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Clinical counseling on sun protection and indoor tanning avoidance: A survey of current practices among U.S. health care providers

Dawn M. Holman^{a,*}, Jin Qin^a, Elizabeth A. Gottschlich^b, Sophie J. Balk^c^a Centers for Disease Control and Prevention, Division of Cancer Prevention and Control, Atlanta, GA, United States of America^b Department of Research, American Academy of Pediatrics, Itasca, IL, United States of America^c Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY, United States of America

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ABSTRACT

Clinicians can play a role in skin cancer prevention by counseling their patients on use of sun protection and indoor tanning avoidance. We used data from the 2016 DocStyles, a web-based survey of U.S. primary care providers, to examine skin cancer prevention counseling practices among 1506 providers. In 2018, we conducted logistic regression analyses to examine factors associated with regularly providing counseling. Almost half (48.5%) of all providers reported regularly counseling on sun protection, and 27.4% reported regularly counseling on indoor tanning. Provider characteristics associated with regular counseling included having practiced medicine for at least 16 years (sun protection: adjusted prevalence ratio [aPR] = 1.27, 95% confidence interval [CI] = 1.15, 1.41; indoor tanning: aPR = 1.38, 95% CI = 1.17, 1.63), having treated sunburn in the past year (sun protection: aPR = 1.78, 95% CI = 1.46, 2.17; indoor tanning: aPR = 2.42, 95% CI = 1.73, 3.39), and awareness of U.S. Preventive Services Task Force recommendations (sun protection: aPR = 1.73, 95% CI = 1.51, 2.00; indoor tanning: aPR = 2.70, 95% CI = 2.09, 3.48). Reporting barriers to counseling was associated with a lower likelihood of regularly counseling on sun protection (1–3 barriers: aPR = 0.82, 95% CI = 0.71, 0.94; 4+ barriers: aPR = 0.80, 95% CI = 0.69, 0.93) and indoor tanning (1–3 barriers: aPR = 0.72, 95% CI = 0.57, 0.91; 4+ barriers: aPR = 0.61, 95% CI = 0.47, 0.78). Barriers to counseling included lack of time (58.1%), more urgent health concerns (49.1%), and patient disinterest (46.3%). Although many providers report regularly counseling patients on skin cancer prevention, most report serious barriers to providing such counseling. Additional research could explore strategies to integrate compelling and informative skin cancer prevention counseling into current provider practices.

1. Introduction

Each year in the United States, nearly 5 million adults are treated for skin cancer with a corresponding \$8.1 billion spent on treatment (Guy Jr et al., 2015). Most skin cancer cases are understood to be caused by exposure to ultraviolet radiation (UVR) from the sun or from indoor tanning devices (Armstrong and Kricker, 2001). Individuals with fair skin, light hair, light eyes, skin that burns or freckles, certain types or a large number of moles, and a personal or family history of skin cancer tend to be more susceptible to the carcinogenic effects of UVR exposure (Armstrong and Kricker, 2001). Recommendations to reduce skin cancer risk include using a combination of sun protection strategies when outdoors (e.g., shade, protective clothing, sunscreen), minimizing time outdoors during midday when the sun's rays are most intense, and avoiding intentional sun tanning and indoor tanning (US Department of

Health and Human Services, 2014). National data indicate that about one-third of U.S. adults routinely use sunscreen (33.7%), wear protective clothing (38.4%), or seek shade (39.1%) when spending time outdoors on a warm sunny day (National Cancer Institute, n.d.). Although indoor tanning prevalence has declined in recent years, 3.6% of adults and 5.6% of high school students report using indoor tanning devices (National Cancer Institute, n.d.). Furthermore, each year, about one-third (35.3%) of adults and over half (57.2%) of adolescents get sunburned each year (National Cancer Institute, n.d.).

In recent years, there have been efforts to raise awareness about the role clinicians can play in promoting skin cancer prevention and sun-safe behaviors. In 2012, the U.S. Preventive Services Task Force (USPSTF) released its first set of recommendations regarding clinical counseling on skin cancer prevention (U.S. Preventive Services Task Force, n.d.). At the time, the U.S. Preventive Services Task Force

* Corresponding author at: Division of Cancer Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS F76, Chamblee, GA 30341, United States of America.

E-mail address: dholman@cdc.gov (D.M. Holman).

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recommendations that clinicians counsel fair-skinned patients aged 10 to 24 years. Because of a lack of sufficient evidence, the USPSTF concluded that the current evidence was “insufficient to assess the balance of benefits and harms of counseling adults older than age 24 years about minimizing risks to prevent skin cancer.” Additionally, in 2014, the U.S. Surgeon General released *The Surgeon General's Call to Action to Prevent Skin Cancer* (U.S. Department of Health and Human Services, 2014). This report described five strategic goals for skin cancer prevention, one of which was to “provide individuals with the information they need to make informed, healthy choices about UV exposure.” One strategy described to help reach this goal was to monitor provider counseling on skin cancer prevention.

