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# Behavioral and Community Interventions to Prevent Skin Cancer

## What Works?

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### **Commentary on: Preventing skin cancer: findings of the Task Force on Community Preventive Services on Reducing Exposure to Ultraviolet Light.**

*Centers for Disease Control and Prevention*  
MMWR. 2003;52(RR-15):1-12.

### **Guide to Community Preventive Services: Systematic Reviews and Evidence-Based Recommendations: Prevention of skin cancer by reducing exposure to UV light through educational and policy approaches oriented to health care settings and providers.**

*Centers for Disease Control, Community Guide Branch*  
Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5215a1.htm>.  
Updated October 14, 2003. Accessed January 11, 2006.

### **Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: a systematic review.**

Saraiya M, Glanz K, Briss P, et al  
*Am J Prev Med.* 2004;27:422-466.

**Question:** How successful are behavioral and community interventions in reducing exposure to UV radiation and improving sun-protective behavior? Which approaches are the most effective, and how can dermatologists help advance successful prevention strategies?

**Data Sources:** A comprehensive search was made of 3 databases (MEDLINE, PsychINFO, and CINAHL) for primary investigations of interventions, published in English from 1966 to 2000, that compared outcomes among persons exposed to interventions with those among persons not exposed or less exposed to the interventions. The database of investigations was updated to 2003 for the Task Force on Community Preventive Services on Reducing Exposure to Ultraviolet Light (Task Force) and to mid 2005 for this article.

**Study Selection:** A systematic review was conducted in which more than 6000 titles and citations were screened,

159 articles reviewed, and 85 studies included in the skin cancer prevention analysis. Nine separate reviews, each focusing on specific settings or populations, were conducted by the Task Force. One of the reviews evaluated the state of the science regarding interventions in health care settings or among physicians, nurses, and residents (providers) to improve patients' sun-protective behavior (11 qualifying studies).

**Data Extraction:** Each study was evaluated with the use of a standardized abstraction form and was assessed for suitability of study design and threats to validity. Two abstractors evaluated each study, and their abstractions were reviewed, and reconciled if necessary, by a multidisciplinary team of scientists.

**Data Synthesis:** A conceptual model, or analytic framework, was developed to show the relationship of the interventions to relevant intermediate outcomes (eg, knowledge, attitudes, and intentions regarding sun-protective behaviors) and to behaviors and skin cancer prevention. Outcome data extracted from the studies were aligned with the analytic framework to answer specific research questions.

**Authors' Conclusions:** There was sufficient evidence to recommend 2 interventions that are based on improvements in sun-protective or covering-up behavior: (1) for children, educational and policy approaches in primary schools, and (2) for adults, educational and policy approaches at recreational or tourism sites. They found insufficient evidence to determine the effectiveness of a range of other population-based interventions and recommended additional research in these areas: child care centers; secondary schools and colleges; recreation and tourism sites for children; workplaces; interventions conducted in health care settings both for providers and patients; media campaigns; and communitywide multicomponent interventions. If new studies are to improve the evidence base, they must use methods of sufficient quality to add to knowledge of how sun safety can be effectively promoted in health care settings. Dermatologists can provide leadership in designing, implementing, and evaluating promising theory-driven intervention strategies and assuring allocation of resources to increase the evidence base regarding skin cancer prevention.

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## Comment

Dermatologists, who are regarded as the experts in skin cancer prevention, diagnosis, and therapy, have popularized the dogma that most skin cancers can be prevented by assiduous lifelong sun protection. Implementing this skin cancer prevention strategy on a national level, however, has proved to be a daunting task.<sup>1</sup> The necessity of occupational outdoor activities, the benefits of outdoor recreation, and the prevailing cultural desirability of a tan pose significant challenges to the message about sun protection.

