

Introduction to Shoe Modifications

Orthopaedic footwear against foot ulcers in diabetes.

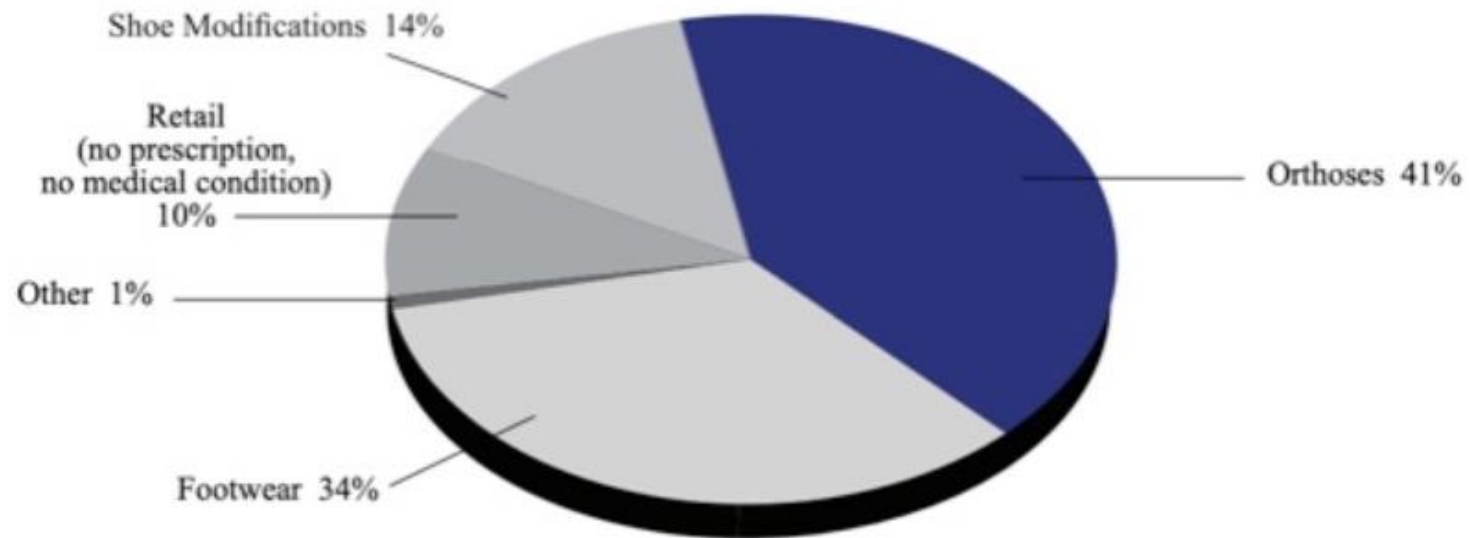
- Bus SA. Ned Tijdschr Geneeskd. 2014;158:A7497.
- In people with diabetes mellitus, foot ulcers are a major problem because they increase the risk of a foot infection and amputation and reduce quality of life. After a foot ulcer has healed, the risk of recurrence is high. Orthopaedic shoes and orthotics are often prescribed to high risk patients and aim to reduce the mechanical pressure on the plantar surface of the foot.
- Orthopaedic footwear that is modified to reduce pressure is not much more effective in preventing foot ulcer recurrence than orthopaedic footwear that did not undergo such modification, *unless the shoes are worn as recommended*. In that case, the risk of ulcer recurrence is reduced by 46%.
- In patients with a history of ulceration, compliance in wearing orthopaedic shoes at home is low, while these patients walk more inside the house than outside the house

Adherence to Wearing Prescription Custom-Made Footwear in Patients With Diabetes at High Risk for Plantar Foot Ulceration

- Roelof Waijman, MSC, Renske Keukenkamp, MSC, Mirjam de Haart, MD, PHD, Wojtek P. Polonski, MD, Frans Nollet, MD, PHD, and Sicco A. Bus, PHD^{1,3} Diabetes Care. 2013 Jun; 36(6): 1613–1618.
- OBJECTIVE: Prescription custom-made footwear can only be effective in preventing diabetic foot ulcers if worn by the patient. Particularly, the high prevalence of recurrent foot ulcers focuses the attention on adherence, for which objective data are nonexistent. We objectively assessed adherence in patients with high risk of ulcer recurrence and evaluated what determines adherence.
- RESEARCH DESIGN AND METHODS: In 107 patients with diabetes, neuropathy, a recently healed plantar foot ulcer, and custom-made footwear, footwear use was measured during 7 consecutive days using a shoe-worn, temperature-based monitor. Daily step count was measured simultaneously using an ankle-worn activity monitor. Patients logged time away from home. Adherence was calculated as the percentage of steps that prescription footwear was worn.
- RESULTS: Mean adherence was 71 %. Adherence at home was 61 (+/- 32)%, over 3,959 ± 2,594 steps, and away from home 87 ± 26%, over 2,604 ± 2,507 steps. In 35 patients with low adherence (<60%), adherence at home was 28 ± 24%. Lower BMI, more severe foot deformity, and more appealing footwear were significantly associated with higher adherence.
- CONCLUSIONS: The results show that adherence to wearing custom-made footwear is insufficient, particularly at home where patients exhibit their largest walking activity. This low adherence is a major threat for reulceration.

2017 ABC Pedorthic Practice Analysis

Figure 1 - Percentage of Time in Pedorthic Practice Areas



2017 ABC Pedorthic Practice Analysis

- Percent of Time in Pedorthic Practice Areas and Devices
 - Foot orthoses 41%
 - Footwear 34.3%
 - Shoe modifications 14.2%
- Percent of CPeds Performing Each Activity in Last 12 Months
 - Assess for shoe sole mod use 72%
 - Fit/dispense shoe sole mods 67%
 - Fabricate shoe sole mods 39%

Why Isn't Shoe Mod Utilization Higher?

- 2015 AOPA survey found 87% of O&P facilities use c-fab to some degree.
 - Few labs offer shoe modification services
- Trend had been decreasing emphasis on fabrication skills in schools in recent years.

THURSDAY
September 26, 1996

8:30 - 10:00 AM
Room 303
Tod S. Reed, D.P.M.

* Biomechanical Foot & Ankle
(pes planus/pes cavus)

10:00 AM

BREAK

10:15 AM - 10:45
Room 301
Kim McAmis, C. Ped.