The objective of the current study was to examine the reported skin cancer prevention counseling practices of U.S. health care providers and factors associated with regular counseling. This study builds on previous work led by the American Academy of Pediatrics (AAP) which used data from a 2015 survey of AAP members to assess their counseling practices about use of sun protection and avoidance of indoor tanning (Balk et al., 2017). The study findings revealed that the percentage of pediatricians who reported discussing sun protection with at least 75% of their patients during the most recent summer months ranged from 45% for patients aged ≥ 14 years to 51% for patients aged 7 months–2 years (Balk et al., 2017). Furthermore, about one-third reported discussing indoor tanning at least once with 10- to 13-year-old patients, and approximately half discussed this topic with older adolescents (Balk et al., 2017). In the current study, we examine counseling practices and barriers to counseling among pediatricians, family practitioners, internists, and nurse practitioners.

2. Methods

We used data from DocStyles, a web-based survey with a main sample of primary care physicians and additional samples of other specialties. The survey instrument was developed by Porter Novelli Public Services with technical guidance provided by federal public health agencies and other non-profit and for-profit clients. Porter Novelli Public Services is a public relations firm that has a specialty practice in health and social marketing (Porter Novelli Public Services, n.d.). The 2016 DocStyles contained 144 questions, including questions about skin cancer prevention counseling behaviors, and was fielded from June 9th to July 1st, 2016. Respondents were paid an honorarium of \$21–\$90 for completing the survey. Analysis of DocStyles data is exempt from the CDC Institutional Review Board process.

2.1. Study sample

The study sample was recruited from the SERMO research network (SERMO, n.d.). This network includes 40% of the physician population in the United States, as well as other medical professionals (e.g., nurse practitioners) recruited through partner organizations (SERMO, n.d.). The samples were specifically drawn from SERMO's Global Medical Panel, which includes over 350,000 medical professionals in the United States (SERMO, n.d.). Panelists were verified using a double opt-in sign up process with telephone confirmation at place of work. SERMO took a random sample of eligible and participating health care professionals from their main database to load into their invitation database. All invitations included a link to the Web-based survey. Physicians and nurse practitioners were screened to include only those who were practicing in the United States, actively seeing patients, working in an individual, group, or hospital practice, and who had been practicing for at least three years. To protect respondent confidentiality, no individual identifiers were included in the database. We limited our analyses to family practitioners, internists, pediatricians, and nurse practitioners. Samples of obstetrician-gynecologists and pharmacists were not asked questions about skin cancer prevention counseling and were excluded from our analyses. Response rates to the invitation to complete the

survey ranged from 41.3% among nurse practitioners to 70.5% among family practitioners and internists.

2.2. Measures

Survey measures related to skin cancer prevention counseling included beliefs about prevention and counseling, frequency of counseling (regularly, occasionally, only when the patient or guardian inquires, or rarely/never), who within the practice provides the counseling, respondent's confidence in his or her own ability to counsel, characteristics of patients who are typically counseled, recommendations provided when counseling, and barriers to counseling. A complete list of these survey items is provided in Table A.1. Provider characteristics of interest included gender, race, specialty, years practicing medicine, personal or family history of skin cancer, awareness of the 2012 USPSTF recommendation for counseling, and barriers to providing counseling. We created a summary score to quantify the number of barriers reported and created a categorical variable of 0, 1–3, and 4+ reported barriers. Patient population characteristics of interest included the proportion of patients who had fair skin, the proportion of patients between the ages of 10–24 years, and the number of sunburns the provider treated in the past 12 months.

2.3. Statistical analysis

We conducted the analyses in 2018. We used IBM SPSS to calculate descriptive statistics for all variables of interest overall and stratified by specialty (family practitioners, internists, pediatricians, and nurse practitioners). We conducted logistic regression analyses to examine provider characteristics associated with regularly providing counseling to patients or their parents on 1) sun protection and 2) avoiding indoor tanning. Using SAS 9.4 (Cary, NC), we estimated the adjusted prevalence ratio (aPR) and its 95% confidence interval (CI) for regular counseling on sun protection and indoor tanning avoidance, while simultaneously adjusting for characteristics of the health care providers and patients. We also repeated the logistic regression analyses among only respondents who reported that “most” or “all” of their patients had “fair skin.”

