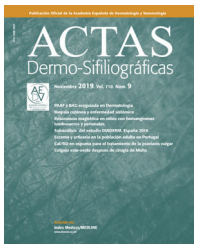
ACTAS
Dermo-Sifiliográficas

Full English text available at
www.actasdermo.org



ORIGINAL ARTICLE

What Proportion of the Caseload at Dermatology Outpatient Clinics in Spain Do Skin Tumors Account for? Results from the DIADERM National Random Sampling Project☆

A. Martin-Gorgojo,[a,b,*] M.Á. Descalzo-Gallego,[b] S. Arias-Santiago,[c] A. Molina-Leyva,[c] Y. Gilaberte,[d] P. Fernández-Crehuet,[e] H. Husein-ElAhmed,[f] A. Viera-Ramírez,[g] P. Fernández-Peñas,[h] R. Taberner,[i] A. Buendía-Eisman,[j] I. García-Doval[b]

[a] *Sección de Especialidades Médicas, Servicio de ITS/Dermatología, Ayuntamiento de Madrid, Madrid, Spain*
[b] *Unidad de Investigación, Fundación Piel Sana, Academia Española de Dermatología y Venereología, Madrid, Spain*
[c] *Servicio de Dermatología, Hospital Virgen de las Nieves, Granada, Spain*
[d] *Servicio de Dermatología, Hospital Universitario Miguel Servet, IIS Aragón, Zaragoza, Spain*
[e] *Servicio de Dermatología, Hospital Universitario Reina Sofía, Córdoba, Spain*
[f] *Servicio de Dermatología, Hospital General de Baza, Baza, Granada, Spain*
[g] *Servicio de Dermatología, Hospital Santa Catalina, Las Palmas de Gran Canaria, Canarias, Spain*
[h] *Department of Dermatology, Westmead Hospital, The University of Sydney, Westmead, New South Wales, Australia*
[i] *Departamento de Dermatología, Hospital de Son Llàtzer, Palma de Mallorca, Baleares, Spain*
[j] *Facultad de Medicina, Universidad de Granada, Granada, Spain*

Received 27 January 2021; accepted 10 February 2021
Available online 13 May 2021

KEYWORDS
International Classification of Diseases 10th Revision;
Hospital outpatient clinics;

Abstract

Introduction and objective: A significant part of a dermatologist's activity involves the diagnosis and management of tumors.The aim of this study was to analyze the caseload at public and private dermatology outpatient clinics in Spain to determine the proportion of tumor diagnoses.
Material and method: Observational cross-sectional study of diagnoses made in dermatology outpatient clinics during 2 data-collection periods in the DIADERM study, an anonymous survey of a random, representative sample of dermatologists across Spain. Diagnoses made during

☆ Please cite this article as: Martin-Gorgojo A, Descalzo-Gallego MÁ, Arias-Santiago S, Molina-Leyva A, Gilaberte Y, Fernández-Crehuet P, et al., ¿Cuánta carga asistencial supone la enfermedad tumoral cutánea en la actividad ambulatoria en la Dermatología española? Resultados del muestreo aleatorio nacional DIADERM, ACTAS Dermo-Sifiliográficas, 2021;112:632–639.

* Corresponding author.
E-mail address: alejandromartingorgojo@aedv.es (A. Martin-Gorgojo).

Ambulatory care;
Dermatology;
Prevalence;
Skin neoplasms

the 2 periods were coded according to the 10th revision of the International Classification of Diseases. There were 165 tumor-related codes, classified into 24 groups. For the purpose of this study, these groups were then reduced to benign melanocytic lesions, malignant melanocytic lesions, benign nonmelanocytic lesions, and malignant nonmelanocytic lesions.
Results: Tumors accounted for 46.2% of all diagnoses; 18.5% of the tumors were malignant (a category that included in situ forms of keratinocyte cancers). Four of the 10 most common diagnoses were of malignant tumors: in situ keratinocyte cancers, basal cell carcinoma, melanoma, and squamous cell carcinoma. Significant differences were observed between malignant and benign tumors according to type of practice (public vs. private) and geographic region.
Conclusion: Skin cancer accounts for a significant part of the dermatologist's caseload in Spain. Differences can be observed depending on the public/private healthcare setting and other factors.