* Demonstration on Safety of
Machinery & Equipment

10:45 - 12:00
Room 301
Dennis Janisse, C. Ped.
Kim McAmis, C. Ped.
Erick Janisse, C. Ped.

External Shoe Modificaions
(Demonstration)
* Rocker Soles
* Metatarsal bars
* Fiberglassing footwear
* Flaring
* Elevations

12:00 Noon

LUNCH

1:00 - 4:45 PM
Room 301
Dennis Janisse, C. Ped.
Kim McAmis, C. Ped.
Erick Janisse, C. Ped.

Laboratory - Use factory shoes
1. Lateral Flare
2. Rocker Soles
3. Elevations
4. Fiberglassing
5. Metatarsal Bars

3:00 PM

BREAK

5:00 PM

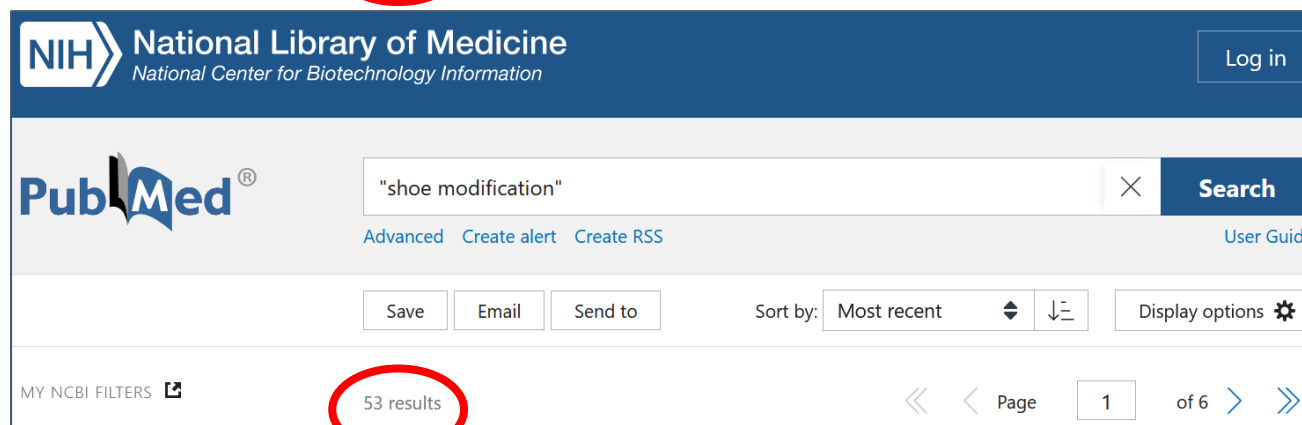
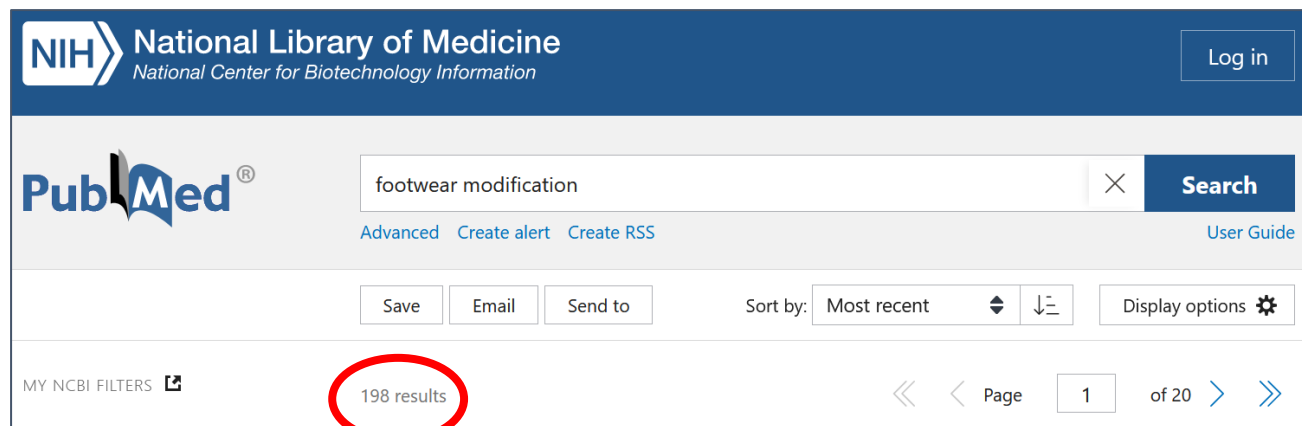
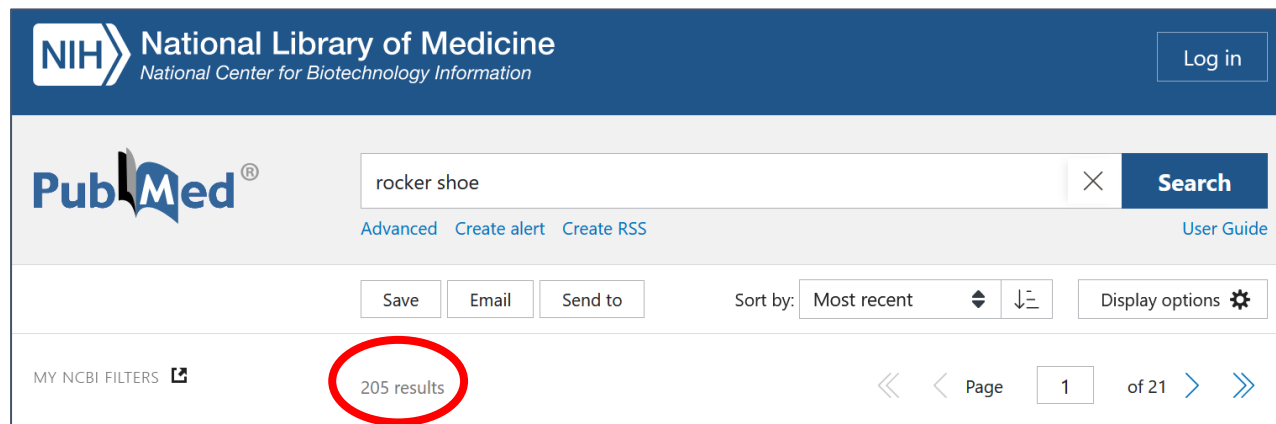
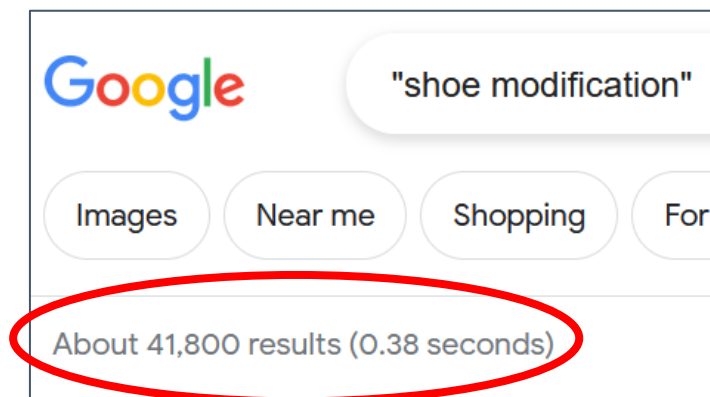
DINNER

