Original Investigation

Clinical Skin Examination Outcomes After a Video-Based Behavioral Intervention

Analysis From a Randomized Clinical Trial

Monika Janda, PhD; Philippa Youl, PhD; Rachel Neale, PhD; Joanne Aitken, PhD; David Whiteman, PhD; Louisa Gordon, PhD; Peter Baade, PhD

IMPORTANCE Older men are at risk of dying of melanoma.

OBJECTIVE To assess attendance at and clinical outcomes of clinical skin examinations (CSEs) in older men exposed to a video-based behavioral intervention.

DESIGN, SETTING, AND PARTICIPANTS This was a behavioral randomized clinical trial of a video-based intervention in men aged at least 50 years. Between June 1 and August 31, 2008, men were recruited, completed baseline telephone interviews, and were than randomized to receive either a video-based intervention (n = 469) or brochures only (n = 461; overall response rate, 37.1%) and were again interviewed 7 months later (n = 870; 93.5% retention).

INTERVENTIONS Video on skin self-examination and skin awareness and written informational materials. The control group received written materials only.

MAIN OUTCOMES AND MEASURES Participants who reported a CSE were asked for the type of CSE (skin spot, partial body, or whole body), who initiated it, whether the physician noted any suspicious lesions, and, if so, how lesions were managed. Physicians completed a case report form that included the type of CSE, who initiated it, the number of suspicious lesions detected, how lesions were managed (excision, nonsurgical treatment, monitoring, or referral), and pathology reports after lesion excision or biopsy.

RESULTS Overall, 540 of 870 men (62.1%) self-reported a CSE since receiving intervention materials, and 321 of 540 (59.4%) consented for their physician to provide medical information (received for 266 of 321 [82.9%]). Attendance of any CSE was similar between groups (intervention group, 246 of 436 [56.4%]; control group, 229 of 434 [52.8%]), but men in the intervention group were more likely to self-report a whole-body CSE (154 of 436 [35.3%] vs 118 of 434 [27.2%] for control group; $P = .01$). Two melanomas, 29 squamous cell carcinomas, and 38 basal cell carcinomas were diagnosed, with a higher proportion of malignant lesions in the intervention group (60.0% vs 40.0% for controls; $P = .03$). Baseline attitudes, behaviors, and skin cancer history were associated with higher odds of CSE and skin cancer diagnosis.

CONCLUSIONS AND RELEVANCE A video-based intervention may increase whole-body CSE and skin cancer diagnosis in older men.

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Author Affiliations: School of Public Health and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Queensland, Australia (Janda, Aitken, Baade); Queensland Cancer Council, Brisbane, Queensland, Australia (Youl, Aitken, Baade); Queensland Institute of Medical Research, Brisbane, Queensland, Australia (Neale, Whiteman); Griffith University, Brisbane, Queensland, Australia (Gordon, Baade).

Corresponding Author: Monika Janda, PhD, School of Public Health and Institute of Health and Biomedical Innovation, Queensland University of Technology, Kelvin Grove, Brisbane, Queensland 4059, Australia (m.janda@qut.edu.au).

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Melanoma is a common malignancy of the skin. In Australia in 2008, the age-standardized rate was 65 melanomas per 100 000 population,[1,2] compared with 21 per 100 000[3,4] in the United States. Although a stabilization of incidence rates in younger birth cohorts has been observed,[5,6] the incidence in older age groups continues to increase in the United States, Australia, and Europe.[7,8] In the United States, death rates from melanoma have decreased in women but have increased in men.[9]

Removing melanomas when they are thin (<1 mm) is associated with lower morbidity and mortality rates.[10-12] Early detection is an important strategy to reduce the burden of melanoma[13] and can be achieved through visual inspection by a layperson (skin self-examination [SSE]) or a clinician (clinical skin examination [CSE]). In 1996, a population-based case-control study suggested that SSE was associated with a survival benefit.[14] A case-control study in Queensland showed that melanomas detected during deliberate examinations (by a layperson or a physician) were thinner than those detected otherwise.[15] Having 1 whole-body CSE within the past 3 years can reduce by 14% the risk of diagnosis of a thick melanoma.[16] This may improve 10-year survival rates among screened (92.6%) vs unscreened (90.4%) melanoma survivors,[16] although lead time bias needs to be considered. Clinical skin examinations have also been shown in other studies to demonstrate thin melanomas and reduce the incidence of thick melanomas.[15,17-20] A skin cancer screening project in Germany reported a reduction in mortality rates from melanoma in a state offering screening by CSE, compared with states not offering CSE screening.[21]

Approximately 30% of persons attend a physician for a CSE at least every 3 years,[22] but older men are less likely than other populations to do so.[16,21] In addition, other investigators have found that men have worse survival rates than women even after controlling for tumor thickness, suggesting that sex-specific biological factors may play a role in survival. Older men are also more likely to have diagnoses of thick melanomas, and their melanomas are more likely to be fatal.[23] A cost analysis estimated that providing CSEs to men aged at least 50 years would incur health care costs similar to those of other early detection programs, such as mammography for breast cancer or fecal occult blood testing for colorectal cancer.[24] Even so, melanoma screening is currently not recommended in most countries[25] owing to lack of evidence of a mortality benefit in randomized trials (although 1 trial is currently ongoing).[21,22]

The present study forms part of a randomized behavioral trial of a video-based intervention designed to improve SSE, skin awareness, and CSE behaviors in men aged at least 50 years. Previous reports from this trial have focused on methods and SSE outcomes.[26,27] This analysis focused on the prespecified secondary aim of the trial to assess CSE attendance and outcomes. We aimed to assess whether the intervention increased the proportion of men who presented to a physician for a CSE, received a whole-body CSE, and received a diagnosis of skin cancer. Another aim was to determine factors other than the intervention or control condition associated with having a CSE or skin cancer diagnosis during the trial.

