



Tanning bed burns reported on Twitter: over 15,000 in 2013

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Abstract

Few surveillance tools exist for monitoring tanning bed injuries. Twitter data were examined to identify and describe reports of tanning bed-caused burns. Tweets sent in 2013 containing keywords for tanning bed use and burning were content analyzed to determine whether a burn caused by a tanning bed was described, and additional data on tanning behavior and burn characteristics were extracted. After content assessment, 15,178 (64 %) tweets were found to describe a tanning bed-caused burn. Sites most reportedly burnt were buttocks ($n = 3117$), face/head ($n = 1020$), and chest/breast ($n = 546$). Alarmingly, 200 burns to the eyes/eyelids were mentioned. A total of 456 tweets described burning >1 time from a tanning bed. A total of 211 tweets mentioned falling asleep inside the tanning bed. In 2013, over 15,000 tweets reported tanning bed-caused burns. Twitter data provides unique insight into tanning behaviors and injuries not captured through traditional public health surveillance.

Keywords

Tanning beds, Burns, Surveillance, Social media

INTRODUCTION

Youth and young adult use of ultraviolet (UV)-emitting tanning beds has reached epidemic levels [1–3]. A meta-analysis of 88 studies from Western countries found the prevalence of ever exposure to indoor tanning to be 55 % for all university students and 19 % for all adolescents, with female university students (69 %) and adolescents (32 %) tanning at a higher prevalence than males (40 and 14 %, respectively) [3]. Further, surveys of American high school students reveal that tanning bed use is a frequent behavior, with 54 % of female and 41 % of male tanners using a tanning bed ten or more times in the past year [4]. These high rates of tanning bed use contribute to a substantial number of skin cancer cases annually. More than 450,000 cases of non-melanoma skin cancer and 10,000 cases of melanoma are estimated to be attributable to tanning bed use each year in the USA, Europe, and Australia [3].

Melanoma is the second most common cancer in females in their 20s, and alarmingly, melanoma incidence is rising among this demographic group [5, 6]. Researchers have attributed this trend partially to

Implications

Research: Questions assessing tanning bed-caused burning should be added to population-based surveys to help estimate the prevalence of tanning bed-caused injury.

Practice: Health campaigns are needed to educate the public on the risk of tanning bed-caused burns.

Policy: Policies are needed to reduce the harms caused by tanning bed use.

tanning bed use [6]. Sunburns are also a significant risk factor; risk for melanoma doubles with more than five sunburns [7]. Burns incurred in tanning beds have received less research attention, and little is known about how often they occur and what body parts are most commonly affected.

Recently, Guy et al. [8] reported data from US hospital emergency departments (ED) on indoor tanning-related ED visits. The researchers estimated that over 3000 ED visits are made each year in the USA for indoor tanning injuries, with over 75 % of visits due to erythema [8]. Further, a separate study asked a sample of indoor tanners to report tanning behaviors and erythema through bimonthly diary entries. The researchers found that 66 % of those reporting indoor tanning bed use experienced erythema [9].

Twitter has been shown to have broad applicability to public health surveillance and research [10]. The growing popularity of Twitter among teenagers and young adults may provide opportunities for understanding indoor tanning behaviors and resulting injuries. The social networking service has been used to track the spread of infectious diseases such as influenza [11], H1N1 [12], pertussis [13], and foodborne illness [14]. Similar to foodborne illnesses, acute health consequences of tanning bed use, such as burns, are not routinely monitored or reported.

An observational study was conducted to assess the prevalence of indoor tanning-caused burns on Twitter. Data was also extracted to describe indoor tanning behaviors (e.g., number of minutes tanning, burning

multiple times) as well as symptoms (e.g., pain, itching) and consequences (e.g., having to seek medical treatment) of indoor tanning-caused burns.

METHODS

Twitter, a free social network service, enables users to send and read each other's "tweets," which are brief 140 character messages. Twitter has more than 302 million monthly users worldwide and processes about 500 million tweets per day [15]. Twitter users receive a feed of tweets from any individual that the user "follows." Tweets from the vast majority of Twitter accounts are publicly viewable, and it was only such tweets that were accessed for the present study.

Twitter data were acquired from a commercial social media-monitoring firm (Olytico; Dublin, Ireland). The firm uses Topsy Pro, a Twitter firehose provider, to retrospectively query tweets containing selected keywords. The data collection of tweets specific to indoor tanning beds was based on previous health data collection research using Twitter [16]. The list of variables (e.g., symptoms and consequences) to be coded was generated after an initial review of a sample of tweets.