6:30 - 9:00 PM
Room 301
Kim McAmis, C. Ped.
Dennis Janisse, C. Ped.
Erick Janisse, C. Ped.

Impression Demonstrations
* Foam Impression
* Wax Impression/Peloprints & Reg.
* Sand & Wax Impressions

Why Isn't Shoe Mod Utilization Higher?

- Technical skill in applying modifications in an aesthetically pleasing manner is critical to patient compliance.
- Many 3rd party payors do not cover shoe modifications.
 - Medicare
 - Worker's compensation

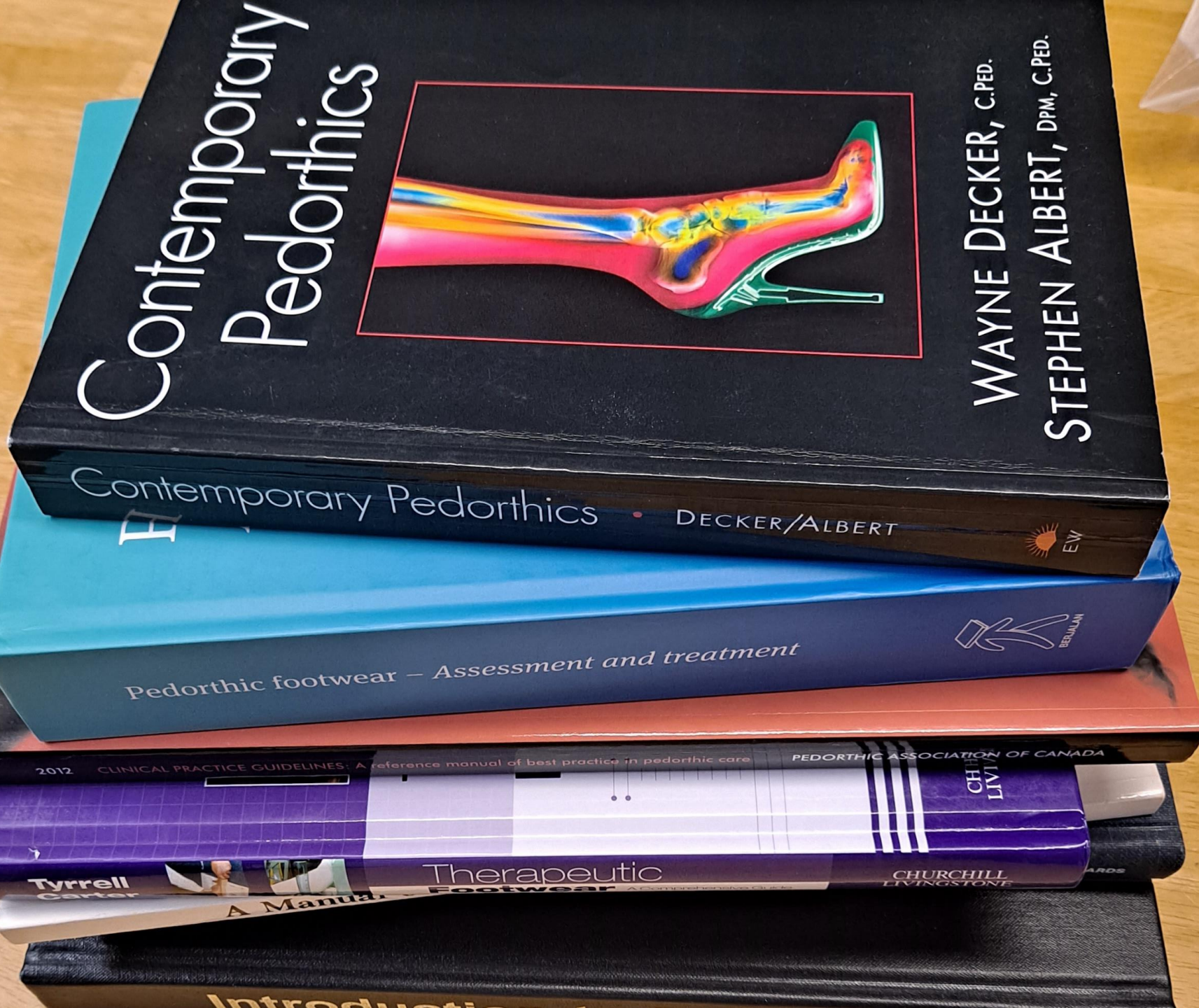


Shoe Modifications for Ulcer Reduction

- Bus SA, van Deursen RW, Armstrong DG, Lewis JE, Caravaggi CF, Cavanagh PR; International Working Group on the Diabetic Foot. Footwear and offloading interventions to prevent and heal foot ulcers and reduce plantar pressure in patients with diabetes: a systematic review. *Diabetes Metab Res Rev*. 2016 Jan;32 Suppl 1:99-118. doi: 10.1002/dmrr.2702. PMID: 26342178.
 - [T]wo systematic reviews and meta-analyses, 32 randomized controlled trials, 15 other controlled studies, and another 127 non-controlled studies. Several randomized controlled trials with low risk of bias show the efficacy of therapeutic footwear that demonstrates to relief [sic] plantar pressure *and is worn by the patient*, in the prevention of plantar foot ulcer recurrence.
 - Significant pressure reduction can be achieved with footwear with a rocker-bottom outsole...
 - Shoes with a rocker-bottom outsole are reported to be effective in reducing forefoot peak pressures.