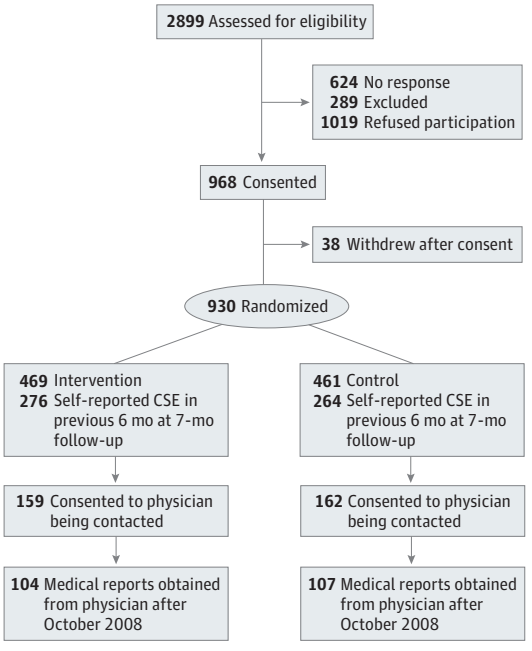
Methods

Ethical approval was received from the Queensland University of Technology's ethics committee (approval QUT 0600000645). Between June 1 and August 31, 2008, a total of 930 men aged at least 50 years were recruited through random selection from the Queensland electoral roll (response rate, 37.1%) (**Figure**). Eligibility criteria included proficiency in English, access to a digital video disc (DVD) player, and no previous history of melanoma. Participants were enrolled into a randomized clinical trial, the Skin Awareness Study (anzctr.org.au Identifier: ACTRN12608000384358). All participants provided written informed consent.

Intervention and Control Conditions

Intervention participants received both video-based and written skin awareness educational materials, and control group participants received only the written educational materials.[27] The intervention was underpinned by the Health Belief Model.[28] The video highlighted the seriousness of a melanoma diagnosis (perceived seriousness according to the health belief model), risk factors for melanoma, and the increased risk in men aged at least 50 years (perceived susceptibility); modeled a whole-body SSE (self-efficacy); presented a melanoma surgeon who encouraged SSE (cues to action) and presentation to a physician for a whole-body CSE; and showed a CSE being performed (overcoming barriers). A national sports personality along with melanoma survivors encouraged men to become skin aware (benefit).

Figure. Flow of Participants Through Study and Clinical Skin Examination (CSE) Outcomes



Participants were randomized into intervention and control groups.

Main Outcome Measures

Outcomes were the prevalence and frequency of having undergone any type or whole-body CSEs since baseline, as well as clinical and histopathological outcomes of skin lesions treated during the past 6 months. Overall, 469 men were randomized to the intervention group and 461 to the control group. Baseline telephone survey results were available for 929 participants.[26,27] At baseline, 80.8% of men reported that a physician had ever checked any part of their skin for early signs of skin cancer, and 38.8% had undergone a whole-body CSE within the past 12 months.[26]

For the present analysis, we used data from a telephone interview administered 7 months after baseline, along with information from participants' physicians. Participants were asked whether they had undergone CSE within the past 6 months. The validity of CSE self-report had been previously established (93.7% concordance between self-report and physician report for CSE within the past 3 years), with some evidence for telescoping when a shorter interval was assessed (74.3% concordance for CSE within the past 12 months).[29] If participants reported having undergone a CSE, we asked about the type of CSE (skin spot, partial body, or whole body), who initiated it (the participant himself or his physician during a consultation for another reason), whether the physician noted any suspicious lesions, and, if so, how they were managed. With participant consent, we asked the physician to complete a case report form (eFigure in the Supplement) that included type of CSE, who initiated it, number of suspicious lesions detected, and how lesions were managed (nonsurgical treatment, surgical treatment [excision or biopsy], monitoring, or referral), and we obtained pathology reports for excisions or biopsies. Analysis was restricted to CSEs completed after the study starting date, October 1, 2008, and before the 7-month interview.

Statistical Analysis

Analyses were performed using SAS software (versions 9.2 and 9.3; SAS Institute). Descriptive analyses were conducted, and χ^2 tests and Wilcoxon rank sum tests were used to assess differences in self-reported outcomes between intervention and control groups; χ^2 tests were also used to compare the distribution of physicians' responses to each question in the case-report forms and diagnostic outcomes between treatment arms. Agreement between participant-reported and physician reported data was assessed using the Cohen κ statistic.

