

# Home vs In-Office Phototherapy for Patients with Vitiligo: Comparison of Time, Cost, Efficacy, and Safety

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## INTRODUCTION

Vitiligo is a common depigmenting skin disorder caused by destruction of melanocytes, the cells that produce melanin in the epidermis. Narrowband ultraviolet B (NB-UVB) phototherapy is a treatment option that emits light over a short range of wavelengths (311-312 nanometers), which is more effective when treating areas of depigmentation and is less likely to cause adverse effects such as sunburns [1]. NB-UVB phototherapy does not require the use of oral psoralen, which is used in conjunction with UVA in an older form of phototherapy, PUVA, which has ocular and gastrointestinal side effects [2]. NB-UVB phototherapy treatment can be administered under the supervision of a physician at home or in a dermatology clinic. The use of home phototherapy as standard treatment has been a research topic for multiple skin diseases including vitiligo, psoriasis, and eczema. There has been increased interest in the use of home phototherapy. Recently, studies have shown that compliance with in-office treatments can be problematic due to the average three-day-per-week treatment plan [3]. However, some insurance companies consider home phototherapy for treatment of vitiligo experimental and investigational because there is lack of evidence regarding the safety and effectiveness of home phototherapy for this condition. If efficacy and safety benefits of home phototherapy can be determined for vitiligo patients, it would be easier to get approval for these devices which reduce cost of treatment and save time.



Fig. 1. Vitiligo, a chronic disease, has no cure and is characterized by loss of pigment due to the destruction of melanocytes. It has an autoimmune pathogenesis and affects 1-2% of the worldwide population.



Fig. 2. A patient with vitiligo experienced repigmentation after receiving NB-UVB phototherapy for 7 months.

## HYPOTHESIS

If vitiligo patients self-administer NB-UVB phototherapy at home, then cost and time will be lower when compared to patients receiving in office NB-UVB phototherapy and efficacy and safety will not significantly differ between both groups.

## METHODS

This cross-sectional study was conducted under the supervision and mentorship of Dr. Amit Pandya and the Department of Dermatology at UT Southwestern (UTSW) Medical Center. Dr. Pandya is the principal investigator of the institutional review board (IRB)-approved study titled Clinical and Immunological Studies of Vitiligo.



Fig. 3. National Biological Panoal 3D NB-UVB phototherapy unit.

A total of 9 matching pairs of patients with vitiligo were identified as receiving either home phototherapy or in-office phototherapy based on chart review. All home phototherapy patients had to be receiving full-body NB-UVB, using a National Biological Panoal 3-D machine.

### Time

Vitiligo patients received 1-3 phototherapy treatments a week. The time of treatment was recorded for 3 separate days for all patients. The time of treatment for the home group consisted of the time it took to set up the machine, undress, prepare the areas being treated, the actual treatment time, re-dressing and putting the machine away. The time of treatment for the in-office group included the length of the patient's appointment, measured using the check-in and check-out times, and the patient's travel time to the clinic and back to their home or workplace.

### Cost

For the home phototherapy group the cost of the machine was \$4,590 for all patients. For the patients in the in-office phototherapy group the cost was the mean insurance reimbursement plus mean out-of-pocket payment. The total cost was then multiplied by 12, assuming that all patients received 12 treatments in 1 month. The total expense calculated for 1 month was then projected over one year. Since bulbs need to be replaced after 150 cumulative hours of exposure and since the total exposure time for our patients was much less than 150 cumulative hours over one year's time, the cost to replace the bulbs was not included in the cost estimates for this study.

### Efficacy

The charts of the patients were reviewed to identify the total body surface area percentage from the baseline visit to their second follow-up visit. The duration of phototherapy treatment was a mean of 7 months for the home group and 6 months for the in-office group. The mean percent improvement for the home and in-office group was then determined.

### Safety

The charts of all 18 patients were retrospectively reviewed to identify any significant side effects, such as severe erythema (redness of skin). The erythema codes that are used in the dermatology clinic range from 0 to 3+, with 0 indicating no erythema, 1+ indicating pink erythema and no discomfort, 2+ indicating red erythema and associated pain, and 3+ indicating blistering of the skin. The time period reviewed was once again from the patients' baseline visit to their second follow-up visit.

