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Title: Role of the partner/spouse in melanoma discovery and related health behaviors and practices

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Spouses and partners play a key role in early melanoma detection. We surveyed newly-diagnosed patients with primary invasive cutaneous melanoma¹ and their spouses/partners regarding melanoma-related health behaviors to investigate the partners' role in earlier detection.

Institutional board approval was obtained at Stanford University Medical Center, Veterans Affairs Palo Alto Health Care System, and University of Michigan. Eligible, consecutive melanoma patients 18 years and older and their cohabitating spouse/partner (prior 12+ months) were surveyed from 2006 to 2009, within 3 months of diagnostic biopsy, as described.¹ Chi-square and t-test analyses were used to evaluate differences in demographics between study participants and excluded patients without a qualifying spouse/partner, hereafter referred to as "partner." Logistic regression models were used to assess the relationship between a partner's reported health behaviors and patient sex, adjusted for patient age; and between the person first detecting melanoma (patient, practitioner vs partner) and Breslow thickness at diagnosis, adjusted for patient sex and age. Type 1 error of 0.05 with a two-sided test was considered statistically significant. Analyses were performed using SAS 9.3 (Cary, NC, USA) and Stata 12.0 (College Station, TX, USA).

Of 566 patients surveyed overall (see reference for complete demographic information),¹ 433 (76.5%) had a cohabitating partner; 313 patient-partner pairs completed the survey (312 male-female couples, one male-male). Of this group, 306 patients (98%) were white, and 208 (67%) were male, with mean age 57 years (95% CI 55.7, 58.9) for patients and 56 years (95% CI 54.3, 57.4) for partners. Patients with partners did not differ from those without (n=118) by age, sex, or mean tumor thickness ($p>0.05$ for all comparisons).¹ There was no statistically significant difference in the frequency of personal or family history of melanoma between patients and participating partners ($p>0.05$ for both comparisons).

Female partners reported playing an active role in their spouse's health more frequently than male partners did [Table 1]. Nearly half of surveyed partners (49.8%) reported knowledge

about the ABCD rule for melanoma detection, including significantly more female partners (58.3%) than male partners (33%, $p < 0.001$); 39.0% of female partners reported knowing the difference between melanoma and ordinary skin growths, compared to 19.8% of male partners ($p < 0.001$). Female partners were more likely to report keeping in touch with health matters better than their partner, compared to their male counterparts (40.0% vs. 6.7%, $p < 0.001$). Nearly two-thirds (64.4%) of female partners helped in making sure their male partner went to the doctor, compared to 26.9% of male partners ($p < 0.001$). Female partners were significantly more likely than their male counterparts to report: helping their partner learn about health problems (67.3% vs. 31.1%, $p < 0.001$), checking the partner's skin (48.5 vs. 20.4%, $p < 0.001$), talking to the doctor on the partner's behalf (30.2% vs. 15.2%, $p = 0.010$), and making medical decisions for the partner (65.6% vs. 41.6%, $p < 0.001$).

Female partners were significantly more likely to discover melanoma in male patients (24.0%) than male partners were for female patients (3.0%) ($p < 0.001$). Female patients discovered a significantly higher proportion of their own melanomas than did male patients (74.2% vs 48.4%) ($p < 0.001$) but were nearly 4 times more likely to self-discover thicker (> 1 mm) melanomas. Physician detection was associated with a 73% reduced likelihood of thicker melanoma among all patients [Table 1].

This study examining concordant health behaviors of newly-diagnosed melanoma patients and their partners shows strikingly similar findings to a 1992 survey in the United States demonstrating increased melanoma discovery by female spouses compared with male spouses (23% vs 2%) and a 2000-2003 survey in Queensland, Australia in which men had a greater proportion of partner-detected melanoma (27% vs 8%).^{2,3} We found that female partners role-model positive health behaviors more often than do male partners, and that female patients and female partners are more frequently involved in initial melanoma detection, although unexpectedly, thicker melanomas were self-detected in females compared with males.

Study limitations include assessment of only cohabitating partners. Melanoma outcomes among single or unmarried patients are poorer than those of patients with a live-in partner.⁴ Future efforts could utilize close contacts, including family, friends, and lay health advocates (e.g., hair professionals, massage therapists) to reach this population.⁵ There was only one same-sex couple in our study cohort, and 98% were white. Further studies should assess health behavior patterns in same-sex couples and in other racial/ethnic groups.