3. Results

Our final sample ($N = 1506$) included 480 family practitioners (31.9%), 523 internists (34.7%), 250 pediatricians (16.6%), and 253 nurse practitioners (16.8%). Among all respondents, 79.5% had at least some patients between 10 and 24 years of age, and 96.5% had at least some fair-skinned patients. About one-third of internists (33.3%) and nurse practitioners (30.4%) reported having very few or no patients aged 10–24 years. In contrast, only 2.0% pediatricians and 6.3% of family practitioners had very few or no patients in that age range. Most respondents (81.3%) had treated sunburn in the past year. Nearly all respondents reported either regularly (48.5%) or occasionally (44.8%) counseling on sun protection (Table 1). Fewer respondents (27.4%) reported regularly counseling on indoor tanning avoidance, but more than half (54.2%) reported occasionally counseling on this topic. For both sun protection and indoor tanning avoidance, just over 70% were very confident in their ability to provide counseling.

Most practitioners (89.4%) reported typically counseling patients with light skin tones. Just over half (56.4%) typically counseled patients with medium skin tones, and just over one-third (36.9%) typically counseled patients with dark skin tones. Other groups of patients that respondents typically counseled included those with a family history of skin cancer (80.1%), those who asked or expressed concern about the topic (76.8%), those with a tendency to sunburn (76.7%), those with excessively tanned or sunburned skin (76.2%), those with a history of indoor tanning (73.4%), those with prior treatment for sunburn (66.2%), those with a certain number or type of nevi (59.9%), and

Table 1
Counseling practices and confidence in counseling on sun protection and indoor tanning avoidance.

	Overall (N = 1506)		Family practitioner (N = 480)		Internist (N = 523)		Pediatrician (N = 250)		Nurse practitioner (N = 253)	
	N	%	N	%	N	%	N	%	N	%
Sun protection										
Frequency of counseling on sun protection										
Regularly	730	48.5	239	49.8	193	36.9	174	69.6	124	49.0
Occasionally or when patient or guardian inquires	674	44.8	222	46.3	280	53.5	67	26.8	105	41.5
Rarely/never	102	6.8	19	4.0	50	9.6	9	3.6	24	9.5
When counseling on sun protection is provided in your practice, who does it? ^a										
Physician	1014	72.2	409	88.7	375	79.3	226	93.8	4	1.7
Nurse practitioner	269	19.2	22	4.8	39	8.2	3	1.2	205	89.5
Nurse or other office medical staff	104	7.4	29	6.3	51	10.8	8	3.3	16	7.0
Don't know	17	1.2	1	0.2	8	1.7	4	1.7	4	1.7
How confident do you feel about your ability to provide counseling on sun protection?										
Very confident	1079	71.6	364	75.8	325	62.1	190	76.0	200	79.1
Somewhat confident	420	27.9	115	24.0	192	36.7	60	24.0	53	20.9
Not at all confident	7	0.5	1	0.2	6	1.1	0	0.0	0	0.0
Indoor tanning avoidance										
Frequency of counseling on avoiding indoor tanning										
Regularly	413	27.4	146	30.4	114	21.8	70	28.0	83	32.8
Occasionally or when patient or guardian inquires	817	54.2	274	57.1	298	57.0	136	54.4	109	43.1
Rarely/never	276	18.3	60	12.5	111	21.2	44	17.6	61	24.1
When counseling on avoiding indoor tanning is provided in your practice, who does it? ^a										
Physician	905	73.6	377	89.8	330	80.1	195	94.7	3	1.6
Nurse practitioner	235	19.1	18	4.3	38	9.2	5	2.4	174	90.6
Nurse or other office medical staff	82	6.7	23	5.5	42	10.2	5	2.4	12	6.3
Don't know	8	0.7	2	0.5	2	0.5	1	0.5	3	1.6
How confident do you feel about your ability to provide counseling on avoiding indoor tanning?										
Very confident	1063	70.6	368	76.7	333	63.7	168	67.2	194	76.7
Somewhat confident	394	26.2	98	20.4	168	32.1	75	30.0	53	20.9
Not at all confident	49	3.3	14	2.9	22	4.2	7	2.8	6	2.4

^a Questions about who provides the counseling were not asked of participants who reported that counseling is “rarely” or “never” provided.

those with a tendency to freckle (59.6%).

When asked about skin cancer prevention practices usually recommended to patients, using sunscreen (89.5%), avoiding indoor tanning (78.6%), wearing protective clothing (77.7%), wearing a wide-brimmed hat (76.0%), and avoiding the sun during peak hours (73.8%) were the most frequently reported recommendations. Just over half of respondents (58.8%) reported recommending that their patients seek shade, and only 32.9% reported recommending that their patients consult the UV index (World Health Organization, n.d.). Most (56.5%) recommended using sunscreen with a sun protection factor (SPF) of at least 30 to their patients. Only 8.5% recommended an SPF of at least 15, and 28.3% recommended an SPF of at least 50. Less than half (41.9%) of respondents reported encouraging patients to use a broad spectrum sunscreen. Just over one-third (36.5%) encouraged their patients to use a physical sunscreen, and 17.9% encouraged patients to use a chemical sunscreen.

