. 2018;19(1):72. doi:10.1186/s12891-018-1984-z

11. Akintayo OA, Adegbehingbe O, Cook T, Morcuende JA. Initial program evaluation of the Ponseti method in Nigeria. Iowa Orthop J. 2012;32:141-149.

12. Owen RM, Penny JN, Mayo A, Morcuende J, Lavy CBD. A collaborative public health approach to clubfoot intervention in 10 low-income and middle-income countries: 2-year outcomes and lessons learnt. Journal of Pediatric Orthopaedics B. 2012;21(4):361-365. doi:10.1097/BPB.0b013e3283504006

13. Nogueira MP, Ey Batlle AM, Alves CG. Is it possible to treat recurrent clubfoot with the Ponseti technique after posteromedial release?: a preliminary study. Clin Orthop Relat Res. 2009;467(5):1298-1305. doi:10.1007/s11999-009-0718-9

14. Agarwal A, Kumar A, Mishra M. The foot abduction characteristics following Steenbeek foot abduction brace. J Orthop Surg (Hong Kong). 2017;25(1):2309499016684085. doi:10.1177/2309499016684085

15. Kenis VM, Baindurashvili AG, Shpulev PS, et al. Usefulness and accessibility of information on the treatment of children with congenital clubfoot: results of a survey of parents. Pediatr Traumatol Orthop Reconstr Surg. 2024;12(3):327-334. doi:10.17816/PTORS634027

16. Kumari P, Kalyani VC, Sharma M, Singh V, Prashar AK, Patiyal N. Assess perception, practice and lived experiences on use of corrective braces among parents of children diagnosed with clubfoot: A mixed method study. J Educ Health Promot. 2023;12:270. doi:10.4103/jehp.jehp_1584_22

17. Pavone V, Chisari E, Vescio A, Lucenti L, Sessa G, Testa G. The etiology of idiopathic congenital talipes equinovarus: a systematic review. J Orthop Surg Res. 2018;13(1):206. doi:10.1186/s13018-018-0913-z

18. Changulani M, Garg NK, Rajagopal TS, et al. Treatment of idiopathic club foot using the Ponseti method. Initial experience. J Bone Joint Surg Br. 2006;88(10):1385-1387. doi:10.1302/0301-620X.88B10.17578

19. Smythe T, Owen RM, Aspden A, et al. Global clubfoot treatment in 2023: An overview of advances and outcomes. BMJ Glob Health. 2025;10(3). doi:10.1136/bmjgh-2024-017861

20. Dobbs MB, Rudzki JR, Purcell DB, Walton T, Porter KR, Gurnett CA. Factors Predictive of Outcome After Use of the Ponseti Method for the Treatment of Idiopathic Clubfeet: The Journal of Bone and Joint Surgery-American Volume. 2004;86(1):22-27. doi:10.2106/00004623-200401000-00005

Guideline Question 5.

Casting within 4 weeks of birth

Should infants with idiopathic clubfoot undergo casting within 4 weeks of birth or upon diagnosis as part of initial conservative (non-surgical) management?

Recommendation		Certainty of evidence	Strength of Recommendation
5	We recommend early* initiation of Ponseti treatment once infants are diagnosed with idiopathic clubfoot. ***Remarks:*** *Less than 3 months of age or with a foot size that can fit the smallest available brace.*	⊕◯◯◯ Very Low	Strong

Guideline Panel Considerations

Justification

The panel unanimously voted in favor of early initiation of casting, noting that infant feet are more malleable during the first months of life, which facilitates correction with fewer complications. Earlier treatment allows timely transition to bracing, reduces risk of stigma and parental distress associated with visible deformity, and may positively influence later motor development. Although evidence certainty was very low, the panel judged that the potential benefits of earlier correction and improved adherence outweigh possible risks, such as skin fragility or cast slippage in very young infants.

Implementation Considerations

In current practice, most orthopedic surgeons in the Philippines begin casting within 2–3 weeks of birth, but no later than 3 months of age. Casting younger infants may be technically more challenging due to higher risk of slippage, smaller foot size, and more delicate skin, but these challenges can be addressed with good technique and careful monitoring. Barriers include distance from treatment centers, limited availability of appropriate braces (minimum foot size ~8 cm), and cultural beliefs that discourage early treatment ("too young for casting" or stigma related to deformity). Strategies to improve feasibility and acceptability include educating parents and extended family members (e.g., grandparents), addressing misconceptions, and providing social and financial support for travel and follow-up. Integration into the Expanded Newborn Screening Program provides opportunities for earlier detection, but ensuring timely referral and access to trained providers remains critical.

Key Findings

- **Characteristics of the evidence:** No RCTs were identified. Evidence was derived from 6 non-randomized comparative or cohort studies evaluating the Ponseti method, which combines serial casting, manipulation, Achilles tenotomy when indicated, and foot abduction bracing. Three non-randomized studies compared early (<1 month) versus later (>1 month) treatment initiation.

- **Benefits of casting within 4 weeks:** The risk of having unsuccessful initial correction may be higher among infants treated within 4 weeks; although results for this outcome were inconsistent and very uncertain (one study reported a 2.7-fold higher risk with early treatment, while others showed no difference). Relapse occurred in about 15% of infants overall, with two studies suggesting up to a 2-fold increased risk in those treated before 1 month, largely linked to non-compliance with bracing. Infants treated later required fewer casts (3.7–4.3 vs. 4.5–5.5) and had slightly better ICFSG/Dimeglio severity scores. Some evidence suggested that initiating treatment between 1–3 months, or when foot length is ≥8 cm, may optimize outcomes. Treatment within 4 wks was associated with a 1–2 month delay in independent walking compared to typically developing children, although no studies compared long-term motor function among patients treated early versus later than 4 wks.

- **Harms/risks/complications:** Complications were rare but slightly more frequent with early treatment (6.7% vs. 0%), including cast slippage, blisters, and one case of rocker-bottom deformity. Beyond tenotomy, major surgery was rarely required. Nonetheless, infants treated earlier also exhibited lower brace noncompliance rates compared to those treated later (14.6% vs. 18.5%).

- **Certainty of evidence:** Very low, downgraded for serious risk of bias (uncontrolled confounding), imprecision, and study design limitations inherent to non-randomized studies.

Background

Early casting is commonly recommended for idiopathic clubfoot, but evidence on the optimal timing remains unclear. It is generally believed that manipulation and casting for clubfoot correction should begin as early as possible. Some studies show no difference in recurrence, need for tenotomy, or number of casts when treatment begins before or after 6 months of age. It is uncertain whether starting in the newborn period offers meaningful benefits and influences relapse rates.

Summary of the Evidence

Characteristics of included studies

No RCTs were found specifically comparing the effect of early casting vs. late casting in infants with idiopathic clubfoot. Evidence for this recommendation was based on 3 non-randomized, comparative studies from Portugal (Alves 2009)[1], China (Liu 2018)[2], and Turkey (Iltar 2010)[3]. Additional data were also obtained from 3 other retrospective cohort studies done in the USA (Colburn 2003[4], Zionts 2014[5]) and Italy (Zanardi 2019) to obtain incidence rates for each outcome for infants treated within 4 weeks.[6]

All 6 studies involved the use of casting as part of the Ponseti protocol, which involved weekly serial manipulation, casting using thinly padded plastic[4] / fiberglass[5] / Plaster of Paris[1] / unspecified material[2,3,6], percutaneous Achilles tenotomy for some infants, and foot abduction braces. Follow-up across studies ranged from about 12 months to 8 years, with mean durations between 15.8 and 60 months.

Alves et. al (2009): This study retrospectively reviewed 68 children with 102 idiopathic clubfeet treated by the Ponseti technique. They specifically divided patients into two groups according to their age at the beginning of treatment: Group I (younger than 6 months) and Group II (older than 6 months). The study then compared these groups on outcomes such as the number of casts, tenotomies, initial correction rates, recurrence rates, and the need for tibialis anterior transference or extensive surgery. Follow-up duration was 41.4 months on average.

Liu et al. (2018): This retrospective study focused on whether the age at the start of treatment influences clinical outcomes. They divided 90 children (131 idiopathic clubfeet), all under 6 months at presentation, into three groups based on age at treatment initiation: Group I (younger than 28 days), Group II (between 28 days and under 3 months), and Group III (between 3 and under 6 months). They analyzed differences in casts required, relapse rates, and final ICFSG scores among these age groups. Their findings suggested that initiating treatment between 28 days and 3 months of age (Group II) was associated with fewer casts, a lower relapse rate, and better final ICFSG scores. Follow-up duration was 5 years on average.

Iltar et al. (2010) involved 29 infants (mean age 59 days; 65% were < 1 month old) treated with the Ponseti method and followed up to 2 years of age. Serial casting was done weekly by one surgeon, followed by tenotomy if midfoot Pirani scores indicated correction and external rotation of 15 degrees and bracing. Primary outcome assessed was clubfoot severity, expressed in terms of Pirani and Dimeglio scores, with subgroup analysis for newborns (< 1 mo) and older infants (1-12 months). Other outcomes were relapse rates, number of casts required for correction, complications. Average follow-up was 34 months.

Zanardi et al. (2019) and Zionts et al. (2014) exclusively focus on gross motor development milestones, specifically the age at which children achieve pull-to-standing, cruising, and independent walking. Zionts et al. also investigated how factors like deformity severity and relapse influenced walking age. Colburn 2003 provided data on relapse rates, number of casts, successful correction, and need for posteromedial release surgery on a cohort of 34 infants.

Efficacy outcomes

Rate of unsuccessful initial correction

Correction was considered successful when the foot deformity can be reduced sufficiently to allow bracing, though definitions vary across studies. Dorsiflexion thresholds range from ≥10° vs. ≥15°: two studies define it as 60–70° abduction with <15° dorsiflexion[2,5], while Alves 2009[1] requires ≥15° dorsiflexion plus 70° abduction and proper heel/lateral border alignment for full correction. Liu 2018 does not provide a single explicit definition of “initial correction” , but requires the foot to be ready for a foot abduction orthosis. Colburn and Williams define success mainly by avoiding surgery, with ≥10° dorsiflexion used for final outcomes. Others (e.g., Zanardi) report correction after casting ± tenotomy without clear criteria.

The study by Alves 2009 reported 100% successful correction (n=68) for either early or late treatment initiation.[1] A foot was considered "corrected" when it was clinically possible to achieve at least 15° of dorsiflexion, 70° of abduction, a neutral or slightly valgus heel, and a straight lateral foot border. In contrast, the study by Liu 2018[2] found that the risk for unsuccessful correction was 2x higher for infants treated with Ponseti method (10% for early treatment vs. 8.0% for late; RR 2.67 [95%CI 1.06 to 6.69]). Other cohort studies reported unsuccessful correction rates ranging from 0% to 32.4%.[4-6]

Relapse rate

Relapse was generally defined as recurrence of any clubfoot deformity requiring further treatment, though specific criteria varied (e.g., loss of dorsiflexion[2,5], dynamic supination[1], or noncompliance with bracing[4]. Follow-ups ranged from 1 year[4] to at least 5 years[2], with most relapses reported within 1–5 years after treatment.

Across four studies[1,2,4,5], 31/208 infants (14.9%) experienced relapse. Relapse rates ranged from 8%[1] to 23.3%.[2] Pooled estimates from two NSRIs showed that the risk for relapse was higher for infants treated in the first month (14/107 feet or 13.1%) compared to those treated later (9/95 feet or 9.5%) (RR 1.96 [95%CI 0.78 to 4.88]).[1]

Noncompliance with bracing was cited as the primary cause of relapse[1,2,4,5] with one study estimating 3x higher odds for relapse.[2] Across studies, relapse management most often involved repeat casting and bracing, sometimes with an additional Achilles tenotomy.

Number of casts needed before tenotomy

Based on 5 studies,[1-5] infants who were treated within the first month required an average of 4.5 to 5.5 casts before needing tenotomy. In the comparative study by Liu 2018, infants treated in the first month required a significantly higher number of casts (4.5 ± 1.6 casts) than infants treated between 1-3 months of age (3.7 ± 1.2 casts). Similar results were found by Alves 2009, although did not reach statistical significance (5.3 ± 0.9 casts in infants < 6 mos vs. 4.3 ± 1.2 casts in > 6 mos).

Need for more invasive surgical interventions

Based on 3 studies[2,5,6], a total of 139/150 (92.7%) infants required Achilles tenotomy after casting (range: 84.6% to 94.7%). Tenotomy rates may be higher in infants treated earlier (87.5% of all clubfeet) versus later (83.2%) (RR 1.09 [95%CI 0.97 to 1.22]).[1,2] Alves 2009 also noted higher rates for tibialis anterior transference in the early treatment group (5.2% vs. 4.0% of all clubfeet; RR 1.30 [95%CI 0.15 to 11.1]). No infants required posteromedial release.

Long-term foot function (strength, flexibility, endurance)

No studies compared the outcomes of early versus late initiation of casting on long-term foot function.

The subgroup of clubfoot children treated with the Ponseti method in the comparative study by Zanardi et al. (2019) achieved pull-to-stand at 9.8 (SD 1.5) mos, cruising at 11.3 (1.4), and independent walking at 14.3 (1.6 mos). Sex, severity of presentation, laterality, need for tenotomy did not influence results. However, the study authors excluded infants with relapses in the analysis.

Zionts et al. (2014) also reported significantly more delayed independent walking age (14.5 ± 2.6 mos) in infants receiving early Ponseti treatment (i.e., 28.7 ± 16.8 days), which was 2.4 months later compared to 816 healthy patients (mean 12.1 ± 1.8 mos; $p < 0.001$). The acquisition of motor milestones was not affected by sex, bilaterality, or family history of clubfoot; however, infants who experienced relapse of deformity began walking 1.7 months later than those who did not.

Clubfoot severity after treatment

Liu 2018 reported no difference between infants treated within 1 month or later in terms of their final Dimeglio score (mean 4.3 ± 1.3 for < 1 mo; 4.1 ± 0.8 for 1-3 mo; 4.1 ± 0.6 for 3-6 mo). In terms of ICFSG Scores, all infants exhibited good to excellent scores after Ponseti treatment. However, infants treated between 1-3 months had the lowest (mean 3.9 ± 2.2) compared to < 1 mo (4.6 ± 1.4) and 3-6 mo (6.3 ± 1.1).[2] ICFSG scores 0-5 are considered "excellent" (i.e. near-normal foot morphology or function) while 6–15 are rated "good" (i.e., minor residual deformity or functional limitation).

Iltar 2010 found significantly better clubfoot severity using the Dimeglio scoring system in infants treated at 1-12 months (mean 4 [range 4-5]) compared to < 1 month (mean 5 [range 4-7]).[3] Dimeglio scores of 0-5 are classified as "very mild" deformity, while 6-10 are "mild." Additionally, better Dimeglio scores were noted in infants who had ≥ 8 cm at the beginning of treatment (mean 4 [range 4-5]) compared to those with < 8 cm foot length (mean 5 [range 4-7]).

Safety outcomes

Complications

Based on 2 NSRIs, the rate of complications may be higher in infants treated within 4 weeks (6.7% vs. 0%; RR 7.36 [95%CI 0.95 to 57.0]). These include 1 case of rocker bottom deformity, 1 blister due to cast, 2 blisters due to bracing, and 4 cast slippages. Nonetheless, infants treated earlier also exhibited lower brace noncompliance rates compared to those treated later (14.6% vs. 18.5%; RR 0.78 [95%CI 0.34 to 1.77]).

Table Q5.1. GRADE Summary of Fundings: Benefits and risks of casting within 4 weeks of birth or upon diagnosis as part of initial conservative (non-surgical) management compared to casting > 4 weeks for infants with idiopathic clubfoot.

Outcome № of participants (studies)	Relative effect (95% CI)	Anticipated absolute effects (95% CI)			Certainty	Interpretation
		[LATE] casting > 4 wks	[EARLY] casting w/in 4 wks	Difference		
Rate of unsuccessful initial correction assessed with: deformity reduction sufficient for non-surgical management and bracing follow-up: range 30 months to 8 years № of participants: 168 (2 non-randomised studies)	**RR 2.67** (1.06 to 6.69)	**8.0%** 7/88	**10.0%** 8/80	**133 more** (5 more to 453 more)	⊕◯◯◯ Very low	Casting < 1 mo may result in more cases with unsuccessful initial correction; but this effect is very uncertain.
Rate of relapse / recurrence of deformity assessed with: varied criteria (e.g., loss of dorsiflexion, dynamic supination, or noncompliance with bracing) follow-up: range 30 months to 8 years № of participants: 202 (2 non-randomised studies)	**RR 1.96** (0.78 to 4.88)	**9.5%** 9/95	**13.1%** 14/107	**91 more** (21 fewer to 368 more)	⊕◯◯◯ Very low	Casting < 4 wks may result in more relapses; but this effect is very uncertain.
Number of casts before tenotomy № of participants: (2 non-randomised studies)	Infants treated in the first month required more casts than those treated later (Liu 2018: 4.5 ± 1.6 vs. 3.7 ± 1.2; Alves 2009: 5.3 ± 0.9 vs. 4.3 ± 1.2, NS).				⊕◯◯◯ Very low	Casting < 4 wks may result in more casts; but this effect is very uncertain.
Need for tenotomies follow-up: range 30 months to 8 years № of participants: 233 (2 non-randomised studies)	**RR 1.09** (0.98 to 1.22)	**83.2%** 94/113	**87.5%** 105/120	**75 more** (17 fewer to 183 more)	⊕◯◯◯ Very low	Casting < 1 mo may result in more tenotomies; very uncertain.
Need for posteromedial release follow-up: range 30 months to 61 months № of participants: 102 (1 non-randomised study)	not estimable	**0%** 0/25	**0%** 0/77	**0 fewer** (0 fewer to 0 fewer)	⊕◯◯◯ Very low	Inconclusive
Need for tibialis anterior transference follow-up: range 30 months to 61 months № of participants: 102 (1 non-randomised study)	**RR 1.30** (0.15 to 11.09)	**4.0%** 1/25	**5.2%** 4/77	**12 more** (34 fewer to 404 more)	⊕◯◯◯ Very low	Casting < 1 mo may result in more TAT; very uncertain.

