



# Portable home phototherapy for vitiligo

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**Abstract** Vitiligo is the most common depigmentation disorder, affecting around 1% of population worldwide. There is no cure, and no firm clinical recommendations can be made for the treatment of vitiligo. A European guideline suggests early treatment of small lesions of recent onset and childhood vitiligo with combination of phototherapy and topical agents. Suitable facilities and equipment, such as hand-held portable phototherapy devices, are needed, if this new guideline is to be implemented. Hand-held units are suitable for small lesions, making phototherapy available for patients with limited and/or early vitiligo.

Recently, a pilot randomized controlled multicenter trial study was conducted to develop an educational package for patients describing how to use phototherapy at home, adjust the dose, and manage short-term side effects. The pilot trial showed that vitiligo patients are very keen to participate in trials of home phototherapy. The study has successfully demonstrated willingness of participants to be randomized and very good treatment adherence and repigmentation rates, providing evidence of feasibility for a definitive trial.

The mean post-trial outputs of hand-held phototherapy devices were lower than the pretrial values. Close collaboration with a local medical physics department is essential. Hand-held phototherapy devices might overcome the need to treat vitiligo in hospital-based phototherapy cabinets and allow early treatment at home that may enhance the likelihood of successful repigmentation.

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## Introduction

Vitiligo is the most common depigmentation disorder, affecting around 1% of the population worldwide.<sup>1</sup> Despite the fact that many clinicians consider vitiligo a cosmetic disorder, it has a major negative impact on patients' quality of life.<sup>2</sup> There is no cure, and no firm clinical recommendations can be made for the treatment of vitiligo.<sup>3</sup> Recently, an updated Cochrane systematic review, Interventions for Vitiligo 2015, concluded that the combination of topical treatments and light therapy is more effective than monotherapies alone.<sup>3</sup>

Currently, phototherapy is reserved for wide-spread vitiligo and usually involves hospital visits two to three times per week for several months.<sup>4</sup> Recent studies report that early treatment of the disease might be more effective than treatment of long-standing lesions.<sup>5</sup>

Narrow-band ultraviolet (UV) phototherapy using whole-body units at home is available for the treatment of various dermatologic conditions, such as psoriasis and vitiligo.<sup>6</sup> Narrow-band refers to a specific wavelength of UV radiation (311–312 nm). Currently, various devices are available on the market for the delivery of narrow-band UV light B (NB-UVB), including whole-body units, hand-and-feet units, and hand-held portable units. The choice of the devices is usually based on the size and location of the lesions and the percentage of the affected body surface.<sup>7</sup> The lamps used in all units are TLO1.

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## Hospital versus home phototherapy

Hospital NB-UVB usually involves whole-body cabinets suitable for extensive disease. During the session, the participant goes into a specially designed cabinet containing fluorescent light tubes (whole-body units). The participant stands in the center of the cabinet, undressed except for underwear, and wears protective goggles. Usually, the whole body is exposed to the UVB for a short time (seconds to minutes).<sup>8</sup>

A recent randomized controlled trial comparing home (whole-body units) versus hospital NB-UVB phototherapy for mild and severe psoriasis concluded that home phototherapy is equally effective and implies no additional safety hazards compared with hospital phototherapy. Most of the participants said that they would prefer future phototherapy at home; home phototherapy lowered the burden of the treatment and improved participants' quality of life.<sup>9</sup> Similarly, a small retrospective questionnaire study for the treatment of nonsegmental vitiligo showed participant-reported outcomes of home and outpatient NB-UVB therapy as comparable, with similar repigmentation and occurrence of side effects.<sup>10</sup> In another study that surveyed psoriasis, vitiligo, atopic dermatitis, and mycosis fungoides, participants reported that they found home phototherapy to be effective and agreed to continue, repeat, and recommend the therapy to others. The home phototherapy units used in this study were hand-and-feet units and whole-body units.<sup>11</sup>

A European guideline for vitiligo was published, suggesting early treatment of small lesions of recent onset and childhood vitiligo with the combination of phototherapy and topical agents<sup>12</sup>; however, suitable facilities and equipment, such as hand-held portable phototherapy devices, are needed if this new guideline is to be implemented.<sup>4</sup>

## Hand-held portable phototherapy

The hand-held NB-UVB unit is a portable and lightweight NB-UVB device that is slightly larger than a usual hairbrush. It is held above any small area of the skin (around 10–12 cm × 4–6.5 cm), and spacers are provided to standardize the distance from the skin. The lamp is held still above the lesion. Hand-held NB-UVB units are suitable for small lesions, making phototherapy available for patients with limited disease.

Trials on the effectiveness and safety of hand-held portable devices on scalp psoriasis at home showed that this treatment is effective, well tolerated, easy to use, and safe for the treatment of psoriasis.<sup>13,14</sup> A pilot trial on home hand-held phototherapy for the treatment of vitiligo was conducted to develop an educational package on how to teach patients and their carers to treat their vitiligo at home, adjust the dose, and manage short-term side effects. This trial showed that patients with vitiligo were very keen to use home hand-held phototherapy and that patients' educational package was safe and comprehensive.<sup>4</sup> A training DVD on how to use hand-held devices at home has been produced to standardize this intervention and ensure consistency in the training provided.<sup>15</sup> The training package developed for this trial proved to be comprehensive, well understood, and safe.<sup>4</sup>

Two different devices were tested in the aforementioned pilot home hand-held phototherapy trial (the Dermfix 1000<sup>TM</sup> NB-UVB and Waldmann<sup>TM</sup> NB-UVB 109). Both devices received the following similar positive comments: easy to use, portable and compact, and convenient to operate at home instead of coming to the hospital. Additional positive comments on Dermfix devices regarded their convenient size.<sup>4</sup>

## Output of hand-held phototherapy devices with respect to time

Currently, there are several manufacturers of hand-held phototherapy units with the appropriate CE marking (IIb medical device), such as Waldmann and Androv. All have similar output, as they use the same TLO1 bulb and are licensed to treat various skin conditions, such as psoriasis of the scalp, vitiligo, and eczema.<sup>8</sup>

A pilot trial on hand-held phototherapy devices for the treatment of vitiligo at home showed that the mean post-trial outputs of both the Dermfix 1000 NB-UVB and Waldmann NB-UVB 109 units were less than the pre-trial values (Table 1). Both the Dermfix 1000 NB-UVB and Waldmann NB-UVB 109 hand-held units follow a similar pattern, with a sharp increase in output from lamp ignition to the peak value and then a gradual decay in output over time (Figure 1). Great variability in the output of hand-held devices was also noted. In particular, although Waldmann units had greater mean output both

**Table 1** Comparison of pre- and post-trial measurements of Dermfix 1000 NB-UVB and Waldmann NB-UVB 109 devices

	Dermfix		Waldmann	
	Pretrial	Posttrial	Pretrial	Posttrial
Mean output, mW/cm <sup>2</sup>	3.81	3.24	4.5	3.92
SD, mW/cm <sup>2</sup>	0.37	0.42	0.2	0.67
Coefficient of variation, %	9.7	12.9	4.4	17
Mean difference, %		–14.5		–13
Maximum difference pre- and posttrial, %		–28.5		–38.5
Minimum difference pre- and posttrial, %		–7.4		+10.5

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