The *Guide to Community Preventive Services* contains an evidence-based review of the efficacy of sun-protection interventions in varied segments of the population across various implementation settings. Studies were identified for the review by a comprehensive search of 3 databases (MEDLINE, PsychINFO, and CINAHL) for primary investigations of interventions, published in English from 1966 to 2000, that compared outcomes among persons exposed to interventions with those among persons not exposed or less exposed to the interventions. The focus was strictly on prevention, not on detection or patient education related to cancer treatment. Studies were excluded from the review if the design precluded any comparison (either before and after comparison or other group comparison) or if there were too many limitations in study execution to justify a confident acceptance of the findings and interpretation.<sup>2</sup> Additional studies published after 2000 were included—up to studies that were in press through 2003—if they became available through a call for input that was sent to active skin cancer prevention researchers.

Although review of the detailed findings of this extensive report is beyond the scope of this commentary, we provide herein a synopsis of the findings most relevant to clinical dermatologists. These include the findings on successful sun safety interventions in the primary school and outdoor recreation settings, as well as the findings on interventions in the health care setting. We also comment on studies published from 2003 through mid 2005 and draw on available evidence about health care provider interventions for smoking cessation to suggest promising actions.

**Evidence Reviews:** A series of systematic evidence reviews of the effectiveness of interventions for reducing UV radiation exposure to prevent skin cancer was conducted for the Centers for Disease Control and Prevention (CDC) guide, *Preventing Skin Cancer: Findings of the Task Force on Community Preventive Services on Reducing Exposure to Ultraviolet Light*.

A summary of the inclusion and exclusion criteria is provided in the Comment section. These reviews examined behavioral, educational, policy, and environmental strategies for changing behaviors to reduce skin cancer risk and improve health (see the article by Saraiya et al). In planning the evidence review, the Community Guide Task Force accepted several premises: the causative role of sun exposure in skin cancer, the protective role of covering up and avoiding exposure to UV radiation, and the inadequacy of sunscreen use alone as an effectiveness outcome for studies such as that by the CDC (see the interventions and settings categories). The evidence reviews covered 9 different categories

of interventions. The first 6 categories are distinct settings for interventions, each of which was examined separately: health care settings, occupational settings, recreational and tourism settings, secondary schools and colleges, primary schools, and child care centers. The other 3 categories focused on a target population—children's parents and caregivers—and broad types of interventions, such as media campaigns and communitywide multicomponent interventions. The focus was limited to *prevention*, not detection or patient education related to cancer treatment.

A systematic review was conducted in which more than 6000 titles and citations were screened, 159 articles reviewed, and 85 studies included in the skin cancer prevention analysis (see the *Guide to Community Preventive Services* by the CDC and the article by Saraiya et al). Additional studies published or in press through 2003 were included if they became available after a call for input from researchers active in skin cancer prevention. We updated the search to mid 2005 to examine recent progress and lessons derived from newly published studies, although those studies were not subjected to full formal abstraction using *Guide to Community Preventive Services* methods.

The standard *Guide to Community Preventive Services* methods were followed.<sup>2</sup> Each study was evaluated by means of a standardized abstraction form and was assessed for suitability of study design and threats to validity. Two abstractors evaluated each study, and their abstractions were reviewed, and reconciled if necessary, by a multidisciplinary team of scientists. A conceptual model, or analytic framework, was developed to show the relationship of the interventions to relevant intermediate outcomes (eg, knowledge, attitudes, and intentions regarding sun-protective behaviors) and to behaviors and reduction in skin cancer incidence. Outcome data extracted from the studies were aligned with the analytic framework to answer specific research questions.

Key outcome targets identified in the framework for the reviews of interventions were increases in knowledge; intentions to reduce UV exposure or increase solar protection; changes in attitudes, in sun exposure and use of sun protection, and in policies and environments to reduce exposure (eg, limiting exposure during peak sun hours, increasing shade, and providing sunscreen); and reduction of sunburn. Although few of the studies measured either decreased incidence of precancer, nevi, or photodamage or decreased incidence of skin cancer, the review team assumed that the behavioral changes and reduction of sunburn, if found, would lead to lower rates of cancer (see the article by Saraiya et al). The Task Force required at least 2 high-quality studies showing positive effects as a basis for a positive recommendation.