All English language tweets sent in 2013 containing both a keyword for indoor tanning (i.e., "tanning bed," "tanning salon," "tanning gym," "indoor tanning") and a keyword for burning (i.e., "burn," "burnt," "fried," "sunburn") were collected. The data included the text of each tweet, and the time and date that the tweet was sent.

Measures

The main outcome was whether the tweet described an indoor tanning-caused burn (e.g., "I burnt in the tanning bed tonight"). If a tanning bed-caused burn was mentioned, additional data pertaining to tanning behavior and burn-related symptoms and consequences were also collected.

Burn classification

A conservative approach was used in classifying tweets as describing a tanning bed-caused burn or not, and only tweets that unambiguously described tanning bed-caused burns were designated as such. Tweets that used language such as "I think I burnt" and "I may have burnt," which suggest some degree of uncertainty, were not classified as tanning bed-caused burns and were excluded. In addition, tweets describing burns that resulted from both tanning bed use and sun exposure (e.g., "laying out," "practice," "lake") were not categorized as tanning bed-caused burns. Tweets mentioning burning while in the middle of a tanning bed session (e.g., "I can literally feel my lips getting burnt in this tanning bed") were also excluded due to the potential of a burn being confused with heat from the hot lamps.

Other measures

For those tweets that detailed indoor tanning burns, additional data were coded (if present in the tweet). These data included location of burn (e.g., face, back), whether the tweet described burning from a tanning bed on more than one occasion (e.g., "I burnt again," "I always burn"), whether the tweet described falling asleep in the tanning bed, whether the tweet described using a tanning bed with new bulbs, the number of minutes spent inside the tanning bed, and any symptoms (e.g., pain, itching, peeling) or consequences (e.g., inability to sleep, having to seek medical treatment) associated with the tanning bed-caused burn.

Reliability

All tweets were read and coded by a single reviewer, and a second reviewer read and coded a random 5 % sample of tweets. Krippendorff's α was calculated for each coded variable using the krippalpha command in STATA 13. Reliability was found to be high for all non-rare event (prevalence > 1 %) variables, with Krippendorff's alphas ranging from 0.879 to 1 (mean = 0.945).

RESULTS

A total of 23,558 tweets were tweeted in 2013 that included keywords for indoor tanning and burning. Of these, 16,827 (71.4 %) unambiguously described tanning bed-caused burns. Among the tweets describing a tanning bed-caused burn, 1649 were re-tweets or quoted messages. Thus, a total of 15,178 (64.4 %) original tweets describing a tanning bed-caused burn were sent in 2013.

The 6731 tweets (i.e., 23,558–16,827) not classified as burns included 838 tweets ambiguously describing an indoor tanning burn (e.g., "I think I got burnt in the tanning bed"), 444 tweets anticipated a future burn (e.g., "This tanning bed is about to burn me up"), 291 tweets described a tanning bed burnt smell, and 252 tweets described burning at the time that the tweet was sent (e.g., "I can feel myself getting burnt but I'm just too lazy and it's too cold to get out of the tanning bed!"). In addition, 293 tweets contained messages that were truncated or cutoff mid-statement and were excluded. The remaining 4613 tweets did not describe cases of tanning bed-caused burns, and no data were extracted from these tweets. Examples of the types of tweets not describing tanning bed-caused burns included references to a tanning bed scene from a movie, indoor tanning marketing, and public health messages about the dangers of tanning, among others. Figure 1 contains a flowchart of how tweets were classified.

Figure 2 graphically displays the frequency of tweets mentioning a tanning bed-caused burn by month. Overall, nearly two thirds (63 %) of all tweets sent as original messages describing tanning bed-caused burns in 2013 were sent between January and April. The month of March had the highest number of burns reported on Twitter ($n=3135$). Examples of tweets

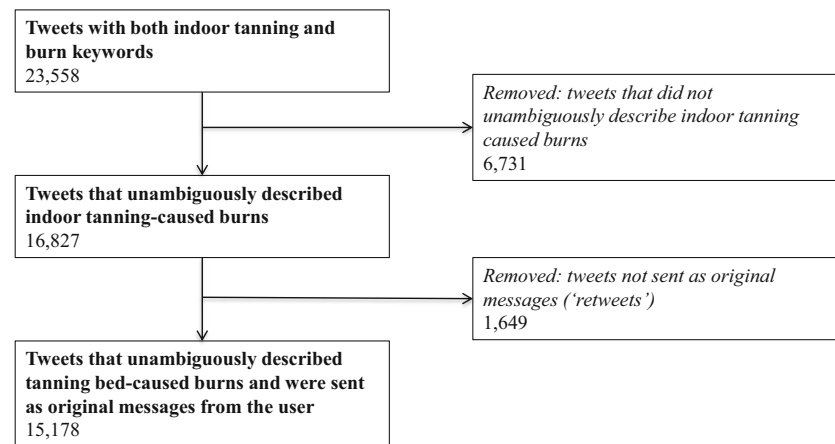


Fig. 1 | Flowchart for reviewing and classifying tweets

describing indoor tanning-caused burns are listed in Table 1.