PALABRAS CLAVE
Clasificación Internacional de Enfermedades 10.ª revisión;
Consulta externa hospitalaria;
Actividad ambulatoria;
Dermatología;
Prevalencia;
Neoplasias cutáneas

¿Cuánta carga asistencial supone la enfermedad tumoral cutánea en la actividad ambulatoria en la Dermatología española? Resultados del muestreo aleatorio nacional DIADERM

Resumen
Introducción y objetivo: La patología tumoral conforma una parte esencial de la actividad dermatológica. El presente estudio pretende analizar la carga de la patología tumoral en la actividad dermatológica pública y privada del sistema de salud español.
Material y método: Estudio observacional de corte transversal de dos períodos de tiempo describiendo los diagnósticos realizados en consultas externas dermatológicas, obtenidos a través de la encuesta anónima DIADERM, realizada a una muestra aleatoria y representativa de dermatólogos. A partir de la codificación de diagnósticos CIE-10, se seleccionó toda la patología tumoral (165 diagnósticos codificados en los dos períodos), que se clasificaron en 24 grupos, posteriormente subclasificados en patología benigna y maligna, melanocítica y no melanocítica.
Resultados: El 46,2% de los diagnósticos fueron de patología tumoral. El 18,5% de los diagnósticos globales se debió a patología tumoral maligna (incluyendo entre estos diagnósticos los tumores queratinocíticos *in situ*). De los primeros 10 diagnósticos de patología tumoral en frecuencia, 4 eran malignos: tumores queratinocíticos *in situ*, carcinoma basocelular, melanoma y carcinoma espinocelular. Se encontraron algunas diferencias significativas entre patología tumoral maligna y benigna atendiendo al ámbito de su asistencia (público/privado), así como a factores geográficos.
Conclusión: El cáncer cutáneo tiene un peso importante en la asistencia dermatológica en España. Se pueden observar algunas diferencias en función del ámbito de atención público/privado y de otros factores.

Introduction

The objective of the DIADERM study was to analyze diagnoses made in the dermatology clinics of members of the Spanish Academy of Dermatology and Venereology (Academia Española de Dermatología y Venerología [AEDV]).[1] The study showed that the most common diagnoses made by dermatologists belonged to the following categories of the *International Statistical Classification of Diseases, Tenth Edition* (*ICD-10*): L57 (skin abnormalities, such as actinic keratosis), C44 (nonmelanoma skin cancer, such as basal cell carcinoma), and D22 (melanocytic nevi). This finding highlighted the importance of skin cancer in the daily practice of dermatologists.

The caseload generated by dermatologic conditions in primary care is substantial,[2] and a considerable percentage of patients are referred from this level to dermatology clinics. Similarly, the dermatologist plays an active role on hospital wards[3,4] and in emergency departments.[5] Dermatologists show better diagnostic performance with respect to skin tumors (agreement between the presumptive diagnosis of primary care specialists and dermatologists is weaker in skin tumors[6]). The same is true for therapeutic performance. In addition to being the main parties involved in the surgical treatment of skin cancer,[7] dermatologists are more effective and efficient with respect to this condition, according to data from Spain.[8] They also achieve a lower percentage of positive margins in keratinocyte carcinoma

Table 1 Estimated Frequency of Diagnoses Made in Spain by Dermatologists in the Outpatient Clinic.