More than half (67.4%) of respondents stated that they were aware of the USPSTF recommendations for skin cancer prevention counseling, and nearly all (92.0%) agreed that it is a health care provider's role to counsel patients on using sun protection and avoiding indoor tanning. Most (88.6%) agreed that skin cancer represents a significant public health problem in the United States, and 93.6% agreed that indoor tanning increases skin cancer risk. However, 93.6% agreed that vitamin D deficiency represents a significant public health problem in the United States, and 66.3% agreed that sun exposure is necessary to get adequate vitamin D.

More than half (56.5%) of respondents reported 1–3 barriers to counseling on sun protection and indoor tanning, and just over one-

third (36.0%) reported 4 or more barriers to counseling (Table 2). The most frequently cited barriers were a lack of sufficient time (58.1%), other more urgent health concerns for the patient population (49.1%), and disinterest shown by patients listening to advice on these topics (46.3%). Lack of sufficient time was the most frequently cited barrier among family practitioners (64.0%), internists (55.3%), and pediatricians (62.0%). Having other more urgent health concerns was the most frequently cited barrier among nurse practitioners (61.7%).

Table 3 shows factors associated with regularly counseling on sun protection and indoor tanning avoidance. Respondent characteristics associated with a greater likelihood of regularly counseling patients on sun protection included practicing medicine for sixteen or more years (adjusted prevalence ratio [aPR] = 1.27, 95% confidence interval [CI] = 1.15, 1.41), having treated sunburn in the past 12 months (aPR = 1.78, 95% CI = 1.46, 2.17), being aware of the USPSTF recommendations (aPR = 1.73, 95% CI = 1.51, 2.00), and having a personal or family history of skin cancer (aPR = 1.12, 95% CI = 1.01, 1.25). Respondent characteristics associated with a lower likelihood of regularly counseling their patients on sun protection included self-identifying as white (aPR = 0.87, 95% CI = 0.78, 0.97), being an internist (aPR = 0.62, 95% CI = 0.54, 0.71), a family practitioner (aPR = 0.77, 95% CI = 0.68, 0.86), or a nurse practitioner (0.83, 95% CI = 0.72, 0.97; compared to pediatricians), and reporting 1–3 barriers to counseling (aPR = 0.82, CI = 0.71, 0.94) or 4+ barriers to counseling (aPR = 0.80, 95% CI = 0.69, 0.93).

Respondent characteristics associated with a greater likelihood of regularly counseling patients on indoor tanning avoidance included being a nurse practitioner (aPR = 1.54, CI = 1.19, 2.01; compared to

Table 2
Barriers to counseling on sun protection and indoor tanning avoidance.

	Overall (N = 1506)		Family practitioner (N = 480)		Internist (N = 523)		Pediatrician (N = 250)		Nurse practitioner (N = 253)	
	N	%	N	%	N	%	N	%	N	%
Lack of sufficient time in health maintenance visits to address these topics	875	58.1	307	64.0	289	55.3	155	62.0	124	49.0
Other health concerns are more urgent for my patient population	739	49.1	252	52.5	224	42.8	107	42.8	156	61.7
Disinterest shown by patients listening to advice on these topics	697	46.3	233	48.5	213	40.7	119	47.6	132	52.2
Lack of a reminder system to counsel on these topics	411	27.3	148	30.8	136	26.0	56	22.4	71	28.1
Lack of adequate payment for counseling on these topics	410	27.2	157	32.7	154	29.4	47	18.8	52	20.6
Lack of written information on these topics to give to patients	350	23.2	107	22.3	116	22.2	60	24.0	67	26.5
Lack of adequate professional training on these topics	262	17.4	64	13.3	110	21.0	44	17.6	44	17.4
Concern about adequate vitamin D levels	260	17.3	84	17.5	112	21.4	21	8.4	43	17.0
Patient population not generally at high risk for skin cancer	211	14.0	54	11.3	76	14.5	34	13.6	47	18.6
Difficulty communicating the topic of avoiding indoor tanning effectively	211	14.0	63	13.1	88	16.8	31	12.4	18	7.1
Difficulty communicating the topic of sun protection effectively	200	13.3	72	15.0	76	14.5	35	14.0	28	11.1
Number of barriers										
0	113	7.5	31	6.5	45	8.6	21	8.4	16	6.3
1–3	851	56.5	253	52.7	295	56.4	155	62.0	148	58.5
4+	542	36.0	196	40.8	183	35.0	74	29.6	89	35.2