Bivariate logistic regression analyses were initially conducted, including demographic and clinical factors, phenotypic characteristics, SSE behaviors, and attitudes and social supports associated with undergoing at least 1 partial- or whole-body self-reported CSE during the study period. Multivariable logistic regression was then used to assess which characteristics were independently associated with self-reported CSE after adjustment for other variables (key demographic and skin cancer risk factors, sun protection behaviors, attitudes, and beliefs, as described elsewhere[26]), including randomization to intervention or control groups. Factors with a *P* value <.20 were initially included in the multivariable logistic regression, removed individually, and then reentered while we observed changes in the likelihood ratio to derive the most parsimonious model. Terms were retained if the *P* value was less than .05 within the multivariable model. Similarly, we established baseline factors independently associated with the diagnosis of skin cancer (melanoma, squamous cell carcinoma [SCC], or basal cell carcinoma [BCC]).

Results

Once baseline interviews were complete (**Table 1** presents baseline characteristics), participants were randomized into intervention and control groups stratified by area of residence (southeast corner of vs rest of Queensland); randomization was based on a computer-generated random number list generated separately from other study procedures by the study statistician (P. B.). Given the nature of the intervention, it was not possible to mask participants for their group assignment; however, telephone interviewers were working for a professional telephone survey company independent from the research team and masked to participants' allocations. The 7-month follow-up telephone interviews were completed by 870 of 930 men (93.5% of those enrolled); the Figure summarizes participant flow. Demographic characteristics at baseline have been described elsewhere.[26]

Self-reported Outcomes

Overall, at the 7-month interview, 475 of 870 men (54.6%) self-reported that a physician had deliberately checked any part of their skin during the past 6 months, and these results did not differ between intervention (246 of 436 [56.4%]) and control (229 of 434 [52.8%]) groups (*P* = .28). There was also no difference in the number of participants who reported that the physician looked at a skin spot during a consultation for another reason (intervention, 114 of 436 [26.1%]; control, 112 of 434 [25.8%]). However, participants in the intervention group (154 of 436 [35.3%]) were significantly more likely than controls (118 of 434 [27.2%]; *P* = .01) to report a whole-body CSE during the past 6 months. Among participants who reported either a dedicated CSE or skin spot check during another consultation, **Table 2** compares the distribution of participants' self-reported outcomes for these consultations. Men in the intervention group were more likely to have been asked by their physician to return for a follow-up examination (*P* = .001), but there was no difference between intervention or control groups in relation to self-reported skin lesion treatment (Table 2).

In the multivariable model, baseline factors positively associated with a self-reported CSE within the first 6 months of the trial included having a regular general practitioner (odds ratio, 1.49; 95% CI, 1.15-1.92), having had a spot or mole removed in the past (1.45; 1.24-1.71), current concern about a spot or mole (1.31; 1.10-1.56), having checked one's own skin in the past 6 months (1.15; 1.00-1.33), having undergone CSE in the previous 12 months (1.47; 1.26-1.70), and sometimes or usually wearing a hat (1.34; 1.01-1.78). Within men in the intervention group who reported at least 1 CSE, those who watched the DVD more than once were more likely to report a whole-body CSE (62.2%) than those who watched the DVD once (55.2%) or

did not watch it (50.0%); however, this difference was not statistically significant ($P = .34$).

Of men who reported undergoing CSE in the previous 6 months, 321 of 540 (59.4%; 159 in the intervention and 162 in the control group) gave consent for their physician to be contacted by the study team for further details about the CSE. Men who had black hair, no previous history of skin excision or treatment, and no CSE within the 12 months before baseline were less likely to consent for their physician to be contacted (all $P < .05$). Men who did not provide consent to contact their physician were less likely to self-report that at least 1 skin lesion was found during the CSE (84 of 216 [38.9%]) than those who gave permission (165 of 321 [51.4%]; $P = .004$), and they self-reported a lower distribution of lesions requiring treatment (median, 2 lesions; range, 1-15) than men who consented to physician contact (median, 2 lesions; range, 1-28; $P < .001$).

In total, medical case report forms and pathology reports (where applicable) were obtained from the physician for 266 of the 321 men (82.8%) who consented. Of these case report forms, 211 of 266 (79.3%) were for CSEs conducted within the study period and were used in this analysis (104 in the intervention and 107 in the control group).

Physician-Reported Outcomes

Based on the case reports received from physicians, men in the intervention group were more likely to have undergone a whole-body CSE than those in the control group (74.5% vs 61.4%; $P = .046$); however, men in both groups were equally likely to be perceived by the physician as having initiated the CSE (64.7% vs 57.9%; $P = .31$). After the CSE, physicians treated, monitored, or referred at least 1 lesion in 76% of participants (76.0% in the intervention and 76.6% in the control group). Of those, 49.3% of participants (104 of 211) had nonsurgical management of at least 1 lesion (50 of 104 [48.1%] in the intervention and 54 of 107 [50.5%] in the control group). Many of them (86 of 211 [40.8%]) were treated with cryotherapy. Overall, 34.1% (72 of 211) underwent surgical excision or biopsy of at least 1 lesion (41.3% in the intervention and 27.1% in the control group; $P = .03$), with a median of 2 lesions found (**Table 3**). The concordance between self-reported and physician-reported CSE was moderate for whole-body CSE (Cohen $\kappa = 0.53$) and for management of any lesions (Cohen $\kappa = 0.43$).