Grouped Diagnosis	Estimated Frequency in 5 Days (1 Working Week)	Percentage of Tumor Group	Percentage of Total Diagnoses
Benign melanocytic tumors	16 677	20.4	9.4
In situ keratinocyte tumors	14 858	18.2	8.4
Seborrheic keratosis and associated conditions	12 687	15.5	7.2
Basal cell carcinoma	10 934	13.4	6.2
Benign fibrous tumors	5653	6.9	3.2
Benign adnexal tumors	4597	5.6	2.6
Potentially UV-induced benign tumors	4546	5.6	2.6
Malignant melanocytic tumors	2865	3.5	1.6
Squamous cell carcinoma	2662	3.3	1.5
Benign vascular tumors	2302	2.8	1.3
Other benign lesions	1246	1.5	0.7
Cancer-related syndromes (and associated benign lesions)	740	0.9	0.4
Cutaneous horn and keratoacanthoma	636	0.8	0.4
Lymphomas	366	0.4	0.2
Hamartomas and associated conditions	302	0.4	0.2
Malignant tumor NOS	208	0.3	0.1
Metastasis and associated conditions	191	0.2	0.1
Nonclassified tumors	96	0.1	0.1
Malignant vascular tumors	77	0.1	0.0
Melanocytosis	64	0.1	0.0
Basosquamous cell carcinoma	32	0.0	0.0
Merkel carcinoma	32	0.0	0.0
Malignant adnexal tumors	31	0.0	0.0
Fibroepithelioma of Pinkus	16	0.0	0.0
Subtotal for tumor diagnoses	**81 820**	**100**	**46.2**
Subtotal for non–tumor diagnoses	**95 152**		**53.8**
Total	**176 972**		**100**

Abbreviation: NOS, not otherwise specified.

than other surgical specialties,[9] as well as better outcomes in the treatment of patients with melanoma.[10]

We estimated the prevalence of coded diagnoses in dermatology clinics to measure the demand for outpatient care of tumors by dermatologists in Spain. We also analyzed some of the differences between these diagnoses according to factors such as geographic area, origin of the consultation, and destination of the referral, taking into accout both public and private health care settings.

Methods

We performed a cross-sectional observational study based on estimated data on the prevalence of skin diseases collected over 2 periods (January 19 to 21 and May 18 to 20, 2016). The data were obtained via the anonymous DIADERM survey, which was carried out in a random and representative sample of dermatologists in Spain. The methodology and characteristics of the survey (including the data collected and the method for coding the diagnoses) are addressed in detail in the first manuscript of the project.[1]

The specific analysis of tumors was made by reviewing the complete list of coded diagnoses, from which a total of 165 diseases were selected. Based on the list of selected diagnoses, we formed 24 diagnostic groups, which, in some cases, included more than 1 category from the ICD-10. In order to perform the statistical analyses, the classification was reduced to 4 groups (benign melanocytic, malignant melanocytic, benign nonmelanocytic, and malignant nonmelanocytic) and 2 groups (benign and malignant vs non–tumor-associated disease). In situ keratinocyte cancers (including actinic keratosis, Bowen disease, and leukoplasia) were classified as malignant. Keratoacanthomas were also included as malignant tumors: while these are traditionally categorized as benign, they are now considered a well-differentiated form of squamous cell carcinoma.[11] Similarly, cutaneous horns were classified as malignant, since, in a significant percentage of cases, this clinical diagnosis is associated with premalignant or malignant lesions.[12]

We included variables that had previously been collected in the study, as well as the type of climate (subtropical, Mediterranean, continental-Mediterranean, and oceanic; this variable was created in ecological terms by taking into account the geographic areas of each of the sections and its predominant climate).

The statistical analysis was performed using the *survey* module of Stata and taking into consideration the design used to collect the sample.[13] The module includes standard errors for correlated data. Furthermore, given the real number of dermatologists for each section of the AEDV, which was close to unity, it was not necessary to apply a correction for finite populations.

The study was classified as a non–postauthorization study by the Spanish Agency of Medicines and Medical Devices and approved by the Clinical Research Ethics Committee of the Province of Granada, Spain (October 8, 2014).