pediatricians), having sixteen or more years practicing medicine (aPR = 1.38, 95% CI = 1.17, 1.63), having treated sunburn in the past 12 months (aPR = 2.42, 95% CI = 1.73, 3.39), and being aware of the USPSTF recommendations for clinical counseling on skin cancer prevention (aPR = 2.70, 95% CI = 2.09, 3.48). Reporting 1–3 barriers (aPR = 0.72, 95% CI = 0.57, 0.91) or 4+ barriers (aPR = 0.61, 95% CI = 0.47, 0.78) was associated with a lower likelihood of regularly counseling patients on indoor tanning.

After limiting the analyses to only respondents who reported that “most” or “all” of their patients had fair skin (n = 519; Table 4),

respondent characteristics associated with a greater likelihood of regularly counseling patients on sun protection were having treated sunburn in the past 12 months (aPR = 1.59, 95% CI = 1.19, 2.14) and being aware of the USPSTF recommendations (aPR = 1.56, 95% CI = 1.24, 1.95). Being an internist was associated with a lower likelihood of regularly counseling patients on sun protection (aPR = 0.69, 95% CI = 0.56, 0.86; compared to pediatricians). Respondent characteristics associated with a greater likelihood of regularly counseling patients on indoor tanning were having sixteen or more years practicing medicine (aPR = 1.48, 95% CI = 1.15, 1.91), having treated sunburn in

Table 3
Provider characteristics associated with regularly counseling patients on sun protection and indoor tanning (N = 1506).

	Sun protection		Indoor tanning	
	%	aPR (95% CI)	%	aPR (95% CI)
Provider gender				
Female	50.7	1.01 (0.91, 1.13)	28.6	0.93 (0.78, 1.11)
Male	47.5	1.0	27.5	1.0
Provider race				
White	48.7	0.87 (0.78, 0.97)	28.3	0.86 (0.71, 1.04)
All other groups combined	48.9	1.0	27.3	1.0
Provider specialty				
Family practitioner	49.9	0.77 (0.68, 0.86)	30.7	1.20 (0.95, 1.51)
Internist	37.4	0.62 (0.54, 0.71)	22.5	0.94 (0.74, 1.21)
Nurse practitioner	49.2	0.83 (0.72, 0.97)	33.5	1.54 (1.19, 2.01)
Pediatrician	69.9	1.0	28.3	1.0
Years practicing medicine				
16+ years	56.7	1.27 (1.15, 1.41)	33.7	1.38 (1.17, 1.63)
3–16 years	41.4	1.0	22.5	1.0
Provider treated sunburn in past 12 months				
Yes	53.8	1.78 (1.46, 2.17)	31.5	2.42 (1.73, 3.39)
No	26.6	1.0	11.9	1.0
Provider is aware of USPSTF recommendation ^a				
Yes	57.9	1.73 (1.51, 2.00)	35.5	2.70 (2.09, 3.48)
No	30.0	1.0	11.8	1.0
Provider has a personal or family history of skin cancer				
Yes	53.5	1.12 (1.01, 1.25)	31.7	1.15 (0.96, 1.36)
No	47.1	1.0	26.4	1.0
Number of barriers reported				
4+	48.6	0.80 (0.69, 0.93)	25.6	0.61 (0.47, 0.78)
1–3	47.2	0.82 (0.71, 0.94)	27.6	0.72 (0.57, 0.91)
0	61.8	1.0	42.6	1.0

aPR, adjusted prevalence ratio; CI, confidence interval.

^a U.S. Preventive Services Task Force recommendation for clinical counseling on skin cancer prevention.

Table 4

Provider characteristics associated with regularly counseling patients on sun protection and indoor tanning, among providers who report that “most” or “all” of their patients have fair skin (N = 519).