Complications: brace non-compliance follow-up: range 20 to 8 years № of participants: 129 (2 non-randomised studies)	**RR 0.78** (0.34 to 1.77)	**18.5%** 15/81	**14.6%** 7/48	**41 fewer** (122 fewer to 143 more)	⊕◯◯◯ Very low	Casting < 1 mo may result in fewer cases of brace non-compliance; very uncertain.
Complications: other **assessed with: cast slippage, blisters** follow-up: range 30 months to 8 years № of participants: 233 (2 non-randomised studies)		**0%** 0/113	**6.7%** 8/120	**27.9 more** (0 fewer to 245 more)	⊕◯◯◯ Very low	Casting < 1 mo may result in more cast slippage and blisters; very uncertain.
Independent walking assessed with: age at which child can walk 10 steps without support follow-up: range 10 months to 48 months № of participants: (2 non-randomised studies)	**No data comparing outcomes of early vs late casting.** Children treated with the Ponseti method achieved pull-to-stand at 9.8 ± 1.5 months, cruising at 11.3 ± 1.4, and walking at 14.3 ± 1.6 months (Zanardi 2019), while early-treated infants walked **2.4 months later** than healthy controls (14.5 ± 2.6 vs. 12.1 ± 1.8 months; p < 0.001), with relapses adding a further **1.7-month delay** (Zionts 2014).				⊕◯◯◯ Very low	Inconclusive
Clubfoot severity after treatment assessed with: ICFSG score, Dimeglio score, or Pirani score follow-up: range 30 months to 8 years № of participants: (2 non-randomised studies)	Liu 2018 found no difference in final Dimeglio scores across treatment ages (<1 mo: 4.3 ± 1.3; 1–3 mo: 4.1 ± 0.8; 3–6 mo: 4.1 ± 0.6), while ICFSG scores were best for 1–3 mo (3.9 ± 2.2) compared to <1 mo (4.6 ± 1.4) and 3–6 mo (6.3 ± 1.1), all within good–excellent range. Iltar 2010 reported better Dimeglio scores for treatment at 1–12 mo (mean 4) vs <1 mo (mean 5), and in infants with ≥8 cm foot length (mean 4) vs <8 cm (mean 5).				⊕◯◯◯ Very low	Casting < 4 wks may result in slightly higher (worse) clubfoot severity scores; but this effect is very uncertain

CI: confidence interval; **RR:** risk ratio

Certainty of the Evidence

Overall certainty of evidence is very low. Due to the inherent study design limitations associated with NSRIs, the initial certainty of evidence was low. Further downgrading was done due to serious risk of bias in the included studies, inconsistency in the direction of effect (e.g., rates of unsuccessful initial correction), imprecision (e.g., complication rates, relapse rates, tenotomy rates). Specific issues increasing study risk of bias include the following: confounding bias related to not being able to match groups in terms of previous treatment received or clubfoot severity (Alves 2009) or due to unmeasured confounding (Liu 2018), selection bias due to the inclusion of patients with previous tenotomy (Alves 2019) or significant number of patients lost to follow-up or due to relapse (Liu 2018).

Other Considerations

Resource implications

No economic evaluation studies were found related to the topic.

Stakeholder values, preferences, and acceptability

Parents strongly preferred semirigid fiberglass over plaster for infant serial casting, citing greater durability, convenience, and faster removal (21 vs. 55 minutes). Complication rates were similar, with 94% favoring fiberglass.[7]

A retrospective chart review of 75 patients treated at the PGH Clubfoot Clinic showed that despite being detectable at birth, over half of patients present after one year, reflecting barriers such as limited healthcare access, poor health-seeking behavior, and social stigma.[8] These delays contribute to abnormal ambulation and related sequelae. Other barriers to clubfoot care in LMICs include challenges with brace/cast care and gaps in provider skills.[9]

References (Q5)

1. Alves C, Escalda C, Fernandes P, Tavares D, Neves MC. Ponseti method: does age at the beginning of treatment make a difference? Clin Orthop Relat Res. 2009;467(5):1271-1277. doi:10.1007/s11999-008-0698-1

2. Timing for Ponseti Clubfoot Management: Does the Age Matter? 90 Children (131 Feet) with a Mean Follow-up of 5 Years. Vol 89.; 2018. doi:10.1080/17453674.2018.1526534

3. Iltar S, Uysal M, Alemdaroğlu KB, Aydoğan NH, Kara T, Atlihan D. Treatment of clubfoot with the Ponseti method: should we begin casting in the newborn period or later? J Foot Ankle Surg. 2010;49(5):426-431. doi:10.1053/j.jfas.2010.06.010

4. Colburn M, Williams M. Evaluation of the treatment of idiopathic clubfoot by using the Ponseti method. The Journal of Foot and Ankle Surgery. 2003;42(5):259-267. doi:10.1016/S1067-2516(03)00312-0

5. Zionts LE, Packer DF, Cooper S, Ebramzadeh E, Sangiorgio S. Walking age of infants with idiopathic clubfoot treated using the ponseti method. J Bone Joint Surg Am. 2014;96(19):e164. doi:10.2106/JBJS.M.01525

6. Zanardi A, Fortini V, Abati CN, et al. Standing and walking age in children with idiopathic clubfoot: French physiotherapy versus Ponseti method. Journal of Children's Orthopaedics. 2019;13(5):471-477. doi:10.1302/1863-2548.13.190097

7. Coss HS, Hennrikus WL. Parent Satisfaction Comparing Two Bandage Materials Used During Serial Casting in Infants. Foot Ankle Int. 1996;17(8):483-486. doi:10.1177/107110079601700809

8. Eusebio, IDD, Sumpaico, CEJ. Results of Ponseti casting for clubfoot in a tertiary public hospital. Acta Medica Philippina. 2021;55(3):315-321.

9. Johnson RR, Friedman JM, Becker AM, Spiegel DA. The Ponseti Method for Clubfoot Treatment in Low and Middle-Income Countries: A Systematic Review of Barriers and Solutions to Service Delivery. J Pediatr Orthop. 2017;37(2):e134-e139. doi:10.1097/BPO.0000000000000723

Guideline Question 6.

Percutaneous tenotomy following Ponseti casting

Should percutaneous tenotomy be performed in those eligible following completion of Ponseti casting among patients with idiopathic clubfoot?

Recommendations		Certainty of evidence	Strength of Recommendation
6.1	We recommend doing percutaneous tenotomy following completion of Ponseti casting among patients with idiopathic clubfoot who meet all the following clinical indications: (5) inability to achieve ankle dorsiflexion of at least 15°, (6) fully covered lateral head of the talus; (7) foot abduction of at least 50°; (8) heel in neutral or valgus.	⊕⊕◯◯ Low	Strong
6.2	If the patient is able to achieve at least 15 degrees of ankle dorsiflexion and fulfills criteria (2) to (4), the patient may proceed with bracing but with close follow-up. If the aforementioned criteria are not met, the patient should be re-evaluated.	None	Good Practice Statement

Guideline Panel Considerations

Justification

The panel unanimously supported tenotomy in eligible cases, judging that the benefits in achieving full correction and reducing relapse outweigh the risks. Evidence, although of low certainty, suggests tenotomy improves Pirani hindfoot scores, increases dorsiflexion, and reduces relapse compared with continued casting alone. The procedure is minimally invasive, can be done under local anesthesia in an outpatient setting, and may reduce the need for future open surgery. Risks are generally low but must be mitigated by strict adherence to indications and proper training.

Subgroup Considerations

Percutaneous tenotomy is most effective in children under 2 years of age, consistent with the original Ponseti protocol, although its effectiveness in older children remains uncertain and open tenotomy may be required for syndromic or complex cases. Not all patients with clubfoot need tenotomy; it is only indicated for those with residual equinus deformity despite adequate casting. For younger patients, the percutaneous approach is generally less traumatic and easier to perform, while older children and those with recurrent deformities may require open procedures.

Implementation Considerations

Tenotomy should only be performed by pediatric orthopedic surgeons or adequately trained physicians, while non-specialist surgeons are considered only under supervision. Training in Ponseti-specific techniques is ongoing

under the Philippine National Clubfoot Program, and this recommendation highlights the need to expand training and mentorship. While casting can be delegated to paramedical staff, tenotomy requires surgical skill and structured training. Clear communication with families is critical, as parental concerns about invasiveness often reduce acceptance. Using analogies (e.g., "like ear piercing"), visual aids, and explanations in the local language can improve acceptability.

Resource and Equity Considerations

Tenotomy is relatively low-cost, can be performed in outpatient settings, and avoids expenses linked to operating room use and general anesthesia. Although no Philippine-specific cost-effectiveness studies were identified, international data suggest that tenotomy reduces the likelihood of later surgery by 30–50%. Main financial barriers for families include transport and material costs (casts and braces). Access is also limited by the uneven distribution of trained providers, particularly in rural and geographically isolated areas. Feasibility is enhanced by the procedure's minimal equipment needs and potential for satellite clinics, but sustainability requires investment in provider training, referral systems, and local brace supply chains.

Stakeholder Values and Preferences

Families prefer needle over scalpel tenotomy due to perceived safety and simplicity, and appreciate outpatient same-day correction. Parents place a high value on clear, culturally appropriate explanations. Providers favor outpatient procedures, standardized protocols, refresher training, and objective criteria to guide tenotomy decisions.

Research Priorities

Evidence gaps include the effectiveness of percutaneous tenotomy in older children, long-term relapse outcomes by age group, and local cost-effectiveness analyses in the Philippine setting.

Key Findings

- **Characteristics of the evidence:** Two observational studies comprising 1,184 clubfeet in 791 patients with untreated idiopathic clubfoot who underwent Ponseti treatment with a minimum of 2 years follow-up. Studies included patients under 3 months of age, with 70% (826 feet) receiving initial heel cord tenotomy and 30% (358 feet) achieving correction without initial tenotomy.
- **Benefits and risks:** Percutaneous tenotomy may improve treatment outcomes among patients eligible after completion of Ponseti casting, potentially increasing successful correction, improving hindfoot Pirani scores, and increasing ankle dorsiflexion and Achilles tendon length. Late tenotomy may reduce relapse probability compared to no tenotomy, though uncertainty remains regarding effects on residual deformity and whether initial tenotomy affects recurrence rates.
- **Certainty of the evidence:** Low for all outcomes due to observational study design and risk of bias. There were no studies found on long-term functional outcomes, health-related quality of life, gait function and mobility, and adverse events related to anesthesia.

Background

Achieving complete correction with the Ponseti method often requires addressing residual equinus deformity through percutaneous Achilles tenotomy, a minimally invasive procedure that involves surgical division of the Achilles tendon to allow adequate ankle dorsiflexion.[5] However, significant variations in clinical practice exist,

with tenotomy rates ranging from 40% to over 90% among different practitioners and institutions.[6] While some clinicians routinely perform tenotomy as part of the standard Ponseti protocol, others attempt to achieve correction through additional casting alone, leading to uncertainty about optimal management strategies.[7]
Recent evidence suggests that initial tenotomy may reduce the need for subsequent surgical interventions by 30-50% and improve long-term outcomes, particularly in patients with severe deformities (Dimeglio scores ≥13), yet practice patterns remain inconsistent.[6,8] Additionally, emerging concerns about long-term tendon integrity and potential complications in adolescent athletes previously treated with tenotomy highlight the need for evidence-based guidance on when this intervention should be performed to optimize the benefit-harm ratio in clubfoot management. [9,10]

Summary of the Evidence

Characteristics of included studies

Two observational studies including 1,206 patients (1,400 feet) with idiopathic clubfoot treated using the Ponseti method. The evidence consisted of one large retrospective cohort study (Cao et al., 2025) with 1,184 clubfeet examining long-term outcomes of percutaneous heel cord tenotomy versus casting alone, and one smaller prospective observational study (Chandirasegaran et al., 2019) with 50 clubfeet that incorporated ultrasonographic assessment of Achilles tendon healing alongside clinical outcomes.

Both studies focused on infants under 3 months of age with idiopathic clubfoot, comparing patients who underwent percutaneous tenotomy for residual equinus (typically when ankle dorsiflexion was <15°) versus those achieving correction through casting alone. The studies employed different outcome measures including clinical assessment using Pirani or Dimeglio scoring systems, functional outcomes via the Richards classification, need for additional procedures, and objective ultrasonographic evaluation of tendon morphology and healing, providing both short-term biological insights and long-term clinical effectiveness data.

Efficacy outcomes

Successful correction (2 studies, N=1,726, low certainty)

Percutaneous tenotomy demonstrated superior rates of successful correction compared to no initial tenotomy, with pooled results showing OR 1.85 (95% CI 1.09-3.13) favoring tenotomy when compared to no tenotomy, and OR 3.02 (95% CI 1.52-6.00) when comparing no tenotomy to late tenotomy groups. The certainty of evidence was rated as low due to the observational study design and potential confounding factors.

Recurrence/relapse requiring further intervention (1 study, N=1,726, low certainty)

The evidence showed conflicting results regarding recurrence rates. Initial tenotomy versus no tenotomy showed OR 1.22 (95% CI 0.97-1.53), suggesting inconclusive evidence, while comparison of no tenotomy versus late tenotomy demonstrated OR 0.015 (95% CI 0.006-0.041) favoring no tenotomy for reducing recurrence risk. The certainty of evidence was low due to observational study design and potential selection bias.

Improvement in hindfoot Pirani score (1 study, N=50, low certainty)

The tenotomy group showed marked improvement in hindfoot correction with a mean improvement of 96.67% (SD 9.62) compared to 63.73% (SD 13.18) in the non-tenotomy group, representing a mean difference of 32.94% higher improvement (95% CI 26.36-39.52) favoring tenotomy. The certainty of evidence was low due to the small sample size and observational design.

Increase in ankle dorsiflexion (1 study, N=50, low certainty)

Patients undergoing tenotomy achieved significantly greater ankle dorsiflexion with a mean of 44.20° (SD 11.87) compared to 7.60° (SD 4.36) in the casting-alone group, yielding a mean difference of 36.6° higher dorsiflexion (95% CI 31.45-41.75) favoring tenotomy. The certainty of evidence was low due to study limitations and small sample size.

Increase in length of Achilles tendon (1 study, N=50, low certainty)

Ultrasonographic assessment demonstrated that patients undergoing tenotomy achieved significantly greater increase in Achilles tendon length with a mean of 0.38 cm (SD 0.10) compared to 0.18 cm (SD 0.08) in the casting-alone group, representing a mean difference of 0.20 cm greater lengthening (95% CI not specified) favoring tenotomy. This objective measurement provided biological evidence supporting the clinical findings of improved dorsiflexion and hindfoot correction.

Residual deformity after treatment completion (1 study, N=542, low certainty)

There was inconclusive evidence regarding residual deformity as measured by Dimeglio score, with a mean difference of 2 points higher in the tenotomy group (95% CI 8.97 lower to 12.97 higher), indicating no significant difference between groups. The certainty of evidence was low due to wide confidence intervals and study limitations.

Table Q6.1. GRADE Summary of Findings: Percutaneous tenotomy versus no tenotomy.

Outcomes	Basis	Effect on Intervention (tenotomy)	Effect on Control (no tenotomy)	Effect Estimate	95% Confidence Interval	Interpretation	Certainty of Evidence
Successful correction - Good- plantigrade foot with or without need for a later or repeat Achilles tenotomy							
no tenotomy vs initial tenotomy	1 observational study n=1184	869 per 1,000 (796 to 918)	782 per 1,000	OR 1.85	(1.09 to 3.13)	Favors tenotomy	⊕⊕◯◯ Low
no tenotomy vs late tenotomy	1 observational study n=542	775 per 1,000 (634 to 872)	533 per 1,000	OR 3.02	(1.52 to 6.00)	Favors tenotomy	⊕⊕◯◯ Low
Recurrence/relapse requiring further intervention (additional procedure)							
no tenotomy vs initial tenotomy	1 observational study n=1184	459 per 1,000 (403 to 516)	411 per 1,000	OR 1.22	(0.97 to 1.53)	Inconclusive?	⊕⊕◯◯ Low
no tenotomy vs late tenotomy	1 observational study n=542	10 per 1,000 (4 to 28)	411 per 1,000	OR 0.015	(0.006 to 0.04)	Favors no tenotomy	⊕⊕◯◯ Low
Residual deformity after initial treatment completion (Demiglio score)	1 observational study n=1184	14 (95% CI 4-20)	12 (95% CI 4-19)	MD 2 higher	(8.97 lower to 12.97 higher)	inconclusive	⊕⊕◯◯ Low
Improvement in hindfoot Pirani score	1 observational study n=50	Mean 96.67 SD 9.62	63.73 SD 13.18	MD 32.94 % higher	(26.36 higher to 39.52 higher)	Favors tenotomy	⊕⊕◯◯ Low
Increase in ankle dorsiflexion	1 observational study (n=50)	44.20 SD 11.87	7.60 SD 4.36	MD 36.6 degrees higher	(31.45 higher to 41.75 higher)	Favors tenotomy	⊕⊕◯◯ Low
Increase in length of Achilles tendon (cm)	1 observational study (n=50)	Mean 0.38 SD 0.10	Mean 0.18 0.08	MD 0.2 cm higher	(0.15 higher to 0.25 higher)	Favors tenotomy	⊕⊕◯◯ Low

Certainty of the Evidence

The overall certainty of evidence was rated as low across all critical outcomes due to fundamental methodological limitations in both included studies. Key issues identified during quality appraisal included the observational study designs (lacking randomization), significant risk of selection bias from non-randomized treatment allocation with notable provider practice variation (tenotomy rates 40-90%), imprecision from small sample sizes and wide confidence intervals, and inconsistency in recurrence outcomes across different comparison groups.

Other Considerations

Resource implications

No cost-effectiveness studies specific to percutaneous Achilles tenotomy versus casting alone were identified. Initial heel cord tenotomy decreased likelihood of additional surgical procedures by 30-50%[6], potentially resulting in cost savings by avoiding later open surgical interventions. The procedure can be performed in an outpatient setting with local anesthesia, avoiding costs associated with operating room time and general anesthesia. In the Philippines, potential financial barriers may include transportation costs and treatment material expenses (e.g., casting supplies and braces).

Stakeholder values, preferences, and acceptability

Patients and families prefer needle tenotomy over scalpel techniques due to fewer complications and the ability to perform the procedure in an outpatient setting. Additional preferences include accelerated casting protocols to reduce clinic visits, same-day problem resolution, and clear explanations using visual aids in the local language.[11]

Healthcare providers favor outpatient procedures, emphasize the need for adequate training and refresher courses, support standardized protocols to reduce practice variation, and value objective criteria to guide tenotomy decisions.[11] No studies were identified that specifically assessed the acceptability of tenotomy versus casting alone in the Philippine setting.

Equity and feasibility

Several studies have identified barriers to implementation that may contribute to inequities in care. These include limited geographic access, with transportation costs and travel distance being the most frequently reported obstacles; shortages of trained providers, particularly in rural areas; the cost of treatment materials; cultural stigma and misconceptions; and poor brace adherence related to discomfort.

Reported facilitators include the ability to perform tenotomy in outpatient settings without the need for general anesthesia, opportunities for task-shifting to trained non-physician providers, establishment of satellite clinics, provision of transportation subsidies, and development of local brace manufacturing programs.[11]

Overall feasibility is supported by the minimal equipment required and the ability to deliver care in basic clinic settings. Nonetheless, adequate provider training and robust follow-up systems remain critical to successful implementation across diverse healthcare settings in the Philippines.

References (Q6)

1. Wallander H, Hovelius L, Michaelsson K. Incidence of congenital clubfoot in Sweden. Acta Orthop. 2006;77:847-852.

2. Besselaar AT, Kamp MC, Reijman M, van der Steen M. Incidence of congenital idiopathic clubfoot in the Netherlands. J Pediatr Orthop B. 2018;27:563-567.