Results

Tumors accounted for 46.2% of the diagnoses; 18.5% of all diseases seen at the clinic were malignant. Table 1 shows the population-based diagnoses by group in order of frequency. Of the 10 most common diagnostic groups, in situ keratinocyte tumors were second in frequency, basal cell carcinoma fourth, malignant melanocytic tumors eighth, and squamous cell carcinoma ninth.

Table 2 shows the differences between the variables, taking into account the 4 tumor groups. Malignant tumors were more likely to be the main presenting complaint and the reason for follow-up visits. They were also more likely to be managed in the public health system and less likely to be the definitive diagnosis. The differences were statistically significant.

As for the ecological analysis of the type of climate according to geographic area, we recorded a larger percentage of benign melanocytic tumors in areas with a mainly continental-Mediterranean climate, malignant melanocytic tumors in areas with a mainly oceanic and subtropical climate, and benign nonmelanocytic tumors in areas with a mainly subtropical and Mediterranean climate.

Table 3 shows the results of an analysis of specific variables by comparing non–tumor-associated disease with benign and malignant tumors. Statistically significant differences were observed between the groups with respect to the origin and destination of the referrals. In private clinics, consultations for malignant tumors were proportionally more likely to come from another dermatologist. As for destination, patients with benign tumors were more frequently discharged, whereas those with malignant tumors were usually referred for additional dermatologic care. In the public health setting, malignant tumors were also more likely to be referred from another dermatologist. In more than half of cases, benign tumors came from primary care physicians. Patients with benign tumors were somewhat more likely to be discharged (and less likely to receive additional dermatologic care) in the public setting than in the private setting. As in the private setting, patients with malignant tumors were normally referred for additional dermatologic care. Follow-up was more likely to be with the primary care physician for all diseases, including malignant tumors, in the public setting than in the private setting.

Discussion

In the present study, we observed that tumors accounted for almost half of the diagnoses made in dermatology outpatient clinics (46.2%) in Spain. Overall, 18.5% of the caseload of specialists in medical-surgical dermatology and venereology in Spain corresponds to malignant tumors (including in situ keratinocyte tumors). If we exclude in situ keratinocyte cancers, this percentage falls to 10.1%. Patients with malignant tumors as the main reason for seeking care tend to be seen more frequently in the public health setting and generate more follow-up visits. Differences were also observed with respect to the origin and destination of the consultations, depending on whether they were managed in the private or public setting, although this could be affected a priori by organizational factors.

Table 2 Characteristics of Tumors Diagnosed in Spain.