## RESULTS

| NINE MATCHED STUDY PAIRS |                  |                   |                  |                        |                  |
|--------------------------|------------------|-------------------|------------------|------------------------|------------------|
| Pair                     | Ethnicity        | Home phototherapy |                  | In-office phototherapy |                  |
|                          |                  | Home city         | Start date of Tx | Home city              | Start date of Tx |
| 1                        | Hispanic         | Dallas            | 10/16/2014       | Grand Prairie          | 6/16/2014        |
| 2                        | Hispanic         | Garland           | 3/30/2015        | Dallas                 | 6/17/2015        |
| 3                        | South Asian      | The Woodlands     | 5/8/2015         | Euless                 | 2/16/2015        |
| 4                        | Hispanic         | Dallas            | 3/29/2013        | Lewisville             | 9/11/2012        |
| 5                        | Caucasian        | Keller            | 6/1/2015         | Dallas                 | 2/9/2015         |
| 6                        | African American | Dallas            | 2/6/2015         | Cedar Hill             | 4/13/2015        |
| 7                        | Hispanic         | Grand Prairie     | 6/16/2014        | Dallas                 | 10/17/2014       |
| 8                        | Caucasian        | Dallas            | 1/30/2015        | The Colony             | 5/8/2015         |
| 9                        | Hispanic         | Dallas            | 7/14/2014        | Irving                 | 10/27/2014       |

### Time

**Aim 1:** Compare the treatment time of home phototherapy to in-office phototherapy.

The home group had a mean treatment time of 22 minutes, while the in-office group had a mean treatment time of 86 minutes. Two-tailed  $p = 0.0004$ .

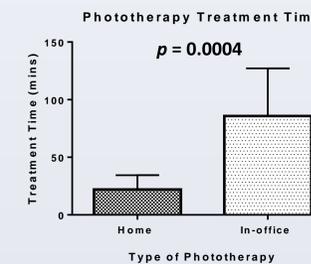


Fig. 4. Mean time for receiving phototherapy at home vs. in-office.

### Cost

**Aim 2:** Compare the direct costs of home phototherapy to in-office phototherapy.

The cost only includes the cost of treatment. Cost data was obtained for 3 months of treatment. This cost was projected to give an estimate for cost of treatment for one year. After just 3 months the machine appears to pay for itself. The projected mean cost over one year for home phototherapy was \$4,590, while the mean cost for in-office phototherapy was \$21,270.84.

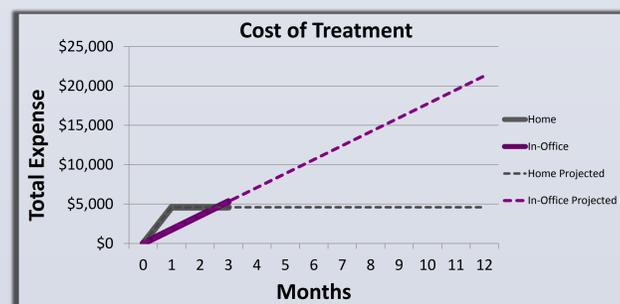


Fig. 5. Projected cost over 1 year.

### Efficacy

**Aim 3:** Compare improvement of vitiligo between both groups. The mean percent improvement for the home group was 43%, while the mean percent improvement for the in-office group was 45%. Two-tailed  $p = 0.8073$ , which is not statistically significant. Both groups had significant improvement of vitiligo.

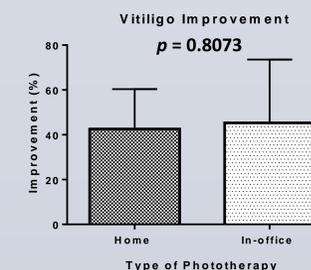


Fig. 6. Mean total body surface area improvement of vitiligo for the home group vs. the in-office group.

### Safety

**Aim 4:** Compare safety between both groups.

Three home phototherapy patients experienced erythema of 1+ and two in-office phototherapy patients experienced erythema of 1+ during the study period, while the rest had no side effects at all.

## CONCLUSIONS

- Vitiligo patients who self-administer NB-UVB phototherapy at home have lower cost and time spent on treatment than patients receiving in-office NB-UVB phototherapy.
- Home NB-UVB phototherapy is just as efficient and safe as in-office phototherapy.

Confounding factors include stage and location of vitiligo, size of vitiligo lesions, severity, and skin type. Patients who begin phototherapy in the early stages of their vitiligo have a shorter exposure time needed to repigment. Depending on the location of the patients' vitiligo lesions, the exposure time needed for repigmentation varies.

Limitations of this study were the small sample size and the short observation period. Patients were not matched based on age, vitiligo severity, or skin type. Indirect costs such as the cost of travel and lost wages were not evaluated.

Vitiligo treatments that are more convenient and require less out-of-pocket costs could improve treatment success, compliance, and patient satisfaction. Most research on the socioeconomic burden of phototherapy has been conducted on psoriasis patients. A few studies have shown the effectiveness of home phototherapy for vitiligo treatment, specifically evaluating the level of repigmentation and symptom regression [4]. Since there are few research trials assessing the burden and cost of phototherapy treatment for vitiligo, the data presented in this study can be useful to justify home phototherapy treatment for patients with vitiligo. In addition, all previous vitiligo studies on home phototherapy have been conducted in countries with universal coverage and none have been performed in the United States. It is hoped that as a result of this study, physicians, insurance carriers, and governmental agencies will consider home phototherapy more favorably for the treatment of vitiligo.

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