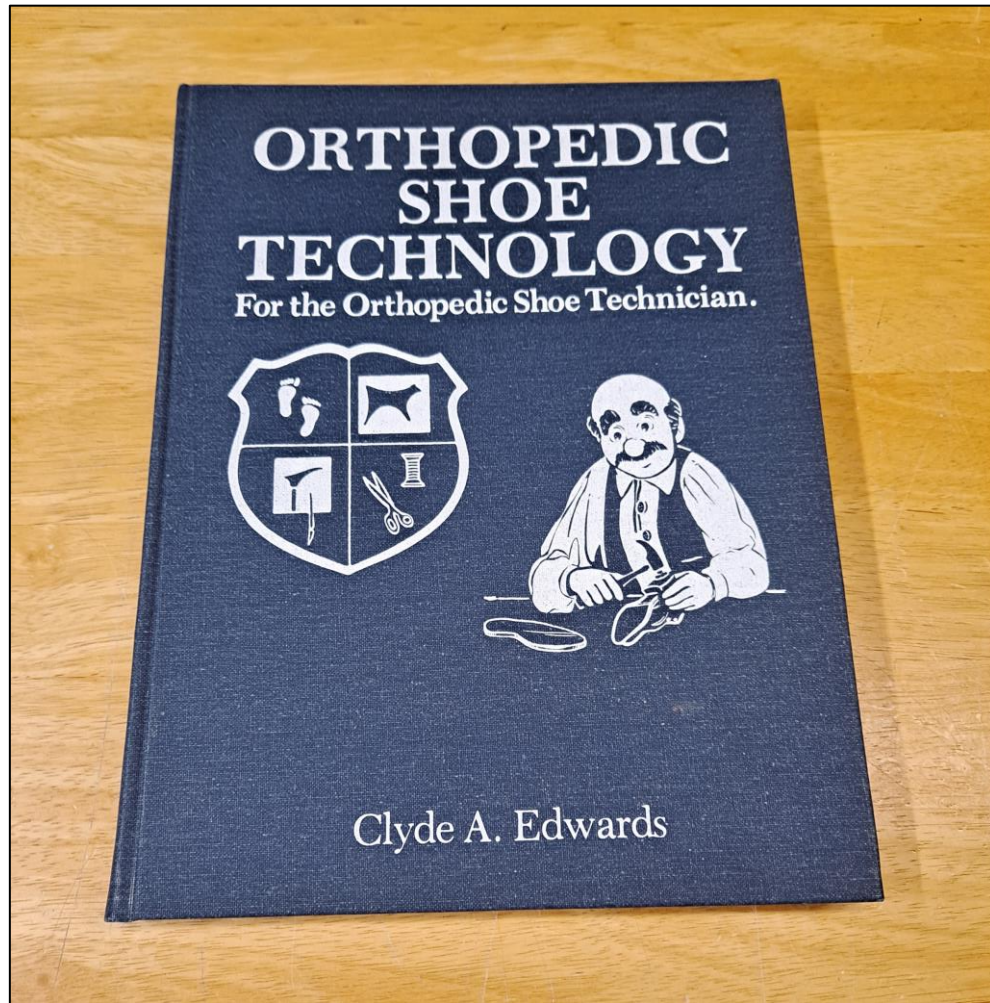
Shoe Modifications for TMA

- Mueller MJ, Strube MJ. Therapeutic footwear: enhanced function in people with diabetes and transtatarsal amputation. Arch Phys Med Rehabil. 1997 Sep;78(9):952-6. doi: 10.1016/s0003-9993(97)90056-3. PMID: 9305267.
 - **Interventions:** Six types of footwear evaluating the following components: length of shoe (full-length or short shoe), a rigid rocker-bottom sole, and an ankle-foot-orthosis.
 - **Conclusion:** Although there are individual exceptions, we recommend the full-length shoe, total-contact insert, and a rigid rocker-bottom sole for most patients with DM and a TMA.
- Mueller MJ, Strube MJ, Allen BT. Therapeutic footwear can reduce plantar pressures in patients with diabetes and transtatarsal amputation. Diabetes Care. 1997 Apr;20(4):637-41. doi: 10.2337/diacare.20.4.637. PMID: 9096994.
 - **Objective:** To compare how footwear (full-length shoe or short shoe), a total contact insert, a rigid rocker-bottom (RRB) sole, and an ankle-foot orthosis (AFO) affect peak plantar pressure (PPP) on the distal residuum and contralateral extremity of patients with diabetes and transtatarsal amputation (TMA).
 - **Conclusions:** The full-length shoe, total contact insert, and an RRB sole provided the best pressure reduction for the residuum and contralateral foot, with the optimal compromise for cosmetic acceptance and function.