Characteristic	Benign Melanocytic (n = 16 741; 21%) n (% of Column Total)	Malignant Melanocytic (n = 2865; 3%) n (% of Column Total)	Benign Nonmelanocytic (n = 32 074; 39%) n (% of Column Total)	Malignant Nonmelanocytic (n = 29 835; 37%) n (% of Column Total)	Total (N = 81 515) n (% of Column Total)	*P*
Presenting complaint						.000
Primary (presenting complaint and diagnosis are the same)	13 418 (83)	2596 (92)	23 504 (75)	24 020 (83)	63 539 (80)	
Secondary	2788 (17)	238 (8)	7664 (25)	4879 (17)	15 568 (20)	
Diagnostic confirmation						.007
Probable	1224 (7)	328 (11)	3032 (10)	4048 (14)	8631 (11)	
Definitive	15 150 (93)	2522 (89)	28 556 (90)	25 297 (86)	71 524 (89)	
Checkups						.000
Diagnosis during follow-up visit	8070 (48)	2513 (88)	12 827 (40)	19 968 (67)	43 376 (53)	
New patient	8671 (52)	353 (12)	19 248 (60)	9868 (33)	38 139 (47)	
System						.000
Private	5538 (35)	285 (10)	13 138 (42)	5092 (18)	24 053 (31)	
Public	10 339 (65)	2566 (90)	17 915 (58)	23 852 (82)	54 671 (69)	
Survey phase						.150
January (cold season)	8709 (52)	1677 (59)	18 226 (57)	17 202 (58)	45 813 (56)	
May (warm season)	8032 (48)	1188 (41)	13 848 (43)	12 634 (42)	35 703 (44)	
Type of climate[a]						.005
Subtropical	1011 (6)	347 (12)	2153 (7)	1763 (6)	5273 (6)	
Mediterranean climate	7193 (43)	1160 (40)	16 501 (51)	14 568 (49)	39 422 (48)	
Continental-Mediterranean	7053 (42)	771 (27)	10 306 (32)	10 259 (34)	28 389 (35)	
Oceanic	1484 (9)	588 (21)	3115 (10)	3246 (11)	8432 (10)	
Geographic area						NA
Asturias, Cantabria, and Castile-Leon (ACCL)	1523 (9)	76 (3)	2756 (9)	1599 (5)	5954 (7)	
Andalusia	2033 (12)	320 (11)	5219 (16)	4290 (14)	11 863 (15)	
Balearic Islands	338 (2)	33 (1)	532 (2)	693 (2)	1595 (2)	
Canary Islands	1011 (6)	347 (12)	2153 (7)	1763 (6)	5273 (6)	
Catalonia	1853 (11)	472 (16)	4665 (15)	3676 (12)	10 666 (13)	
Central Spain	2816 (17)	354 (12)	3991 (12)	5021 (17)	12 182 (15)	
Galicia	1484 (9)	588 (21)	3115 (10)	3246 (11)	8432 (10)	
Murcia	156 (1)	57 (2)	213 (1)	425 (1)	850 (1)	
Basque Country, Navarre, Aragon, and La Rioja (VNAR)	2714 (16)	342 (12)	3559 (11)	3640 (12)	10 253 (13)	
Valencia	2812 (17)	280 (10)	5873 (18)	5484 (18)	14 448 (18)	

The frequencies correspond to the estimated number of lesions seen in the dermatology outpatient clinic during 5 working days throughout Spain.

[a] Predominantly subtropical climate: Canary Islands. Predominantly oceanic climate: Galicia. Predominantly continental climate: ACCL, central Spain, VNAR. Predominantly Mediterranean climate: other areas.

Table 3 Description of Administrative Characteristics (Care Modality, Origin, and Destination) for Tumor-Associated Disease vs Non–Tumor-Associated Disease.[a]

Characteristics	Nontumor (n = 95 152; 54%) n (% of Column Total)	Benign Tumor (n = 48 814; 28%) n (% of Column Total)	Malignant Tumor (n = 32 701; 18%) n (% of Column Total)	Total (N = 176 667) n (% of Column Total)	*P* Value
Teledermatology					.568
No	93 074 (99)	48 400 (99)	32 237 (99)	173 711 (99)	
Yes	934 (1)	414 (1)	464 (1)	1813 (1)	
Origin: private health system					.002
Direct	22 197 (75)	14 355 (78)	3203 (60)	39 755 (75)	
PCP	2283 (8)	838 (5)	430 (8)	3550 (7)	
Specialist	946 (3)	350 (2)	257 (5)	1553 (3)	
Dermatologist	4068 (14)	2865 (16)	1440 (27)	8374 (16)	
Destination: private health system					.000
Discharge	6914 (23)	7826 (43)	468 (9)	15 208 (29)	
PCP	468 (2)	129 (1)	65 (1)	663 (1)	
Specialist	411 (1)	273 (1)	192 (4)	875 (2)	
Dermatologist	21 778 (74)	10 167 (55)	4638 (86)	36 583 (69)	
Origin: public health system					.000
Direct	6789 (11)	3514 (13)	1490 (6)	11 793 (10)	
PCP	24 776 (41)	15 937 (57)	7907 (30)	48 618 (42)	
Specialist	4413 (7)	884 (3)	994 (4)	6290 (5)	
Dermatologist	24 958 (41)	7647 (27)	15 678 (60)	48 283 (42)	
Destination: public health system					.000
Discharge	14 875 (24)	13 487 (48)	2636 (10)	30 998 (27)	
PCP	4936 (8)	1457 (5)	992 (4)	7384 (6)	
Specialist	1289 (2)	478 (2)	753 (3)	2519 (2)	
Dermatologist	39 383 (65)	12 438 (45)	21 680 (83)	73 501 (64)	

Abbreviation: PCP, primary care physician.