	Sun protection		Indoor tanning	
	%	aPR (95% CI)	%	aPR (95% CI)
Provider gender				
Female	58.1	1.04 (0.88, 1.24)	35.3	1.11 (0.84, 1.46)
Male	51.5	1.0	29.2	1.0
Provider race				
White	55.6	1.00 (0.84, 1.19)	30.5	0.80 (0.60, 1.07)
All other groups combined	52.1	1.0	32.6	1.0
Provider specialty				
Family practitioner	57.7	0.84 (0.69, 1.03)	37.4	1.40 (0.93, 2.10)
Internist	43.9	0.69 (0.56, 0.86)	25.0	1.01 (0.66, 1.56)
Nurse practitioner	58.2	0.87 (0.67, 1.13)	38.0	1.55 (0.97, 2.46)
Pediatrician	73.8	1.0	29.5	1.0
Years practicing medicine				
16+ years	60.0	1.12 (0.96, 1.30)	39.7	1.48 (1.15, 1.91)
3–16 years	49.3	1.0	25.1	1.0
Provider treated sunburn in past 12 months				
Yes	58.8	1.59 (1.19, 2.14)	35.6	2.37 (1.36, 4.13)
No	32.6	1.0	12.8	1.0
Provider is aware of USPSTF recommendation ^a				
Yes	61.6	1.56 (1.24, 1.95)	37.4	1.89 (1.31, 2.72)
No	35.5	1.0	17.2	1.0
Provider has a personal or family history of skin cancer				
Yes	58.3	1.04 (0.87, 1.25)	34.9	1.12 (0.84, 1.49)
No	52.9	1.0	30.7	1.0
Number of barriers				
4+	53.3	0.83 (0.66, 1.04)	29.4	0.69 (0.46, 1.02)
1–3	53.0	0.86 (0.69, 1.08)	31.4	0.82 (0.56, 1.20)
0	64.9	1.0	43.2	1.0

^a U.S. Preventive Services Task Force recommendation for clinical counseling on skin cancer prevention.

the past 12 months (aPR = 2.37, 95% CI = 1.36, 4.13), and being aware of the USPSTF recommendations for clinical counseling on skin cancer prevention (aPR = 1.89, 95% CI = 1.31, 2.72).

4. Discussion

This study describes current reported counseling practices among family practitioners, internists, pediatricians, and nurse practitioners. The overall percentage of respondents who reported regularly counseling on sun protection (48.5%) was similar to the findings in the previous study which was conducted among pediatricians only and in which 45–51% reported counseling the majority of their patients (or their parents/guardians) on sun protection (across the range of pediatric patient age groups) (Balk et al., 2017). However, in the current study, the percentage of pediatricians who reported regularly counseling patients or their guardians on sun protection was notably higher (69.6%) compared to the previous study (Balk et al., 2017).

Most reported that their practice either regularly or occasionally provided counseling on sun protection and indoor tanning avoidance and that they felt confident in their own ability to provide such counseling. However, the results point to opportunities to further support, enhance, or increase counseling practices on these topics in clinical settings. For example, respondents often reported that they usually recommend using sunscreen, avoiding indoor tanning, wearing protective clothing and a wide-brimmed hat, and avoiding the sun during peak hours, but fewer respondents reported that they usually recommend seeking shade and consulting the UV index (World Health Organization, n.d.). Each sun-protective strategy has limitations and its appeal at the individual or family level will depend on a variety of personal factors. Providing a wide range of sun-safety options may help

to increase compliance among patients, parents, and guardians, as they are able to find an approach that best fits with their preferences and activities. Respondents varied with regard to the sunscreen characteristics they recommended, such as a specific SPF number, broad spectrum protection, and physical versus chemical sunscreen. Recommendations on characteristics to look for in a sunscreen vary across health organizations but many encourage use of a broad spectrum sunscreen with at least an SPF of 15 or 30 (American Academy of Dermatology, n.d.; U.S. Food and Drug Administration, n.d.). Inconsistent messages about sunscreen from health care providers and other sources could create barriers to regular sunscreen use.

Additionally, although most respondents reported typically counseling patients with light skin tones, fewer providers counseled patients with medium or dark skin tones. Findings from national data about sunburn among U.S. adults show that sunburn occurs within all racial and ethnic groups which suggests that those with medium or dark skin tones may still benefit from sun-safety counseling (Holman et al., 2018). Furthermore, findings from research among black and Hispanic U.S. adults point to a need to address misperceptions about the risks and benefits of sun-safety behaviors within these populations (Buchanan Lunsford et al., 2018).

More than four out of five providers reported treating sunburn in the past year. Those who reported treating sunburn were more likely to report regularly counseling on both use of sun protection and indoor tanning avoidance. This result differs from that reported in the previous study among pediatricians, in which the two-thirds of respondents who had treated sunburn in the past year were significantly more likely to counsel on indoor tanning avoidance but not on sun protection (Balk et al., 2017). Sunburn is a sign of excessive exposure to UVR and continues to be highly prevalent within the U.S. population (Holman

et al., 2018; Kann et al., 2018). Treating sunburn in a clinical setting creates an opportunity for providers to better understand the contexts in which their patients are getting sunburned and to counsel them on how to best protect their skin from UV damage.