Among the tweets reporting a tanning bed-caused burn, 456 (3.0 %) described burning more than once from tanning beds. Several tweets attributed burning to new tanning bed bulbs ($n=240$; 1.6 %) or falling asleep inside the tanning bed ($n=211$; 1.4 %). A total of 749 (4.9 %) tweets describing a burn mentioned how many minutes were spent inside the tanning bed, and the median amount of time was 10 min (IQR 7–15 min).

Multiple effects resulting from indoor tanning-caused burns were mentioned including the following: pain ($n=2016$; 13.3 %), itching ($n=456$; 3.0 %), peeling ($n=52$; 0.3 %), freckling ($n=11$; 0.1 %), blistering ($n=10$; 0.1 %), and purpling ($n=10$; 0.1 %). Consequences of tanning bed-caused burns described included disruption of sleep ($n=117$; 0.8 %); difficulty sitting or laying down ($n=94$; 0.6 %); trouble moving or walking ($n=81$; 0.5 %); inability to wear clothing ($n=63$; 0.4 %); having to miss school, work, or other activities ($n=24$; 0.2 %). Further, five (0.0 %) tweets mentioned seeking medical treatment. Table 2 summarizes the symptoms, consequences, and other

characteristics from tweets describing indoor tanning-caused burns.

Table 3 ranks the most common sites reportedly burnt by indoor tanning beds (not mutually exclusive, as many tweets described burning multiple sites). Buttocks ($n=3117$; 20.5 %), face and head ($n=1020$; 6.7 %), breast or chest ($n=546$; 3.6 %), back ($n=437$; 2.9 %), and lower extremity ($n=236$; 1.6 %) were the sites most commonly burnt by tanning beds. Of note, out of the 236 burns to the lower extremity, 227 occurred on the heels. Other locations in which burning was reported included eyes and eyelids ($n=200$; 1.3 %), lips ($n=168$; 1.1 %), armpits ($n=122$; 0.8 %), stomach ($n=120$; 0.8 %), and genitalia ($n=96$; 0.6 %). Further, 112 (0.7 %) tweets described burns to the entire body or “all over.”

DISCUSSION

In 2013, more than 15,000 English language tweets described indoor tanning-caused burns, including tweets mentioning burns to the eyes and burning multiple times. Tweets detailed a variety of symptoms associated with these burns (e.g., pain, itching), as well

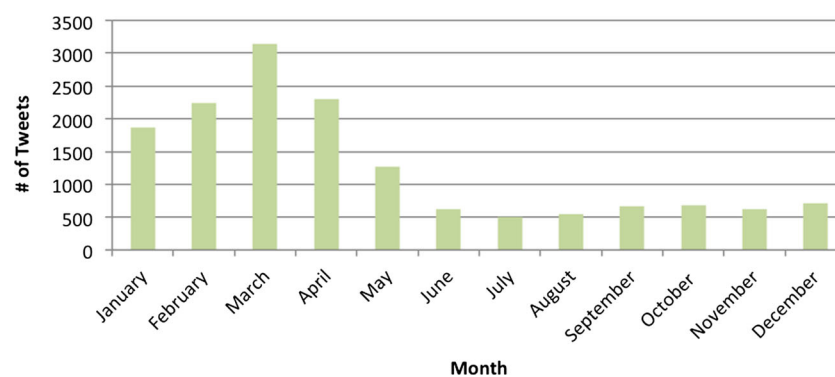


Fig. 2 | Number of tweets describing indoor tanning-caused burns sent in 2013 by month

Table 1 | Examples of tweets describing indoor tanning-caused burns sent in 2013

Text of tweet
“Stupid \$6 tanning bed burnt me all over...”
“when you burn your back in a tanning bed in preparation for vacation and have to put a bra on... #ouch #girlproblems”
“Burnt to a crisp from the tanning bed, but hey at least I won’t be white for semiformal!”
“The lady at the tanning bed told me she’d put me in a bed that had no burning rays in it & only gave u color. I am literally fried. #ouch”
“My eyes have sunburn from texting in the tanning bed.”
“I hate when i get burnt in te tanning bed...my face peels so bad it looks like I have a disease.”
“Am I the only one who get burnt EVERY time I get in the dang tanning bed ??”
“even though i got realy burnt in the tanning bed... im going to go again and again till im really tan :)”
“I’m so burnt! The tanning bed timer didn’t go off n I set if for 8 min was In there almost 15! I’m hurting”
“Being burnt from the tanning bed doesn’t bother me because I know it’s just gonna be a tan tomorrow.”
“I hatw when my eyes burn when I get out of the tanning bed but I refuse to wear eyewear and risk looking like a raccoon”
“Call me weird but I love getting burnt in the tanning bed. #addict”