[a] The frequencies correspond to the estimated number of lesions seen at the dermatology outpatient clinic over 5 working days throughout Spain.

The method followed to classify patients was similar to that used in other studies in Europe, insofar as tumors were classed as benign and malignant.[14,15] This approach attempted to be more inclusive than in other studies, where the only cancers taken into consideration were basal cell carcinoma,[16] squamous cell and basal cell carcinoma,[17] and nonmelanoma skin cancer.[13] Given that keratoacanthoma was traditionally considered benign and cutaneous horns as benign or malignant, we also performed a sensitivity analysis including both diagnoses as benign tumors and found no significant variations in our findings (data not shown).

Although differences in diagnoses were analyzed according to geographic region, this was not specifically by comparing rural and urban areas, as in a study performed in Australia.[18] In any case, we believe that the manner in which the data were analyzed provides a more complete idea of the real caseload of skin tumor diagnoses in Spain than other approaches, since not all tumors require surgery[8] or are managed via interdepartmental consultations (with the percentage of activity above the 5.7% that interdepartmental consultations for skin cancers were thought to represent[19]).

Dermatologists' caseload has grown in recent decades, with a clear increase in tumor diagnoses.[6,13–15] The economic impact of skin cancer on health systems is growing and clear, and according to a recent study based on data from public hospitals in Portugal, it is 4-fold greater when the overall number of nonmelanoma cases is compared with the number of melanoma cases.[20] Some groups have proposed new forms of multidisciplinary and integrated management of patients with skin tumors.[21] The specialist in medical-surgical dermatology and venereology clearly plays a key role in the care of these patients.

Our study has a series of strengths, such as the methodology used (representative of the demand for dermatologic care) and its sample size, which enabled us to report accurate results. Its limitations include potential error in measuring the ecological variable *climate* (which was generated based on the predominant one and only for purposes of generating a hypothesis).

Conclusion

Almost one-fifth of the caseload of specialists in medical-surgical dermatology and venereology in Spain corresponds to malignant cutaneous tumors. Differences are observed between diagnoses based on factors such as the care setting (public vs. private), the geographic area, and the origin of the consultation and destination at discharge. Additional studies are warranted to analyze these factors and determine whether they are due to geographic, cultural, or organizational aspects or to variability in clinical practice.

Funding

The DIADERM study was promoted by the Healthy Skin Foundation of the Spanish Academy of Dermatology and Venereology (*Fundación Piel Sana de la Academia Española de Dermatología y Venereología*), which received funding from Novartis. The pharmaceutical company did not participate in data collection, data analysis, or interpretation of the results.