Pathology reports were obtained for 130 lesions that were excised or sampled for biopsy (85 in the intervention and 45 in the control group). Overall, 2 melanomas, 29 SCCs, 38 BCCs, 17 solar keratoses, 3 dysplastic nevi, 9 benign nevi, and 32 other pigmented or nonpigmented lesions were diagnosed. The 2 melanomas were diagnosed in intervention participants. Thus, the study obtained a melanoma detection rate of 2 of 469 (426 per 100 000). In addition, 21 SCCs and 28 BCCs were detected in 104 intervention participants, and 8 SCCs and 10 BCCs in 107 control participants. Significantly more skin cancers were detected in the intervention group than the control group (60.0% vs 40.0%, respectively; $P = .03$) (**Table 4**).

Factors positively associated with a skin cancer diagnosis during the trial included being an intervention participant (odds ratio, 1.45; 95% CI, 1.20-2.08), conducting SSE within the past 6 months (1.60; 1.04-2.48), history of treatment for a spot or mole (1.78; 1.19-2.67), and self-reported CSE within the past 12 months (2.52; 1.21-5.23). Men who rarely or never stayed in the shade and men who tanned without burning were more likely to have a skin cancer diagnosed (odds ratio, 1.63 [95% CI, 1.10-2.43] and 3.24 [1.42-7.38], respectively) (**Table 5**).

Table 1. Participants' Baseline Demographic and Health Characteristics

Characteristic	Participants, No. (%)	
	Intervention Group (n = 469)	Control Group (n = 460)
Area of Queensland		
Urban	234 (49.9)	221 (48.0)
Rural	235 (50.1)	239 (52.0)
Age group, y		
50-60	186 (39.7)	206 (44.8)
61-70	170 (36.2)	161 (35.0)
71-90	113 (24.1)	93 (20.2)
Highest level of education completed[a]		
Less than junior high school	45 (9.6)	39 (8.5)
Completed junior high school	109 (23.3)	131 (28.5)
Completed senior high school	91 (19.4)	76 (16.6)
Trade or technical certificate or diploma	107 (22.8)	120 (26.1)
University or college degree	117 (24.9)	93 (20.2)
Employment status		
Employed full time	189 (40.3)	199 (43.3)
Employed part time or casual	48 (10.2)	58 (12.6)
Permanently ill/unable to work/ looking for work	19 (4.0)	21 (4.6)
Retired	213 (45.4)	182 (39.6)
Annual household income (before tax), $		
≤20 000	64 (13.6)	56 (12.2)
20 001-40 000	131 (27.9)	111 (24.1)
40 001-60 000	81 (17.3)	84 (18.3)
60 001-80 000	65 (13.9)	47 (10.2)
>80 001	105 (22.4)	127 (27.6)
Refused	23 (4.9)	35 (7.6)
Country of birth		
Australia	363 (77.4)	360 (78.3)
Other	106 (22.6)	100 (21.7)
Has a physician ever deliberately checked any part of your skin for early signs of skin cancer?		
Yes	379 (80.8)	380 (82.6)
No	90 (19.2)	80 (17.4)
In the past 12 mo has a physician deliberately checked the skin on your whole body?		
Yes	182 (38.8)	180 (39.1)
No	287 (61.2)	280 (60.9)
Have you ever had a skin cancer, mole, or other spot(s) removed or treated?		
Yes	333 (71.0)	327 (71.1)
No	136 (29.0)	133 (28.9)

[a] Data missing for 1 participant in the control group.

Table 2. Self-reported Outcomes of CSEs[a]

Outcome	Participants, No. (%)		P Value[b]
	Intervention (n = 276)	Control (n = 264)	
Asked by physician to return for follow-up examination in the future	136 (49.3)	94 (35.6)	.001
≥1 Lesion found during CSE	131 (47.5)	118 (44.7)	.52
No. of lesions in participants with ≥1 lesion found, median (range)	2 (1-28)	2 (1-20)	.85
≥1 Lesion treated during CSE	116 (42.0)	101 (38.3)	.37
Course of treatment in participants with ≥1 lesion treated			
Excision	59 (50.9)	43 (42.6)	.22
Other treatment	57 (49.1)	58 (57.4)	

Abbreviation: CSE, clinical skin examination.

[a] Data represent number (percentage) of participants unless otherwise specified.

[b] *P* values determined with χ^2 or Wilcoxon rank sum tests.