3. Ponseti IV. Treatment of congenital club foot. J Bone Joint Surg Am. 1992;74:448-454.

4. Radler C. The Ponseti method for the treatment of congenital club foot: Review of the current literature and treatment recommendations. Int Orthop. 2013;37:1747-1753.

5. Scher DM, Feldman DS, van Bosse HJ, Sala DA, Lehman WB. Predicting the need for tenotomy in the Ponseti method for correction of clubfeet. J Pediatr Orthop. 2004;24:349-352.

6. Cao L, Parenti S, Jo CH, Riccio AI. Is percutaneous heel cord tenotomy a necessary component in the Ponseti treatment of idiopathic clubfoot deformity? J Pediatr Orthop B. 2025;34:157-161.

7. Chandirasegaran S, Gunalan R, Aik S, Kaur S. A comparison study on hindfoot correction, Achilles tendon length and thickness between clubfoot patients treated with percutaneous Achilles tendon tenotomy versus casting alone using Ponseti method. J Orthop Surg. 2019;27:2309499019839126.

8. Dobbs MB, Rudzki JR, Purcell DB, et al. Factors predictive of outcome after use of the Ponseti method for the treatment of idiopathic clubfeet. J Bone Joint Surg Am. 2004;86:22-27.

9. Pedrotti L, Bertani B, Tuvo G, et al. Ultrasonic Evaluation of the Achilles Tendon in Patients Treated for Congenital Clubfoot: Comparison between Patients Treated with Plaster Alone, Achilles Tenotomy, and Z-Plasty Lengthening. Children. 2024;11:580.

10. Egger AC, Levine AD, Mistovich RJ. Acute Rupture of Achilles Tendon in an Adolescent with a History of Ponseti Casting and Achilles Tenotomy: A Case Report. JBJS Case Connect. 2019;9:e0197.

11. Johnson RR, et al. The Ponseti Method for Clubfoot Treatment in Low and Middle-Income Countries: A Systematic Review of Barriers and Solutions to Service Delivery. J Pediatr Orthop 2016.

Guideline Question 7.

Outpatient percutaneous tenotomy

Should outpatient percutaneous tenotomy be offered as an alternative to operating room-based tenotomy in patients with clubfoot?

Recommendations		Certainty of evidence	Strength of Recommendation
7.1	We recommend doing percutaneous Achilles tenotomy under local anesthesia. However, general anesthesia may be considered for children over six months of age or at the discretion of the surgeon.	⊕◯◯◯ Very Low	Strong
7.2	Performing successful outpatient percutaneous Achilles tenotomy under local anesthesia requires proper pre-operative counseling, adequate training of the surgical team, and an adequately equipped facility.	None	Good Practice Statement

Guideline Panel Considerations

Justification

The panel issued a strong recommendation in favor of offering outpatient percutaneous Achilles tenotomy as an alternative to operating room–based tenotomy for patients with idiopathic clubfoot. This was based on evidence showing equivalent results between outpatient and operating room settings, combined with practical advantages and strong caregiver acceptability.

Panelists highlighted that outpatient tenotomy requires less resources, is associated with fewer complications, and is easier and faster to schedule compared to operating room procedures. Avoiding OR backlogs also reduces the risk of prolonged casting, which can compromise outcomes if correction is delayed. These operational efficiencies were considered highly relevant in local contexts with limited surgical capacity.

The panel emphasized that parents and caregivers generally prefer outpatient procedures, especially under local anesthesia, as these are perceived as less invasive and less burdensome than an “operation” under general anesthesia. However, they also stressed the importance of framing: when described as “surgery,” many mothers become fearful and may withdraw consent. Reassuring communication and repackaging the way tenotomy is explained were seen as key to promoting acceptance and adherence.

Patient safety was underscored. While most infants and young children are good candidates for outpatient procedures, combative or uncooperative children—regardless of age—may be safer under sedation in an operating room. In this regard, the panel endorsed the wording of the British Orthopaedic Association, which recommends that primary tenotomy be performed under local anesthesia, with general anesthesia considered for children over six months of age or at the discretion of the surgeon. The panel found this formulation useful because it allows flexibility without restricting clinician judgment.

In conclusion, the panel determined that outpatient tenotomy delivers equivalent results with fewer complications, requires fewer resources, is easier to schedule, and aligns with caregiver preferences, while still allowing for operating room–based procedures in select cases where safety or cooperation is a concern.

Key Findings

- **Characteristics of the evidence:** No RCTs compared outpatient-based tenotomy as an alternative to OR-based tenotomy. The available evidence comes from 3 retrospective cohort studies including 711 infants with idiopathic clubfoot, which compared outpatient-based Achilles tenotomy performed under local anesthesia in the clinic with operating room–based Achilles tenotomy performed under general anesthesia.
- **Benefits and risks:** Results suggest similar complication rates and need for repeat tenotomy between the two settings, with no serious adverse events reported. No evidence was available on longer-term functional outcomes or on patients with syndromic or neuromuscular clubfoot.
- **Certainty of the evidence:** Very low mainly due to the observational design, small sample sizes, and very wide confidence intervals leading to serious imprecision.

Background

In 80–90% of children, correction requires an Achilles tenotomy to address persistent equinus deformity. However, practice varies across centers regarding the setting of the procedure (clinic vs. operating room) and the type of anesthesia used. General anesthesia (GA) is widely practiced, offering reliable analgesia, good procedural control, and the option for mini-open techniques to reduce the risk of neurovascular injury. However, concerns remain about the potential long-term effects of GA in infants, and resource demands are considerable.

Alternatives, such as sedation protocols (e.g., propofol), have been shown to be safe and effective, thereby avoiding airway instrumentation. Conversely, evidence supports the safety and effectiveness of performing tenotomy under local anesthesia (LA) in outpatient settings, with studies showing low complication and readmission rates, and no significant difference in recurrence compared to GA. Advantages of LA include lower cost, reduced caregiver separation, and avoidance of pre-procedure fasting—factors particularly relevant in high-volume, resource-limited settings. This variation in practice, alongside uncertainties regarding long-term safety and resource use, justifies the prioritization of this guideline question.[1]

Summary of the Evidence

Characteristics of included studies

We identified three observational cohort studies that directly compared outpatient-based versus operating room–based percutaneous Achilles tenotomy among infants with idiopathic clubfoot. These studies included a total of 711 patients (comprising over 900 feet). All were retrospective in design, conducted between 2013 and 2018, and evaluated short- to medium-term outcomes following Achilles tenotomy performed as part of the Ponseti method of clubfoot correction. The included populations were infants with idiopathic congenital clubfoot; patients with syndromic or neuromuscular etiologies were excluded. The mean age at the time of tenotomy ranged from 1.5 to 12 weeks, with both unilateral and bilateral cases represented. One study was multicenter and U.S.-based[4], one study was from New Zealand[2], and one from Turkey[3].

The intervention across studies was percutaneous Achilles tenotomy performed in the outpatient clinic setting under local anesthesia or topical anesthetic cream. In contrast, the comparator was the same procedure

performed in the operating room under general anesthesia, sometimes with inpatient admission for observation. While the surgical technique was broadly consistent (percutaneous release), the type of anesthesia, perioperative monitoring, and hospital protocols varied across studies. The outcomes assessed included perioperative complications (e.g., bleeding, infection, casting issues, neurological deficit), need for repeat tenotomy, recurrence of deformity, parental satisfaction, and cost analyses. Across the three studies, no serious adverse events were reported. Long-term functional outcomes (e.g., gait, pain, quality of life) were not evaluated, and no studies included non-idiopathic or syndromic populations. An important difference across the included studies was sample size and scope: the Hedrick multicentre analysis contributed the majority of patients and focused primarily on cost and complication rates, while Agius and Tuhanioğlu provided more detailed clinical follow-up on recurrence and parental perspectives but had smaller cohorts.

Efficacy outcomes

Repeat tenotomy (2 cohort studies, N = 144, very low certainty)

Two observational studies found no significant difference in the need for repeat tenotomy between outpatient-based and operating room–based procedures (OR 3.13, 95% CI 0.32, 30.80, I^2 = 0%). The overall certainty of the evidence is very low, downgraded due to imprecision and study design limitations.

Safety outcomes

Complications (3 cohort studies, N = 711, very low certainty)

Three observational studies comparing outpatient-based versus operating room–based percutaneous Achilles tenotomy found no significant difference in the proportion of patients who developed complications (OR 0.60, 95% CI 0.14, 2.65, I^2 = 13%). While the pooled estimate suggests outpatient procedures may have fewer complications, the confidence interval is wide and compatible with both potential benefit and harm. Reported complications were generally minor, including casting issues, minor bleeding, and parental concerns. No serious adverse outcomes such as infection, neurological deficit, or severe bleeding were reported. The overall certainty of the evidence is very low, downgraded due to serious imprecision and observational study design.

Table Q7.1. GRADE Summary of Findings: Outpatient or Office-based tenotomy as an alternative versus OR- or theater-based tenotomy.

Critical Outcomes	Basis	Effect estimate	95% CI	Interpretation	Certainty of evidence
Repeat tenotomy	2 cohort studies (N = 144)	OR 3.13	0.32 to 30.80	Inconclusive	⊕◯◯◯ Very Low[a,b]
Complications	3 cohort studies (N = 711)	OR 0.60	0.14 to 2.65	Inconclusive	⊕◯◯◯ Very Low[a,b]
*casting issues, complications of infection, bleeding or neurological deficit. [a] serious RoB; [b] serious imprecision					

Certainty of the Evidence

All three included studies were retrospective observational cohort studies, which start at a lower certainty of evidence compared with randomized controlled trials. The study by Agius et al.[2] had a moderate risk of bias due to allocation by surgeon preference, lack of blinding in outcome assessment, and incomplete parental survey responses. Tuhanioğlu et al.[3] was judged to have low to moderate risk of bias, with potential residual confounding

from unmeasured factors such as brace compliance. Hedrick et al.[4] had low risk of bias overall, benefitting from a large multicenter design and complete hospital record review, but was limited by lack of long-term follow-up on recurrence outcomes.

Across outcomes, the certainty of evidence was downgraded further for serious imprecision because of small sample sizes, few events, and very wide confidence intervals spanning both potential benefit and harm.

Taken together, the overall certainty of the evidence was rated very low, primarily due to observational study design and serious imprecision in the effect estimates.

Other Considerations

Resource implications

Across the included evidence, shifting Achilles tenotomy from the OR under GA to an outpatient/clinic setting under LA consistently reduces resource use and cost. The 2022 systematic review concludes that OPD LA tenotomy is safe, with similar success and complication rates to OR GA, and mentions that it was cost-effective with similar success rates, citing markedly lower hospital charges when performed as an outpatient procedure.

A single-centre analysis referenced in the service evaluation from St George's (UK) quantified savings of roughly US$4,122 per case when the procedure was performed in clinic rather than theatre, alongside shorter total event time; cumulatively this also frees scarce theatre lists for other cases. Beyond direct costs, the clinic pathway reduces indirect costs: there is no pre-operative fasting or anesthetic fitness work-up, less separation time for carers and child, and (in the UK experience) avoidance of pre-/post-op inpatient time and COVID-related isolation requirements—factors that translate to fewer lost workdays and less logistics burden for families and services.

While the included studies are outside the Philippines, the main cost drivers (OR time, anesthesia team, theatre supplies, pre-admission processes) are analogous in local settings; thus, the direction of effect (OPD LA being less costly and more efficient) is likely transferable. For local decision-making, unit prices should be obtained from (a) a DOH hospital (e.g., PGH or a regional medical center) and (b) a private tertiary hospital to present a Philippine government–private range for: professional fees, OR charges, anesthesia fees/medications, outpatient procedural room fees, consumables, and post-procedure analgesia. In the absence of Philippine economic evaluations in the included evidence, reporting these local unit costs and computing the regimen total (i.e., single tenotomy event within the Ponseti pathway) will provide insights into the resources required.

Stakeholder values, preferences, and acceptability

Parents/carers: In the prospective UK service evaluation (clinic LA pathway), all parents reported a positive overall experience; 96–99% felt less anxious with clinic LA than theatre GA; none preferred theatre; and only 2 parents suggested being present during the procedure as a desirable change. These findings indicate high acceptability of the OPD LA pathway to families.

Clinicians/services: The systematic review notes that many surgeons (particularly during COVID-19) preferred to avoid GA when feasible and perform tenotomy in OPD under LA to reduce aerosol-generating procedures and logistical burden—again supporting acceptability among providers.

Policy/funders: The combination of similar outcomes and lower resource use with OPD LA supports payer and hospital preferences for clinic-based delivery, especially where theatre capacity is constrained.

Equity and feasibility

In the UK service evaluation, the shift to an outpatient clinic pathway was supported by the development of a structured standard operating procedure (SOP) covering infection control, anaphylaxis/bleeding response, staffing, and consultant oversight with physiotherapy support. This enabled safe delivery in a non-theatre setting, with all infants achieving ≥15° dorsiflexion and no complications or readmissions. Drawing from this, the Philippine context would benefit from adopting a similar SOP to ensure safe scale-up in outpatient clinics.
Studies have shown that clinical outcomes and complication rates are comparable between outpatient local anesthesia and theatre-based general anesthesia. When bleeding occurred, it was managed effectively with local pressure, and infections were not reported. This suggests that the outpatient approach is not only feasible but can be safely implemented when basic safeguards are in place.

Experience from other centers demonstrated that moving eligible cases to the clinic helped decongest operating rooms during periods of high demand, particularly in the pandemic. This reallocation of resources freed theatre lists for more complex procedures—a system-level benefit that would also be relevant in Philippine government hospitals where OR access is often a bottleneck.

Addressing potential barriers

International reports also highlighted challenges such as uncontrolled bleeding or incomplete release. These were mitigated by ensuring readiness with proper instruments, emergency response plans, and clinician expertise. Replicating these safety nets will be essential in the local rollout.

Practical issues like child agitation or bilateral procedures were encountered in other programs. Centres addressed these with topical anaesthetic, swift technique, support from trained assistants, and brief observation after the procedure. Embedding these measures in local practice would help maintain both safety and parental confidence.

In terms of brace adherence after tenotomy, studies emphasized that outcomes depended heavily on parental compliance. To address this, international programmes coupled the tenotomy with robust parent education and clear follow-up schedules. Locally, there is a need to ensure accessible and affordable brace supplies, complemented by family counselling to support adherence.

Equity considerations

Evidence from abroad shows that outpatient tenotomy under local anesthesia reduced the burden on families by avoiding inpatient stays, minimizing work absences, and shortening travel and recovery time. In the Philippine setting, this would directly benefit lower-income families who bear high opportunity costs.

Other countries expanded their service to regional centers by training staff and standardizing protocols, which reduced delays in care for children outside major cities. A similar decentralization approach could improve geographic equity in the Philippines.

Public hospitals that have adopted outpatient pathways abroad reported lower costs and reduced out-of-pocket spending for families. For local applicability, government institutions can integrate this into PhilHealth coverage and hospital billing systems to strengthen financial risk protection.

Successful programs elsewhere monitored implementation through quality KPIs such as complication rates, repeat procedures, parental satisfaction measures, and patient drop-out or lost-to-follow-up rates. Establishing a

structured monitoring system in the Philippines would be a feasible and equitable strategy to ensure accountability, track performance, and guide ongoing improvements in access, quality, and caregiver experience.

References (Q7)

1. Barkham B, McNally T, Russell A, Bridgens A, Gelfer Y. Percutaneous Achilles tenotomy under local anaesthetic in the clubfoot clinic was safe during the COVID-19 pandemic, for both children and parents. Int Orthop. 2021 Sep;45(9):2271-6. doi:10.1007/s00264-021-05119-w. Epub 2021 Jul 4. PMID: 34218297; PMCID: PMC8254860.

2. Agius L, Wickham A, Knudsen J, Walker C. Achilles tenotomy as an office procedure and current practising trends among New Zealand orthopaedic surgeons. N Z Med J. 2018 May 18;131(1475):44-54

3. Tuhanioğlu Ü, Seyfettinoğlu F, Bekir H, Ciçekli Ö, Erkoçak ÖF. Achilles tenotomy performed under local anesthesia during Ponseti treatment is safe and effective: results from 57 patients with clubfoot. J Orthop Surg Res. 2018 Jun 26;13(1):166. doi:10.1186/s13018-018-0851-9

4. Hedrick B, Gettys FK, Richards S, Muchow RD, Jo CH, Abbott MD. Percutaneous heel cord release for clubfoot: a retrospective, multicentre cost analysis. J Child Orthop. 2018;12(3):273-8. doi:10.1302/1863-2548.12.170216

5. Rangasamy K, Baburaj V, Gopinathan NR, Sudesh P. Techniques, anaesthesia preferences, and outcomes of Achilles tenotomy during Ponseti method of idiopathic clubfoot correction: a systematic review. Foot (Edinb). 2022 Mar;52:101922. doi:10.1016/j.foot.2022.101922.

6. Gelfer Y, Davis N, Blanco J, Buckingham R, Trees A, Mavrotas J, Tennant S, Theologis T. Attaining a British consensus on managing idiopathic congenital talipes equinovarus up to walking age. Bone Joint J. 2022 Jun;104-B(6):758-764. doi: 10.1302/0301-620X.104B6.BJJ-2021-1687.R1. PMID: 35638218; PMCID: PMC9948433.

7. Cady R, Hennessey TA, Schwend RM. Diagnosis and Treatment of Idiopathic Congenital Clubfoot. Pediatrics. 2022 Feb 1;149(2):e2021055555. doi: 10.1542/peds.2021-055555. PMID: 35104362; PMCID: PMC9645716.

Guideline Question 8.

Treatment for children with clubfoot older than 4 years old

Should children with clubfoot who are older than 4 years undergo casting (e.g., Ponseti method or other casting techniques) or proceed directly (i.e., outright) to surgical management?

Recommendations		Certainty of evidence	Strength of Recommendation
8.1	We suggest that children with untreated idiopathic clubfoot older than two years undergo a trial of serial casting using the principles of the Ponseti method before considering subsequent surgical management.	⊕◯◯◯ Very Low	Weak
8.2	In this age group, treatment is not limited to casting or surgery but should include physiotherapy and consideration for use of age-appropriate orthosis.	None	Good Practice Statement

Guideline Panel Considerations

Justification

The panel first acknowledged that the cutoff of four years is arbitrary and was set primarily to facilitate the search for evidence, rather than reflecting a strict clinical boundary. In practice, decisions are individualized based on patient context, developmental stage, and tolerance for conservative management.

The panel agreed with the framing that children with untreated idiopathic clubfoot older than 2 years should first undergo a trial of serial casting using the principles of the Ponseti method before considering subsequent surgical management. In this age group, treatment is not limited to casting or surgery but should also include physiotherapy and the use of age-appropriate orthoses as part of comprehensive care. This framing reflects the panel's intent not to impose a strict age cutoff but rather to encourage individualized, stepwise management that maximizes correction while minimizing risk.