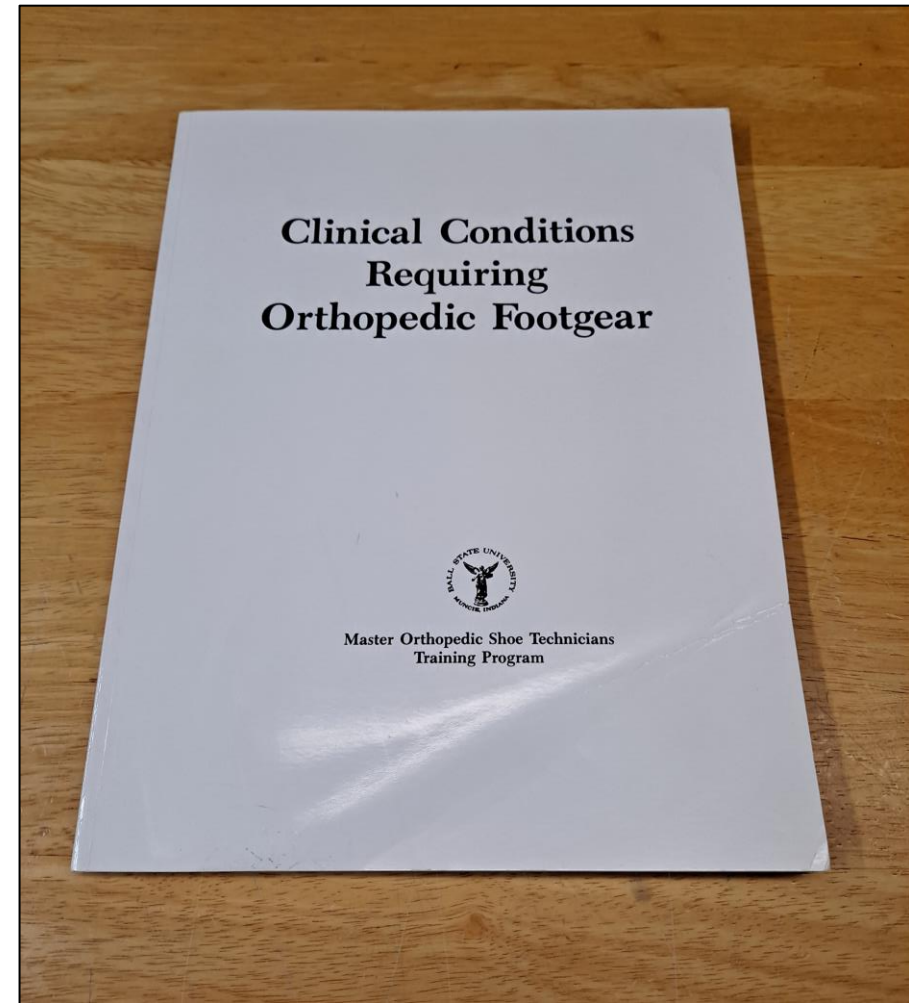


But Where Can I Learn More?

- Unfortunately, there aren't any quality tutorials on YouTube...
- There are some good books. Although the best instructional ones are out of print...
- The Pedorthic track at the 2023 AOPA National Assembly!



