

# Lawrence Berkeley National Laboratory

LBL Publications

## Title

Use of Indoor Tanning Diagnosis Codes in Claims Data.

## Permalink

<https://escholarship.org/uc/item/4jf435hx>

## Journal

JID Innovations, 1(4)

## Authors

Brown, Alexandria

Li, Yao

Hinkston, Candice

et al.

## Publication Date

2021-12-01

## DOI

10.1016/j.xjidi.2021.100048

Peer reviewed



# Use of Indoor Tanning Diagnosis Codes in Claims Data

Alexandria M. Brown<sup>1</sup>, Yao Li<sup>2</sup>, Candice L. Hinkston<sup>2</sup>, Sharon H. Giordano<sup>2,3</sup> and Mackenzie R. Wehner<sup>2,4</sup>

The International Classification of Diseases: 10th Revision (effective from October 2015) included indoor tanning diagnosis codes for the first time. The majority of data on indoor tanning is self-reported. We used a large claims dataset to investigate the patients and settings in which indoor tanning International Classification of Diseases: 10th Revision codes are being used. We included encounters with the International Classification of Diseases: 10th Revision indoor tanning codes in Truven Health MarketScan data 2016–2018, which contain deidentified commercial insurance claims data for approximately 43 million patients. We used descriptive statistics to evaluate patient and encounter characteristics and normalized results using outpatient dermatology encounters. A total of 4,550 encounters were identified, 99.0% of which were outpatient, and 72.3% were with dermatology. Patients were majority female (85.0%) with ages ranging from 7 to 93. The Midwest region had the most indoor tanning encounters. Destruction of a premalignant lesion was performed in 15.1%, and biopsies were performed in 18.4% of encounters, suggesting that encounters may have been for skin cancer surveillance. Increased usage of indoor tanning International Classification of Diseases: 10th Revision codes in the coming years may strengthen the indoor tanning literature. Claims data are a potential tool to better understand patients who have a history of exposure to indoor tanning and their associated risk factors, comorbidities, behaviors, and healthcare utilization.

*JID Innovations* (2021);1:100048 doi:10.1016/j.xjidi.2021.100048

## INTRODUCTION

There is significant evidence supporting the association of indoor tanning with melanoma and keratinocyte carcinomas, and the rates of these malignancies continue to rise in the United States (Colantonio et al., 2014; Wehner et al., 2012). Efforts to reduce indoor tanning require knowledge of the population at risk. The ability to recognize and provide counseling to at-risk patients has been shown to improve sun-protective behaviors and reduce indoor tanning (Henrikson et al., 2018; Lin et al., 2011). Whereas the majority of indoor tanning data are self-reported, insurance claims databases provide information on patient encounters, and the International Classification of Diseases: 10th Revision (ICD-10) (effective from October 2015) included diagnosis codes for indoor tanning exposure for the first time. To our knowledge, no previous studies have examined indoor tanning

ICD-10 codes. In this study, we use a large claims database to evaluate the patients and settings in which ICD-10 codes are being used.

## RESULTS

From 2016–2018, a total of 4,550 patient encounters with indoor tanning claims were recorded in 4,101 patients (3,755 [91.6%] patients with a single encounter with an indoor tanning ICD-10 code, 346 [8.4%] with more than one encounter). Provider information (National Provider Identifier number) was available in 2,707 encounters (59.5%). In these 2,707 encounters, there were 1,118 unique providers (mean of 2.4 encounters with indoor tanning claims per unique provider). Patient demographics and encounter characteristics are shown in Table 1. The most common provider specialty was dermatology (72.3% of encounters; 86.0% of encounters with a known specialty), and 99.0% of encounters were outpatient. There were 29 encounters with indoor tanning claims per 100,000 dermatology encounters. The majority of patients were female (85.0%). Ages ranged from 7 to 93 years, with the majority of encounters in patients aged 18–54 years, relative to the number of dermatology visits in these age groups. Encounters with indoor tanning ICD-10 codes were most common in the spring and least common in the fall (in absolute numbers and relative to dermatology encounters). The Midwest region had the highest number of indoor tanning encounters per 100,000 dermatology encounters, nearly double that of the next highest region. Table 2 shows other ICD-10 codes and procedural Current Procedural Terminology (CPT) codes recorded in at least 10% of encounters with the indoor tanning ICD-10 codes. Other ICD-10 codes were all dermatology