The Ponseti method remains the preferred initial approach, even in children beyond infancy, as it achieves the best correction with fewer risks than outright surgery. Attempting conservative treatment first reduces deformity severity and may simplify any later surgical interventions if needed. In contrast, outright surgery was noted to carry significant risks of scarring, stiffness, and long-term pain.

Special considerations were discussed. Children with neurodevelopmental or neuroatypical conditions (e.g., intellectual disability, patients with autism spectrum disorder, or patients with neurological sequelae of TB meningitis) may have limited tolerance for serial casting or adherence to bracing, making surgery a more practical option in select cases. The panel also noted that treatment goals differ between pre-walking and walking-age children, with functional demands shaping expectations of correction.

The panel underscored that the Ponseti method should be the initial approach whenever feasible, complemented by physiotherapy and age-appropriate orthoses. If conservative management fails or is not tolerated, surgical options such as posterior release, tibialis anterior tendon transfer, or open lengthening may be considered, recognizing their higher risk of complications. Overall, the panel expressed a strong preference for the Ponseti method as first-line management for children older than two years with untreated idiopathic clubfoot, with surgery reserved for select cases where non-surgical measures prove insufficient or challenging.

Key Findings

- **Characteristics of the evidence:** No direct evidence assessed the efficacy and safety of casting (e.g., Ponseti method) compared to surgery among children with clubfoot older than 4 years old. One (1) systematic review that included 12 noncomparative case series evaluated the Ponseti method for older children with neglected clubfoot.
- **Benefits and risks:** We are uncertain whether the Ponseti method increases or decreases the treatment success and recurrence rate compared to surgery. In terms of safety, we are also uncertain if the Ponseti method increases or decreases the complication rate compared to surgery.
- **Certainty of the evidence:** The overall certainty of the evidence is very low due to issues of indirectness and inconsistency.

Background

Over the past two decades, the standard approach to treating clubfoot deformity has shifted from extensive surgical correction to less invasive techniques.[5,6] Conservative management with serial cast changes is widely accepted in the literature, with the Ponseti method regarded as the preferred treatment approach.[7,8] Several randomized trials have also shown the efficacy and superiority of the Ponseti method compared to surgery among infants less than one year of age with congenital clubfoot.[9–11] The treatment of congenital clubfoot after the walking age is still a subject of many studies. Early studies documented the efficacy of the Ponseti method among older children with clubfoot.[12] As such, evidence review is needed to give recommendations on the use of Ponseti or other casting techniques for older children with clubfoot.

Summary of the Evidence

Characteristics of included studies

We found one (1) systematic review and meta-analysis[14] that included 12 non-comparative case-series. Since the publication of the meta-analysis, another two case-series reported the use of Ponseti method for older children with clubfoot or those with neglected or untreated clubfoot.[15,16] The results of the studies were similar to the meta-analysis, hence, we opted not to add their results into the pooled proportions.

All studies were done among children with congenital untreated clubfoot with a mean age of 1.76 to 8.9 years old. All children were treated with the Ponseti method. Clinical and radiological assessments were done pre- and post-treatment, including Pirani score, Dimeglio score, ankle dorsiflexion, and radiological assessment. Outcomes reported include success rate in eleven studies[12,17–24], recurrence rate[12,17,17,20,21,24–26], and complications.[12,18,19,24] The studies had overall moderate risk of bias. Ten studies had unclear reporting of consecutive inclusion of participants identified,[17–19,21–27] while two studies had unclear or no reporting of complete inclusion of participants.[21,23]

Given the indirectness of these studies, we also included a review of the studies that evaluated surgery among patients with neglected clubfoot. We found four (4) observational studies (3 noncomparative case-series[28–30] and 1 cross-sectional study[31]). These studies were done among children with untreated clubfoot with a mean age of 7.86 to 26 years old. Three studies employed Ilizarov fixator[28,29,29], while one study used posteromedial release with triple arthrodesis.[30] Outcomes reported included treatment success, recurrence, and complications. The studies had overall moderate risk of bias due to unclear consecutive inclusion of participants[28–31] and unclear reporting of complete inclusion of identified participants.

Efficacy outcomes (Ponseti method for neglected clubfoot)

Success (11 noncomparative case series, N = 654 feet)

Success rate was defined as pain-free, aesthetically acceptable plantigrade foot, with no need for extensive surgical tissue release after casting and tenotomy. Based on 11 case-series, Ponseti method achieved a high success rate RR 0.89 (95% CI 0.82-0.94). The certainty of evidence was very low due to serious indirectness and inconsistency.

Recurrence (9 noncomparative case-series, N = 366 feet)

Pooled analysis of proportions after the treatment showed that the use of Ponseti method among children with neglected clubfoot had low recurrence rate RR 0.18 (95% CI 0.14-0.24). The certainty of evidence was very low due to serious indirectness.

Safety outcomes

Complications (5 noncomparative case-series, N = 173 feet)

Complications were defined as the occurrence of local wound, swelling, erythema, and osteopenia. Based on 5 case-series, the Ponseti method among children with neglected clubfoot had a low complication rate, RR 0.07 (95% CI 0.03-0.15). The certainty of evidence was very low due to serious indirectness.

Efficacy outcomes (Surgery for neglected clubfoot)

Success (3 noncomparative case-series, 1 cross-sectional study)

Treatment success was defined as pain-free, capacity to walk on a plantigrade foot, capacity to wear conventional shoes, absence of recurrence, and personal satisfaction of final appearance. Based on four observational studies, the success rate ranges from 60% to 78.9%.[28–31] The certainty of evidence was very low due to serious indirectness and inconsistency.

Recurrence (1 noncomparative case-series)

Based on one (1) noncomparative case-series, the recurrence rate among patients with neglected clubfoot treated with Ilizarov fixator was 50%.[29] The certainty of evidence was very low due to serious indirectness and inconsistency.

Safety outcomes

Complications (3 noncomparative case-series, 1 cross-sectional study)

Complications in these studies were defined as infection, clawing of the toes, ankylosis of foot and ankle joints, callosities, arthritis, necrosis, and loss of sensation on the foot. Complication rate ranges from 5% to 73.7%.[28–31] The certainty of evidence was very low due to serious indirectness and inconsistency.

Table Q8.1. GRADE Summary of Findings: Ponseti method for neglected clubfoot.

Outcomes	Basis	Impact	Interpretation	Certainty of Evidence
Treatment Success*	11 noncomparative case-series (N=654 feet)	Success rate 0.89 (95% CI: 0.82-0.94)	Favors Ponseti method	⊕◯◯◯ Very low[a,b]
Recurrence	9 noncomparative case-series (N=366 feet)	Recurrence rate 0.18 (95% CI: 0.14-0.24)	Favors Ponseti method	⊕◯◯◯ Very low[a,b]
Complications**	5 noncomparative case-series (N=173 feet)	Complication rate: 0.07 (95% CI: 0.03-0.15)	Favors Ponseti method	⊕◯◯◯ Very low[a,b]

[a] serious inconsistency; [b] serious indirectness
*pain-free, aesthetically acceptable plantigrade foot, with no need for extensive surgical tissue release after casting and tenotomy
***local wound, swelling, erythema and osteopenia

Table Q8.2. GRADE Summary of Findings: Surgery for neglected clubfoot.

Outcomes	Basis	Impact	Interpretation	Certainty of Evidence
Treatment Success*	3 noncomparative case-series, 1 cross-sectional study (N=146 feet)	Success rate ranges: 60% to 78.9%	Favors surgery	⊕◯◯◯ Very low[a,b]
Recurrence	1 noncomparative case-series (N=38 feet)	Recurrence rate: 50%	Does not favor surgery	⊕◯◯◯ Very low[a,b]
Complications**	3 noncomparative case-series, 1 cross-sectional study (N=146 feet)	Complication rate: 5% to 73.7%	Does not favor surgery	⊕◯◯◯ Very low[a,b]

[a] serious inconsistency; [b] serious indirectness
*pain-free, capacity to walk on a plantigrade foot, capacity to wear conventional shoes, absence of recurrence, personal satisfaction of final appearance
**infection, clawing of the toes, ankylosis of foot and ankle joints, callosities, arthritis, necrosis, loss of sense

Certainty of the Evidence

The certainty of the evidence was started as low given the study design of the available studies. The outcomes on success rates were further downgraded due to serious inconsistency and indirectness. Recurrence and complication rate outcomes were further downgraded due to very serious indirectness in the studies that used Ponseti method, and also for serious inconsistency in the studies that employed surgery. Overall, the certainty of the evidence is very low.

Other Considerations

Resource implications

There were no direct studies assessing the cost-effectiveness of Ponseti versus surgery among older children with clubfoot. However, a cost-effectiveness study of Ponseti method in Pakistan showed that the Ponseti method is more cost-effective than surgery. Results of the study showed an incremental cost-effectiveness ratio of $1,225. The average cost per patient was $349 for treatment with the Ponseti method, compared with $810 for surgical management. Most costs were incurred prior to diagnosis and following inadequate treatment, with the greatest share attributed to transportation, materials, and service fees.[35]

Stakeholder values, preferences, and acceptability

There were no studies found assessing patient/parent values, preferences and acceptability.

Equity and feasibility

There were no direct studies assessing the equity and feasibility of Ponseti versus surgery among older children with clubfoot. A systematic review on the barriers and solutions to Ponseti method for clubfoot treatment in low and middle-income countries identified several barriers at the patient, health system, and provider level.36 Common barriers found to have the most impact on patient care included financial constraints, transportation, difficulties with brace and cast care, self-perceived health status, lack of physical resources, and provider's lack of knowledge and skill. Based on this review, older children may face additional barriers as they are often considered too old for conservative treatment. Limited surgical capacity in low- and middle-income countries may make casting the only viable option for older children. Socioeconomic factors may limit access to either treatment options for children with neglected clubfoot.

References (Q8)

1. Chueire AJFG, Carvalho Filho G, Kobayashi OY, Carrenho L. Treatment of congenital clubfoot using Ponseti method. Rev Bras Ortop. 2016 May 4;51(3):313–8.

2. Wynne-Davies R. Family studies and aetiology of club foot. J Med Genet. 1965 Dec;2(4):227–32.

3. Pavone V, Chisari E, Vescio A, Lucenti L, Sessa G, Testa G. The etiology of idiopathic congenital talipes equinovarus: a systematic review. J Orthop Surg. 2018 Aug 22;13(1):206.

4. Matuszewski L, Gil L, Karski J. Early results of treatment for congenital clubfoot using the Ponseti method. Eur J Orthop Surg Traumatol Orthop Traumatol. 2012 Jul;22(5):403–6.

5. Graf A, Hassani S, Krzak J, Long J, Caudill A, Flanagan A, et al. Long-term outcome evaluation in young adults following clubfoot surgical release. J Pediatr Orthop. 2010 Jun;30(4):379–85.

6. Brand RA. Clubfoot: Etiology and Treatment Ignacio V. Ponseti, MD, 1914–. Clin Orthop. 2009 May;467(5):1121–3.

7. Ponseti IV. Treatment of congenital club foot. J Bone Joint Surg Am. 1992 Mar;74(3):448–54.

8. Morcuende JA, Dolan LA, Dietz FR, Ponseti IV. Radical reduction in the rate of extensive corrective surgery for clubfoot using the Ponseti method. Pediatrics. 2004 Feb;113(2):376–80.

9. Svehlik M, Guggenberger B, Stöckler M, Klim S, Kraus T. The Ponseti Method vs. Surgical Treatment for Idiopathic Clubfoot: A Prospective Long-Term Follow-Up. Children. 2024 Dec;11(12):1422.

10. Gintautienė J, Čekanauskas E, Barauskas V, Žalinkevičius R. Comparison of the Ponseti method versus early tibialis anterior tendon transfer for idiopathic clubfoot: A prospective randomized study. Medicina (Mex). 2016 Jan 1;52(3):163–70.

11. Zwick EB, Kraus T, Maizen C, Steinwender G, Linhart WE. Comparison of Ponseti versus Surgical Treatment for Idiopathic Clubfoot: A Short-term Preliminary Report. Clin Orthop Relat Res. 2009 Oct;467(10):2668.

12. Lourenço AF, Morcuende JA. Correction of neglected idiopathic club foot by the Ponseti method. J Bone Joint Surg Br. 2007 Mar 1;89-B(3):378–81.

13. Munn Z, Barker TH, Moola S, Tufanaru C, Stern C, McArthur A, et al. Methodological quality of case series studies: an introduction to the JBI critical appraisal tool. JBI Evid Synth. 2020 Oct;18(10):2127.

14. Ferreira GF, Stéfani KC, Haje D de P, Nogueira MP. The Ponseti method in children with clubfoot after walking age – Systematic review and metanalysis of observational studies. PLOS ONE. 2018 Nov 20;13(11):e0207153.

15. Shah A, Mehta R, Aroojis A. The Ponseti method of clubfoot treatment in walking age children: is it effective? A study of 56 children from 1 to 10 years of age. J Pediatr Orthop Part B. 2019 Mar;28(2):159–66.

16. de Podesta Haje D, Maranho DA, Ferreira GF, Rocha Geded AC, Aroojis A, Queiroz AC, et al. Ponseti Method After Walking Age - A Multi-Centric Study of 429 Feet: Results, Possible Treatment Modifications and Outcomes According to Age Groups. Iowa Orthop J. 2020;40(2):1–12.

17. Mehtani A, Prakash J, Vijay V, Kumar N, Sinha A. Modified Ponseti technique for management of neglected clubfeet. J Pediatr Orthop B. 2018 Jan;27(1):61.

18. Sinha A, Mehtani A, Sud A, Vijay V, Kumar N, Prakash J. Evaluation of Ponseti method in neglected clubfoot. Indian J Orthop. 2016 Oct 1;50(5):529–35.

19. Faizan M, Jilani LZ, Abbas M, Zahid M, Asif N. Management of Idiopathic Clubfoot by Ponseti Technique in Children Presenting After One Year of Age. J Foot Ankle Surg. 2015 Sep 1;54(5):967–72.

20. Ayana B, Klungsøyr PJ. Good results after Ponseti treatment for neglected congenital clubfoot in Ethiopia. Acta Orthop. 2014 Dec 1;641–5.

21. Hassan MK, Ibrahim AH, Mostafa MM, Bakr HA. Ponseti method for management of neglected idiopathic clubfoot. Curr Orthop Pract. 2013 Jun;24(3):295.

22. Spiegel DA, Shrestha OP, Sitoula P, Rajbhandary T, Bijukachhe B, Banskota AK. Ponseti Method for Untreated Idiopathic Clubfeet in Nepalese Patients From 1 to 6 Years of Age. Clin Orthop Relat Res. 2009 May;467(5):1164.

23. Verma A, Mehtani A, Sural S, Maini L, Gautam VK, Basran SS, et al. Management of idiopathic clubfoot in toddlers by Ponseti's method. J Pediatr Orthop Part B. 2012 Jan;21(1):79–84.

24. Khan SA, Kumar A. Ponseti's manipulation in neglected clubfoot in children more than 7 years of age: a prospective evaluation of 25 feet with long-term follow-up. J Pediatr Orthop B. 2010 Sep;19(5):385.

25. Yagmurlu MF, Ermis MN, Akdeniz HE, Kesin E, Karakas ES. Ponseti management of clubfoot after walking age. Pediatr Int. 2011;53(1):85–9.

26. Banskota B, Banskota AK, Regmi R, Rajbhandary T, Shrestha OP, Spiegel DA. The Ponseti method in the treatment of children with idiopathic clubfoot presenting between five and ten years of age. Bone Jt J. 2013 Dec 1;95-B(12):1721–5.

27. Qureshi AR, Warriach SB. Evaluation of Ponseti Method for Management of Idiopathic Clubfoot in Toddlers.

28. Fadel M, Kandil MF. Management of neglected clubfoot in children using Ilizarov external fixator and minimal invasive surgery, Sub-Saharan Africa experience. Int Orthop. 2022 Jan;46(1):125–32.

29. Ferreira RC, Costo MT, Frizzo GG, da Fonseca Filho FF. Correction of Neglected Clubfoot Using the Ilizarov External Fixator. Foot Ankle Int. 2006 Apr 1;27(4):266–73.

30. Akıncı O, Akalın Y. Medium-term results of single-stage posteromedial release and triple arthrodesis in treatment of neglected clubfoot deformity in adults. Acta Orthop Traumatol Turc. 2015;49(2):175–83.

31. Aslani HS, Athari MB, Tavakoli-Darestani R, Pourmojarab A, Baroutkoub M, Zamani M. Clubfoot Deformity Treatment with Ilizarov Apparatus in the Paediatric Population without Corrective Osteotomies and Soft Tissue Release: A Cross-Sectional Study. Malays Orthop J. 2023 Nov;17(3):42–7.

32. Hopwood S, Khan F, Kemp J, Rehm A, Ashby E. Clubfoot: an overview and the latest UK guidelines. Br J Hosp Med. 2023 Jan 2;84(1):1–7.

33. Cady R, Hennessey TA, Schwend RM, SECTION ON ORTHOPAEDICS. Diagnosis and Treatment of Idiopathic Congenital Clubfoot. Pediatrics. 2022 Jan 31;149(2):e2021055555.

34. Besselaar AT, Sakkers RJB, Schuppers HA, Witbreuk MMEH, Zeegers EVCM, Visser JD, et al. Guideline on the diagnosis and treatment of primary idiopathic clubfoot. Acta Orthop. 2017 Jun;88(3):305–9.

35. Hussain H, Burfat AM, Samad L, Jawed F, Chinoy MA, Khan MA. Cost-Effectiveness of the Ponseti Method for Treatment of Clubfoot in Pakistan. World J Surg. 2014;38(9):1.

36. Johnson RR, Friedman JM, Becker AM, Spiegel DA. The Ponseti Method for Clubfoot Treatment in Low and Middle-Income Countries: A Systematic Review of Barriers and Solutions to Service Delivery. J Pediatr Orthop. 2017 Mar;37(2):e134–9.

Guideline Question 9.

Routine monitoring

Should patients with idiopathic clubfoot be routinely monitored using clinical scoring systems such as Pirani scoring system during and after treatment?

Recommendations		Certainty of evidence	Strength of Recommendation
9.1	We recommend routine monitoring using the Pirani scoring system among children with idiopathic clubfoot during and after treatment.	⊕◯◯◯ Very Low	Strong
9.2	Frequency of monitoring ● During serial casting – weekly monitoring ● At start of bracing – then monthly for 3 months ● During part time bracing – every 3 months until completion of treatment ● Yearly until skeletal maturity (18 years of age)	None	Good Practice Statement
9.3	Include measurement of the foot abduction and ankle dorsiflexion angles during the whole treatment period.	None	Good Practice Statement

Guideline Panel Considerations

Justification

The panel issued a strong recommendation that patients with idiopathic clubfoot be routinely monitored using clinical scoring systems such as the Pirani score during and after treatment. The decision was grounded on the broad utility, feasibility, and acceptability of these scoring systems across different phases of care.