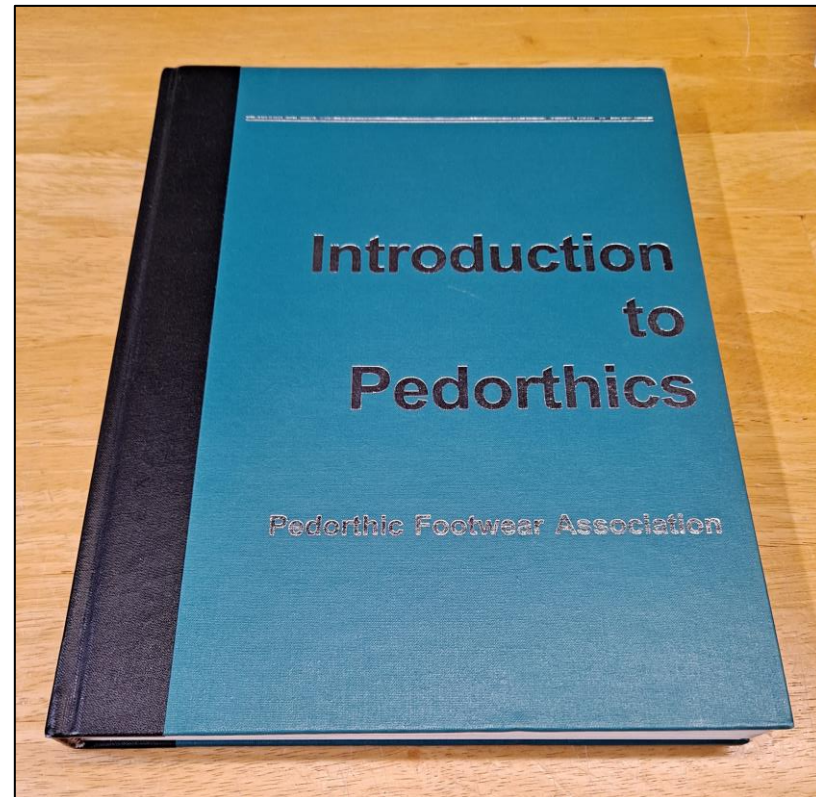
Clyde Edwards, 1981



Clyde Edwards, 1985

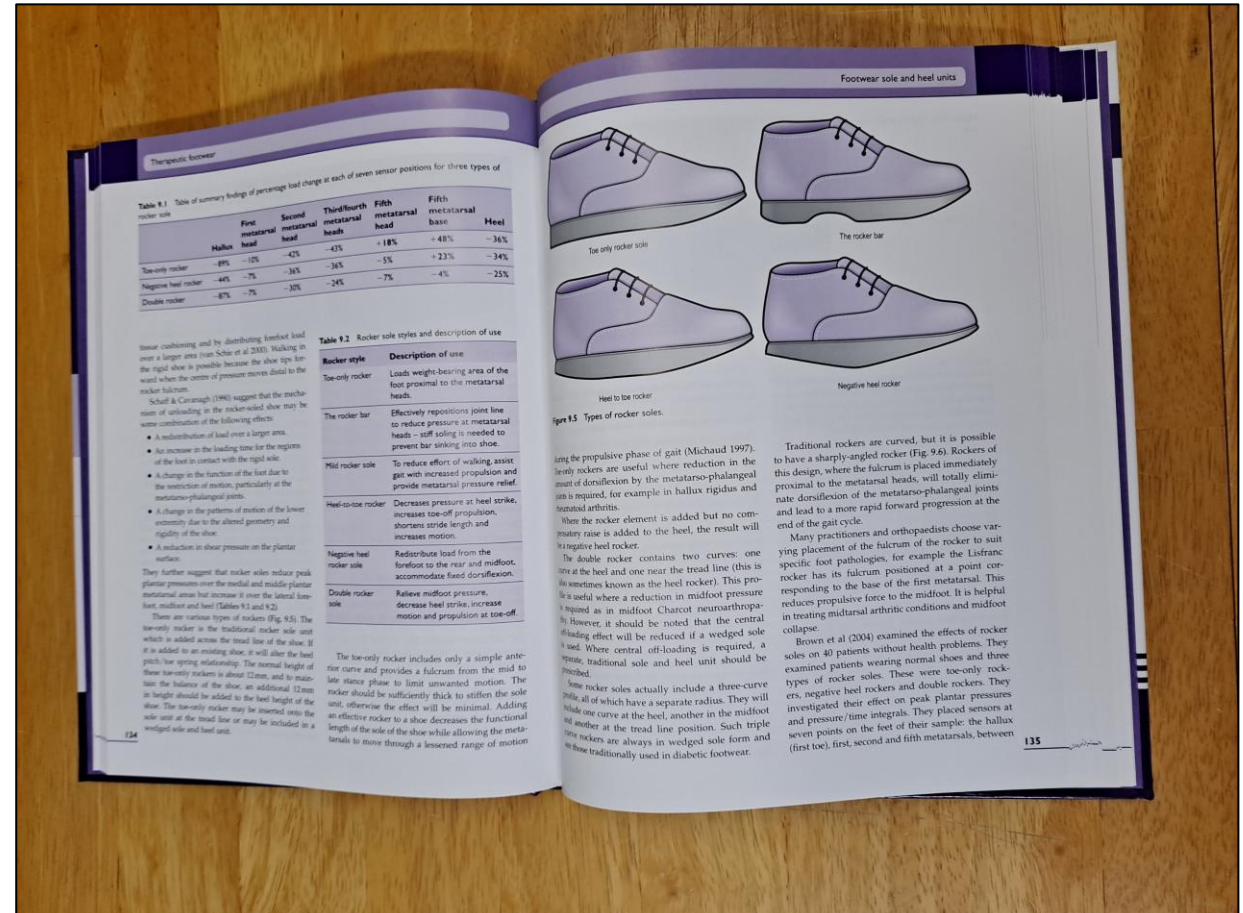
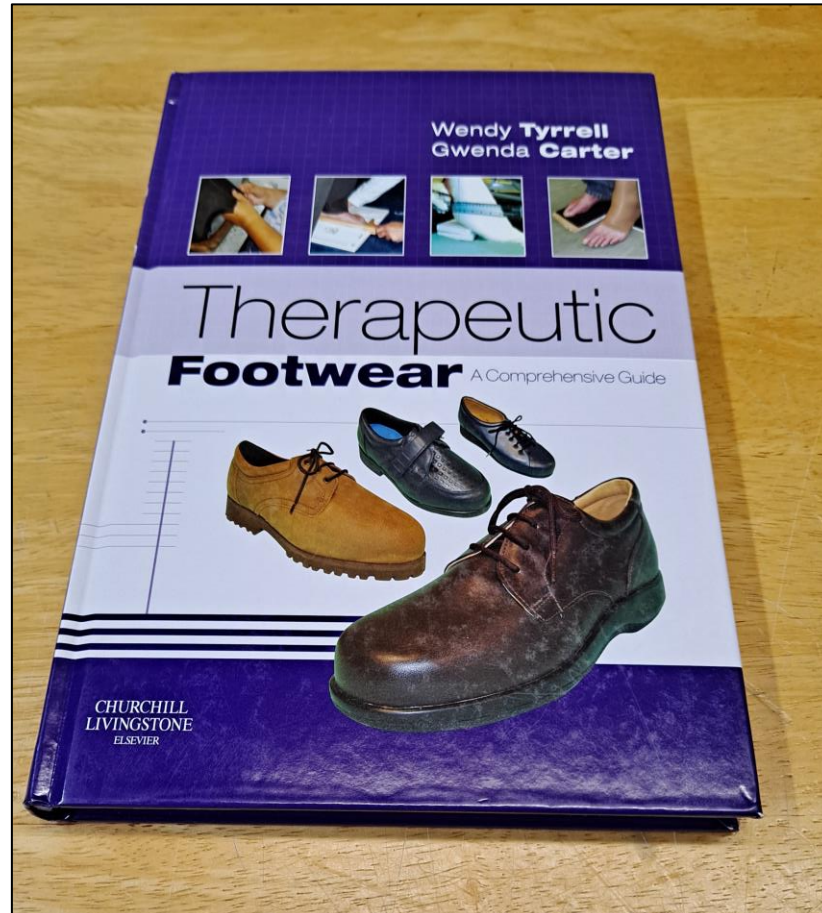
Introduction to Pedorthics

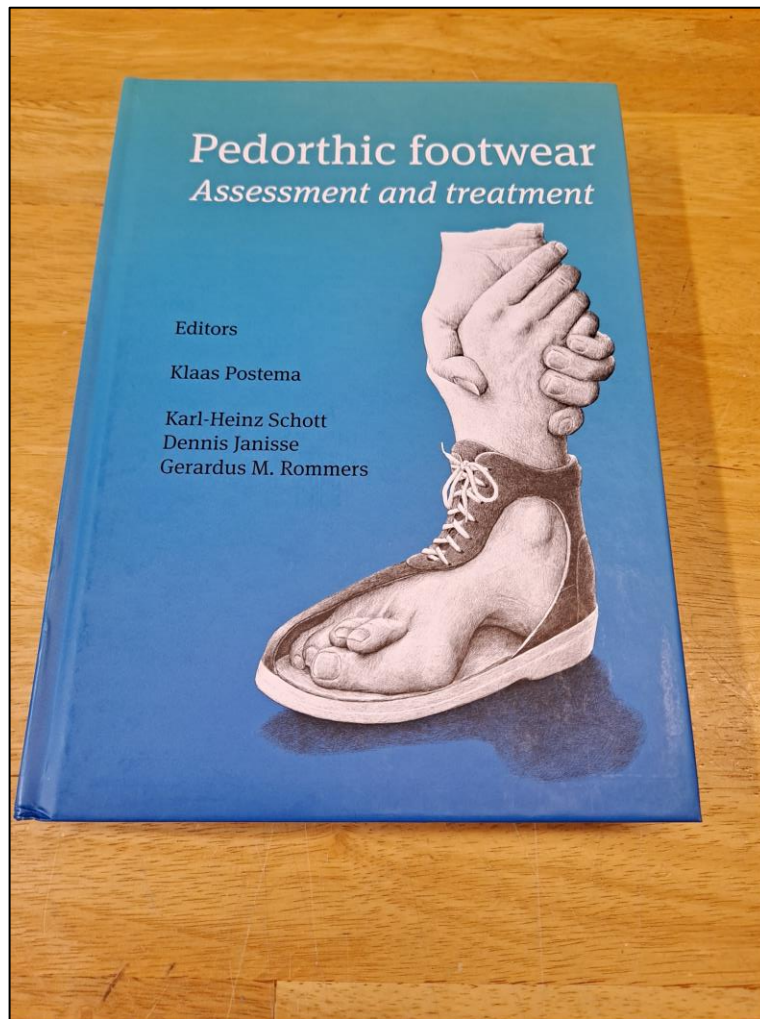
- Pedorthic Footwear Association, 2002
- D Janisse, ed
- (Out of print)