Table 3. CSE Details Reported by Physicians

CSE Details	Control (n = 107)		Intervention (n = 104)		P Value[b]
	Participants, No. (%)[a]	OR (95% CI)	Participants, No. (%)[a]	OR (95% CI)	
Examination initiated by participant	59 (57.9)	1 [Reference]	66 (64.7)	1.34 (0.76-2.35)	.31
Whole-body skin examination	62 (61.4)	1 [Reference]	76 (74.5)	1.84 (1.01-3.36)	.046
Participants who received treatment, monitoring, or referral because of CSE	82 (76.6)	1 [Reference]	79 (76.0)	1.00 (0.53-1.90)	.99
Participants whose lesions were nonsurgically managed	54 (50.5)	1 [Reference]	50 (48.1)	0.91 (0.53-1.57)	.73
Cryotherapy	47 (43.9)	...	39 (37.5)	...	
Topical cream, monitoring, or other nonsurgical treatment	7 (6.5)	...	11 (10.6)	...	
Participants whose lesions were surgically managed (excision or biopsy)	29 (27.1)	1 [Reference]	43 (41.3)	1.90 (1.06-3.38)	.03
Treated lesions, median (range), No.					
Nonsurgical management	9 (1-30)	...	3.5 (1-100)	...	...
Excision or biopsy	1 (1-5)	...	1 (1-8)	...	...

Abbreviation: CSE, clinical skin examination.

[a] Data represent number (percentage) of participants unless otherwise specified; denominators vary slightly owing to missing data.

[b] *P* values determined with univariate logistic regression analysis.

Discussion

Although screening for melanoma by CSE for men aged at least 50 years may be cost-effective,[30] it is often not recommended owing to the absence of evidence of a mortality benefit in randomized clinical trials. However, data are accumulating from observational studies on the value of CSE for reducing melanoma thickness at diagnosis and mortality rates, highlighting the benefit for men aged at least 50 years.[16,31] This study found that a video-based intervention designed to increase skin awareness, SSE, and presentation to a physician with suspicious skin lesions among men aged at least 50 years resulted in a higher prevalence of self- and physician-reported whole-body CSE than the provision of written materials alone among men who underwent any type of CSE. Among men who underwent CSE, 34.1% had excision or biopsy of at least 1 lesion, consistent with high levels of clinical suspicion for these lesions and highlighting the potential value of facilitating CSEs in this group of older men in Australia.

Compared with the control group, men receiving the video intervention were more likely to self-report undergoing whole-body CSE. Also noted by the physicians, a larger proportion of CSEs in intervention participants (74.5%) were whole-body examinations, which were recommended in the video intervention to make certain that lesions on difficult-to-see body areas were also assessed.[6,32,33] Our analysis shows that men were more likely to self-report CSEs if they had a regular physician, previous SSEs and/or CSEs, previous treatment of skin lesions or moles, or current concern about a skin lesion, largely similar to previous findings.[34,35] The complementary nature of SSE and CSE has been noted elsewhere in an investigation of skin cancer early detection behavior among melanoma survivors.[36]

A previous trial of a video-based intervention (the Check-It-Out trial),[37,38] compared SSE and CSE outcomes among 1356 men and women (median age, 52 years). The intervention included educational materials provided in paper-based and video formats plus individual behavioral counseling (1 face-to-face and 1 telephone session). Control participants received the same attention but were counseled about healthy diet. Participants randomized to the SSE group were significantly more likely to undergo skin surgery during the first 6 months after the intervention (8% vs to 4% in the diet group). The number of malignant lesions found was small compared with our study (1 melanoma, 10 BCCs, and 3 SCCs), probably because of the younger age group involved and the lower skin cancer risk in the United States compared with Australia.[8,38]

Another trial that focused on improving early detection of skin cancers in men aged at least 50 years randomized men to

Table 4. Diagnoses of Malignant Lesions Identified at CSE

Diagnosis	Lesions, No.	
	Control Group (n = 107)	Intervention Group (n = 104)
Melanoma	0	2
Squamous cell carcinoma	8	21
Basal cell carcinoma	10	28
All malignant lesions	18[a]	51[a]
Solar keratosis	2	15
Dysplastic nevus	1	2
Benign nevus	7	2
Other pigmented lesions	8	6
Other nonpigmented lesions	9	9
Total	45	85

Abbreviation: CSE, clinical skin examination.

[a] Of all lesions, 40.0% were malignant in the control group and 60.0% in the intervention group ($P = .03$; χ^2 test).

Table 5. Multivariable Model Factors Associated With Diagnosis of Skin Cancer During the Trial[a]

Factor	Odds Ratio for Diagnosis of Skin Cancer (95% CI)	*P* Value
Treatment arm		
Intervention	1.45 (1.20-2.08)	.047
Control	1.00 [Reference]	
Participant checked his own skin within 6 mo before baseline		
Yes	1.60 (1.04-2.48)	.03
No/unsure	1.00 [Reference]	
Physician treatment of any particular spots or skin lesions during the last skin check		
Yes	1.78 (1.19-2.67)	.005
No	1.00 [Reference]	
Deliberate checking by physician of any part of participant's skin for early signs of skin cancer within 12 mo before baseline		
Yes	2.52 (1.21-5.23)	.01
No/don't know	1.00 [Reference]	
Participant stays in the shade		
Rarely/never	1.63 (1.10-2.43)	.02
Sometimes/usually/always	1.00 [Reference]	
Participant's skin response on exposure to strong sun for 30 min		.04
Burn and not tan	0.89 (0.43-1.81)	.74
Burn then tan	1.16 (0.65-2.06)	.62
Tan slightly without burning	1.00 [Reference]	...
Tan a lot without burning	3.24 (1.42-7.38)	.005