<sup>1</sup>School of Medicine, Baylor College of Medicine, Houston, Texas, USA;

<sup>2</sup>Department of Health Services Research, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA; <sup>3</sup>Department of Breast Medical Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA; and <sup>4</sup>Department of Dermatology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

Correspondence: Mackenzie R. Wehner, Department of Health Services Research, The University of Texas MD Anderson Cancer Center, 1400 Pressler Street, Unit 1444, Houston, Texas 77030, USA. E-mail: [mwehner@mdanderson.org](mailto:mwehner@mdanderson.org)

Abbreviations: CPT, Current Procedural Terminology; ICD-10, International Classification of Diseases: 10th Revision

Received 10 May 2021; revised 29 June 2021; accepted 30 June 2021; accepted manuscript published online XXX; corrected proof published online XXX

Cite this article as: *JID Innovations* 2021;1:100048

related (e.g., melanin hyperpigmentation, actinic keratosis). CPT codes were also all dermatology related. Notably, destruction of at least one premalignant lesion (CPTs 17000 or 17004) was performed in 689 encounters (15.1%), and at least one biopsy (CPTs 11100) was performed in 817 encounters (18.0%).

**DISCUSSION**

In this study, we report that encounters with indoor tanning ICD-10 codes are uncommon, relative to how common indoor tanning exposure is in the population (Wehner et al., 2014), and occur primarily in outpatient dermatology. Patient demographics were in line with the known demographics of individuals who indoor tan and who tend to be younger females. However, encounters occurred across the age spectrum. The Midwest had nearly double the number of relative encounters, compared with those in other regions. Whether dermatologists in the Midwest are more likely to use these codes or whether patients in the Midwest are more likely to indoor tan is unknown. In addition, a substantial number of encounters with indoor tanning ICD-10 codes included premalignant lesion destruction or skin biopsy. This suggests that many of these encounters may have been for skin cancer surveillance and that indoor tanning exposure may have been coded as part of a patient’s skin cancer risk profile.

This study provides insight into how and when indoor tanning ICD-10 codes are being used. The prevalence of indoor tanning ever exposure has previously been found to be 35.7% in adults, 55.0% in university students, and 19.3% in adolescents (Wehner et al., 2014). Given that this study observed 29 encounters with indoor tanning claims per 100,000 dermatology encounters (0.029% of dermatology encounters), we suspect significant underutilization of these codes. Because indoor tanning ICD-10 codes were only recently universally implemented in 2015 and because providers may be using other codes that cover similar services, it is likely that our data underestimate the number of encounters and sequelae associated with indoor tanning. We hope that this study increases the awareness and encourages the adoption of these codes among providers. The use of indoor tanning exposure codes could have several potential positive impacts on indoor tanning research, patient care, and outcomes. Increased documentation of indoor tanning exposure would allow researchers to identify patients with this skin cancer risk factor and investigate other risk factors, patterns of care, and outcomes associated with indoor tanning. Furthermore, increased documentation of indoor tanning exposure in electronic health records could better equip clinicians to identify patients’ associated risk factors and to provide counseling and/or preventative services for their patients, potentially improving outcomes.

Insurance claims data can provide patient and encounter information across provider settings and can help identify healthcare utilization patterns. Future research could consider claims databases as a valuable tool to better understand patients who have been exposed to indoor tanning and their associated risk factors, comorbidities, behaviors, and healthcare utilization.

