Clinical and economic impact of a two-layer compression system with zinc, odor, and itch control compared to Unna's boot for the treatment of lower extremity ulcers: a systematic review

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Introduction:
A systematic review aimed to identify key economic, and patient reported outcome measures to inform the design of a multi-site quality improvement collaborative project regarding the clinical advantages & cost-effectiveness of a modern, two-component system with zinc-impregnated foam with itch, odor control, and cohesive wrap (TLC+). This updated evidence review focuses on the PICO question regarding clinical effectiveness demonstrated by patient reported outcome measures & product use, over the traditional Unna's Boot (UB) for lower extremity management.

Methods:
The literature search was conducted via the PubMed, MEDLINE, EMBASE, CINAHL, Cochrane library databases from inception up to December 11th, 2025. The PubMed search was updated January 2025. Study selection, MeSH terms utilized, quality assessment, data synthesis were undertaken in transparent accordance with recommended PRISMA standards including extraction by multiple expert clinician scientist reviewers. Covidence software was utilized for data extraction and storage. Findings are presented narratively. Patient reported outcome measures of itch and odor were assessed as the patient's subjective experience is paramount.

Results:
The primary economic driver in wound care is time to complete healing, impacting both labor and supply costs. Based on clinical data and manufacturer specifications a comparison of two-layer and four-layer bandages demonstrated better Health-Related Quality of Life (HRQoL) and lower 6-month costs for combined populations ($3,218.22 vs. $3,610.33 or $3,531.64) and newly diagnosed patients using the two-layer option.

Primary differentiators between UB and TLC:
- dermal interface layer material construction
- potential for variable compression therapeutics

Material construction of dermal interface layers are known to significantly impact the performance of wound dressings, skin micro-climate and risk for skin deterioration. Breathability and moisture management are primary drivers of both itch and odor. Itch is a common negative stimuli experienced by those with lower extremity conditions, increasing to high levels with those undergoing compression therapy. Additional primary drivers of itch include skin dryness and irritation from the bandage material. Gauze is known to foster an unfavorable wound environment.

UB provides inelastic, stiff compression (~20–30 mmHg) that increases during muscle contraction (walking) and decreases at rest, whereas two-layer systems offer more consistent, sustained pressure. UB may be appropriate for active patients with venous ulcers with lower exudate levels.

The desirability of consistently applied, therapeutic compression also favors TLC as the compression therapeutics encompass all individuals that would qualify for UB given that both are able to deliver therapeutic zinc topically. Expected outcome variances due to the bio-physical impact of compression between the two therapies is removed if those applying UB use the zinc gauze layer and follow with therapeutic compression.

However, this would not impact cost significantly as two products remain needed. This also does not improve cost measures associated with longer wear time and optimized skin condition that does not improve when the dermal interface layer is gauze.



Images: Complete UB application (1), UB interface layer (Zinc) (2), Dermal microclimate following UB tx (3), Complete TLC application (4), TLC interface layer (TLC Zinc) (5), Dermal microclimate following TLC tx (6).
Note: decreased remaining hyperkeratotic plaques, erythema, and product residuum.

Table 1. Comparison of features between UB and TLC

Features	Unna's Boot (UB)	TLC / 2-Layer
Odor	**Poor**: Gauze does contain irritative exudative components away from the skin, limited absorption can lead to increased odor especially with high exudate.	**Excellent**: Foam layer absorbs higher volumes and neutralizes odor. Approx 85% of odors neutralized compared to standard foam or gauze-based wraps
Itch	**Good**: Zinc / Calamine soothes skin. **Poor**: Rigid, dried paste can cause "mechanical itch" or irritation if it rubs against the skin or if skin becomes too dry underneath.	**Good**: Zinc / Calamine soothes skin. **Excellent**: Options of aloe, zinc, or calamine infused foam prevents dryness and friction itch.
Safety	Increased assessment frequency **required.**	Guided application visual indicators enhance safety, reduce treatment failures, **decrease costly re-visits** due to bandage slippage
Cost	Often **lower** unit cost.	Supply chain efficiency is improved by using all-in-one kits (impregnated foam, cohesive wrap, outer stocking) over sourcing multiple components.
MVTR	**Low**: Semi-rigid, occlusive "cast". Poor modulation of dermal microclimate.	**High**: Breathable foam allows for better air / moisture vapor exchange.
Use	Paste can leak or flake off. Difficult to fully cleanse for imaging and assessment.	**Cleaner**: Soft foam removes, non-greasy.
Absorptive Capacity	Inelastic bandage = Limited to minimal or no exudate.	Limited to low exudate, requires secondary dressing for more highly exudative conditions. Odor control foam absorbs ~20 times its own weight.

Discussion:
The foam layer provides odor / itch control and improved envelopment, addressing common UB discomfort and enhancing patient adherence. Device comparison noted significant differences in dermal micro-environment and compression mechanisms.

Based on these findings, TLC systems with zinc, odor, and itch control **may result in lower treatment costs**, **better ulcer healing**, and **improved HRQoL** compared with Unna's boot multicomponent therapy in patients with lower extremity skin conditions requiring therapeutic compression.

Observed reductions in patient visits without reductions in outcomes reflected savings in nurse time, facility overhead, and patient travel. Thus, non-inferiority dictates a health economics position centered on paying a subtly higher material price for a superior, safer delivery system that leads to better clinical outcomes and lower overall resource use. However, further high-quality research is needed on bandage wear time and its impact on the lower extremity tissue microclimate, especially for patient related quality of life outcomes such as itch, odor.

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Footnotes: +CoFlex TLC Zinc Two-Layer Compression (OVIK Health, LLC, Spartanburg, SC 29303)