The *Guide to Community Preventive Services* team considered sunscreen use to be a secondary outcome of sun-protective programs because (1) sunscreen prevents sunburn (a marker of unprotected UV exposure and a health outcome associated with increased risk of skin cancer in epidemiologic studies) and reduces the incidence of squamous cell cancers, and (2) sunscreen is the protective method of choice in many situations. However, sunscreen's role in preventing melanoma has not been unequivocally shown and remains complex.<sup>3,4</sup> Thus, change in sunscreen use alone would not result in a recommen-

dation regarding a prevention outcome (see the *Guide to Community Preventive Services* by the CDC).

**What types of interventions could be recommended as effective?** Educational and policy intervention approaches in primary school settings were found to have sufficient evidence of increasing children's covering-up behavior, specifically, wearing protective clothing and hats. These intervention approaches included strategies such as interactive classroom and take-home activities about sun protection, brochures for parents, and a working session to develop sun-protection plans and policies for schools. They provided sufficient evidence of improvement in covering-up behavior, with a median relative increase of 25% across 6 studies of good quality that assessed these outcomes. These strategies draw heavily on social cognitive theory,<sup>5</sup> which suggests the importance of reciprocal relationships between children and their social environments, involvement of parents, and supportive policies and environments. Because of inconsistent results, the evidence was insufficient to determine effectiveness in improving other behaviors such as sun avoidance. Likewise, because there was only a single study and it had limitations in design and execution, the evidence was insufficient to determine effectiveness in decreasing sunburns.

There was sufficient evidence of effectiveness for interventions in recreational or tourism settings, for increasing adults' sun-protective covering-up behavior, with median net increases of 11.2% across 5 studies. These interventions included 1 or more of these strategies: sun safety training of and role modeling by outdoor recreation staff and lifeguards; sun safety lessons, interactive activities, and programs for parents; increasing available shaded areas; providing sunscreen; educational brochures; and point-of-purchase prompts. Like the primary school interventions, these strategies have foundations in key constructs of social cognitive theory, including role modeling and environmental supports.<sup>5</sup> However, the inconsistent results of intervention studies yielded insufficient evidence to determine effectiveness in affecting children's sun-protective behavior.

Five new intervention studies reported results from 2003 to 2005; they provide new insights but insufficient evidence to alter the main conclusions and recommendations of the Task Force's review. A theory-based parent intervention was found to reduce sunburns and sunbathing among young adolescents.<sup>6</sup> Two studies that used sun-damage imaging with education and sunscreen or sunless tanners found that participants receiving those strategies had higher intentions, motivation, and/or sun-protection behaviors.<sup>7,8</sup> A Swedish population-based communication experiment found that different brochures with or without UV radiation intensity indicator cards did not differentially influence sun safety knowledge and sun-protection behaviors.<sup>9</sup> In a study<sup>10</sup> of outdoor workers in the recreation industry, a worksite sun safety program based on diffusion of innovations theory was found to reduce sunburns among ski area employees. As in some previous studies, such as that by Saraiya et al, there was a dose-related response: greater program implementation was associated with fewer sunburns.<sup>10</sup>

**What were the outcomes for interventions in health care settings?** The review of studies that focused on health

care providers or settings included 4 types of outcomes for interventions: providers' and clients' knowledge about effective ways to decrease UV exposure; changes in attitudes, intentions, or clinical behaviors (eg, provision of sun safety advice) of health care providers; changes in providers as role models of sun safety behaviors; and changes in clients' attitudes, intentions, or behaviors.