[a] Of 929 participants, skin cancer was diagnosed in 40; some had more than 1 lesion. Diagnoses included malignant melanoma, squamous cell carcinoma, and basal cell carcinoma.

receive or not receive photographs of their skin to help detect any changes in lesions.[39] During the 2-year follow-up period, 34% underwent skin excision, similar to the 34.1% rate observed in our study. The proportions of cancers among the excised lesions (58% in the intervention and 42% in the control group) were also similar to those observed in our study. Hanrahan et al[39] discussed whether this between-group difference in overall excised lesions may have reflected missed lesions in the absence of photographs or treatment of lesions by cryotherapy in the control participants. However, in our study, the proportions of participants treated with cryotherapy were similar between the 2 groups.

Our findings indicate that in 76.3% of men with a CSE reported by their physician, skin lesions were discovered that required some form of management, of which 40.0% and 60.0% were identified as skin cancers in the pathology report in the control and intervention groups, respectively. This may suggest that a targeted educational program such as ours may lead to early detection of melanoma or other skin cancers. Although the overall level of excisions may seem high, we reported elsewhere that Australian general practitioners are excellent at diagnosing skin cancer, needing to excise a mean of just 2 skin lesions to find 1 skin cancer.[40] Furthermore, Fransen et al[41(p566)] reported that "83% of NMSC [nonmelanoma skin cancer] treatments were administered in people aged 55 years and over, and nearly two-thirds of NMSC treatments were administered in persons aged 65 years and over."

Strengths of our study include its focus on men aged at least 50 years, a group at increased risk of dying of melanoma. Its limitations include the fact that the men who agreed to participate in the trial were already relatively skin aware at baseline (39% self-reported undergoing whole-body CSE within the 12 months before enrollment, with no difference between intervention and control groups). Our results could therefore underestimate the true effect of our intervention program, if less health-aware men are assumed to be more likely to have unidentified skin cancers. A relatively low proportion of men gave consent for us to contact their physicians (321 of 540 [59.4%]), mostly out of reluctance to create work for their physician, although the response rate from physicians was good (266 of 321 [82.9%]). This meant that CSE outcomes were available for 266 of 540 participants (49.3%) self-reporting a CSE. It is therefore likely that additional cancers were diagnosed but not recorded during the study. Men with fair phenotypes and previous skin excisions were more likely to consent to our contacting their physician. Compared with men who consented to physician follow-up, men who did not consent self-reported fewer lesions being found during CSEs. If men who did not give consent were at lower risk of skin cancer, our results may overestimate somewhat the number of skin cancers that could be diagnosed. As noted elsewhere,[28] Skin Awareness Study participants may have been more health conscious than men from the general population, and 81.7% reported at baseline having ever undergone any type of skin examination by a physician. Our results may therefore overestimate what could be achieved in less health-conscious men.

Conclusions

In summary, our trial showed that men aged at least 50 years responded favorably to video-based education, increasing their

skin awareness and attendance at whole-body CSE during 7 months of follow-up. Among men in both intervention and control groups, many malignant lesions were diagnosed and treated because of CSEs. We acknowledge that routine use of CSE as a screening tool will place a burden on the health care system and could lead to the detection of skin cancers that are relatively indolent and may never cause death or significant morbidity.[22,25] However, with increasing evidence from observational studies supporting the effects of CSE in reducing the incidence of thick melanomas and melanoma-associated mortality rates[16,31,42] and with evidence of potential reductions in the cost-benefit ratio,[24] our results support implementing behavioral interventions to encourage skin awareness among men aged at least 50 years.

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Acquisition of data: Janda, Baade.
Analysis and interpretation of data: Janda, Youl, Aitken, Whiteman, Baade.
Drafting of the manuscript: Janda.
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REFERENCES

1. Australian Institute of Health and Welfare. Melanoma of the skin. 2011. http://www.aihw.gov.au/acim-books/. Accessed October 15, 2012.

2. Australian Bureau of Statistics. 3218.0 - Regional population growth, Australia, 2008-09. 2010; http://www.abs.gov.au/ausstats/abs@.nsf/Products/3218.0~2008-09~Main+Features~Main+Features?OpenDocument. Accessed October 15, 2012.

3. United States Census Bureau. Congressional apportionment: 2010 census briefs. http://www.census.gov/prod/cen2010/briefs/c2010br-08.pdf. Accessed October 17, 2012.

4. United States Census Bureau. Table 178: Cancer—estimated new cases, 2010, and survival rates. http://www.census.gov/compendia/statab/2011/tables/11s0178.xls. Accessed October 17, 2012.

5. Erman AB, Collar RM, Griffith KA, et al. Sentinel lymph node biopsy is accurate and prognostic in head and neck melanoma. *Cancer*. 2012;118(4):1040-1047.

6. Youl PH, Youlden DR, Baade PD. Changes in the site distribution of common melanoma subtypes in Queensland, Australia over time: implications for public health campaigns. *Br J Dermatol*. 2013;168(1):136-144.

