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Title

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Permalink

<https://escholarship.org/uc/item/33j0040b>

Journal

Dermatology Online Journal, 23(5)

Authors

Mounessa, Jessica S
Box, Neil F
Asdigian, Nancy L
et al.

Publication Date

2017

DOI

10.5070/D3235034923

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Portable equipment for taking dramatic sun-damage-revealing photos at skin cancer prevention outreach events

Jessica S. Mounessa¹, Neil F. Box¹, Nancy L. Asdigian², Taylor Braunberger³, Cory A. Dunnick^{1,4}, Lori A. Crane², Robert P. Dellavalle^{1,2,4}

Affiliations: ¹Department of Dermatology, University of Colorado Anschutz Medical Campus, Aurora, Colorado, ²Department of Epidemiology, Colorado School of Public Health, University of Colorado Anschutz Medical Campus, Aurora, Colorado, ³University of North Dakota School of Medicine, Grand Forks, North Dakota, ⁴Dermatology Service, Eastern Colorado Health Care System, US Department of Veteran Affairs, Denver, Colorado

Corresponding Author: Robert Dellavalle, MD, PhD, MSPH, Chief, Dermatology Service, US Department of Veterans Affairs, 1055 Clermont Street, Box 165, Denver, CO 80220, Tel: 303-399-8020 ext. 2475; Fax: (303) 393-4686, Email: robert.dellavalle@ucdenver.edu

Abstract

In recent years, appearance-based interventions have gained popularity as a means to improve public awareness about skin cancer and sun protective behaviors. Although numerous reports discuss the use of ultraviolet (UV) camera devices for this purpose, studies on the use of portable imaging devices in community outreach events do not presently exist. In this report, we discuss how we successfully utilize portable imaging devices at community outreach events. We also discuss the advantages and disadvantages of our portable devices in comparison to traditional UV cameras. Portable imaging devices are easy to use and have allowed us to increase our involvement in community outreach events targeting a wide range of participants.

Keywords: ultraviolet camera, UV camera, community outreach, skin cancer prevention

Introduction

As skin cancer remains the most common cancer in the United States, the search for effective tools to promote sun-safety continues. Several studies reveal that appearance-based interventions increase public awareness and sun protective behaviors [1-3]. In addition, photography highlighting hidden UV damage promotes sun protective behaviors [4].

For example, Pagoto et al. discovered that a multi-component skin cancer prevention intervention, consisting of personalized UV photography,

supplementary educational materials, and free sunscreen, improved sun protection behaviors of midwestern beachgoers at a two-month follow up [5]. A more recent study suggested that in a teenage population, UV photography promoted behavioral change by decreasing the cause-and-effect delay between the occurrence of sun damage and its photo-aging effect later in life [6]. Furthermore, in a recent randomized control study, university students in two different regions of the United States were assigned to receive an intervention (UV photograph alone or a UV photograph with educational materials) or no intervention at all. Improved sun protection intentions occurred in both intervention groups and persisted even at one-year follow up [7].

UV cameras identify areas of non-uniform skin by emitting flashes of UV light through the epidermal and dermal layers of the skin [4]. Light is reflected back to the camera lens, resulting in a three-dimensional, multi-spectral image with accompanying analysis [8]. Although the use of UV cameras successfully improves sun-protective behaviors, their costs can be prohibitive for skin cancer prevention programs. A Visia UV camera by Canfield Scientific Inc. typically costs around \$20,000 [4].

In recent years, the Reveal Imager, a portable device by Canfield Scientific Inc., has gained popularity as an appearance-based intervention. Though it is not a UV camera, this device yields similar images using standard white light and cross-polarized flash photography to record areas of brown spots, red spots, and sun damage. It can be conveniently transported in a traveling case and only costs

approximately \$6,000. Although evidence on the use of this tool is scarce, we report numerous successes of its use at community events throughout Colorado.

Methods

We report the use of the Reveal Imager for skin cancer prevention education at community outreach events facilitated by two organizations affiliated with our Department of Dermatology: the Colorado Melanoma Foundation (CMF) and the Colorado Skin Cancer Task Force (CSCTF). Events took place between May 15, 2015 (when the Reveal Imager first became available for use by the department) and April 15, 2016. The number of people reached and anecdotal experiences from leaders at each event were reported.

Results

Since purchasing two portable imaging devices 11 months ago, we have participated in a wide range of community outreach events. On average, the portable imaging devices were used at one event per month ($n=10$). The mean number of people photographed at each event was 62 with the range being 25 to 180 people. Our busiest months were March, April, and May (total number of events: 8), whereas no events occurred during the months of October, November, and December. **Table 1** shows the total number of events and approximate number of photographs taken per month.

Events engaged a wide range of participants. This included university students at health fairs and career education learning days [9], consumers at convention center trade shows, employees of public health agencies and training centers, attendees at charity events, and the general public at walks, races, and outdoor events. For example, during the annual international snow sports show in our city's convention center in January 2016, hundreds of attendees lined up at our dermatology booth to receive their photographs and sunscreen samples.