Panelists emphasized that clinical scores are indispensable not only for initial evaluation but also for monitoring treatment progress, detecting recurrence, guiding research, and improving communication among healthcare providers. The Pirani score was highlighted as an established tool that has demonstrated ease of use and high interobserver reliability, while requiring minimal cost and no specialized instrumentation. These attributes make it practical for widespread use even in low-resource settings.

Training requirements were considered modest. The panel noted that the scoring system is straightforward and can be taught even to laypersons and caregivers, who may use simple pictures or visual guides to understand the scoring process. This enhances shared decision-making and promotes caregiver involvement in the treatment course. Moreover, its visual simplicity allows for clearer communication across multidisciplinary teams and between providers and families.

Overall, the panel concluded that routine use of clinical scoring systems such as the Pirani score is feasible, cost-effective, and highly valuable for both clinical and research purposes, while also empowering caregivers and improving consistency in patient care.

Key Findings

- **Characteristics of the evidence:** Twelve (12) studies on routine clinical scoring for idiopathic clubfoot, spanning retrospective and prospective cohorts plus two reliability studies from North America, Europe, and Asia.
- **Benefits:** Routine use of clinical scoring systems, primarily Pirani and Diméglio, during Ponseti treatment shows a moderate association with treatment burden with pooled correlations between baseline scores and the number of casts are about r=0.53 for Pirani (95% CI 0.36, 0.66) and r=0.62 for Diméglio (95% CI 0.38–0.78). Both scores perform similarly for guiding Achilles tenotomy decisions, with no clear superiority of one scale over the other. For relapse, very high baseline severity identifies higher-risk children—e.g., Pirani ≥5.75 (OR 23.3) and Diméglio ≥17.5 (OR 3.1) while adjusted cohort data suggest that each 1-point increase in baseline Pirani roughly doubles to triples relapse odds.
- **Inter-observer reliability:** Measurement properties are strong: inter-observer reliability is good to excellent for total scores (Pirani ICC 0.76, 0.95; Diméglio 0.80, 0.91) and improves with brief rater training.
- **Certainty of the evidence:** Very low due for prognostic outcomes and for reliability due to indirectness (no trials directly compare "structured scoring" versus "no scoring")

Background

Routine clinical scoring using mainly Pirani (0–6) and Diméglio (0–20), which are widely used to standardize assessment during casting and anticipate treatment burden (casts, tenotomy) and outcomes (relapse, later surgery). There are no trials that randomize patients to "structured scoring" versus "no scoring," so evidence is indirect, primarily reliability and prognostic studies showing how scores inform decisions and predict outcomes.

Summary of the Evidence

Characteristics of included studies

Twelve (12) studies on routine clinical scoring for idiopathic clubfoot, spanning retrospective and prospective cohorts plus two reliability studies from North America, Europe, and Asia were retrieved for this review. Across these studies, Pirani and/or Diméglio scores were recorded at baseline in infant populations with idiopathic clubfoot treated with Ponseti casting, with outcomes including number of casts, need for Achilles tenotomy, relapse/recurrence, later surgery, and inter-observer reliability (ICC). Reliability studies compared agreement between trained consultants and trainees.

Predicting number of casts (5 cohort studies, N=681 feet, very low certainty)

Across the included cohorts, higher baseline clinical severity on either Pirani or Diméglio was associated with greater treatment burden during casting. The pooled correlation between baseline Pirani and the number of casts was r = 0.529 (95% CI 0.364–0.662), and for baseline Diméglio it was r = 0.616 (95% CI 0.384–0.775), indicating moderate to moderate-strong associations on average, with heterogeneity across centers and raters. Prospective data show that both scores perform similarly for discriminating the need for percutaneous Achilles tenotomy; neither tool is clearly superior, so consistency of use within a service is more important than the specific scale chosen.

Predicting relapse (1 cohort study, N=143 feet, very low certainty)

For post-casting outcomes, higher baseline Pirani scores were linked to a greater risk of relapse. In adjusted cohorts, each 1-point increase in baseline Pirani was associated with a ~2–3x increase in relapse odds (pooled fixed-effect OR ≈ 2.65; 95% CI 1.63–4.30). One study proposed high-risk thresholds (Pirani ≥ 5.75, Diméglio ≥ 17.5) with approximate effects (OR ≈ 23.3 and OR ≈ 3.1, respectively), though estimates were imprecise and based on few events. Importantly, brace non-adherence consistently magnified relapse risk and should be monitored alongside scores.

Inter-observer reliability (2 reliability studies, N=50-60 feet, very low certainty)

Measurement outcomes were favorable: inter-observer reliability for total scores was good to excellent (Pirani ICC ~0.76–0.95; Diméglio ICC ~0.80–0.91), supporting structured scoring over unstructured observation for clinical decisions and audit.

Table Q9.1. GRADE Summary of Findings: Routinely monitoring using clinical scoring systems.

Critical Outcomes	Basis	Effect Size	95% CI	Interpretation	Certainty of evidence
Predicting number of casts with Pirani (baseline)	5 cohort studies (N=681 feet)	Pooled correlation r 0.529	0.364, 0.662	Positive association, higher baseline Pirani score, mean more casts	⊕◯◯◯ Very Low[a,b]
Predicting number of casts with Dimeglio (baseline)	4 cohort studies (N=509 feet)	Pooled correlation r 0.616	0.384, 0.775	Positive association, higher baseline Dimeglio score, mean more casts	⊕◯◯◯ Very low[a,b,c]
Predicting relapse (Pirani cut-point ≥5.75)	1 cohort (N=143 feet)	OR 23.31	2.91, 186.54	Higher baseline Pirani score, higher risk of relapse	⊕◯◯◯ Very low[a,b,c]
Predicting relapse (Dimeglio cut-point ≥17.5)	1 cohort (N=143 feet)	OR 3.14	0.90, 10.96	Higher baseline Dimeglio score, higher risk of relapse	⊕◯◯◯ Very low[a,b,c]
Inter-observer reliability: Pirani total score	2 reliability studies (N=50–60 feet)	ICC 0.76–0.95	Not reported	Good reliability	⊕◯◯◯ Very Low[a,b]
Inter-observer reliability: Dimeglio total score	2 reliability studies (N=50–60 feet)	ICC 0.80–0.91	Not reported	Good reliability	⊕◯◯◯ Very Low[a,b]

[a] study design limitations; [b] serious indirectness; [c] serious imprecision

Certainty of the Evidence

The overall certainty of evidence was rated as very low for both prognostic outcomes and reliability. Certainty was downgraded due to the observational study designs, substantial between-study heterogeneity in techniques, rater composition, timing, and outcome definitions, particularly for relapse, as well as serious imprecision from cut points derived from few events and indirectness.

Other Considerations

Resource implications

No studies were available for review. However, use of these scoring systems is associated with minimal cost, requiring only brief training and a few minutes per visit, with no additional equipment. The tools are simple to use, easily integrated into charts or electronic medical records, and are likely to be cost-saving by supporting standardized care pathways.

Stakeholder values, preferences, and acceptability

No relevant studies were identified. However, these scoring systems are reported to have high clinician acceptability because they support standardization and communication, while families value clearer prognostic information and counseling. These tools are also widely adopted internationally.

Equity and feasibility

No relevant studies were retrieved. However, implementation is feasible in low-resource settings using paper-based forms and task-shifting to trained non-physician staff. Standardized scoring may also reduce unwarranted variation in care across centers.

References (Q9)

1. Chu A, et al. Clubfoot classification: Correlation with Ponseti cast treatment. J Pediatr Orthop. 2010;30:695-699.
2. Gao R, Tomlinson M, Walker C. Correlation of Pirani and Diméglio scores with number of Ponseti casts. J Pediatr Orthop. 2014;34:639-642.
3. Fan H, et al. The correlation of Pirani and Diméglio scoring systems… Sci Rep. 2017;7:14578.
4. Lampasi M, Abati CN, Trisolino G. Comparison of Diméglio and Pirani score… Int Orthop. 2018;42:2429-2436.
5. Rastogi A, et al. Correlation of Pirani and Diméglio scores with number of casts… J Clin Orthop Trauma. 2020;11:S826-S831.
6. Tahririan MA, et al. Can clubfoot scoring systems predict casts and recurrences? J Orthop Surg Res. 2021;16:216.
7. Goriainov V, Judd J, Uglow M. Does the Pirani score predict relapse? J Child Orthop. 2010;4:439-444.
8. Hu J, et al. Risk factors for relapse after Ponseti treatment. BMC Musculoskelet Disord. 2022;23:xxx.
9. Zhao D, et al. Noncompliance and relapse after Ponseti treatment. J Pediatr Orthop B. 2018;27:xxx.
10. Goldstein RY, et al. Predicting surgery beyond PAT in idiopathic clubfoot. J Pediatr Orthop. 2015;35:395-402.
11. Pavone V, et al. Interobserver reliability of Pirani and Diméglio scores. Children. 2021;8:618.
12. Bettuzzi C, et al. Interobserver reliability of Diméglio and Pirani score… J Child Orthop. 2019;13:161-167.

Guideline Question 10.

Treatment for relapse

Should we repeat Ponseti casting or surgical management among children with idiopathic clubfoot who failed to achieve correction after initial Ponseti casting?

Recommendations		Certainty of evidence	Strength of Recommendation
10.1	We recommend performing repeat Ponseti treatment among children with idiopathic clubfoot who had recurrence of deformity after completion of Ponseti treatment.	⊕◯◯◯ Very Low	Strong

10.2	• Conduct regular monitoring visits throughout and after the clubfoot treatment process.
	• Evaluate the causes of recurrence which may include:
	  ○ Technique-related factors: inappropriate manipulation and casting, incomplete tenotomy; and
	  ○ Patient factors: brace noncompliance, and other possible non-idiopathic etiologies;
	• Refer patients with recurrent clubfoot to an orthopedic subspecialist;
	• Appropriately treat the identified deformities that have relapsed using the Ponseti method after careful assessment;
	• Consider performing Achilles tenotomy, tibialis anterior tendon transfer, and other soft tissue procedures, if needed, after proper re-evaluation;
	• Evaluate the need for orthosis and/or physiotherapy;
	• Refer patients for additional multidisciplinary evaluation, as warranted.
		None	Good Practice Statement

Guideline Panel Considerations

Justification

Evidence, though of very low certainty, indicates that repeat Ponseti treatment can be as effective as initial treatment in correcting relapse, while avoiding the risks, higher costs, and technical demands of surgery. Studies suggest no meaningful differences in outcomes between primary and repeat Ponseti casting. Given its feasibility, cost-effectiveness, and alignment with the principle of minimizing harm, the panel strongly favored repeat Ponseti before considering surgical options.

Relapse often results from poor brace compliance, inadequate tenotomy, or improper casting technique. Even with good adherence, up to 5% of children may still relapse. Repeat Ponseti is usually effective in children under 2 years old, but older children may require additional procedures (e.g., tibialis anterior transfer) when gait

abnormalities or dynamic supination persist. In the Philippines, relapse management is also influenced by caregiver burden, limited access to trained providers, and cultural barriers to brace use.

Surgery should be reserved for cases where Ponseti is not feasible (e.g., lack of access, caregiver refusal, or repeated failures despite proper technique). However, some clinicians proceed directly to surgery, often due to lack of Ponseti expertise, highlighting the need for stronger referral networks and standardized training.

Implementation Considerations

Improving brace compliance is central to preventing relapse. Strategies include ensuring proper fit and comfort of the foot abduction brace, providing clear education that braces only work when the entire system (shoes + bar) is worn, and addressing family pressures to stop bracing prematurely. Early challenges in the first three months of bracing should be anticipated, and families supported through peer groups, barangay health worker monitoring, and, where possible, local government financial assistance. Tertiary centers should serve as referral hubs for complex relapses and potential secondary diagnoses.

Key Findings

- **Characteristics of the evidence:** Five (5) observational studies (n=257 children with at least 180 recurrent clubfeet) investigated the effect of repeat Ponseti casting as management for children with idiopathic clubfoot that recurred.
- **Benefits and risks:** Repeat Ponseti casting may increase success rate, number of feet in plantigrade position, and degree of dorsiflexion/ equinus of the foot. It may also decrease Pirani and Dimeglio scores, and may have impact on quality of life rating as “good”. Although adverse events, particularly diarrhea, were more frequently observed among participants treated with colchicine, the number of serious adverse events were comparable to those who received standard of care. The total number of casts applied ranged from 4.3 to 5.6.
- **Certainty of the evidence:** All studies were rated as moderate quality, with minor concerns in the selection and outcomes domains. Indirectness (due to lack of studies that compared repeat Ponseti casting with surgery) and inconsistency (due to wide range of values in some outcomes) contributed to downgrading of overall certainty of evidence to very low.

Background

The Ponseti method has been used as the standard and preferred treatment modality for clubfoot. However, the median reported relapse rate among 46 studies was 22.5%, with a range of 7% to as high as 67.3% of patients. There were four types of relapse definitions following initial correction: the need for any further treatment, the need for repeat cast treatment, the need for a surgical procedure, and the reappearance of physical qualities associated with clubfeet.[1]

Several factors affect the recurrence of clubfoot after correction: initial severity scores, age at the beginning of treatment, correct identification of idiopathic and complex cases, neuromuscular imbalance, poor nutritional status, noncompliance to brace use, and availability of a specialized attention center for proper Ponseti method application and treatment adherence.[2] Member of the Pediatric Orthopedic Society of North America (POSNA) reported that manipulation and cast treatment (55%) and cast treatment with tenotomy (23%) were the two most commonly reported initial approaches to relapse. They also reported performing heel cord tenotomy (75%), posterior capsular release (43%) and plantar fascia release as alternatives to Tibialis Anterior Tendon Transfer (TATT).[3]

Summary of the Evidence

Characteristics of included studies

No studies were found that directly compared repeat Ponseti casting versus surgery. We found five (5) observational studies that evaluated repeat Ponseti casting in a total of 257 children with at least 280 relapsed or recurrent clubfeet. One study[4] focused on children aged less than 2 years of age, while the others had a more expansive definition of children. The studies were conducted in both high-income countries (Australia and Canada) and lower-middle-income countries (Egypt, Pakistan, and India).

All studies used the Ponseti method, with one study[5] labeling the approach as "modified" without specifying clearly how it was different from the standard method. Three studies[4,5,6] had a pre-specified follow-up period (ranging from 6 months to 2 years), while the rest measured the mean follow-up period from identification of relapse to the latest available data (ranging from ~2 to 7.5 years). Outcomes reported include: success rate, plantigrade position, pirani score, degree of dorsiflexion/ equinus, dimeglio score, health-related quality of life, and number of casts applied.

Efficacy outcomes

Success rate (1 observational study, N=35, very low certainty)

At a mean follow-up of 7.5 years, 26 of 35 patients (74%) did not receive surgery for recurrence and had all of the following: hindfoot in valgus, dorsiflexion of 10 degrees, and a straight lateral border.[7]

Plantigrade position (1 observational study, N=35, very low certainty)

A plantigrade position in a foot means it can rest flat on the ground with the heel bearing weight, which is the normal position. At a mean follow-up of 7.5 years, 46 of 49 feet (94%) were in plantigrade position at follow-up.[7]

Pirani score (4 observational studies, N=222, very low certainty)

The Pirani score is used to assess the severity and monitor the progress of clubfoot deformity. It involves evaluating six specific clinical signs related to the midfoot and hindfoot, with each sign scored from 0 (no deformity), 0.5 (moderate deformity) to 1 (severe deformity). The total score helps determine the amount of initial treatment needed and allows for ongoing tracking of the foot's correction over time, with higher scores indicating a more severe deformity. In the relevant studies[4,5,6,8], baseline Pirani scores ranged from 2.4° to 5.5°. The decrease in Pirani scores at follow-up ranged from -2.4° to -4.5°.

Degree of dorsiflexion/ Equinus (2 observational studies, N=132, very low certainty)

In a properly corrected clubfoot, dorsiflexion (ability to bend foot upward) is measured clinically and radiographically; acceptable ranges are a minimum of 15° to 20° up to age 3 and 15° up to age 5 after Ponseti management. Lower dorsiflexion, such as less than 10°, can indicate recurrence and may require further treatment. In the included studies,[5,8] the degree of improvement at follow-up ranged from +10° to +15° compared to the baseline dorsiflexion/equinus of 3.3° to 7.9°.

Dimeglio Score (1 observational study, N=79, very low certainty)

The Diméglio score is used to classify the severity of clubfoot based on clinical signs of deformity. It assesses four main components—equinus, heel varus, medial rotation, and forefoot adduction—by evaluating their reducibility, plus additional points for deep creases, cavus, and poor muscle condition. The total score ranges from 0 to 20 and categorizes clubfeet into four groups, from benign (≤5 points) to very severe (≥16 points), helping to predict the number of casts, need for surgery, and risk of recurrence. In one study[8], mean Dimeglio score at baseline was 7.9 (SD=2.1). At a mean follow-up of 6.5 years, the decrease in Dimeglio scores was -6.0.

Health-Related Quality of Life (1 observational study, N=35, very low certainty)

The Disease-Specific Instrument (DSI) measures treatment outcomes of patients with clubfoot, such as patient and parent satisfaction, appearance, pain, and physical limitations. The questionnaire gives a total DSI score, a Function Subscale, and a Satisfaction Subscale. Scores from 90 to 100 were considered “excellent”; from 80 to 89, “good”; from 70 to 79, “fair”; and <70, poor.[9] In one study[7], the overall mean score was 83.35. In its two subscales, the mean function score was 85.52, and the mean satisfaction score was 81.17.

Safety outcomes

Number of casts applied (3 observational studies, N= 167, very low certainty)

The number of casts needed for clubfoot treatment is important because it indicates the severity of the deformity and the effectiveness of the correction process. A higher number of casts generally suggests a stiffer foot that requires more serial casting to achieve soft tissue remodeling and correct the foot's alignment. In the relevant studies[5,7,8], the total number of casts applied ranged from 4.3 to 5.6.

Table Q10.1. GRADE Summary of Findings: Repeat Ponseti for relapsed clubfoot.