Most respondents agreed that skin cancer represents a significant public health problem and that it is a health care provider's role to counsel patients on using sun protection and avoiding indoor tanning. However, those who reported barriers to counseling were less likely to do so regularly. Lack of sufficient time, perception that one's patients have other more urgent health concerns, and patient disinterest were the most frequently identified barriers. Similarly, lack of sufficient time was the most frequently cited barrier (65%) in the previous study among pediatricians (Balk et al., 2017). The study findings also suggest that physicians are often the ones providing behavioral counseling in clinical settings. Given the many demands on physicians' time and attention, more research could identify ways to make counseling on healthy behaviors, including those linked to skin cancer risk, easier to implement and integrate into day-to-day practice (Goldberg et al., 2019). Future research could explore the effects of engaging other members of the medical team (e.g., nurses and health educators) in counseling efforts, integrating automated prompts within electronic health record systems, and utilizing print or web-based materials for patients or parents. The high confidence clinicians had in their ability to counsel on skin cancer prevention topics suggests that the skill could be learned and practiced by others such as other health personnel (e.g. health coaches, community health workers, etc.) and workers in other community sectors (e.g., beauticians, aestheticians, hair stylists, tattoo artists, etc.).

Many respondents agreed that vitamin D deficiency is a significant public health problem in the United States, with more than half agreeing that sun exposure is necessary to obtain adequate vitamin D. The amount of vitamin D needed for optimal health (beyond bone health) is an ongoing area of research (National Institutes of Health, n.d.; Autier et al., 2017). Past research findings suggest that sun-safe behaviors can be maintained without negatively affecting vitamin D levels (Jayaratne et al., 2012; Linos et al., 2012; Passeron et al., 2019). Concern about maintaining adequate vitamin D levels could create additional barriers to sun-safety counseling, particularly for darker-skinned patients who may be more likely to have low serum vitamin D levels. An alternative to encouraging sun exposure to obtain adequate vitamin D would be to encourage patients to obtain most of their vitamin D from dietary sources and supplements (US Department of Health and Human Services, 2014; Centers for Disease Control and Prevention, n.d.; Institute of Medicine of the National Academies, 2010).

Awareness of the USPSTF recommendation on clinical counseling for skin cancer prevention was significantly associated with counseling practices, but about one-third of providers were unaware of the recommendation. This finding suggests the need for ongoing efforts to educate and raise awareness among providers about skin cancer prevention-related recommendations. Clinicians who had been practicing medicine for at least sixteen years were more likely to regularly provide counseling to patients than those who had been practicing for less than sixteen years. Targeting early-career clinicians, including residents, medical students and other trainees may be one approach to making awareness-raising efforts more impactful.

4.1. Limitations

There are important limitations to consider when interpreting the findings from this study. The data are cross-sectional, so we are unable to draw any conclusions about causality. We had limited information

about respondents' patient populations. Of particular note, we did not have information about the age distribution, racial, or ethnic makeup of their patient populations. The response options used to measure frequency of counseling and the proportion of patients with fair skin and between the ages of 10–24 years lacked precision and the interpretation of their meaning is subjective. The data are also self-reported, and thus, subject to recall error and social desirability bias. Other studies have found a lower prevalence of clinical counseling on skin cancer prevention (Akamine et al., 2014; Feldman and Fleischer, 2000; McRee et al., 2017). The survey was administered during the summertime, and we do not know if the survey responses would differ at other times of the year. In March 2018, the USPSTF recommendations for skin cancer prevention counseling were revised to recommend counseling fair-skinned patients aged 6 months through 24 years and selectively counseling fair-skinned adults older than 24 years (U.S. Preventive Services Task Force, 2018). Since the current study uses data collected in 2016, the findings do not reflect the potential influence of the updated recommendations on clinical counseling practices. Additionally, given the sampling methods used, the health care providers who participated in this study are not necessarily representative of other providers in their field of medicine, response rates varied across specialties, and the findings may not be generalizable to all family practitioners, internists, pediatricians, and nurse practitioners.

5. Conclusion

Many health care providers report regularly counseling patients on sun protection and indoor tanning avoidance, and opportunities exist to support and possibly increase these counseling practices. Efforts to encourage clinical counseling could include information about the wide array of sun-safety strategies that clinicians could promote among their patients and encourage clinicians to consider other patient characteristics beyond age and skin tone, such as the patient's history of sunburn and family history of skin cancer, when deciding whether to provide clinical counseling. Additional research may shed light on ways to address some of the common barriers to skin cancer prevention counseling that were identified in this study, and increase counseling in clinical settings.

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Declaration of Competing Interest

The authors have no conflicts of interest to disclose.

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All authors (DH, JQ, EG, and SB) contributed to the conception and design of the study. Jin Qin conducted the data analyses, and Dawn Holman wrote the initial manuscript draft. All authors (DH, JQ, EG, and SB) critically revised the draft manuscript for intellectual content.

