

BRIEF ARTICLES

Cost-Effective, Custom-Designed Wet Wrap Garments for Children: Experience at Cardinal Glennon Children's Hospital

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Abbreviations: AD (atopic dermatitis)

Key benefits: Time-saving, Cost-saving, Patient comfort and adherence

INTRODUCTION

Atopic Dermatitis (AD) is the most common chronic inflammatory skin disease, with onset most often in infants and young children¹. Its increasing prevalence worldwide presents a public health problem. It has a chronic relapsing course that requires long-term maintenance therapy, avoidance of triggers and management of acute flares, sometimes requiring hospitalization¹. It results in a profound quality of life impact with sleep disturbances, psychological distress, social isolation, disrupted family dynamics and impaired functioning at school or work¹.

Wet wrap therapy is a well-known, effective short-term treatment for severe inflammatory skin conditions such as AD and psoriasis. It is considered standard of care for inpatient treatment of flaring AD. The traditional wet wrap technique involves application of a corticosteroid ointment and emollient followed by a 2-layer mummy-style wrap consisting of an inner layer using water-dampened roll gauze and an outer layer of polyvinyl kitchen wrap (e.g. Saran Wrap®). Some

advantages of this technique include rapid response and relatively low risk compared to systemic immunosuppressant medications. However, this method is time consuming and labor intensive, with pediatric-specific disadvantages including failure to remain secured (especially on active children), and a potential vinyl wrap suffocation risk.

Commercially-available eczema clothing has been used at our hospital as an alternative for the damp layer, but these garments are expensive at \$50-100 per piece. Ordering difficulties and barriers to maintaining a bulk supply resulted in frequent stock depletion, leaving patients and staff no choices other than roll gauze and vinyl wrap. Extensive searching for a source of less-costly inner-layer wet wrap garments accessible to a hospital-supply system yields only clothing containing dye, metal (e.g. snaps or hooks) and elastic, which are amongst the most common allergens in the pediatric population^{2,3,4}. Commercially available "sauna suits" can serve as an occlusive outer layer for adults, but are not available in sizes to fit infants and children.

MATERIALS AND METHODS

The primary aim of our project was to develop a cost-effective, allergen-free wet wrap garment for pediatric patients to improve the quality, safety and efficiency of inpatient treatment for AD. A secondary aim was to provide hospitalized patients means for continuing wet wrap treatments at home as needed. A grant from the Cardinal Glennon Childrens' Foundation funded development of these garments for pediatric patients. The garments were designed by Drs. Siegfried and Dhandha, and manufactured in India by Chandan textiles. The key design features included round cotton crew neckline, cotton knit wrist and ankle cuffs and a minimal

number of flat, outer seams. The inner layer garments were made from white cotton knit, chosen for its natural abundance, folding endurance, conduction of heat, cost effectiveness and low allergenicity risk^{5,6}. All the garments were made without dye, metal, elastic or other allergens. Plain cotton strings were used to secure the waist. Warp 20 mono x weft 140 slub thread count nylon was used for the outer layer. Nylon was chosen for its light weight and moisture retention. Nine size groups were created, to fit patients from 6 months to 14 years of age. The custom designed cotton garments and nylon suits are not FDA registered or approved devices.

FIGURES



Figure 1: Sample cotton garments

Figure 2: Patient undergoing wet wrap treatment



TABLES

COTTON FULL SLEEVE T SHIRTS - NO TAGS - WHITE ONLY - NO DYE

Age	Sleeve Length (cm)	Width (cm)	Length (cm)
6 months	22.5	25.5	38.5
12 months	27.5	28	41.5
2 years	27.5	28	41.5
3 years	33.5	30.5	45.5
4 years	33.5	30.5	45.5
5 years	39.5	33	49.5
7-8 years	45.5	35.5	53.5
9-10 years	51.5	38	57.5
12-14 years	57.5	40.5	61.5

Table 1: Sizes for full sleeve cotton T- shirts

COTTON PAJAMAS - STRINGS ON THE INSIDE - NO TAGS - WHITE ONLY - NO DYE

Age	Length (cm)	Waist (cm)	Hip (cm)
6 months	27	20	28
12 months	31	22	30
2 years	31	22	30
3 years	38	24	33
4 years	38	24	33
5 years	45	26	36
7-8 years	52	28	39
9-10 years	59	30	42
12-14 years	66	33	45

Table 2: Sizes for cotton pajamas

CONCLUSION AND DISCUSSION

The garments were processed at less than half the cost of branded eczema clothing based on internal online market research. An internal survey of hospital staff members (nurses, physical therapists, physicians) involved in directly providing wet wrap treatments have appreciated these garments for ease of use, patient comfort, and durable supply. Garments used during admission are given to patients at discharge to facilitate continued wet wrap therapy at home as needed. A hospital supply chain management system is currently under development to allow purchase of these garments in small orders as needed. Derm Textiles, LLC is a start-up company working closely with Cardinal Glennon hospital staff to define and implement this process, and facilitate access for other hospitals. Future Quality Assessment and Quality Improvement studies to compare the advantages of this treatment with traditional wraps will allow better evaluation of this custom designed clothing. In addition, cost-benefit analysis over several years would provide additional data regarding the sustainability of the model.

Conflict of Interest Disclosures:

Maulik Manharlal Dhandha – Owns stocks in Derm textiles; Father – owner of Chandan Textiles

Cotton Garments and Nylon suits are NOT FDA approved or registered devices

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