



University of Southern Denmark

Which medical disciplines diagnose and treat melanoma in Europe in 2019?

A survey of experts from melanoma centres in 27 European countries

Kandolf-Sekulovic, L; Peris, K; Stratigos, A; Hauschild, A; Forsea, A-M; Lebbe, C; Lallas, A; Grob, J-J; Harwood, C; Gogas, H; Rutkowski, P; Olah, J; Kelleners-Smeets, N W J; Paoli, J; Dummer, R; Moreno-Ramirez, D; Bastholt, L; Putnik, K; Karls, R; Hoeller, C; Vandersleyen, V; Vieira, R; Arenberger, P; Bylaite-Buckinskiene, M; Ocvirk, J; Situm, M; Weinlich, G; Banjin, M; Todorovic, V; Ymeri, A; Zhukavets, A; Garbe, C

Published in:

Journal of the European Academy of Dermatology and Venereology

DOI:

10.1111/jdv.17086

Publication date:

2021

Document version:

Accepted manuscript

Citation for pulished version (APA):

Kandolf-Sekulovic, L., Peris, K., Stratigos, A., Hauschild, A., Forsea, A.-M., Lebbe, C., Lallas, A., Grob, J.-J., Harwood, C., Gogas, H., Rutkowski, P., Olah, J., Kelleners-Smeets, N. W. J., Paoli, J., Dummer, R., Moreno-Ramirez, D., Bastholt, L., Putnik, K., Karls, R., ... Garbe, C. (2021). Which medical disciplines diagnose and treat melanoma in Europe in 2019? A survey of experts from melanoma centres in 27 European countries. *Journal of the European Academy of Dermatology and Venereology*, 35(5), 1119-1132. <https://doi.org/10.1111/jdv.17086>

Go to publication entry in University of Southern Denmark's Research Portal

Terms of use

This work is brought to you by the University of Southern Denmark.

Unless otherwise specified it has been shared according to the terms for self-archiving.

If no other license is stated, these terms apply:

- You may download this work for personal use only.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying this open access version

If you believe that this document breaches copyright please contact us providing details and we will investigate your claim.

Please direct all enquiries to puresupport@bib.sdu.dk

DR. LIDIJA KANDOLF-SEKULOVIC (Orcid ID : 0000-0002-5221-5068)

PROF. KETTY PERIS (Orcid ID : 0000-0003-1957-6600)

DR. ANA-MARIA FORSEA (Orcid ID : 0000-0002-1007-7883)

DR. AIMILIOS LALLAS (Orcid ID : 0000-0002-7193-0964)

PROF. JEAN-JACQUES GROB (Orcid ID : 0000-0002-0667-153X)

DR. JOHN PAOLI (Orcid ID : 0000-0003-1326-8535)

PROF. REINHARD DUMMER (Orcid ID : 0000-0002-2279-6906)

Article type : Original Article

Which medical disciplines diagnose and treat melanoma in Europe in 2019? A survey of experts from melanoma centers in 27 European countries

L Kandolf Sekulovic¹, K Peris², A Stratigos³, A Hauschild⁴, A-M Forsea⁵, C Lebbe⁶, A Lallas⁷, J-J Grob⁸, C Harwood⁹, H Gogas¹⁰, P Rutkowski¹¹, J Olah¹², NWJ Kelleners-Smeets¹³, J Paoli¹⁴, R Dummer¹⁵, D Moreno-Ramirez¹⁶, L Bastholt¹⁷, K Putnik¹⁸, R Karls¹⁹, C Hoeller²⁰, V Vandersleyen²¹, R Vieira²², P Arenberger²³, M Bylaite-Buckinskiene²⁴, J Ocvirk²⁵, M Situm²⁶, G Weinlich²⁷, M Banjin²⁸, V Todorovic²⁹, A Ymeri³⁰, A Zhukavets³¹ and C Garbe³²

Keywords: melanoma, dermatology, oncology, skin cancer, care pathway, surgery

3322 words, 8 Tables, 1 Figure

¹Department of Dermatology, Faculty of Medicine, Military Medical Academy, Belgrade, Serbia

²Institute of Dermatology, Catholic University of the Sacred Heart, Rome, Italy

³1st Department of Dermatology-Venereology, Andreas Sygros Hospital, National and Kapodistrian University of Athens, Athens, Greece

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/JDV.17086](https://doi.org/10.1111/JDV.17086)