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

1. Buendia-Eisman A, Arias-Santiago S, Molina-Leyva A, Gilaberte Y, Fernandez-Crehuet P, Husein-ElAhmed H, et al. Outpatient dermatological diagnoses in Spain: results from the national DIADERM random sampling project. Actas Dermosifiliogr. 2018;109:416–23.
2. Julian CG. Dermatology in general practice. Br J Dermatol. 1999;141:518–20.
3. Ko LN, Kroshinsky D. Dermatology hospitalists: a multicenter survey study characterizing the infrastructure of consultative dermatology in select american hospitals. Int J Dermatol. 2018;57:553–8.
4. Maza A, Berbis J, Gaudy-Marqueste C, Morand JJ, Berbis P, Grob JJ, et al. Evaluation of dermatology consultations in a prospective multicenter study involving a French teaching hospital. Ann Dermatol Venereol. 2009;136:241–8.
5. Murr D, Bocquet H, Bachot N, Bagot M, Revuz J, Roujeau JC. Medical activity in a emergency outpatient department dermatology. Ann Dermatol Venereol. 2003;130:167–70.
6. Holme SA, Scott-Lang VE, Ooi ET, Matthews AG, Darling MI, Needham D, et al. The South-East Scotland dermatology workload study: 30 years' analysis. Br J Dermatol. 2012;167:123–30.
7. Donaldson MR, Coldiron BM. Dermatologists perform the majority of cutaneous reconstructions in the Medicare population: numbers and trends from 2004 to 2009. J Am Acad Dermatol. 2013;68:803–8.
8. Hernandez-Martin A, Arias-Palomo D, Barahona E, Hidalgo C, Munoz C, Garcia-Higuera I. Análisis del tratamiento quirúrgico del cáncer cutáneo no melanoma cuando es realizado por dermatólogos en un hospital público: correlación anatomoclínica, empleo de recursos hospitalarios y tiempo de espera desde el diagnóstico. Actas Dermosifiliogr. 2007;98:694–701.
9. Nolan GS, Kiely AL, Totty JP, Wormald JCR, Wade RG, Arbyn M, et al. Incomplete surgical excision of keratinocyte skin cancers: a systematic review and meta-analysis. Br J Dermatol. 2020, http://dx.doi.org/10.1111/bjd.19660 [in press]. Online ahead of print.
10. McKenna DB, Marioni JC, Lee RJ, Prescott RJ, Doherty VR. A comparison of dermatologists', surgeons' and general practitioners' surgical management of cutaneous melanoma. Br J Dermatol. 2004;151:636–44.
11. Majores M, Bierhoff E. [Actinic keratosis, bowen's disease, keratoacanthoma and squamous cell carcinoma of the skin] German. Pathologe. 2015;36:16–29.
12. Fernandes NF, Sinha S, Lambert WC, Schwartz RA. Cutaneous horn: a potentially malignant entity. Acta Dermatovenerol Alp Pannonica Adriat. 2009;18:189–93.
13. Rogers HW, Weinstock MA, Harris AR, Hinckley MR, Feldman SR, Fleischer AB, et al. Incidence estimate of nonmelanoma skin cancer in the United States, 2006. Arch Dermatol. 2010;146:283–7.
14. Benton EC, Kerr OA, Fisher A, Fraser SJ, McCormack SK, Tidman MJ. The changing face of dermatological practice: 25 years' experience. Br J Dermatol. 2008;159:413–8.
15. Esson GA, Hale D, Holme SA. The evolution of dermatology: dermatological workload in southeast scotland 1921-2010. Clin Exp Dermatol. 2016;41:591–4.

16. Arits AH, Schlangen MH, Nelemans PJ, Kelleners-Smeets NW. Trends in the incidence of basal cell carcinoma by histopathological subtype. J Eur Acad Dermatol Venereol. 2011;25:565–9.
17. Holme SA, Malinovszky K, Roberts DL. Changing trends in non-melanoma skin cancer in South Wales, 1988-98. Br J Dermatol. 2000;143:1224–9.
18. Tilakaratne D, Warren L, Menz J. A casemix study of patients seen by a dermatology trainee in rural and urban outpatient settings. Australas J Dermatol. 2016;57:33–8.
19. Penate Y, Guillermo N, Melwani P, Martel R, Borrego L. Dermatologists in hospital wards: an 8-year study of dermatology consultations. Dermatology. 2009;219:225–31.
20. Duarte AF, Sousa-Pinto B, Freitas A, Delgado L, Costa-Pereira A, Correia O. Skin cancer healthcare impact: a nation-wide assessment of an administrative database. Cancer Epidemiol. 2018;56:154–60.
21. Van der Geer S, Reijers HA, van Tuijl HF, de Vries H, Krekels GA. Need for a new skin cancer management strategy. Arch Dermatol. 2010;146:332–6.