Critical Outcomes	Basis	Impact	Interpretation*	Certainty of evidence
Success rate	1 observational study, N=35	26/35 patients (74%) did not receive surgery for recurrence and had all of the following: hindfoot in valgus, dorsiflexion of 10°, and a straight lateral border.	Repeat Ponseti may increase success rate	⊕◯◯◯ Very Low[a]

Critical Outcomes	Basis	Impact	Interpretation*	Certainty of evidence
Plantigrade position	1 observational study, N=35	46/49 feet (94%) were in plantigrade position at follow-up.	Repeat Ponseti may increase number of feet in plantigrade position	⊕◯◯◯ Very Low[a]
Pirani score	4 observational studies, N=222	Baseline Pirani scores ranged from 2.4 to 5.5. The decrease in Pirani scores at follow-up ranges from -2.4 to -4.5.	Repeat Ponseti may decrease Pirani Score	⊕◯◯◯ Very Low[a,b]
Degree of dorsiflexion/equinus	2 observational studies, N=132	Baseline dorsiflexion/ equinus ranged from 3.3 to 7.9 degrees. The improvement at follow-up ranges from +10° to +15°.	Repeat Ponseti may increase degree of dorsiflexion/ equinus of the foot	⊕◯◯◯ Very Low[a,b]
Dimeglio score	1 observational study, N=79	Baseline Dimeglio score was 7.9. The decrease at follow-up was -6.0.	Repeat Ponseti may decrease Dimeglio scores.	⊕◯◯◯ Very Low[a]
Health-related quality of life	1 observational study, N=35	Overall mean score was 83.35. In its two subscales, the mean function score was 85.52, and the mean satisfaction score was 81.17.	Repeat Ponseti's impact on quality of life is rated as "good"	⊕◯◯◯ Very Low[a]
Number of casts applied	3 observational studies, N=167	The total number of casts applied ranged from 4.3 to 5.6.	N/A	⊕◯◯◯ Very Low[a]

[a] serious indirectness; [b] serious inconsistency
* Interpretation is not compared to surgery due to absence of direct comparative studies

Certainty of the Evidence

All of the five studies were assessed as moderate quality based on the Newcastle Ottawa Scale and scored 0 on the comparability domain due to the absence of a comparator group. Three studies[4,6,8] received a score of 1 on the selection domain due to an unrepresentative exposed group, absent non-exposed/ comparator group, and lack of demonstration that outcomes were not present at study start. Two studies each received a score of 2 on the outcomes domain due to significant loss to follow-up and inadequate duration of follow-up of 6 months.[5,7]

The over-all certainty of evidence was then downgraded to Very Low because of indirectness (due to lack of appropriate comparator surgery group) and inconsistency (due to large range of results), across the critical outcomes.

Other Considerations

Resource implications

There are no studies on the cost-effectiveness specific to repeat Ponseti casting for relapsed clubfoot. In a cost-effectiveness analysis of initial Ponseti casting in low- and middle-income countries in Africa[11], the average cost of the Ponseti treatment was estimated to be US$167 (PHP 9,530) per patient and its cost-effectiveness ratio was US$22.46 (PHP 1,282) per disability-adjusted life year averted.

Stakeholder values, preferences, and acceptability

At five years follow-up, children with recurred clubfoot (aged 5-18) did not have significantly different mobility, pain, and peer relationship outcomes compared with children without recurrent clubfoot, regardless of treatment modality for recurrence.[12]

Equity and feasibility

There are no studies on equity and feasibility specific to repeat Ponseti casting for relapsed clubfoot. The Ponseti method is particularly well suited for use in resource-limited countries because the casting and brace supervision can be performed by physicians and physical therapists. Also, effective and economical braces can be made using local systems.[13]

References (Q10)

1. Thomas HM, Sangiorgio SN, Ebramzadeh E, Zionts LE. Relapse Rates in Patients with Clubfoot Treated Using the Ponseti Method Increase with Time: A Systematic Review. JBJS Rev. 2019 May;7(5):e6. doi: 10.2106/JBJS.RVW.18.00124. PMID: 31116129.

2. Portilla-Rojas E, Jovel-Trujillo G, Ramírez L, Moreno C, Taborda JC. Factors influencing recurrence in clubfoot treatment with the Ponseti method in children under 5 years of age: a scoping review. J Pediatr Orthop B. 2025 Mar 1;34(2):177-184. doi: 10.1097/BPB.0000000000001231. Epub 2025 Jan 7. PMID: 39783832.

3. Hosseinzadeh P, Kiebzak GM, Dolan L, Zionts LE, Morcuende J. Management of Clubfoot Relapses With the Ponseti Method: Results of a Survey of the POSNA Members. J Pediatr Orthop. 2019 Jan;39(1):38-41. doi: 10.1097/BPO.0000000000000953. PMID: 28178093.

4. Ahmed KFE, Marzouk AR, Eldin MS. Repeating Ponseti method for treating relapsed idiopathic congenital talipes equinovarus in children less than two years of age: a prospective study. BMC Musculoskelet Disord. 2025 Mar 15;26(1):263. doi: 10.1186/s12891-025-08464-8. PMID: 40087635; PMCID: PMC11909929.

5. Marquez E, Pacey V, Chivers A, Gibbons P, Gray K. The Ponseti technique and improved ankle dorsiflexion in children with relapsed clubfoot: a retrospective data analysis. J Pediatr Orthop B. 2017 Mar;26(2):116-121. doi: 10.1097/BPB.0000000000000390. PMID: 27649368.

6. Butt MN, Perveen W, Ciongradi CI, Alexe DI, Marryam M, Khalid L, Dobreci DL, Sârbu I. Outcomes of the Ponseti Technique in Different Types of Clubfoot-A Single Center Retrospective Analysis. Children (Basel). 2023 Aug 3;10(8):1340. doi: 10.3390/children10081340. PMID: 37628341; PMCID: PMC10453163.

7. van Praag VM, Lysenko M, Harvey B, Yankanah R, Wright JG. Casting Is Effective for Recurrence Following Ponseti Treatment of Clubfoot. J Bone Joint Surg Am. 2018 Jun 20;100(12):1001-1008. doi: 10.2106/JBJS.17.01049. PMID: 29916926; PMCID: PMC6075876.

8. Chand, S., Mehtani, A., Sud, A., Prakash, J., Sinha, A., & Agnihotri, A. (2018). Relapse following use of Ponseti method in idiopathic clubfoot. Journal of children's orthopaedics, 12(6), 566–574. https://doi.org/10.1302/1863-2548.12.180117.

9. Roye BD, Vitale MG, Gelijns AC, Roye DP Jr. Patient-based outcomes after clubfoot surgery. J Pediatr Orthop. 2001 Jan-Feb;21(1):42-9. doi: 10.1097/00004694-200101000-00010. PMID: 11176352.

10. Gelfer Y, Davis N, Blanco J, Buckingham R, Trees A, Mavrotas J, Tennant S, Theologis T. Attaining a British consensus on managing idiopathic congenital talipes equinovarus up to walking age. Bone Joint J. 2022 Jun;104-B(6):758-764. doi: 10.1302/0301-620X.104B6.BJJ-2021-1687.R1. PMID: 35638218; PMCID: PMC9948433.

11. Grimes CE, Holmer H, Maraka J, Ayana B, Hansen L, Lavy CBD. Cost-effectiveness of club-foot treatment in low-income and middle-income countries by the Ponseti method. BMJ Glob Health. 2016 May 26;1(1):e000023. doi: 10.1136/bmjgh-2015-000023. Erratum in: BMJ Glob Health. 2018 Dec 14;3(6):e000023corr1. doi: 10.1136/bmjgh-2015-000023corr1. PMID: 28588918; PMCID: PMC5321308.

12. Schaibley C, Torres-Izquierdo B, Hosseinzadeh P. Patient-Reported Outcomes in Children With Idiopathic Clubfoot Deformity Treated With Ponseti Casting: Does Recurrence of the Deformity Play a Role? J Am Acad Orthop Surg. 2025 May 1;33(9):496-502. doi: 10.5435/JAAOS-D-24-00792. Epub 2025 Jan 28. PMID: 39888661.

13. Cady, R., Hennessey, T. A., & Schwend, R. M. (2022). Diagnosis and Treatment of Idiopathic Congenital Clubfoot. Pediatrics, 149(2), e2021055555. https://doi.org/10.1542/peds.2021-055555

Chapter 4.
Dissemination and Implementation

Dissemination

Multiple channels will be used to disseminate the Philippine Clinical Practice Guideline on the Screening and Management of Clubfoot in Children to ensure wide reach among clinicians, program implementers, and policymakers. The guideline will be disseminated through **professional networks, scientific meetings, training activities, and digital platforms** relevant to child health, orthopedics, rehabilitation, and primary care.

Following approval, the CPG will be submitted to the Department of Health (DOH) for official adoption and uploaded to the DOH Compendium of Clinical Practice Guidelines website (https://doh.gov.ph/dpcb/doh-approved-cpg/). The guideline will also be shared through the communication platforms of the Philippine National Clubfoot Council and partner organizations involved in clubfoot care.

Targeted dissemination activities will include presentations and orientations during **national and regional conferences, conventions, and continuing professional development activities**, particularly those organized by relevant professional societies. These include, but are not limited to, the **Philippine Orthopaedic Association**, **Pediatric Orthopaedic Society of the Philippines**, **Philippine Pediatric Society**, **Philippine Academy of Family Physicians**, **Philippine Academy of Rehabilitation Medicine**, and the **Philippine Society of Newborn Medicine**. Dissemination will also extend to multidisciplinary audiences involved in clubfoot care, including primary care providers, rehabilitation professionals, orthotists, and social workers.

The CPG recommendations will be shared with public and private healthcare facilities, local government units, and non-government organizations involved in clubfoot screening, treatment, and follow-up, including partners supporting service delivery and caregiver education. Digital dissemination will be supported through **organizational websites and social media platforms** to enhance accessibility.

To further promote awareness and uptake, a manuscript describing the guideline development process and key recommendations will be submitted for **publication in a local peer-reviewed medical journal**, such as *Acta Medica Philippina*, to facilitate broader dissemination within the academic and clinical community.

Implementation

These Clinical Practice Guidelines are intended to serve as a practical implementation resource for healthcare providers, program managers, and policymakers involved in the screening, management, monitoring, and follow-up of children with clubfoot in the Philippine setting. The recommendations are designed to be applicable across primary, secondary, and tertiary levels of care, taking into account variations in resources, workforce capacity, and service delivery models.

Implementation Strategies and Tools

Implementation of the Clubfoot CPG will be supported through the use of **standardized implementation tools**, capacity-building activities, and integration into existing service delivery platforms. These include:

1. **Supportive Supervision Tools**
    - A **Supportive Supervision Checklist**, currently used by **MiracleFeet-supported programs**, will be utilized to guide routine monitoring of clinic practices, adherence to recommended treatment protocols, and quality of care delivery.

- The checklist supports structured supervision visits, identification of gaps, and feedback to healthcare teams involved in clubfoot care.

2. **Training and Capacity-Building Materials**

    - **Training Manuals (Basic and Advanced)** for clubfoot management will be used to support initial training and continuing capacity development of healthcare providers.

    - These materials are intended for use in formal training workshops, on-site mentoring, and refresher courses for clinicians, allied health professionals, and other members of multidisciplinary clubfoot care teams.

3. **Clubfoot Service Mapping and Referral Support**

    - A **list of clinics with allied health workers trained as clubfoot practitioners** will be maintained and used to facilitate referral, continuity of care, and service coordination.
    - This directory supports appropriate referral pathways, particularly for patients requiring ongoing bracing, rehabilitation, or follow-up care.
    - As of February 10, 2026, the following partner clinics have been listed by the Philippine National Clubfoot Program: .

LUZON

Baguio General Hospital and Medical Center (BGHMC)
Address: Baguio General Hospital Driveway, Baguio, Benguet
SC: Ms. Krysty Wynwyn Simon, RN
Email: clubfootbaguio1@gmail.com
Contact Number: 0919 072 5439 / 0916 410 0411
Clubfoot Day: Wednesday (08:00AM – 4:00PM)
Thursday (08:00AM – 12:00NN)
(Walk-in and appointment)

Batangas Medical Center (BatMC)
Address: Bihi Road, Kumintang Ibaba, Batangas City, Batangas
SC: Joan Justine Dela Roca
Contact Number: 0998 565 1253 / 09669263123
FB Page: Batangas Medical Center – Department of Orthopaedics
Clubfoot Day: Friday (01:00-4:00PM) – Appointment Basis

Benguet General Hospital (BeGH)
Address: Km 5, Halsema Highway, La Trinidad, Benguet
SC: Hya Babag, PTRP
Contact Number: 0919 072 5440 / 0932 865 8257
FB Page: miracle feet- benguet
Clubfoot Day: Thursday (Time: 8-12 noon)
(Walk-in and appointment)

Bicol Medical Center (BiMC)
Address: BMC Rd., Concepcion Pequeña, Naga City, Camarines Sur

SC: Dr. Norris Tribiana
Contact Number: 0908 812 3342
FB Page: BMC Clubfoot
Clubfoot Day: Tuesday 9AM to 12NN

Cagayan Valley Medical Center (CVMC)
Address: Pan-Philippine Hwy, Carig Regional Center, Tuguegarao City, Cagayan
SC: Shiena Marie Guittu Pagunuran
Contact Number: 0919 072 5432
FB Page: CVMC Clubfoot Clinic
Clubfoot Day: Thursday and Friday (1-5pm) except holiday
(Walk-in and appointment)

Dr. Jose N. Rodriguez Memorial Hospital and Sanitarium (DJNRMHS)
Address: Saint Joseph Avenue Tala, Caloocan City
SC: Ms. Aubrey Madriaga
Contact Number: 09190648363 / 09166741143
Clubfoot Day: Thursday (Time: 8am-12pm)
(Walk-in and appointment)

Dr. Paulino J. Garcia Memorial Research and Medical Center
Address: Mabini Street, Brgy. Quezon District, Cabanatuan, Nueva Ecija
SC: Ms. Joann Sapiandante
Contact Number: 0962 184 2596
Clubfoot Day: Friday (01:00 PM - 05:00 PM) Strictly Appointment

East Avenue Medical Center (EAMC)
Address: East Ave, Diliman, Quezon City, Metro Manila
SC: Dr Juan Paulo Hidalgo
Contact Number: 0919 072 5447
Clubfoot Day: Thursday (1:00PM) Triage Before 1:00PM Walk in

Ilocos Training and Regional Medical Center (ITRMC)
Address: MacArthur Highway, San Fernando, La Union
SC: Christine Tejada
Contact Number: 0919 072 5433 / 0930 711 1111
FB Page: Department of Orthopaedics ITRMC
Clubfoot Day: Thursday (08:00AM- 12:00NN)
(Walk-in and appointment)

Jose B. Lingad Memorial General Hospital (JBLMGH)
Address: Dolores City, San Fernando, Pampanga
SC: Austine Julianne Bonifacio
Contact Number: 0919 072 5441
Clubfoot Day: Monday, Wednesday, Thursday, Friday
Time: 09:00AM – 02:00PM

Jose R. Reyes Memorial Medical Center (JRRMMC)
Address: Rizal Ave, Santa Cruz, Manila, Metro Manila

SC: Dr. Lorenz Rael Datay Cruz
Contact Number: 0919 072 5427
FB Page: Clubfoot Clinic - Jose R. Reyes Memorial Medical Center
Clubfoot: Tuesday 1:00PM

Maria Estrella General Hospital (MEGH)
Address: Calapan Clinic: Tawiran, Calapan City, Oriental Mindoro
Pinamalayan Clinic: De Villa Birung' Clinic tapat ng pilot school
SC: Bernadette Magallanes
Contact Number: 0939 919 6291
Clubfoot Day: Monday to Friday by appointment

Naga City General Hospital
Address: Naga City General Hospital, Leon SA. Aureus St, Balatas, Naga City, Camarines Sur (Southern Luzon)
Site Coordinator / Dr. In-charge: Dr. Ray Dimaano
Contact Number: 0915-715-2721.
Clubfoot Day: Tuesday (Time: 1:00PM- 5:00PM)

Pagamutan ng Dasmarinas (PND)
Address: Burol II, Dasmariñas, Cavite
SC: Dr. Rachel Leslie de Leon
Viber: 0919 072 5430
FB Page: Pagamutan ng Dasmariñas Clubfoot Clinic
Clubfoot Day: Friday (01:00-03:00PM) Strictly appointment basis

Philippine General Hospital (PGH)
SC: Louie Magpile Alcazar
Contact Number: 0919 072 5428
FB: PGH Clubfoot Ortho
Clubfoot day: Wednesday (10am) and Thursday (7am)
Strictly appointment basis

QPHN - Quezon Medical Center (QMC)
Address: Quezon Ave Ext. Brgy XI, Lucena, Quezon Province
SC: Noelene Mendoza
Contact Number: 0919 064 8364
Clubfoot Day: Tuesday (Time: Morning Only - 6:00am @ TRIAGE area with cut off)

Quirino Memorial Medical Center (QMMC)
Address: JP Rizal, Project 4, Quezon City
SC: Suzette Mhae Doctolero
Contact Number: 0919 072 5426
FB Page: QMMC Clubfoot Clinic
Clubfoot Day: Monday (09
:00AM- 12:00NN) Strictly appointment basis only

Region 1 Medical Center (R1MC)
Address: Arellano Street, Dagupan, Pangasinan
SC: Jennefer Barcellano

Contact Number: 0919 072 5448 / 0933 178 3362
FB Page: R1MC Clubfoot Clinic
Clubfoot Day: (08:00-12:00NN) Thursday
Walk in /Appointment

Region II Trauma Medical Center (R2TMC)
Address: AH26, Brgy. Magsaysay, Bayombong, Nueva Vizcaya
Site Coordinator/s: Regine Monique Yumul / Marion Alexis R. Apostol, RN
Contact Number: 0919 074 9303
FB Page: R2TMC Clubfoot Clinic
Clubfoot Days: Tuesday and Thursday (Time: 8:00 am to 5:00pm
Walk in /Appointment

Simon of Cyrene Community Rehabilitation and Development Foundation, Inc. (SCCRDFI)
Address: 286 Bañag Daraga, Albay
SC: Angie Monreal-Federio
Email: angiefederio.sccrdfi@gmail.com
Contact Number: 0919 072 5431 / 0935 818 2259
Clubfoot Day: Thursday (08:00AM- 05:00PM)
Walk in / Appointment basis

LGU Baao Clubfoot Treatment Center (Step by Step)
Address: Baao Evacuation Center and Multi-Purpose Building, Salvacion, Baao Camarines Sur.
SC: Ma'am Gina Bayta
Email: ongstepbystep.contact@gmail.com
Contact Number: 09471754448/0991 530 8051
Clubfoot Day: Thursday
Appointment basis only

The Medical City (TMC)
Address: Ortigas Ave, Pasig, Metro Manila
SC: Precious Anne Mara gay, RN and Alvilucky Nabua
Contact Number: 0919 072 5429
FB Page: Ortho Clubfoot Tmc
Clubfoot Day: Wednesday /Thursday 09:00AM onwards- Strictly appointment basis Only

Victoriano Luna General Hospital
Address: 3rd Floor, Ward 3 - Charlie, AFP Medical Center, V.luna Avenue, Quezon City
Site Coordinator / Doctor-in-charge: Dr. Michael Shaun Ritualo
Contact Number: 09616019596
Clubfoot Day: Saturday 9-11am
Appointment Basis