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Table A.1
Survey questions and response options.

Question	Response options
1. It is a health care provider's role to counsel patients on using sun protection and avoiding indoor tanning.	(1) Strongly disagree
2. Skin cancer represents a significant public health problem in the United States.	(2) Somewhat disagree
3. Sun exposure is necessary to get adequate vitamin D.	(3) Neutral
4. Indoor tanning increases skin cancer risk.	(4) Somewhat agree
5. Vitamin D deficiency represents a significant public health problem in the United States.	(5) Strongly agree
6. In the past 12 months, approximately how many cases of sunburn have you treated? Just give your best guess. Please enter a number or "0" if none.	0–999
7. How often is counseling on sun protection provided in your practice? Select one only.	(1) Regularly
8. How often is counseling on avoiding indoor tanning provided in your practice? Select one only.	(2) Occasionally
	(3) Only when patient or guardian inquires
	(4) Rarely or never
	(5) Don't know
9. When counseling on sun protection is provided in your practice, who does it? Select one only.	(1) Physician
10. When counseling on avoiding indoor tanning is provided in your practice, who does it? Select one only.	(2) Nurse practitioner
	(3) Nurse or other office medical staff
	(5) Don't know
11. How confident do you feel about your ability to provide counseling on sun protection? Select one only.	(1) Very confident
12. How confident do you feel about your ability to provide counseling on avoiding indoor tanning? Select one only.	(2) Somewhat confident
	(3) Not at all confident
13. Generally speaking, patients with which of the following skin tones are typically counseled on sun protection and/or avoiding indoor tanning in your practice? Select all that apply.	(1) Those with light skin tones
	(2) Those with medium skin tones
	(3) Those with dark skin tones
	(4) None of the above
14. Generally speaking, patients with which of the following other characteristics are typically counseled on sun protection and/or avoiding indoor tanning in your practice?	(1) Those with a tendency to burn
	(2) Those with prior treatment for sunburn
	(3) Those with a tendency to freckle
	(4) Those with a family history of skin cancer
	(5) Those with a certain number or type of nevi
	(6) Those with a history of indoor tanning
	(7) Those whose skin is excessively tanned or sunburned
	(8) Those who ask or express concern about sun protection and/or indoor tanning
	(9) None of the above
15. Which of the following sun-safety practices do you usually recommend to patients? Select all that apply	(1) Wearing a hat with a wide brim
	(2) Wearing protective clothing
	(3) Seeking shade whenever possible
	(4) Using sunscreen
	(5) Avoiding the sun during peak hours (e.g., from 10 am to 4 pm)
	(6) Avoiding indoor tanning
	(7) Consulting the UV index
	(8) None of the above
16. Which of the following characteristics do you tell patients to look for when selecting a sunscreen? Select all that apply.	(1) An SPF of at least 15
	(2) An SPF of at least 30
	(3) An SPF of at least 50
	(4) Broad spectrum protection
	(5) A physical sunscreen (reflects ultraviolet radiation)
	(6) A chemical sunscreen (absorbs ultraviolet radiation)
	(7) Contains or does not contain specific ingredients
	(8) None of the above

(continued on next page)

Table A.1 (continued)

Question	Response options
17. Which of the following are barriers to providing counseling on sun protection and/or avoiding indoor tanning in your practice? Select all that apply	(1) Lack of sufficient time in health maintenance visits to address these topics (2) Lack of adequate professional training on these topics (3) Difficulty communicating the topic of sun protection effectively (4) Difficulty communicating the topic of avoiding indoor tanning effectively (5) Disinterest shown by patients listening to advice on these topics (6) Lack of adequate payment for counseling on these topics (7) Lack of a reminder system to counsel on these topics (8) Lack of written information on these topics to give to patients (9) Patient population not generally at high risk for skin cancer (10) Other health concerns are more urgent for my patient population (11) Concern about adequate vitamin D levels (12) None of the above
18. What proportion of your patients is female?	(1) 0–25% (2) 26–50% (3) 51–75% (4) 76–100% (5) Don't know
19. How many of your patients would you estimate to have fair skin?	(1) None or very few
20. How many of your patients would you estimate are between the ages of 10–24 years?	(2) Some (3) Most (4) All (5) Don't know
21. Are you aware that the U.S. Preventive Services Task Force recommends counseling children, adolescents, and young adults aged 10 to 24 years who have fair skin about minimizing their exposure to UV radiation to reduce risk for skin cancer?	(1) Yes (2) No
22. Do you or any members of your family have a history of skin cancer?	(1) Yes (2) No (3) Don't know

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