Study participants were medical students, residents, primary care physicians, nurses, and pharmacists. Of the 11 studies included, 2 were randomized controlled trials and the rest were nonrandomized before-and-after studies or time series analyses. Sample size of respondents ranged from 17 to 342. The duration of interventions ranged from 1 hour to 12 weeks, and follow-up periods were as short as immediate posttreatment testing and as long as 1 year. The *Guide to Community Preventive Services* included both randomized trials and nonrandomized studies, provided the design and execution had few (0 to 1) or fair (2 to 4) limitations. There are no additional studies published through mid 2005 that add to this evidence base.

Nine studies were excluded from the review, mainly because of predetermined exclusion criteria, that is, they were studies of only early detection or of cancer patient education. Two studies were excluded because of limited study quality and execution. For example, in 1 study the authors did not describe the study population, sampling frame, or follow-up groups (1 study), and in another study there were large losses to follow-up, low response rates, no statistical analysis, and no assessment of exposure or confounding variables.

The conclusion drawn from the review was that, although available studies were reasonably consistent in showing improvements in providers' knowledge, attitudes, and behaviors, the available literature does not link these changes to improvements in clients' behaviors or outcomes. Thus, there is insufficient evidence to recommend interventions on the part of health care providers or in health care settings to reduce UV exposure or increase sun safety behaviors.

Many of the studies within the health care setting and directed at providers contained small sample sizes, thereby limiting generalizability beyond the primary study. More studies are needed that expand their scope to encompass larger groups of more diverse populations. Follow-up time for many of the studies was minimal, generally coming immediately after the intervention or within a few weeks. Longer follow-up times would be useful. Studies rooted in promising theoretical formulations, such as those based on social cognitive theory,<sup>5</sup> might be useful in translating improved provider attitudes and knowledge into advocating and improving sun-protective behavior among their clients. Additional studies are needed to determine whether these interventions improve clients' behaviors or outcomes.

**What guidance do these evidence reviews offer to health care providers?** The literature is replete with studies of health care providers' knowledge, skills, and counseling regarding skin cancer prevention. The literature also advocates greater emphasis on developing providers' skills and encouraging them to play a key role in preventing skin cancer.<sup>11</sup> Studies have reported that (1) pediatricians feel it is their responsibility to counsel about skin cancer prevention, (2) most say they frequently counsel about sun pro-

tection, especially about using sunscreen, but (3) they lack formal training and often feel unprepared to take on this role.<sup>12-14</sup> Journal articles encourage family physicians to emphasize primary prevention of skin cancer, but American primary care physicians say they address skin cancer less than half the time with their typical patients.<sup>15</sup> By contrast, Australian physicians do so much more often.<sup>16</sup> Dermatologists more often make concerted efforts to provide skin cancer preventive services, although there is wide variation.<sup>17,18</sup> The use of nonphysician providers for skin cancer prevention and detection in primary care settings is both common and necessary.<sup>19</sup>

Most of these studies are surveys of physicians' usual practice, with the concomitant limitations and imprecision. Two of the most telling reports, based on data from the National Ambulatory Medical Care Survey, examined the percentage of visits during which documented skin cancer prevention counseling and/or education occurred. The frequency was 1.5% of visits in 1 very large study<sup>20</sup> and 2.3% in another substantial but much smaller study.<sup>21</sup> Counseling for higher-risk patients was found to be much more frequent in Feldman and Fleischer's study<sup>20</sup>: by primary care providers at 24% of visits and by dermatologists at 41% of visits.

Dermatologists and others interested in making optimal use of the health care encounter to prevent skin cancer can learn from the large body of evidence about health care provider strategies to increase smoking cessation. The Task Force has found sufficient evidence to recommend provider reminder systems that help clinicians to identify patients who use tobacco and to prompt them to discuss and advise patients about cessation. The Task Force also has strong evidence to recommend the use of provider reminders combined with provider education (with or without patient education).<sup>22</sup> Furthermore, these guidelines are consistent with evidence-based recommendations for other US and international expert reviews.<sup>23</sup> Reminder systems in health care settings might increase the prevalence of skin cancer prevention counseling, and provider education might improve the quality and effectiveness of this counseling.