7. Cancer Council Queensland. Cancer In Queensland: 1982 to 2007—incidence, mortality, survival and prevalence. Queensland Cancer Registry 2010. http://www.cancerqld.org.au/icms_docs/61568_Cancer_in_Queensland_-_Incidence_Mortality_Survival_and_Prevalence_1982_to_2010.pdf. Accessed October 17, 2012.

8. Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. *CA Cancer J Clin*. 2007;57(1):43-66.

9. Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. *CA Cancer J Clin*. 2009;59(4):225-249.

10. Weinstock MA. Early detection of melanoma. *JAMA*. 2000;284(7):886-889.

11. Balch CM, Gershenwald JE, Soong SJ, et al. Final version of 2009 AJCC melanoma staging and classification. *J Clin Oncol*. 2009;27(36):6199-6206.

12. Rigel DS, Carucci JA. Malignant melanoma: prevention, early detection, and treatment in the 21st century. *CA Cancer J Clin*. 2000;50(4):215-240.

13. Mitchell JK, Leslie KS. Melanoma death prevention: moving away from the sun. *J Am Acad Dermatol*. 2013;68(6):e169-e175.

14. Berwick M, Begg CB, Fine JA, Roush GC, Barnhill RL. Screening for cutaneous melanoma by skin self-examination. *J Natl Cancer Inst*. 1996;88(1):17-23.

15. Baade PD, English DR, Youl PH, McPherson M, Elwood JM, Aitken JF. The relationship between melanoma thickness and time to diagnosis in a large population-based study. *Arch Dermatol*. 2006;142(11):1422-1427.

16. Aitken JF, Elwood M, Baade PD, Youl P, English D. Clinical whole-body skin examination reduces the incidence of thick melanomas. *Int J Cancer*. 2010;126(2):450-458.

17. Stratigos A, Nikolaou V, Kedicoglou S, et al. Melanoma/skin cancer screening in a Mediterranean country: results of the Euromelanoma Screening Day Campaign in Greece. *J Eur Acad Dermatol Venereol*. 2007;21(1):56-62.

18. Rossi CR, Vecchiato A, Bezze G, et al. Early detection of melanoma: an educational campaign in Padova, Italy. *Melanoma Res*. 2000;10(2):181-187.

19. Carli P, Palli D. Melanocytic nevi, solar keratoses, and divergent pathways to cutaneous melanoma. *J Natl Cancer Inst*. 2003;95(23):1801-1802.

20. Epstein DS, Lange JR, Gruber SB, Mofid M, Koch SE. Is physician detection associated with thinner melanomas? *JAMA*. 1999;281(7):640-643.

21. Waldmann A, Nolte S, Weinstock MA, et al. Skin cancer screening participation and impact on melanoma incidence in Germany—an observational study on incidence trends in regions with and without population-based screening. *Br J Cancer*. 2012;106(5):970-974.

22. Youl PH, Coxeter PD, Whiteman DC, Aitken JF. Screening for skin cancer in Queensland: who attends, and why and where do they attend? *Med J Aust*. 2009;190(1):45.

23. Geller AC, Swetter SM, Brooks K, Demierre MF, Yaroch AL. Screening, early detection, and trends for melanoma: current status (2000-2006) and future directions. *J Am Acad Dermatol*. 2007;57(4):555-576.

24. Gordon L, Youl PH, Elwood M, et al. Diagnosis and management costs of suspicious skin lesions from a population-based melanoma screening programme. *J Med Screen*. 2007;14(2):98-102.

25. U.S. Preventive Services Task Force. Screening for skin cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2009;150(3):188-193.

26. Janda M, Baade PD, Youl PH, et al. The skin awareness study: promoting thorough skin self-examination for skin cancer among men 50 years or older. *Contemp Clin Trials*. 2010;31(1):119-130.

27. Janda M, Neale RE, Youl P, Whiteman DC, Gordon L, Baade PD. Impact of a video-based intervention to improve the prevalence of skin self-examination in men 50 years or older: the randomized skin awareness trial. *Arch Dermatol*. 2011;147(7):799-806.

28. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. *Health Educ Q*. 1988;15(2):175-183.

29. Aitken JF, Youl PH, Janda M, Elwood M, Ring IT, Lowe JB. Comparability of skin screening histories obtained by telephone interviews and mailed questionnaires: a randomized crossover study. *Am J Epidemiol*. 2004;160(6):598-604.

30. Girgis A, Clarke P, Burton RC, Sanson-Fisher RW. Screening for melanoma by primary health care physicians: a cost-effectiveness analysis. *J Med Screen*. 1996;3(1):47-53.

31. Katalinic A, Waldmann A, Weinstock MA, et al. Does skin cancer screening save lives? an observational study comparing trends in melanoma mortality in regions with and without screening. *Cancer*. 2012;118(21):5395-5402.

32. Youl PH, Janda M, Aitken JF, Del Mar CB, Whiteman DC, Baade PD. Body-site distribution of skin cancer, pre-malignant and common benign pigmented lesions excised in general practice. *Br J Dermatol*. 2011;165(1):35-43.

33. McPherson M, Elwood M, English DR, Baade PD, Youl PH, Aitken JF. Presentation and detection of invasive melanoma in a high-risk population. *J Am Acad Dermatol*. 2006;54(5):783-792.