as consequences such as disruption of sleep, limited movement, or having to stay home from school or work. The frequency of tweets reporting burns caused by tanning bed use was most prevalent between January and April. These findings reveal that discussions of tanning bed burns are common on Twitter and suggest that increased surveillance of tanning bed injuries is warranted.

This is the second known investigation to assess indoor tanning-related content on Twitter. Using a different data source and search criteria, Wehner and colleagues [17] examined tweets mentioning keywords for indoor tanning during a 2-week time period in 2013 (March 27–April 10) and found that only a small percentage of these tweets mentioned health consequences, such as skin cancer (2.56 %). While Wehner’s

Table 2 | Number of tweets and percentages describing indoor tanning behaviors and burn characteristics within tweets describing indoor tanning-caused burns

Tanning behaviors and burn characteristics	<i>N</i>	% ^a
Behaviors		
Multiple indoor tanning burns	456	3.0
Tanning with new bulbs and burning	240	1.6
Falling asleep and burning	211	1.4
Symptoms		
Pain	2016	13.3
Itching	456	3.0
Skin peeling	52	0.3
Appearance of freckles	11	0.1
Blisters	10	0.1
Skin purpling	10	0.1
Chills	5	0.0
Swelling	5	0.0
Bleeding	3	0.0
Skin scabbing	3	0.0
Consequences		
Inability to sleep	117	0.8
Inability to sit or lay	94	0.6
Inability to walk or move	81	0.5
Inability to wear clothes	63	0.4
Missing school, work, activities	24	0.2
Medical treatment	5	0.0
Inability to shower	1	0.0
Inability to blink	1	0.0
Inability to see	1	0.0

^a Percentages were calculated by dividing the number of tweets by the total number of tweets describing a burn (*n* = 15,178)

Table 3 | Body locations mentioned in tweets describing tanning bed-caused burns

Body part	<i>n</i>	% ^a	% ^b
Buttocks	3117	20.5	45.4
Face/head	1020	6.7	14.9
Breast/chest	546	3.6	8.0
Back	437	2.9	6.4
Lower extremity	236	1.6	3.4
Eyes/eyelids	200	1.3	2.9
Lips	168	1.1	2.4
Armpit	122	0.8	1.8
Stomach	120	0.8	1.7
“All over”	112	0.7	1.6
Genitalia	96	0.6	1.4
Upper extremity	73	0.5	1.1
Shoulder	19	0.1	0.3
Neck	18	0.1	0.3

Burns to multiple body locations possible

^a Percentages calculated by dividing the number of tweets describing a burn to specific location by the total number of tweets describing a burn (*n* = 15,178)

^b Percentages calculated by dividing the number of tweets describing a burn to specific location by the number of tweets describing a burn that mentioned a burn location (*n* = 6860)

study noted that burns were mentioned in 7344 (4.75 %) tanning bed-related tweets, the present investigation is the first to manually content analyze the tweets to identify descriptions of indoor tanning-caused burns. Further, this investigation is the first to extract additional data on tanning behaviors and burn-related symptoms and consequences.

Moreover, Hossler et al. [18] described the content from 72 YouTube videos, identified using search keywords for tanning bed use, and found 9 videos mentioning burning as an adverse event caused by indoor tanning. However, the researchers did not report on whether these videos contained testimonials of individuals describing a personal tanning bed session that resulted in a burn or whether references to burns were general public health messages. Findings from both studies reveal the presence of conversations about indoor tanning on social media.

UV exposure from indoor tanning beds is a known cause of eye problems [8], and chronic UV exposure to the eyes can damage surface tissues and internal structures (e.g., cornea, lens) [19, 20]. Federal regulations require the usage of eye protection while indoor tanning [21]. However, 200 tweets described tanning bed-caused burns to the eyes and eyelids. Reports of eye injuries suggest that protective eyewear is either not providing full protection, not being worn properly, or not worn at all. Several tweets suggest that eyewear is not being worn by tanning bed users, possibly because of discomfort or concerns that protective eyewear may create uneven tans or “raccoon eyes.”