**Table 1. Characteristics of 4,550 Indoor Tanning ICD-10 Encounters**

Encounter Characteristics	Number (%)	Per 100,000 Dermatology Encounters
<b>Indoor tanning ICD-10 used</b>		
Initial encounter (W89.1XXA)	3,846 (84.5)	NA
Subsequent encounter (W89.1XXD)	189 (4.2)	NA
Sequela (W891.XXS)	516 (11.3)	NA
<b>Setting of encounter</b>		
Outpatient	4,503 (99.0)	NA
Emergency room	12 (0.3)	NA
Urgent care	10 (0.2)	NA
Other	25 (0.5)	NA
<b>Provider specialty at encounter</b>		
Dermatology	3,293 (72.3)	NA
Internal medicine	63 (1.4)	NA
Emergency medicine	9 (0.2)	NA
Family medicine	135 (3.0)	NA
Pediatrics	58 (1.3)	NA
Other	273 (6.0)	NA
Unknown	719 (15.8)	NA
<b>Patient sex</b>		
Female	3,867 (85.0)	42
Male	683 (15.0)	10
<b>Patient age (y)</b>		
<18	72 (1.6)	4
18–24	532 (11.7)	40
25–34	884 (19.4)	56
35–44	938 (20.6)	47
45–54	1,033 (22.7)	37
55–64	868 (19.1)	22
65+	223 (4.9)	11
<b>Year of encounter</b>		
2016	1,418 (31.2)	25
2017	1,428 (31.4)	28
2018	1,704 (37.5)	34
<b>Season of encounter</b>		
Spring (March–May)	1,304 (28.7)	32
Summer (June–August)	1,115 (24.5)	27
Fall (September–November)	1,043 (22.9)	26
Winter (December–February)	1,088 (23.9)	29
<b>Geography of encounter</b>		
South	1,892 (41.6)	28
Midwest	1,560 (34.3)	55
Northeast	610 (13.4)	16
West	472 (10.4)	21
Other/unknown	16 (0.4)	42

Abbreviations: ICD-10, International Classification of Diseases: 10th Revision; NA, not applicable.

**MATERIALS AND METHODS**

We utilized Truven Health MarketScan data (2016–2018) (IBM, Armonk, NY), which include deidentified commercial insurance claims data for approximately 43 million patients. We included patient encounters with ICD-10 indoor tanning codes W89.1, W89.1XXA, W89.1XXD, and W89.1XXS. These codes are included in the ICD-10 Clinical Modification chapter on external causes of morbidity and represent *exposure to a tanning bed* (W89.1), with seventh digit specifiers indicating *initial*

**Table 2. ICD and CPT Codes Present in at least 10% of Encounters**

ICD Codes		
Count	ICD-10 Code	Code Description
931	L81.4	Other melanin hyperpigmentation
860	D22.5	Melanocytic nevi of trunk
855	L57.0	Actinic keratosis
808	D48.5	Neoplasm of uncertain behavior of skin
743	L57.8	Other skin changes due to chronic exposure to nonionizing radiation
689	L82.1	Other seborrheic keratosis
530	X32.XXXA	Exposure to sunlight, initial encounter
526	D22.9	Melanocytic nevi, unspecified
387	L70.0	Acne vulgaris
269	D18.01	Hemangioma of skin and subcutaneous tissue
250	Z12.83	Encounter for screening for malignant neoplasm of skin
148	Z80.8	Family history of malignant neoplasm of other organs or systems
148	L82.0	Inflamed seborrheic keratosis
127	D23.9	Other benign neoplasms of the skin, unspecified
127	D49.2	Neoplasm of unspecified behavior of bone, soft tissue, and skin
111	L57.9	Skin changes due to chronic exposure to nonionizing radiation, unspecified
97	Z87.2	Personal history of diseases of the skin and subcutaneous tissue
93	Z85.828	Personal history of other malignant neoplasms of the skin
87	D23.5	Other benign neoplasms of the skin of the trunk
86	L30.9	Dermatitis, unspecified
83	D22.71	Melanocytic nevi of the right lower limb, including the hip
80	L91.8	Other hypertrophic disorders of the skin
79	Z71.89	Other specified counseling
69	D22.61	Melanocytic nevi of the right upper limb, including the shoulder
69	D22.39	Melanocytic nevi of other parts of the face
69	B07.8	Other viral warts
68	D23.71	Other benign neoplasms of the skin of the right lower limb, including the hip
66	D22.72	Melanocytic nevi of the left lower limb, including the hip
65	Z08	Encounter for follow-up examination after completed treatment for malignant neoplasm
64	L56.8	Other specified acute skin changes due to UVR
64	D23.72	Other benign neoplasms of the skin of the left lower limb, including the hip
62	L90.5	Scar conditions and fibrosis of the skin
62	D22.62	Melanocytic nevi of the left upper limb, including the shoulder
60	L72.0	Epidermal cyst
59	L71.8	Other rosacea
59	I78.1	Nevus, non-neoplastic
56	L21.8	Other seborrheic dermatitis
56	L40.0	Psoriasis vulgaris
55	D22.4	Melanocytic nevi of scalp and neck
54	X32.XXXD	Exposure to sunlight, subsequent encounter
50	B36.0	Pityriasis versicolor
48	L85.3	Xerosis cutis
46	L72.8	Other follicular cysts of the skin and subcutaneous tissue