Veterans Memorial Medical Center
Address: Ward 6- Orthopedic Department, North Avenue, Diliman, Quezon City
SC: Dr. Roselle Zamora
Contact Number: 09621890861
Clubfoot Day: Wednesday (01:0PM – 5:00PM)
(Walk-in and appointment)

VISAYAS

Corazon Locsin Montelibano Memorial Regional Hospital (CLMMRH)
Address: Lacson St, Bacolod, Negros Occidental
SC: Jenny Rose Lozarito Apligedo
Contact Number: 0919 072 5442
Clubfoot Day: Tuesday and Friday (09:00AM-12:00NN) - Appointment

Teodorico H. Pacaldo Orthopedic Clinic (TPOC)
Address: Room 408, Medical Arts Building. Riverside Medical Center
BS Aquino drive, Bacolod City, Negros Occidental (Western Visayas)
SC: Ma. Christine Casaysay
Contact Number: 09122250580
Clubfoot Day: Every Tuesday or Thursday
Time: 09:00- 11:00AM (walk in and appointment)

Eastern Visayas Medical Center (EVMC)
Address: Brgy 93 Bagacay, Tacloban City
SC: Maegan Lelis
Contact Number: 0919 073 3684
Clubfoot Days: Friday (11:00 -04:00PM)
Walk in/ Appointment

West Visayas State University Medical Center (WVSUMC)
Address: E. Lopez Street, Jaro, Iloilo City, 5000 (Don Benito)
SC: Clarisse Marie Cruz
Contact Number: 0919 072 5449 or 09695101055
FB Page: Iloilo Clubfoot Clinic
Clubfoot Day: Wednesday
Time: 12:00PM- Appointmentnt

Vicente Sotto Memorial Medical Center (VSMMC)
Address: B. Rodriguez St, Cebu City, Cebu
SC: Marilet A. Abrio
Contact Number: 0919 072 5425 / 0943 093 3327
FB Page: Visayas Clubfoot Support at VSMMC
Clubfoot Day: Tuesday (08:00AM - 12:00NN) Strictly Appointment
Thursday (08:00AM - 12:00NN) Walk-In

MINDANAO

Amai Pakpak Medical Center (APMC)
Address: Amai Pakpak Ave., Marawi City, Lanao Del Sur
SC: Jhonna Mae T. Barbante
Contact Number: 09563180693
Clubfoot Day: Tuesday Morning (8AM - 12NN), Walk-in

Cotabato Regional Medical Center (CRMC)
Address: Rosary Heights, 10 Sinsuat Ave, Cotabato City, Maguindanao
SC: Maira Maulana Musa
Contact Number: 0919 072 5434
Clubfoot Day: Tuesday and Friday Triage 6:00AM (Clinic 10:00AM -onwards)

Davao Regional Medical Center (DRMC)
Address: Davao Regional Medical Center Apokon, Tagum City
Contact No: 09462402337
SC: Jessa Arcilla
Clubfoot day: Tuesday | 10:00 AM
Walk-in/Appointment

Northern Mindanao Medical Center (NMMC)
Address: Capitol Rd, Cagayan de Oro, Misamis Oriental
SC: Dr. Francis Oliveros
Contact Number: 0919 072 5450
Clubfoot Day: Friday (08:00AM - 05:00PM)
Walk in

Surigao Health Specialist Inc. (SHSI)
Address: 2nd Floor, City Arcade, Surigao City, Surigao del Norte
SC: Rubieneth Obeth Azarcon
Contact Number: 0919 068 3324
FB Page: Surigao Clubfoot Clinic
Clubfoot Day: Tuesday and Wednesday (11:00am -03:00PM)

South Cotabato Provincial Hospital (SCPH)
(Satellite Clinic) Allah valley medical specialists center inc. Hospital
Purok Villegas, Gensan Drive, Koronadal City
SC: Ms. Marybelle Agorde Lapidez
Contact Number: 0919 073 8361
Clubfoot Day: Tuesday (01:00PM)- Appointment

Southern Philippines Medical Center (SPMC)
Address: SPMC Orthopedic and Rehabilitation Institute (SPORI)
J.P. Laurel Avenue, Bajada, Davao City
SC: Marilou Rodrigo-Igos
Contact Number: 0919 072 5437
FB Page: Clubfoot Program- Southern Philippines Medical Center /
Clubfoot Day: Wednesday (08:00AM- 03:00PM) Walk in/ appointment

Zamboanga City Medical Center (ZCMC)
Address: Dr. Evangelista Street, Sta. Catalina Rd, Zamboanga City, Zamboanga del Sur
SC Jerissa Marie B. Adalia
Contact Number: 0905 665 3736 / 0919 072 5435
Clubfoot Day: Saturday (07:00AM -12:00NN)
Walk in/Appointment

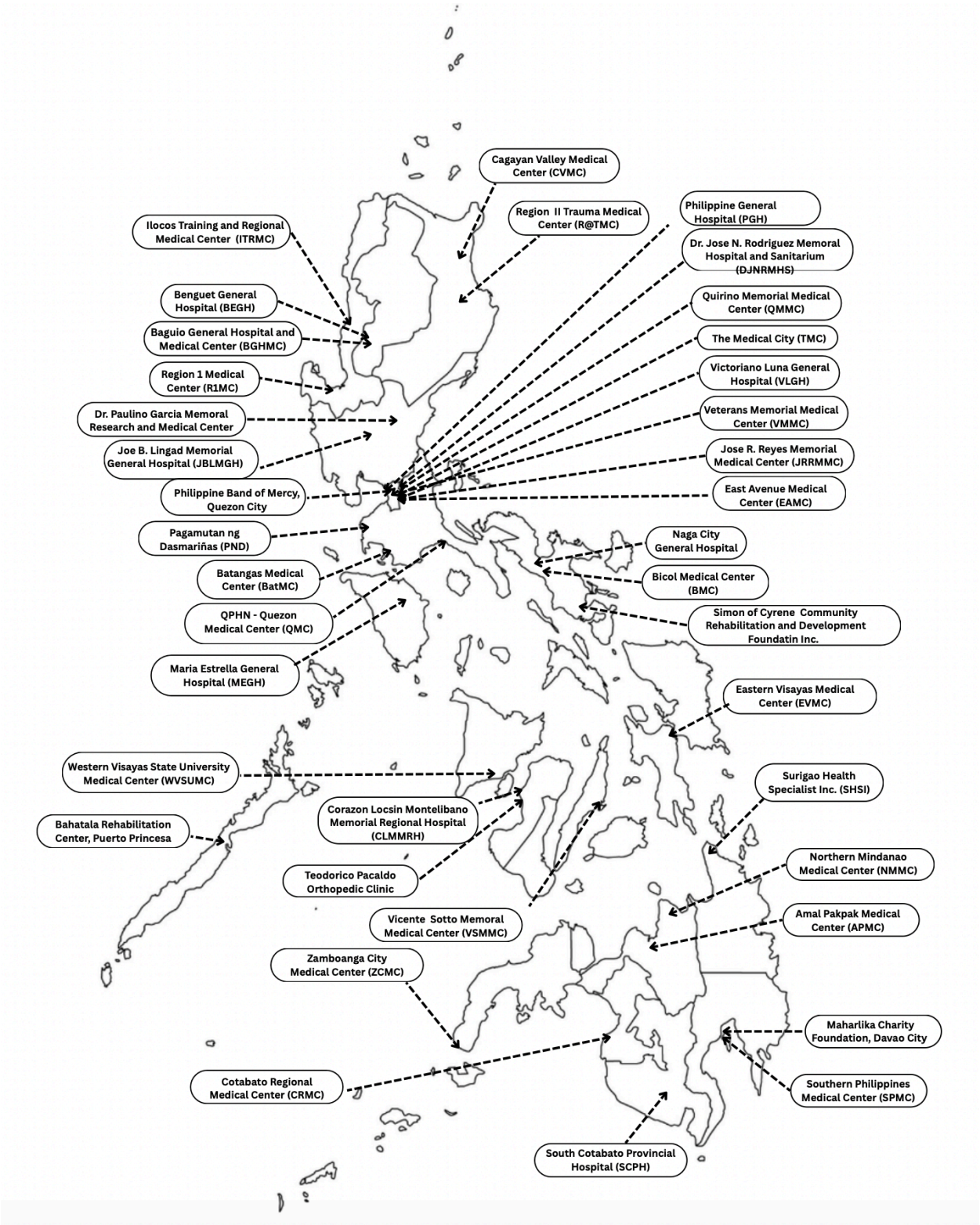

Figure 1. Select clinics in the Philippines with allied health workers trained as clubfoot practitioners.

Facilitators to Implementation

Implementation of the Clubfoot CPG is supported by alignment with existing child health, newborn screening, disability prevention, and referral programs within the Philippine health system. The presence of established clubfoot clinics, trained providers, partner-supported service delivery models, and professional society engagement facilitates adoption of standardized screening, conservative management, and follow-up practices. Ongoing training initiatives for healthcare workers, the involvement of local government units, and collaboration with non-government and development partners further enable implementation across facility- and community-based settings.

Barriers to Implementation

Several challenges may affect implementation of the guideline. These include uneven distribution of trained providers, limited access to specialized services in geographically isolated and disadvantaged areas, variability in availability of casting materials, braces, and orthotic services, and challenges related to caregiver adherence and long-term follow-up. Differences in referral pathways and documentation practices across facilities may also affect continuity of care. These barriers highlight the need for context-sensitive implementation strategies and ongoing supervision.

Resource Considerations

Resource implications were considered during guideline development. Full implementation may require investments in capacity building, availability of essential supplies for conservative management, and support for training, supervision, and monitoring activities. The recommendations are intended to be adaptable to local resource availability while maintaining fidelity to evidence-based principles and national standards of care.

Monitoring and Evaluation

Monitoring activities will focus on adherence to key guideline recommendations, including early screening, timely initiation of treatment, appropriate use of conservative management, and follow-up care. Process indicators such as documentation of clinical assessments and use of standardized scoring systems, as well as service delivery indicators including availability of trained personnel and continuity of care, will also be assessed. Monitoring will be conducted through routine and supportive supervision, facility audits, and stakeholder feedback, with results used to guide quality improvement efforts and inform future guideline updates.

The use of the following implementation checklist is suggested:

a. Preparation and Readiness

- ☐ Secure approval and endorsement from the Department of Health
- ☐ Develop digital and print-ready versions of the guideline
- ☐ Provide quick-reference tools (e.g., protocols, algorithms, care pathways)

b. Capacity Building

- ☐ Utilize existing basic and advanced training manuals for clubfoot care
- ☐ Conduct training and refresher activities through in-person and hybrid platforms
- ☐ Support mentoring and on-site supervision of trained providers

c. System Integration

- ☐ Align recommendations with existing child health and referral systems
- ☐ Integrate protocols into routine facility operations
- ☐ Maintain updated lists of facilities with trained clubfoot practitioners
- ☐ Identify local champions to support implementation and coordination

d. Monitoring and Audit

- ☐ Define key performance indicators to monitor adherence, service quality, and equity in the delivery of clubfoot care.
- ☐ Conduct regular audits using supportive supervision tools to assess service quality, adherence to the guideline, and opportunities for improvement
- ☐ Share lessons learned to improve service delivery, optimize provider practices, and guide system-level adjustments that enhance access, quality, and equity
- ☐ Integrate monitoring findings into continuous quality improvement processes

e. Feedback and Adaptation

- ☐ Collect feedback from frontline providers, program implementers, and parents/caregivers
- ☐ Refine implementation tools and guidance based on usability and feasibility
- ☐ Disseminate updated versions of the guideline as needed

f. Sustainability

- ☐ Schedule periodic refresher trainings
- ☐ Support continuous capacity development
- ☐ Foster collaboration among facilities, professional societies, and partners
- ☐ Advocate for (sustained) budget allocation for clubfoot services, including supplies, staffing, and caregiver support mechanisms

Key Performance Indicators for Screening and Management of Clubfoot in Children

This set of Key Performance Indicators (KPIs) was developed to support the implementation of the Clinical Practice Guideline on the Screening and Management of Clubfoot in Children. The KPIs translate the guideline recommendations into measurable indicators that enable routine monitoring of service delivery, treatment quality, and patient outcomes across all levels of care.

The Core KPIs represent the minimum indicators for national and regional monitoring. These focus on early identification, timely initiation of treatment, adherence to recommended clinical processes, provision of foot abduction braces, standardized monitoring, and recurrence outcomes. The Additional KPIs are intended for local government units, treatment facilities, and programs with greater capacity to implement enhanced monitoring activities. These indicators strengthen caregiver engagement, cultural responsiveness, and system readiness, and may be used to guide local quality improvement initiatives.

Together, the KPIs provide a structured framework for assessing performance, identifying gaps, and supporting continuous improvement in the delivery of clubfoot services nationwide.

CORE KPIs (Essential for national monitoring)

1. **Proportion of diagnosed infants who received treatment**

- **Definition:** Measures the effectiveness of referral pathways from newborn screening and early access to clubfoot services by determining how many diagnosed infants proceed to treatment.
- **Numerator:** Number of infants with confirmed clubfoot who started treatment
- **Denominator:** Number of infants diagnosed with clubfoot
- **Disaggregation:** Age; sex; geographic location (city/municipality, region); facility type
- **Interpretation:** Higher values indicate effective referral and early linkage to care.

2. **Proportion of diagnosed children under two years of age who received Ponseti treatment (coverage indicator)**

- **Definition:** Measures the extent to which diagnosed children under two years of age receive Ponseti treatment, regardless of whether they initiated or completed treatment.
- **Numerator:** Number of children under two years of age with clubfoot who received Ponseti treatment
- **Denominator:** Number of children under two years of age diagnosed with clubfoot
- **Disaggregation:** Facility type; geographic location (city/municipality, region); age at diagnosis
- **Interpretation:** Higher values indicate strong coverage of the recommended standard of care.

3. **Proportion of children under two years of age treated using the Ponseti method (among treated children)**

- **Definition:** Measures the adoption of the recommended standard of care among children under two years of age who received any treatment.
- **Numerator:** Number of children under two years of age with clubfoot who received Ponseti treatment as the first-line treatment
- **Denominator:** Number of children under two years of age with clubfoot who received any method of treatment
- **Disaggregation:** Facility type; geographic location (city/municipality, region); age (in months) at treatment initiation
- **Interpretation:** Higher values indicate strong adherence to evidence-based practice.

4. **Proportion of infants who begin Ponseti treatment before 3 months of age**

- **Definition:** Measures whether infants diagnosed with idiopathic clubfoot begin Ponseti treatment within the recommended early window, defined as less than 3 months of age or when the foot can fit the smallest available brace.
- **Numerator:** Number of infants with idiopathic clubfoot who received Ponseti casting before 3 months of age (or earlier if foot size permits).
- **Denominator:** Number of infants diagnosed with idiopathic clubfoot.
- **Disaggregation:** Age at diagnosis; sex; facility type; geographic location (city/municipality, region)
- **Interpretation:** Higher values indicate timely initiation of conservative management consistent with the CPG recommendation. Lower values may reflect delays in diagnosis, referral, caregiver constraints, or issues with facility capacity.

5. **Proportion of children provided with a foot abduction brace**

- **Definition:** Measures whether children completing Ponseti casting (with or without tenotomy) receive a foot abduction brace, regardless of whether it is locally produced or commercially manufactured.
- **Numerator:** Number of children who received a foot abduction brace after completing Ponseti casting.
- **Denominator:** Number of children who completed Ponseti casting (with or without tenotomy).
- **Disaggregation:** Type of brace (locally produced vs. commercial); facility type; geographic location (city/municipality, region); age at brace initiation
- **Interpretation:** Higher values indicate adequate provision of braces needed to maintain correction until age five. Low values may reflect supply gaps, procurement issues, or a lack of access to locally produced or commercially available braces.

6. **Proportion of eligible infants who received percutaneous tenotomy**

- **Definition:** Measures adherence to the recommendation that infants who meet all clinical indications undergo percutaneous tenotomy.
- **Numerator:** Number of infants who met all clinical indications and received percutaneous tenotomy.
- **Denominator:** Number of infants who met all clinical indications for tenotomy.
- **Disaggregation:** Facility type; geographic location (city/municipality, region)
- **Interpretation:** High values indicate correct application of the guideline. Low values may reflect gaps in provider confidence, facility capacity, or access to trained personnel.

7. **Proportion of percutaneous Achilles tenotomies performed under local anesthesia**

- **Definition:** Measures adherence to the recommendation that percutaneous Achilles tenotomy should be performed under local anesthesia, except in children over six months of age or when general anesthesia is used at the surgeon's discretion.
- **Numerator:** Number of percutaneous Achilles tenotomies performed under local anesthesia.
- **Denominator:** Total number of percutaneous Achilles tenotomies performed.
- **Disaggregation:** Age group (<6 months, ≥6 months); facility type, geographic location (city/municipality, region)
- **Interpretation:** Higher values indicate strong alignment with the guideline recommendation. Lower values may reflect gaps in training, facility readiness, or case selection.

8. **Proportion of facilities routinely using the Pirani scoring system**

- **Definition:** Measures the extent to which facilities providing clubfoot services routinely use the Pirani scoring system for monitoring children with idiopathic clubfoot during casting, bracing, and follow-up.
- **Numerator:** Number of facilities that routinely use the Pirani scoring system as part of clinical monitoring and documentation.
- **Denominator:** Total number of facilities providing clubfoot services.
- **Disaggregation:** Facility type; geographic location (city/municipality, region)
- **Interpretation:** Higher values indicate strong adoption of standardized monitoring practices aligned with the guideline. Lower values may reflect gaps in training, documentation systems, or facility readiness.

9. **Proportion of children with idiopathic clubfoot who had recurrence after completion of Ponseti treatment**

- **Definition:** Measures the recurrence rate of deformity among children who previously achieved successful correction using the Ponseti method. This reflects overall program quality, adherence to bracing, and adequacy of initial treatment.
- **Numerator:** Number of children with idiopathic clubfoot who had recurrence of deformity after completion of Ponseti treatment.
- **Denominator:** Number of children with idiopathic clubfoot who previously achieved successful correction using the Ponseti method
- **Disaggregation:** Age at recurrence; facility type; geographic location, brace adherence history (if available); whether initial tenotomy was performed
- **Interpretation:** Higher values may indicate gaps in bracing adherence, technique-related issues during initial treatment, or challenges in follow-up. Lower values suggest effective initial correction and strong adherence support.

ADDITIONAL KPIs (Recommended for CHDs, LGUs, and more advanced treatment facilities)

1. **Proportion of key stakeholders oriented on caregiver education**

- **Definition:** Ensures that municipal/city health workers, BHWs, primary care physicians, and social workers are aligned.
- **Numerator:** Number of key stakeholders trained/oriented on structured parental education
- **Denominator:** Total number of identified stakeholders in the catchment area
- **Disaggregation:** Facility type, geographic location (city/municipality, region)
- **Interpretation:** Higher values indicate stronger community-based support systems.