Tanners may also choose not to wear eye protection because it may interfere with mobile phone use during

tanning. For instance, several tweets describing a burn mentioned phone use while in the tanning bed (e.g., “Accidentally laid in the tanning bed 15 min straight with my eyes open on my phone and didn’t realize it. Now I have corneal burn. ITSUCKS”). Additionally, a total of 252 tweets described burning while in the middle of a tanning bed session, and presumably, these tweets were sent from a mobile phone inside the tanning bed. Such findings are consistent with a recent article in a tanning industry publication, which acknowledged that many indoor tanners were not wearing eye protection to allow cell phone use [22].

Indoor tanners may also be using their cell phones to take photos of themselves (i.e., selfies) inside a tanning bed. While these data did not include photos, searching on Twitter (www.twitter.com) for the keywords tanning bed and “selfie” yields numerous photos taken inside indoor tanning beds in which users’ eyes are unprotected. Restrictions on cell phone use while in the tanning salon are needed given the potential dangers of UV exposure to the eyes.

A few tweets produced by our search were sent by the tanning industry (i.e., tanning salons or tanning industry trade group) and included claims that tanning bed use lowers the risk of sunburn. For example, one tweet stated, “Indoor tanning is helping to reduce the incidence of sunburn. It’s true. One industry study has shown that indoor... <http://t.co/giaYqHC2BK>.” Another industry tweet stated “Some advantages of Indoor Tanning: exposure control, less chance of sunburn, protective eyewear and lotions and it gives you a base tan!” These tweets are consistent with public statements made by the indoor tanning industry. For example, the executive director of the Indoor Tanning Association has been quoted in a newspaper article stating, “Injured customers are unhappy customers, and staff is trained to show the customer how to use the equipment properly and make sure people are not overexposed or sunburned.” [23]

However, the data presented here do not support the industry message that indoor tanning is a way to avoid burning. These industry messages may be resonating with tanners though, as several tweets revealed attempts at developing a “base tan” to prevent outdoor burning. For example, “In 7th grade my mom took me to a tanning salon to get a base tan before we went to Oahu, and I got a sunburn... in a TANNING bed.” Other tweets reveal that a base tan comes after requisite burning in the tanning bed. For example, “right, I’m Italian & have to burn in a tanning bed for 3 months before I actually start to get a base color.” Prevention messages about the risk of tanning bed burns are needed.

Because Twitter users are willing to discuss tanning online, opportunities for social media interventions may exist. For instance, a Twitter

messaging campaign could be launched prior to the onset of indoor tanning season. Based on the data presented here, the majority of tweets describing a tanning bed-caused burn were sent between January and April. At least one known tanning bed educational campaign using social media has been implemented. In 2007, Denmark launched a web-based tanning prevention media campaign, which was found to be associated with a reduction in indoor tanning among youth [24]. The Danish campaign largely focused on the use of social media.

Twitter users are not a representative sample of indoor tanners; thus, these data are not generalizable. Thus, we are unable to estimate the number of tanning bed-caused burns using Twitter data. Twitter does not provide demographic information of users so it is not possible to accurately and consistently determine gender, age, ethnicity, or geographic location. However, according to a Pew Research survey, 31 % of 18–29 year olds and 18 % of women of all ages report using Twitter [25]. Therefore, a large number of indoor tanners may be using Twitter. This study is further limited by our inability to understand the context in which the tweets were sent. For example, some tweets may have been sent within the context of conversations involving multiple tweets, making it difficult at times to glean the intent of the user. While manual content analysis using more than one coder insured high reliability in the interpretation of tweets, misclassification due to human error is possible. Furthermore, Twitter data likely drastically underreports most phenomena, as many people likely have experienced burns but did not tweet about it.

Based on the data reported here, we recommend that going forward, population-based survey studies specifically inquire about burns resulting from tanning beds, as well as relevant behaviors and consequences. Future research should also explore the role that tanning bed burns play in the development of skin cancers. Findings could have implications for tanning bed regulations. Tweets mentioning tanning bed-caused burning, including burns to the eyes, suggest that tanning bed time limits and eye protection requirements are inadequate or are not being followed.

In summary, an analysis of Twitter data reveals an alarming number of tanning bed-caused burns, including burns to the eyes and reports of burning multiple times. Social media surveillance provides unique insight into tanning behaviors and injuries that are not currently captured through traditional public health surveillance efforts. Social media may also be an effective means to intervene with tanning bed users, as individuals appear to be willing to discuss their tanning online. In accord with the US Surgeon General's 2014 Call to Action to Prevent Skin Cancer [20], comprehensive efforts are needed, including policy and prevention strategies, to reduce the harm caused by tanning beds.

Compliance with ethical standards

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