34. Kasparian NA, McLoone JK, Meiser B. Skin cancer-related prevention and screening behaviors: a review of the literature. *J Behav Med*. 2009;32(5):406-428.

35. Aitken JF, Janda M, Lowe JB, et al. Prevalence of whole-body skin self-examination in a population at high risk for skin cancer (Australia). *Cancer Causes Control*. 2004;15(5):453-463.

36. Swetter SM, Pollitt RA, Johnson TM, Brooks DR, Geller AC. Behavioral determinants of successful early melanoma detection. *Cancer*. 2012;118(15):3725-3734.

37. Weinstock MA, Risica PM, Martin RA, et al. Melanoma early detection with thorough skin self-examination: the "Check It Out" randomized trial. *Am J Prev Med*. 2007;32(6):517-524.

38. Weinstock MA, Risica PM, Martin RA, et al. Efficacy of intervention to increase thorough skin self-examination and effect on surgery on the skin: results of the Check-It-Out project [abstract]. *J Invest Dermatol*. 2005;125(4):855. doi:10.1111/j.0022-202X.2005.23877_17.x.

39. Hanrahan PF, D'Este CA, Menzies SW, Plummer T, Hersey P. A randomised trial of skin photography as an aid to screening skin lesions in older males. *J Med Screen*. 2002;9(3):128-132.

40. Youl PH, Baade PD, Janda M, Del Mar CB, Whiteman DC, Aitken JF. Diagnosing skin cancer in primary care: how do mainstream general practitioners compare with primary care skin cancer clinic doctors? *Med J Aust*. 2007;187(4):215-220.

41. Fransen M, Karahalios A, Sharma N, English DR, Giles GG, Sinclair RD. Non-melanoma skin cancer in Australia. *Med J Aust*. 2012;197(10):565-568.

42. Titus LJ, Clough-Gorr K, Mackenzie TA, et al. Recent skin self-examination and doctor visits in relation to melanoma risk and tumour depth. *Br J Dermatol*. 2013;168(3):571-576.

NOTABLE NOTES

The Forehead Scar as a Literary Device

Nicole Cresce, BS; Melissa A. Muszynski, MD; Scott A. Norton, MD, MPH

Dermatologists and patients often view scars as imperfections. In literature, however, scars can help define a nuanced character, often revealing more than other aspects of a character's appearance. Does the scar connote bravery, some triumph in battle? Or, could it mean something more sinister, a memento of treachery perhaps?

Forehead scars, in particular, are a frequently used literary device. The earliest example of forehead scars may be the biblical tale of Cain and Abel. God banished Cain for murdering his brother, Abel, but God "set a mark upon Cain, lest any finding him should kill him. And Cain went out … and dwelt in the land of Nod, on the east of Eden" (*Genesis* 4:15, King James Version). The Bible does not describe the mark, but some Talmudic interpretations suggest it was a forehead scar shaped like sacred Hebrew letters.

John Steinbeck's novel, *East of Eden*, invokes Cain's story, and forehead scars represent the struggle between good and evil. This modern tale of Cain and Abel involves 2 brothers, Charles and Adam Trask. When Charles accidentally gashed his forehead, the resulting scar is allegorical to the "mark upon Cain." Another character, Adam's wife, Cathy, is an unremittingly evil, soulless creature whose "forehead [was] laid open to the skull" during a vengeful beating by one of her victims; the scar symbolizes her malevolence.[1]

Ahab, the monomaniacal whaling captain in Herman Melville's *Moby-Dick*, has a scar that "resembled that perpendicular seam sometimes made in the straight, lofty trunk of a great tree, when the upper lightning tearingly darts down it… Whether that mark was born with him, or whether it was the scar left by some desperate wound, no one could certainly say."[2]

J. K. Rowling[3] introduced one of the most memorable forehead scars in modern literature: Harry Potter's lightning bolt. Diabolical Lord Voldemort murdered Harry's parents but "Instead of killing the small boy, … Harry survived with nothing but a lightning-shaped cut on his forehead and Voldemort was reduced to something barely alive."[3] Despite the dark origins of Harry's scar, he does not view it as disfiguring, and, in fact, it is the thing he likes most about his appearance.

Scars are powerful and timeless literary tools, and though the frequent use of forehead scars to indicate intrinsic evil may work in literature, film, and comics, it does injustice to real people with real scars.

Author Affiliations: University of Virginia School of Medicine, Charlottesville, Virginia (Cresce); Washington Hospital Center, Georgetown University Hospital, Washington, DC (Muszynski); Children's National Medical Center, Washington, DC (Norton).

Corresponding Author: Nicole D. Cresce, BS, Office for Student Affairs, University of Virginia, PO Box 800739, Charlottesville, VA 22908 (ndc3dz@virginia.edu).

1. Steinbeck J. *East of Eden*. New York, NY: The Viking Press; 1952:111.

2. Melville H. *Moby-Dick; or, The Whale*. London, England: Wordsworth Editions Ltd; 1993:102.

3. Rowling JK. *Harry Potter and the Goblet of Fire*. New York, NY: Scholastic Inc; 2000:20.