Participants typically expressed a motivation to improve their behaviors and a desire to disseminate the information to others. At these events, participants also were eager to learn about skin cancer prevention and sun-safety measures. As the use of the portable cameras continues to spread, we

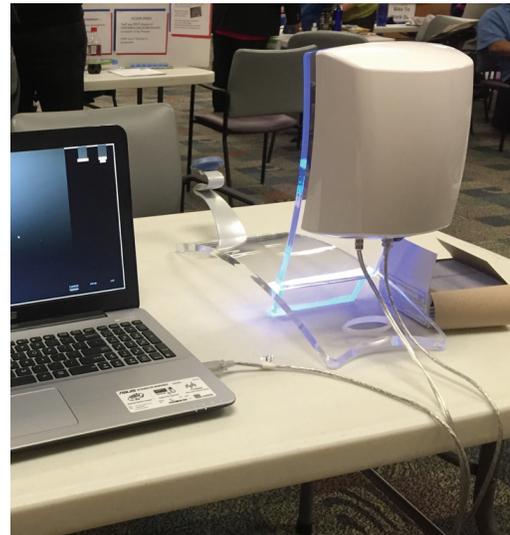


Figure 1. Our portable Reveal Facial Imager on a foldable table during a recent event.



Figure 2. VISIA Facial Imaging Booth.

have been contacted by numerous organizations to lead sun-protection events.

Discussion

Although the traditional UV camera remains the gold standard for research purposes, we suggest that a more portable and affordable camera would be more influential at the community level. Since set up is straightforward and learning how to operate the camera is easy, we have been able to train numerous people to staff events. With an expanding network of volunteer and staff, we have been able to attend a large number of events. **Figure 1** shows our imager conveniently positioned on a folding table at a recent event, as compared to **Figure 2**, which depicts the bulkier VISIA Facial Imaging Booth.

Table 1. Total number of events and approximate number of photographs taken with the Reveal Imager by month and year.

Month and Year (mm/yy)	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	04/16	05/16
Total # of Events	1	0	1	1	1	0	0	0	1	1	2	2	4
Approximate Number of People Photographed	25	0	50	80	40	0	0	0	180	45	85	110	220

Table 2. Comparison of a UV camera to a portable imager.

	UV Camera (i.e. Visia Complexion Analysis)	Portable Camera (i.e. Reveal Imager)
Information provided	Quantitative, age and ethnicity-matched score across eight dimensions: visible spots, wrinkles and fine lines, texture, pores, UV spots, brown spots, vascular areas, and porphyrins and bacterial secretions. [4]	Visualization of surface and sub-surface skin conditions including sun damage, brown spots, and red areas (vascularization and porphyrins) without quantitation.
Cost	~ \$20,000 + cost of laptop	~ \$6,000 + cost of laptop
Dimensions	20.47 x 19.6 x 18.35 inches	21.76 x 6.75 x 14.25 inches
Weight	37.5 pounds	6.0 pounds
Convenience	Difficult to transport and assemble	Portable
Our suggested use	Research	Community outreach and education

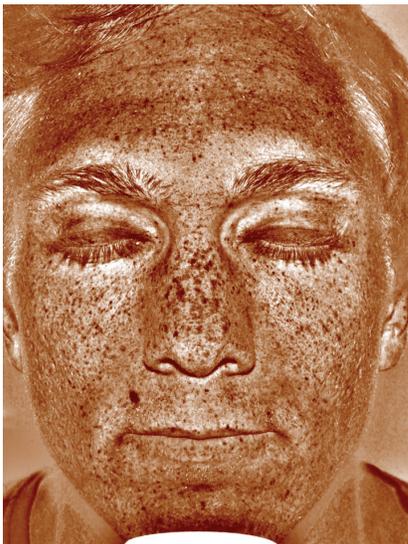


Figure 3. Image taken with Reveal Facial Imager showing sun damaged brown spots.

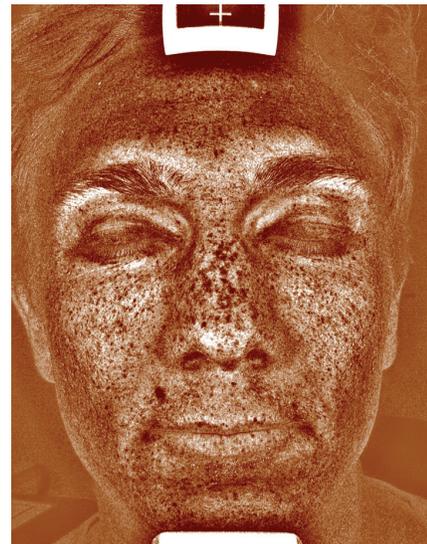


Figure 4. Image taken with VISIA Facial Imager showing sun damaged brown spots.

We also demonstrate that the greatest demand for the portable camera occurs during months of greater outdoor activity and UV exposure. In our state, whereas the spring and summer are busy seasons, fewer requests for the camera are made during the autumn months. During the winter months, however, activity increases again as snow sports are popular. Community outreach coordinators should be aware of such seasonal demands to allow for proper staffing and planning of events.

It is important to note that other manufacturers including Faraghan Medical Camera Systems have developed various imaging systems, including some portable models at comparable costs. **Table 2** compares a portable imaging tool to a UV camera. **Figure 3 and 4** demonstrate examples of photographs taken with the Reveal Imager and the VISIA Imaging Booth.

Conclusion

We encourage skin cancer prevention and outreach programs to consider using portable imaging tools to encourage sun-safety behaviors. For example, portable imaging devices can be used on high school and college campuses to promote tan-free campuses through skin cancer prevention educational events. The same portable camera could be used in a multitude of other settings, including elementary and middle schools, employee training centers, public parks and beaches, homeless shelters, and recreational centers. Portable imaging devices provide a powerful means to affect a wide range of people in a variety of settings.

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