2. **Caregiver understanding of treatment steps**

- **Definition:** Assesses whether caregivers understood the key messages (casting schedule, bracing requirements, follow-up).
- **Numerator:** Number of caregivers who correctly answered key understanding questions (e.g., 3–5 item checklist)
- **Denominator:** Number of caregivers who received structured education
- **Disaggregation:** Facility type, geographic Location (city/municipality, region)
- **Interpretation:** Low scores may indicate the need to improve materials or delivery.

3. **Proportion of facilities with culturally appropriate caregiver education materials**

- **Definition:** Measures the extent to which facilities providing clubfoot services have culturally and linguistically appropriate caregiver education materials available for use (e.g., local language versions, low-literacy formats, culturally adapted illustrations).
- **Numerator:** Number of facilities that have culturally appropriate caregiver education materials available.
- **Denominator:** Total number of facilities providing clubfoot services.
- **Disaggregation:** Facility type, geographic location (city/municipality, region)
- **Interpretation:** Higher values indicate stronger system readiness to deliver equitable, culturally responsive caregiver education. Lower values may reflect gaps in material development, translation, or distribution.

Equity Considerations

Equity was a central consideration in the development and implementation of this guideline. Special attention was given to newborns and children in resource-limited, rural, and geographically isolated areas, and to those facing barriers to timely diagnosis, treatment, and follow-up. Recognizing that women are the primary caregivers responsible for completing clubfoot treatment, the guideline also considers gender-related constraints such as limited financial autonomy, travel burden, and competing household duties. Implementation strategies aim to reduce these inequities and support inclusive, gender-responsive access to quality clubfoot care.

Adaptation of recommendations

Healthcare facilities and local government units are encouraged to adapt the recommendations to ensure feasibility and relevance based on local resources and context, while maintaining the core principles and intent of the guideline.

Updating of the Guideline

This clinical practice guideline will be subject to ongoing monitoring and annual review to ensure that recommendations remain current, valid, and responsive to emerging evidence, local practice needs, and health system contexts. The review process will assess consistency with current standards of clubfoot care, the availability of new evidence affecting benefits and harms, changes in feasibility and service delivery, and feedback from clinicians, facilities, and other stakeholders. Annual reviews will inform whether an update is warranted but will not necessarily result in immediate changes.

A full or focused guideline update will be initiated if there is new high-certainty or practice-changing evidence, changes in standards of care or relevant policies, introduction of new treatments or service delivery models, shifts in resource availability affecting feasibility or equity, emerging safety concerns, or substantial changes in patient or caregiver values and preferences.

When an update is triggered, the Steering Committee, together with relevant technical groups, will determine the scope of the update (full guideline update or focused revision of selected questions). Updates will follow the methodologies outlined in the DOH Manual for National Practice Guideline Development, including evidence synthesis, structured deliberation using the GRADE Evidence-to-Decision framework, and transparent documentation of changes. This structured approach supports the guideline as a living, responsive document, grounded in regular monitoring, explicit update triggers, and transparent decision-making regarding when and how updates are undertaken.

If no triggering events are identified during the annual review, the Steering Committee will formally affirm and document the continued validity of the guideline, indicating that the recommendations remain appropriate and up to date.

Chapter 5.
Editorial Independence

The development of this Clinical Practice Guideline was **supported by MiracleFeet** and **organized through the Philippine National Clubfoot Program, in collaboration with the Philippine NGO Council on Population, Health and Welfare Inc.** MiracleFeet did not influence the content, recommendations, or conclusions of this guideline. The views expressed are solely those of the **Guideline Development Group (GDG)** and do not necessarily reflect the official policies or positions of MiracleFeet, the Philippine National Clubfoot Program, or the Philippine NGO Council on Population, Health and Welfare Inc.

All members of the GDG completed and submitted their Declarations of Conflict of Interest and curricula vitae to the Conflict of Interest Review Committee (COIRC), whose members were independent of the GDG. Any identified conflicts of interest were reviewed and managed in accordance with established procedures to preserve the integrity, transparency, and objectivity of the guideline development process. The algorithm for COI classification is shown in Figure ___ below.

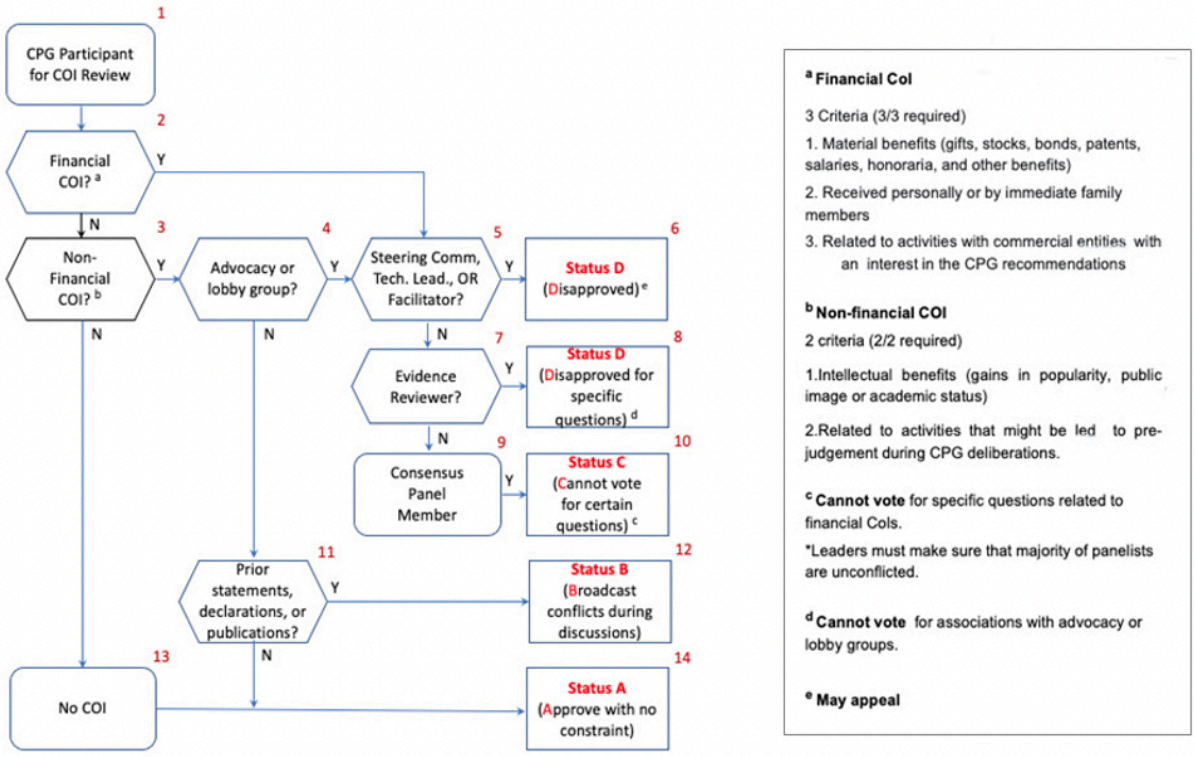

Figure 2. Algorithm for COI Classification.

Steering Committee

No.	Members	Expertise	Disclosure	Management
1	**Lorna F. Ramos-Abad, MD, MSc, FPPS** College of Medicine, University of the Philippines	Pediatric Endocrinology	Practicing pediatrician, membership in a society of Pediatricians	**B** (Broadcast)
2	**Joycie Eulah H. Abiera, MD, FPARM** University of the Philippines Manila - Philippine General Hospital	Rehabilitation Medicine	Rehabilitation Medicine practitioner; membership in a society of rehabilitation medicine; clinical professor	**B** (Broadcast)
3	**Maria Melanie Liberty B. Alcausin, MD, FPPS** Institute of Human Genetics, National Institutes of Health, University of the Philippines Manila	Pediatrics - Clinical Genetics	Lead investigator, DOH Birth Defect Surveillance Project 2024; Practicing pediatrician, with stocks in hospitals but less likely to benefit financially from recommendations in this CPG, membership in a society of Pediatricians	**B** (Broadcast)
4	**Czar Louie L. Gaston, MD, FPOA** University of the Philippines Manila - Philippine General Hospital	Orthopedic Surgery	Editor, Philippine Journal of Orthopedics; With stocks in a hospital but less likely to benefit financially from recommendations in this CPG	**B** (Broadcast)
5	**Juanito S. Javier, MD, MChOrth, FPOA** Philippine National Clubfoot Council	Orthopedic Surgery	Head, Philippine Clubfoot Council (2024-present); National Coordinator for Screening of Congenital Clubfoot, NIH, UP Manila (2023 to present); Former Head, Pediatric Orthopedics Division, UP PGH; Member, Pediatric Orthopaedic Society of the Philippines; Lectures and workshops on Ponseti Technique	**B** (Broadcast)
6	**Maria Cristina Mosende, RSW, PGDip BM, MDM** Philippine National Clubfoot Council	Program Management and Monitoring and Evaluation	Previous employment in a non-profit advocacy group; Previously represented MiracleFeet to the Philippine National Clubfoot Council; No direct financial benefit from management of condition	**B** (Broadcast)

Guideline Panel

No.	Panel Members and Societies Represented	Expertise	Sex	Disclosure	COI Classification & Management
1	**Hyacinth G. Babag, PTRP** Physical Therapist and Site Coordinator of Benguet General Hospital Clubfoot Clinic	Physical Therapy; Baguio and Benguet	F	Advocate based previous activities and involvement; Lectures on early detection of clubfoot in Northern Samar, Ilocos Sur, Biliran and Benguet	**B** (Broadcast activities that may be perceived as conflicts of interest including the advocacy for promoting care for clubfoot patients and assisting in care)
2	**Loudella Calotes-Castillo, MD, DPPS, FCNSP, FPNA** Department of Pediatrics and Neurosciences, Philippine General Hospital	Pediatric Neurology, Manila	F	Practicing Pediatrician, with potential financial COI and non-financial COI from advocacy	**C** (Should not vote for questions that may potentially benefit them: Questions 1, 8)
3	**Monalisa L. Lim-Dungca, MD, FPARM** Department of Rehabilitation Medicine, Philippine General Hospital and Philippine Children's Medical Center	Physical and Rehabilitation Medicine; Manila, Quezon City, Tarlac City	F	Married to a Practicing Pediatric Orthopedic Surgeon; Rehab Med Practice	**B** (Broadcast activities that may be perceived as conflicts of interest including the practice of Rehabilitation Medicine and being married to a Pediatric Orthopedic Surgeon)
4	**Rosalyn P. Flores, MD, FPOA, FPCS** Pediatric Orthopaedic Society of the Philippines, University of the Philippines - Philippine General Hospital, University of Santo Tomas Hospital	Orthopedic Surgery (Pediatric Orthopedics; Ilizarov and Limb Deformity Surgery); Manila	F	Practicing Pediatric Orthopedic Surgeon	**C** (Should not vote for questions that may potentially benefit them)
5	**Arnaldo Songcayaon Favila Jr, MD, FPOA, FPSS** BAHATALA Rehabilitation Centre	Orthopedic Surgery; Puerto Princesa City, Palawan	M	Practicing Pediatric Orthopedic Surgeon	**C** (Should not vote for questions that may potentially benefit them)
6	**Jean Pierre F. Leung, MD, FPOA** Philippine Orthopaedic Association; Benguet General Hospital Clubfoot Clinic	Pediatric Orthopedics and Spine Surgery	M	Practicing Pediatric Orthopedic Surgeon; Trainer for MiracleFeet, Global Clubfoot Initiative	**C** (Should not vote for questions that may potentially benefit them)
7	**Ebner Bon G. Maceda, MD, FPPS** Institute of Human Genetics, National Institutes of Health, University of the Philippines Manila; Division of Clinical and Metabolic Genetics, Department of Pediatrics, Philippine General Hospital	Pediatrics; Clinical Genetics; NCR; Nationwide	M	Practicing Pediatrician, with potential financial COI and non-financial COI from advocacy	**C** (Should not vote for questions that may potentially benefit them: Questions 1, 8))
8	**Jeremieh C. Nisperos, RSW**	Medical Social Service, Social Worker	M	None	**A** (No restrictions)

No.	Panel Members and Societies Represented	Expertise	Sex	Disclosure	COI Classification & Management
	Clinical Genetics and Research Unit, National Institutes of Health University of the Philippines Manila, Philippines				
9	**Japhet Gerard Regidor, CPO, MHCM** University of the East Ramon Magsaysay Memorial Medical Center, Inc.	Orthotics / Bracing; Quezon City	M	Prosthetic and Orthotic Clinician, with financial COI and advocacy	**C** (Should not vote for questions that may potentially benefit them: Question 4)
10	**Michael Shaun B. Ritualo, MD, FPOA** Patient Advocate	General and Pediatric Orthopedic Surgery	M	Practicing Orthopedic Surgeon	**B** (Broadcast activities that may be perceived as conflicts of interest including being a practicing orthopedic surgeon)
11	**Sitti Khadija U. Salabi, MD, DFM** Philippine Academy of Family Physicians	Family and Community Medicine; Manila, Pasig, Pasay, Paranaque, Puerto Princesa City	F	No relevant COI	**A** (No restrictions)
12	**Maria Anna Morales-Tugano, MD, FPPS, DPSNbM** Philippine General Hospital	Pediatrics-Newborn Medicine; Las Pinas City	F	Practicing Pediatrician, with potential financial COI and non-financial COI from advocacy	**C** (Should not vote for questions that may potentially benefit them: Questions 1, 8))
13	**Rechell G. Labay** Parent	Parent, Patient Advocate Quezon City	F	No relevant COI	**A** (No restrictions)

Technical Working Group / Evidence Review Experts

No.	Members	Expertise	Disclosure	Management
1	**Aldrich Ivan Lois D. Burog, MD, MSc (cand.)** Department of Clinical Epidemiology, University of the Philippines - Manila College of Medicine Foundation for the Advancement of Clinical Epidemiology, Inc. (FACE)	Primary Care, Clinical Epidemiology, Guideline Methodology	Received honorarium for different CPGs	**B** (Broadcast activities that may be perceived as conflicts of interest)
2	**Miguel Gaston M. Agcaoili, RND** Evidence Generation and Technical Support Division, Disease Prevention and Control Bureau / College of Public Health, University of the Philippines Manila	Public Health, Nutrition	Part of DOH Clearinghouse	**B** (Broadcast activities that may be perceived as conflicts of interest)
3	**Hannah Haile P. Almenario, MD, MPM**	Internal Medicine	None	**A** (No restrictions)
4	**Howell Henrian G. Bayona, PhD, MSc, RSLP** Institute of Clinical Epidemiology, National Institutes of Health, UP Manila	Speech Language Pathology, Dysphagia Rehabilitation, Clinical Epidemiology,	None	**A** (No restrictions)
5	**Ian Theodore G. Cabaluna, RPh, MD, GDip, MSc** Institute of Clinical Epidemiology, National Institutes of Health, UP Manila	Clinical Epidemiology	None	**A** (No restrictions)
6	**Ericka Louise C. Gilo, RN** University of the Philippines - Philippine General Hospital	Critical Care, Adult Health Nursing, Clinical Epidemiology	None	**A** (No restrictions)
7	**Anna Angelica Macalalad-Josue, MD, FPCP, FPCEDM** Asia Pacific Center for Evidence Based Medicine	Internal Medicine-Adult Endocrinology, Clinical Epidemiology	Received honorarium for endocrinology related therapeutics	**B** (Broadcast activities that may be perceived as conflicts of interest)
8	**Karl Jeffrey E. Murillo, MD, DPCP** Division of Pulmonary Medicine, Department of Medicine, Philippine General Hospital	Internal Medicine	None	**A** (No restrictions)
9	**Dan Louie Renz P. Tating, MS(cand), RN** Institute of Clinical Epidemiology, National Institutes of Health, UP Manila	Public Health, Clinical Epidemiology, Nursing	None	**A** (No restrictions)
10	**Jayson M. Villavicencio, MD, FPCP** Batangas Medical Center	Internal Medicine - Nephrology	None	**A** (No restrictions)

Technical Facilitator

Members	Expertise	Disclosure	Management
Theodore Joseph J. Ablaza, MD, DPPS Philippine General Hospital	Ambulatory Pediatrics	None	**A** (No restrictions

Voting Limitations for Specific Guideline Questions

No.	Guideline Question	Anyone may vote	Limitations
1	Should routine screening for foot deformities (e.g., clubfoot) be conducted for all newborns by primary care providers (i.e., such as midwives, nurses, pediatricians, and family physicians)?		Limit influence by Pediatric Orthopedic practitioners and Pediatricians
2	Among children identified with clubfoot, is routine use of the standard Ponseti method as first-line treatment compared to Modified Ponseti method leads to decreased failure rates/better outcomes?	✔	
3	Should we implement structured parental education and compliance strategies as part of conservative management (e.g., Ponseti method) in children with idiopathic clubfoot?	✔	
4	Should locally produced braces, compared to commercial (branded) braces, be used in patients with idiopathic clubfoot?		Limit influence by any member who may have investments or other interests in locally produced braces
5	Should infants with idiopathic clubfoot undergo casting within 4 weeks of birth or upon diagnosis as part of initial conservative (non-surgical) management?		Limit influence by Pediatric Orthopedic practitioners as it may benefit them
6	Should percutaneous tenotomy be performed in those eligible following completion of Ponseti casting among patients with idiopathic clubfoot?		Limit influence by Pediatric Orthopedic practitioners as it may benefit them
7	Should outpatient percutaneous tenotomy be done as an alternative to operating room-based tenotomy in patients with clubfoot?	✔	
8	Should all children with suspected non-idiopathic clubfoot (e.g., neuromuscular, syndromic types) undergo evaluation by a multidisciplinary team such as specialists in pediatrics, orthopedics, neurology, and rehabilitation medicine?		Limit influence by Pediatric Orthopedic practitioners as it may benefit them Limit influence by Pediatricians
9	Should children with clubfoot who are older than 4* years (Note: do scoping search for the cutoff) undergo casting (e.g., Ponseti method or other casting techniques) or proceed directly (i.e., outright) to surgical management?		Limit influence by Pediatric Orthopedic practitioners as it may benefit them
10	Should patients with idiopathic clubfoot be routinely monitored using clinical scoring systems such as the Pirani score during and after treatment?	✔	
11	Should anterior tibialis tendon transfer with limited soft tissue release be used instead of repeat casting and tenotomy in patients with relapsed idiopathic clubfoot		Limit influence by Pediatric Orthopedic practitioners as it may benefit them
12	Should we do repeat Ponseti casting method or Surgical management (open lengthening, Posteromedial Release) Among children with idiopathic clubfoot who failed treatment with Ponseti Casting?		Limit influence by Pediatric Orthopedic practitioners as it may benefit them

**NOTE: In questions where specific limitations were recommended by the COI Review Committee, votes of Guideline Panelists representing the same professional association or stakeholder (e.g., pediatric orthopedic surgeons) were counted only as one (1) vote.*