**Bottom Line:** Several important take-home messages on interventions to prevent skin cancer can be derived from the evidence review for the *Guide to Community Preventive Services*. First, however, it is important to note that the absence of sufficient data to prove the efficacy of primary prevention efforts in specific settings or subpopulations is not proof of inefficacy. Instead, the findings of the review underscore the need for additional formal studies of primary prevention efforts. A glaring example of the need for further study is the lack of data on the impact of messages about sun protection delivered in the dermatology setting. Data from other areas of cancer prevention (eg, smoking cessation) demonstrate that the physician has significant potential to affect patients' behavior.<sup>16</sup> Nonetheless, there is little evidence of this effect on the part of dermatologists and primary care physicians undertaking skin cancer prevention efforts. This may reflect the inadequacy of the studies that have been undertaken to measure the efficacy of these interventions. It may, however, accurately reflect the inefficacy of current skin cancer prevention messages and their delivery. In either case, there is significant room for improvement and involvement on the part of dermatologists. Opportunities for in-

volvement include the development of more consistent and effective messages about sun protection, design and testing of high-quality theory-based intervention strategies, implementing reminder systems to ensure that they are consistently used, and using postgraduate medical training and continuing medical education to improve providers' skills in prevention counseling. Collaborations with behavioral scientists and medical or health educators might accelerate progress in these areas.

There is also room for dermatologists to contribute to areas having sufficient evidence that skin cancer prevention strategies are effective. Dermatologists can play key roles in working with schools and recreational settings by setting policies and helping shape curricula. Their firsthand clinical experience enables them to be powerful communicators about how patients with skin cancer and their families suffer from this disease. Research dermatologists should also increase their attention to the importance of measuring behavioral outcomes in clients, in collaboration with behavioral scientists when appropriate.

Although the *Guide to Community Preventive Services* fails to provide proof or disproof of the usefulness of skin cancer prevention interventions in many settings, it does support an effect in the primary school and outdoor recreational settings. These findings suggest that the dermatology profession should prioritize the allocation of resources in these areas while working for refinement of the interventions and confirmation of the efficacy of those interventions in other settings.

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**Disclaimer:** The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the CDC.

**Additional Information:** Reports of evidence reviews from the *Guide to Community Preventive Services* are disseminated through multiple sources and in several formats. The 3 sources for this Research Commentary are overlapping but not duplicative, and each provides varying degrees and types of detail.

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# Does Mohs Micrographic Surgery Produce Lower Recurrence Rates?

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## Commentary on: Surgical excision vs Mohs' micrographic surgery for basal-cell carcinoma of the face: randomised controlled trial.

Smeets NW, Krekels GW, Ostertag JU, et al  
*Lancet*. 2004;364:1766-1772.

**Question:** In patients with large, aggressive, or recurrent facial basal cell carcinomas (BCCs), does surgical excision (SE) or Mohs micrographic surgery (MMS) produce lower recurrence rates?

**Setting:** Patients treated in 2 hospitals in the Netherlands (University Hospital Maastricht or the Laurentius Hospital Roermond).

**Design:** The study used a randomized controlled study design and included patients with primary or recurrent BCC. Primary carcinoma was defined as either (1) untreated, larger than 1 cm in diameter, and in the H-zone of the face, or (2) aggressive histopathological subtype, such as morpheaform type, in the face. Recurrent carcinomas were limited to those that were histologically confirmed and on the face. Surgical excision was standardized by mandating 3-mm margins. If the resected margins were found to be positive, a re-excision with a 3-mm margin was performed. If the margins remained positive after the second SE, the patient underwent MMS. The authors looked at recurrence of the carcinoma as their primary outcome and incomplete excision, aesthetic re-