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Long-term Maintenance of a Successful Occupational Sun Safety Intervention

Skin cancer prevention specialists should attempt to reduce UV radiation (UVR) exposure among outdoor workers, as pointed out in a recent review.¹ To address this need, Project SUNWISE,^{2,3} a randomized controlled sun safety intervention trial with Southern Californian US Postal Service letter carriers, was conducted from 2001 through 2004.

Methods. The intervention consisted of providing free sunscreen, free wide-brim hats, a series of 6 brief on-site educational sessions, and sun safety prompts. The primary outcome measures were validated questionnaire items that asked participants how often they had used

specific sun protection strategies over the past 5 work-days while delivering mail.^{2,3} The questionnaires were administered at baseline and 3, 12, 24, and 36 months after baseline. The 5 response options ranged from “never” to “always”; we considered “always” as “consistent use” in analyses.

Results. At the 2-year follow-up evaluation, participants at the intervention postal stations had significantly higher rates of consistent sunscreen and wide-brim hat use than those at control stations.² Details about the study procedures and sample characteristics have been published previously.² Immediately following the 2-year evaluation, control station participants received the free items and 3 of the educational sessions (ie, introduction and protection strategies, sun safety for eyes, and review and encouragement to maintain sun safety practices). At the intervention stations, we continued to provide free sunscreen during that year. Herein, we describe the behavioral outcomes at the 3-year follow-up evaluation.

Evaluation cohort retention rates (of those completing questionnaires) from the 2- to 3-year follow-up periods were 93.2% (927 of 994) for the intervention group and 94.4% (1130 of 1196) for the control group. The trends over 3 years in 2 key outcomes—consistent use of sunscreen and wide-brim hats—were analyzed using generalized linear mixed models treating 3 months, 1 year, 2 years, and 3 years as a set of repeated measures on each postal worker. In addition, we adjusted for postal workers clustered within post offices within a multilevel model. The intraclass correlation coefficients for sunscreen and hats were 0.015 and 0.067, respectively. All analyses were adjusted for the baseline level of the corresponding outcome variable. For each analysis, we tested (1) the time \times condition interaction to determine if the intervention effect remained constant over time and (2) the condition main effect. Consistent sunscreen use rates for intervention participants at the 2- and 3-year follow-up periods were 39.2% and 38.3%, respectively, and for control participants, the rates were 26.3% and 34.3%, respectively. Wide-brim hat use rates for intervention participants during these periods were 40.0% and 43.8%, respectively, and for control participants, the rates were 22.3% and 33.0%, respectively. Results of the analyses for each of these outcomes showed significant time \times condition interaction effects ($P < .001$ for all), in-

Table. Results of Generalized, Linear, Mixed-Model Analyses During 3-Year Follow-up^a

Follow-up Period	Sunscreen	Wide-Brim Hat
3 mo	2.69 (2.13-3.39)	3.13 (2.43-4.03)
1 y	2.06 (1.64-2.58)	2.40 (1.87-3.09)
2 y	1.96 (1.54-2.48)	2.64 (2.03-3.43)
3 y	1.08 (0.85-1.36)	1.44 (1.12-1.85)

^aAll data are reported as odds ratios (95% confidence intervals) for the intervention group always using the listed sun protection vs the control group; all models were adjusted for baseline level of the outcome variable and postal station clustering.

dicating that the differences between the conditions were changing over time. The **Table** lists these findings. For both behaviors, the change in the odds ratios from year 2 to year 3 was not due to a lowered use rate among intervention participants but rather to an increased rate among control group participants.

Comment. We are encouraged that intervention effects were maintained at least 1 year after the program ended and that once the control participants received the intervention, their consistent use of sun protection increased substantially.

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COMMENTS AND OPINIONS

Lymphangiogenesis Induced by Surgery: A Risk for Melanoma Metastasis

I read with interest the editorial of Sondak and Messina¹ on lymphangiogenesis and melanoma metastasis. Lymphangiogenesis has possibly become the crucial problem of melanoma management. Since vascular endothelial growth factors (VEGFs) A, C, and D induce lymphangiogenesis in experimental wounds in adult animals,^{2,3} it is possible that wounding stimulates lymphangiogenesis. The slow healing of chronic diabetic ulcers is related to the downregulation of VEGFs, and the administration of VEGF accelerates wound healing.⁴ Based on these observations, I wish to offer the hypothesis that surgery may promote the same lymphangiogenic activity that promotes the dissemination of malignant cells.

Of course, surgery cannot be abandoned because precise diagnosis cannot be made without excising the tumor. However, new procedures should be used to limit the need for extensive surgery. For example, immunofluorescence analysis even of routine paraffin sections of the lymphatic endothelial hyaluronan receptor 1 (a specific marker of tumor-associated lymphatics) will provide a relatively simple means to determine which patient is destined to experience metastasis.⁵ More importantly, immunofluorescence and other techniques may be used to recruit patients who might be eligible for antilymphangiogenic therapy. Soluble VEGFR-E-IgG fusion proteins and neutralizing anti-VEGF-D antibodies provide novel therapeutic opportunities for preventing dissemination of metastatic cells. A successful case of the use of bevacizumab has been reported,⁶ but a trial of presurgical treatment with antilymphangiogenic drugs offers hope of limiting metastasis for our patients with melanoma.

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