CPT Codes		
Count	Procedure Code	Code Description
817	11100	Skin biopsy, first lesion
631	17000	Destruction of premalignant lesions, first lesion
383	17003	Destruction of premalignant lesions, 2–14 lesions
267	11101	Skin biopsy, each additional lesion
214	17110	Destruction of benign lesions, 1–14 lesions
87	88305	Surgical pathology, gross and microscopic examination
77	11301	Shave removal, lesion diameter of 0.6–1.0 cm
59	11300	Shave removal, lesion diameter of 0.5 cm or less
58	17004	Destruction of premalignant lesions, 15 or more lesions

Abbreviations: CPT, Current Procedural Terminology; ICD, International Classification of Diseases; ICD-10, International Classification of Diseases, 10th Revision.

encounter (W89.1XXA), subsequent encounter (W891.XXD), and sequela (W891.XXS). We used descriptive statistics to evaluate patient and encounter characteristics, including sex, age, location, season, provider specialty, setting, and other ICD-10 codes and procedural CPT codes entered in at least 10% of encounters. Results were also presented per 100,000 encounters with dermatologists in the dataset, which were identified by specialty taxonomy code.

#### Data availability statement

The data that support the findings of this study are available from Truven MarketScan. Restrictions apply to the availability of these data, which were used under license for this study.

#### Ethics statement

This research was conducted in Houston, Texas United States. Institutional Review Board approval was provided by The University of Texas MD Anderson Cancer Center (protocol 2019-0966).

#### ORCIDi

Alexandria M. Brown: <http://orcid.org/0000-0001-6961-3217>

Yao Li: <http://orcid.org/0000-0002-7739-8649>

Candice L. Hinkston: <http://orcid.org/0000-0001-9393-0204>

Sharon H. Giordano: <http://orcid.org/0000-0002-8700-2767>

Mackenzie R. Wehner: <http://orcid.org/0000-0002-5579-2282>

#### AUTHOR CONTRIBUTIONS

Conceptualization: MRW, AMB, CLH, YL; Data Curation: YL; Formal Analysis: YL; Methodology: MRW, AMB, SHG, CLH, YL; Project Administration: MRW, CLH; Resources: MRW, SHG; Supervision: MRW, SHG; Writing - Original Draft Preparation: MRW, AMB, CLH; Writing - Review and Editing: MRW, AMB, SHG, CLH, YL

#### ACKNOWLEDGMENTS

This research was supported, in part, by Cancer Center Support Grant P30 CA016672. MRW is a Cancer Prevention and Research Institute of Texas

Scholar in Cancer Research and is supported by the Cancer Prevention and Research Institute of Texas RR190078. SHG is supported by the Cancer Prevention and Research Institute of Texas RP160674 and Komen SAC150061.

#### Disclaimer

The funding sources for this study had no involvement in the research and/or preparation of this article.

#### CONFLICT OF INTEREST

The authors state no conflict of interest.

#### REFERENCES

- Colantonio S, Bracken MB, Beecker J. The association of indoor tanning and melanoma in adults: systematic review and meta-analysis. *J Am Acad Dermatol* 2014;70:847–57.e1–18.
- Henrikson NB, Morrison CC, Blasi PR, Nguyen M, Shibuya KC, Patnode CD. Behavioral counseling for skin cancer prevention: evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2018;319:1143–57.
- Lin JS, Eder M, Weinmann S. Behavioral counseling to prevent skin cancer: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med* 2011;154:190–201.
- Wehner MR, Chren MM, Nameth D, Choudhry A, Gaskins M, Nead KT, et al. International prevalence of indoor tanning: a systematic review and meta-analysis [published correction appears in *JAMA Dermatol* 2014;150:577]. *JAMA Dermatol* 2014;150:390–400.
- Wehner MR, Shive ML, Chren MM, Han J, Qureshi AA, Linos E. Indoor tanning and non-melanoma skin cancer: systematic review and meta-analysis. *BMJ* 2012;345:e5909.



This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>