Studies evaluating health behavioral changes, including skin self-examination, found that a partner was significantly more likely to make a positive health behavior change if his/her spouse had made this behavior change and if a pair with a high-quality relationship was educated together.⁶⁻⁸ Our study provides a framework for the creation of melanoma early detection campaigns to harness the increased melanoma knowledge and positive health behaviors around melanoma detection of female partners, which could include empowering female friends and lay health advocates in melanoma detection. In addition, these results compel us to consider new ways to improve melanoma knowledge and early detection practices in male patients and by male partners.

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Table 1: Role of the cohabitating spouse/partner in health habits of newly-diagnosed cutaneous melanoma patients (as reported by concordant partner-patient pairs) and relationship between tumor thickness at diagnosis and person detecting the melanoma

| Spouse/partner Assistance with Health Practices | | Number of pairs who both agree with the statement / All concordant pairs (%) | p-value* Male vs. Female |
|---|---------------------|--|-----------------------------|
| Spouse/partner kept in touch with health matters better than the patient. | All patients | 89/166 (53.6%) | <0.001 |
| | Male | 82/114 (71.9%) | |
| | Female | 7/52 (13.5%) | |
| Spouse/partner helped make sure the patient went to the doctor. | All patients | 158/197 (80.2%) | <0.001 |
| | Male | 129/143 (90.2%) | |
| | Female | 29/54 (53.7%) | |
| Spouse/partner helped the patient learn about his/her health problems. | All patients | 166/206 (80.6%) | <0.001 |
| | Male | 134/145 (92.4%) | |
| | Female | 32/61 (52.5%) | |
| Spouse/partner helped in <i>checking patient's skin.</i> | All patients | 117/171 (68.4%) | <0.001 |
| | Male | 96/124 (77.4%) | |
| | Female | 21/47 (44.7%) | |
| Spouse/partner helped | All patients | 73/207 (35.3%) | <0.001 |

| talk to the doctor for the patient. | | Male | 58/129 (45.0%) | | | |
|---|---------------------|---|------------------------|-----------------------|---------------------------------------|--------------|
| | | Female | 15/78 (19.2%) | | | |
| Spouse/partner helped make medical decisions for the patient. | | All patients | 167/208 (80.3%) | | <0.001 | |
| | | Male | 126/141 (89.4%) | | | |
| | | Female | 41/67 (61.2%) | | | |
| Individual who initially detected the patient's melanoma | | Number of pairs who both agree with the statement / All concordant pairs ^Δ (%) | | | Odds Ratio (95% CI) of Tumor >1mm | P-value |
| | | All tumors | Tumor ≤ 1mm | Tumor > 1mm | | |
| Patient detected the melanoma | All patients | 142/246 (57.7%) | 55/108 (50.9%) | 87/138 (63.0%) | 2.20 (1.26, 3.85)^ϕ | 0.006 |
| | Male | 76/157 (48.4%) | 23/58 (39.7%) | 53/99 (53.5%) | 1.76 (0.91, 3.39) [†] | 0.094 |
| | Female | 66/89 (74.2%) | 32/50 (64.0%) | 34/39 (87.2%) | 3.80 (1.26, 11.53)[†] | 0.018 |
| Partner detected the melanoma | All patients | 44/276 (15.9%) | 19/125 (15.2%) | 25/151 (16.6%) | 0.82 (0.41, 1.63) ^ϕ | 0.571 |
| | Male | 41/176 (23.3%) | 16/67 (23.9%) | 25/109 (22.9%) | 0.94 (0.46, 1.93) [†] | 0.873 |
| | Female | 3/100 (3.0%) | 3/58 (5.2%) | 0/42 (0.0%) | -- | -- |
| Healthcare | All | 31/274 | 21/115 | 10/159 | 0.27 (0.12, 0.61)^ϕ | 0.002 |

| | | | | | | |
|---|-----------------|---------------------------------|--------------------------------|-------------------------------|--------------------------------------|--------------|
| provider (physician) detected the melanoma | patients | (11.3%) | (18.3%) | (6.3%) | | |
| | Male | 20/179 (11.2%) | 13/62 (21.0%) | 7/117 (6.0%) | 0.22 (0.08, 0.61)[†] | 0.003 |
| | Female | 11/95 (11.6%) | 8/53 (15.1 %) | 3/42 (7.1%) | 0.42 (0.10, 1.72) [†] | 0.229 |

*Adjusted for patient age (over 60 years vs. 60 years-old or younger)

^ΔConcordant pairs included all pairs that either both agreed or both disagreed with the corresponding statement

^φAdjusted for patient gender and patient age (over 60 years vs. 60 years or younger)

[†]Adjusted for patient age (over 60 years vs. 60 years or younger)