Chapter 12: Pedorthic Care of the Diabetic Foot.....	153
<i>Dennis Janisse, O.S.T., C.Ped.</i>	
Chapter 13: Pedorthic Care of the Arthritic Foot.....	171
<i>Harriet Cavanah Dart, C.Ped. & Carrie Melton, R.T.P.O., C.Ped., BOC Prosthetist</i>	
Chapter 14: Pedorthic Care of Sports Injuries.....	177
<i>Michael Forgrave, C.Ped., C.Ped.(C)</i>	
Chapter 15: Pedorthic Care of the Pediatric Foot.....	187
<i>Herb Steb, C.Ped.</i>	
Chapter 16: Shoe Anatomy and Construction.....	201
<i>William Rossi, D.P.M. & Ross Tennant, D.P.M.</i>	
Chapter 17: Custom Shoe Therapy.....	207
<i>Arnie Davis, C.Ped.</i>	
Chapter 18: Fabricating Shoe Modifications and Foot Orthoses.....	221
<i>Roger Marzano, C.P.O., C.Ped.</i>	
Chapter 19: Patient Management.....	235
<i>Dennis Janisse, O.S.T., C.Ped.</i>	
Chapter 20: Medical Relations.....	241
<i>Dennis Janisse, O.S.T., C.Ped., & Roger Marzano, C.P.O., C.Ped.</i>	
Chapter 21: Practice Management.....	253
<i>Dennis Janisse, O.S.T., C.Ped.</i>	
Appendix A: Proper Shoe Fit.....	261
Appendix B: External Shoe Modifications.....	267
Appendix C: Total Contact Orthoses.....	273
Glossary A: Pedorthic Definitions.....	277
Glossary B: The Foot.....	285
Index.....	291

2008 – Available on Amazon

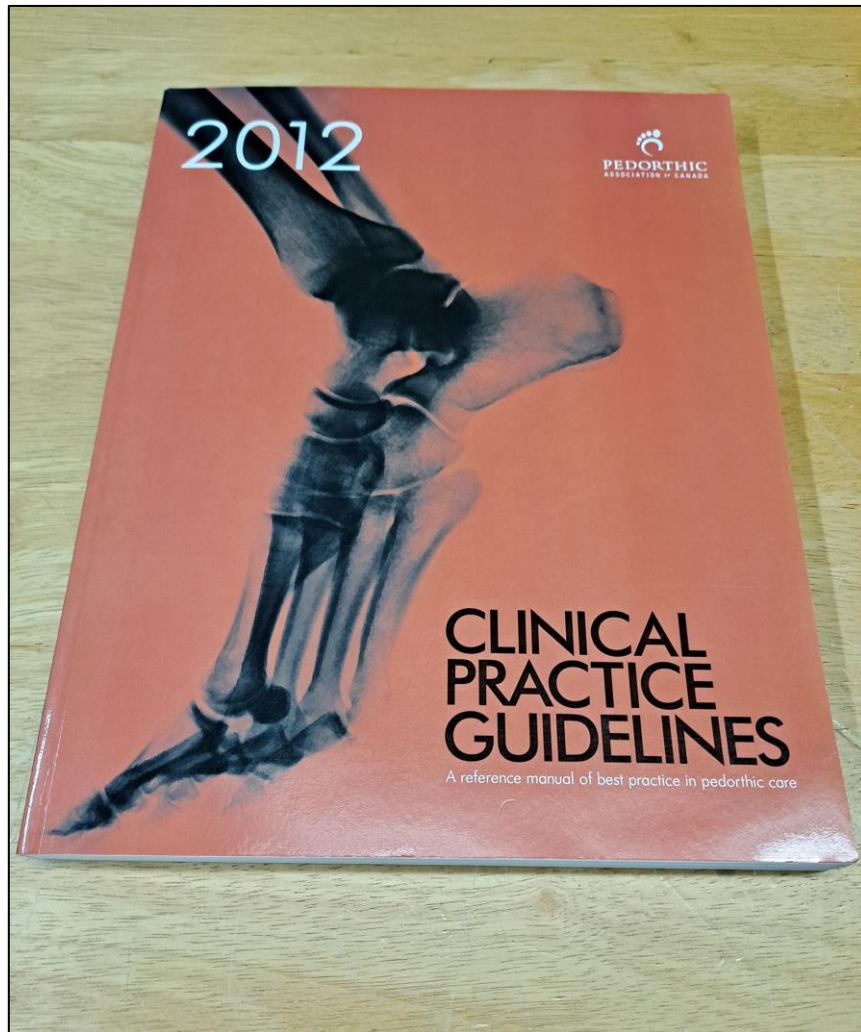




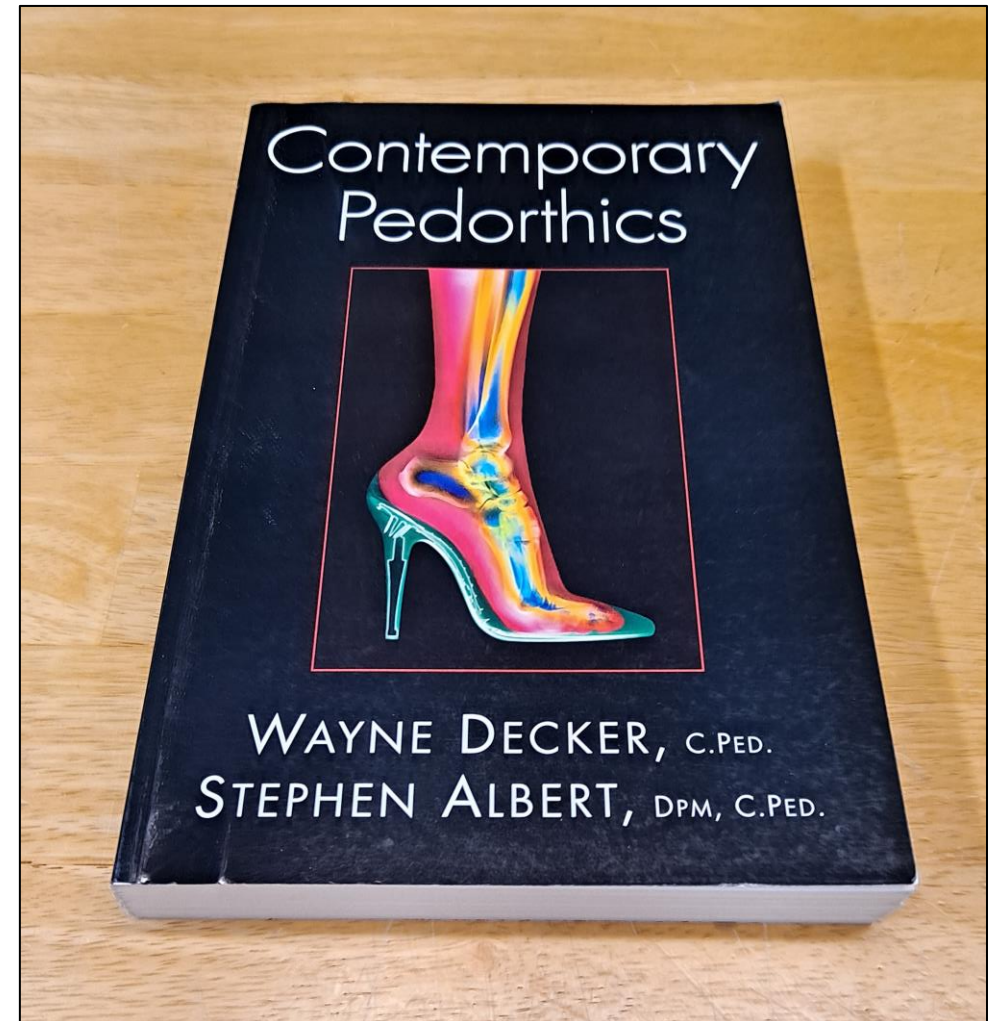
Contents		
Introduction		
Background knowledge 16		
1 The evolution of human walking	Egbert Otten	17
2 Functional anatomy	Huib J.L. van der Heide, Klaas Postema	23
3 Biomechanics of Gait	Jan P.K. Halbertsma, Klaas Postema, Marga Tepper	37
4 Typical development of the lower limb in children	Jessica F. van Hoorn, Corine G. van Es	57
5 Physiological changes during ageing resulting in foot- and walking problems	Karen Mickle	69
Examination, design aspects and model of workprocesses 82		
6 History taking and physical examination of the ankle and foot	Gerardus M. Rommers, Jessika F. van Hoorn, Klaas Postema	83
7 Clinical Gait Observation and analysis	Marga Tepper, Jan P.K. Halbertsma	99
8 Laboratory Gait analysis	Sicco Bus	111
Different aspects of pedorthic footwear 128		
9 The process of providing pedorthic footwear	Yvonne F. Heerkens, Rob Verwaard	129
10 Indication Matrix Model: Modelling plans for treatment.	Rob Verwaard	141
11 Pedorthic lasts	Bert Donders, Klaas Postema	151
12 Footwear: structure, function and construction	David Sutton, Ernie Tye	159
13 Materials in pedorthic footwear	Trudi Sonderkamp, Fred C. Holtkamp	173
14 Adaptations to shoes and foot orthoses	Gaston Jansen, Rob Jansen, Karl-Heinz Schott	187
15 Orthotic management for lower limb deformities	Helen Branthwaite	213
16 The rocker profile	Juha M. Hijmans, Roy Reints, Laurens Kouwenhove	225

- 13 -

2018 Available at: berjalan.org



Available from Pedorthic
Association of Canada



2002
Available on Amazon

Shoe Modifications

1

Facilitate safe,
energy-efficient gait

2

Restrict painful
motion

3

Restore lost
motion/compensate
for deficits

4

Reduce or redirect
harmful pressures

5

Accommodate
deformities



Considerations

- Are shoes appropriate to required modification?
- Does patient have capacity to use modifications safely and comfortably?
- Unilateral Vs. bilateral
- Prognosis/Duration
- Cost/Alternatives

Is the Shoe Appropriate?

- The Shoe Itself

- Structurally sound
- Sole construction
- Conducive to camouflaging the mod to some degree
- Size, width, style



- The Shoe Modification

- Functional
- Minimal added weight
- Placement
- Aesthetics
- Symmetric (if necessary)



Good...Better...Best

(Don't worry, we'll go into greater depth on the different modifications in subsequent modules.)

Diabetic Foot

- Good: Extra depth shoes, heat-molded inserts
- Better: Extra depth shoes, custom inserts
- Best: Extra depth shoes, custom inserts, rocker soles



Charcot Arthropathy

- Good: Extra depth shoes, custom inserts
- Better: Custom shoes, custom inserts
- Best: Relasted extra depth shoe, rocker soles, extended steel shank, custom inserts



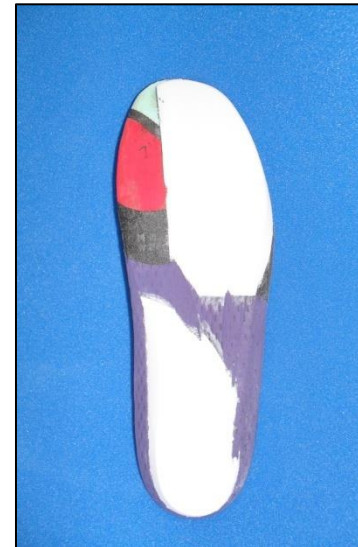
Ankle Instability

- Good: High-top shoe/hiker, prefab inserts
- Better: High-top shoe/hiker, posted custom inserts
- Best: High-top shoe/hiker, posted custom inserts, flares and/or wedges



Posterior Tibial Tendonitis/Dysfunction

- Good: Motion control running shoes, prefab arch supports
- Better: Extra depth shoes, posted custom inserts
- Best: Extra depth shoes, wedge/flare/stabilizer, posted custom inserts (AZ AFO, depending on severity)



Limb Length Discrepancy

- Good: Adjust-a-lift
- Better: Foot orthosis with incorporated heel lift
- Best: External heel-and-sole elevation



Degenerative Ankle Arthritis

- Good: Supportive shoe, prefab ankle brace
- Better: Depth shoe with custom AFO
- Best: Depth shoe with custom AFO, rigid rocker soles



Hallux Limitus/Rigidus

- Good: Spring steel turf toe plate
- Better: Insert with carbon graphite footplate
- Best: Custom inserts, depth shoes, extended steel shank, rocker soles



Midfoot Arthritis

- Good: Extra depth shoes, semi-rigid foot orthoses
- Better: Extra depth shoes, custom foot orthoses, carbon graphite footplate
- Best: Extra depth shoes, custom foot orthoses, extended steel shank, rocker soles



Conclusion

- A pedorthic treatment plan for complicated patients is nearly always more successful with shoe modifications.
- Most likely going to be need to be a cash-and-carry scenario.
- Cosmesis is important to get the patient to try the modified shoes; functional improvement and pain relief keep them wearing the modified shoes.

The End