This article is protected by copyright. All rights reserved

- ⁴Department of Dermatology, University Hospital Schleswig-Holstein (UKSH), Campus Kiel, Kiel, Germany
- ⁵Carol Davila University of Medicine and Pharmacy, Elias University Hospital Bucharest, Romania
- ⁶APHP Dermatology Department, University Paris 7 Diderot, INSERM U976 PARIS France
- ⁷First Department of Dermatology, Aristotle University, Thessaloniki, Greece
- ⁸Service de Dermatologie et Cancérologie Cutanée, Hopital de la Timone, Marseille, France
- ⁹Centre for Cell Biology and Cutaneous Research, Blizard Institute, Barts and the London School of Medicine and Dentistry, Queen Mary University of London, London, UK
- ¹⁰1st Department of Internal Medicine, Laiko Hospital, National and Kapodistrian University of Athens, Athens, Greece
- ¹¹Maria Sklodowska-Curie Institute - Oncology Center, Warsaw, Poland
- ¹²University of Szeged, Department of Oncotherapy, Department of Dermatology and Allergology, Szeged, Hungary
- ¹³ Department of Dermatology, Maastricht University Medical Center, Maastricht, the Netherlands
- ¹⁴ Department of Dermatology and Venereology, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
- ¹⁵UniversitätsSpital Zürich-Skin Cancer Center, University Hospital, Zürich, Switzerland
- ¹⁶Department of Clinical Oncology, Hospital Universitario Virgen Macarena, Sevilla, Spain
- ¹⁷Department of Oncology, Odense University Hospital, Denmark
- ¹⁸North Estonia Medical Centre, Tallinn, Estonia
- ¹⁹Derma Clinic Riga, Riga, Latvia
- ²⁰Department of Dermatology, Medical University of Vienna, Vienna, Austria
- ²¹Department of Medical Oncology, Universitair Ziekenhuis Brussel, Vrije Universiteit Brussel (VUB), Brussels, Belgium
- ²²Department of Dermatology, Medical Faculty, University of Coimbra, Portugal
- ²³Department of Dermatovenereology, Charles University 3rd Faculty of Medicine and University Hospital Kralovske Vinohrady, Prague, Czech Republic
- ²⁴Department of Dermatology, Vilnius University, Lithuania
- ²⁵Institute of Oncology Ljubljana, Ljubljana, Slovenia
- ²⁶Department of Oncology, University Hospital Zagreb, Croatia

²⁷Department of Dermatology, Venerology and Allergology, Medical University of Innsbruck, Innsbruck, Austria

²⁸Department of Oncology, University Hospital Sarajevo, Bosnia and Herzegovina

²⁹Clinic for Oncology and radiotherapy, Podgorica, Montenegro

³⁰University Hospital Mother Theresa, Tirana, Albania

³¹Belarusian Medical Academy of Postgraduate Education (BelMAPE), Minsk, Belarus

³²Centre for Dermatocology, Department of Dermatology, Eberhard Karls University, Tuebingen, Germany

Corresponding author: Lidija Kandolf Sekulovic, Department of Dermatology and Venereology, Faculty of Medicine, Military Medical Academy, Crnotravska 17, 11000 Belgrade, Serbia, Phone: +381112661122, Fax: +381112666164, e-mail: lkandolsekulovic@gmail.com

The study received no funding. None of the authors have received any payment or incentive to complete the survey.

Conflicts of interest

This study received no funding. None of the authors have received any payment or incentive to complete the survey. Authors declare no relevant conflict of interest for any aspect of submitted work. Relevant financial activities outside the submitted work are listed.

LKS: personal fees and non-financial support from MSD, personal fees from Novartis, Roche, BMS, Abbvie, outside the submitted work.

KP: personal fees from Almirall, Abbvie, Biogen, Eli Lilly, Celgene, Galderma, Leo Pharma, Novartis, Pierre Fabre, Sanofi, Sandoz, Sun Pharma, Janssen, outside the submitted work;

AS: personal fees and/or research support from Novartis, Roche, BMS, Abbvie, Sanofi, Regeneron, Genesis Pharma outside the submitted work.

AH: grants and personal fees from BMS, Novartis Pharma, MerckSerono, MSD/Merck, Philogen, Pierre Fabre, Provectus, Regeneron, Roche, Sanofi-Genzyme, personal fees from Amgen, OncoSec, Almirall Hermal, Sun Pharma, outside the submitted work.

AMF: personal fees from Merk, Novartis, Solartium, non-financial support from Leo Pharma, La Roche Posay, outside the submitted work

CL: Grants and personal fees from Bristol-Myers Squibb, Roche, personal fees from MSD, Novartis, Amgen, Avantis Medical Systems, Pierre Fabre, Pfizer, Incyte, Merck Serono, Sanofi, outside the submitted work;

JJG: personal fees and non-financial support from BMS, Novartis, MSD, personal fees from Roche, Amgen, Pierre Fabre, Merck, Pfizer, Sanofi, outside the submitted work;

HG: grants and personal fees from BMS, Roche, MSD, personal fees from Novartis, personal fees from Amgen, Pierre Fabre, outside the submitted work;

PR: personal fees from Novartis, MSD, BMS, Roche, Pfizer, Blueprint Medicines, Pierre Fabre, outside the submitted work;

NKS: personal fees from Janssen, Galderma, AbbVie, outside the submitted work; .

RD: grants and personal fees from Novartis, MSD, BMS, Roche, Amgen, Takeda, Pierre Fabre, Sun Pharma, Sanofi, Catalym, Second Genome outside the submitted work;

LB: personal fees from advisory boards BMS, Novartis, Merck/MSD, personal fees from Swedish Orphan, Bayer, Incyte, outside the submitted work;

KP: grants and personal fees from Almirall and AbbVie, and personal fees from Biogen, Lilly, Celgene, Galderma, Leo Pharma, Novartis, Pierre Fabre, Sanofi, Sandoz, SunPharma and Janssen, outside the submitted work.

CH: personal fees from MSD, Roche, Novartis, BMS, Pierre Fabre, outside the submitted work;

JO: personal fees from Roche, Merck, MSD, Lilly, BMS, Sanofi, Novartis, outside the submitted work;

VT: personal fees and non-financial support from Roche, Novartis, Sanofi, Astra Zeneca, MSD, Merck, outside the submitted work;

CG: grants and personal fees from Novartis, NeraCare, BMS, Roche, Philogen, Sanofi, personal fees from Amgen, MSD, outside the submitted work;

Abstract

Background and objectives: The incidence of melanoma is increasing. This places significant burden on societies to provide efficient cancer care. The European Cancer Organisation recently published the essential requirements for quality melanoma care. The present study is aimed for the first time to roughly estimate the extent to which these requirements have been met in Europe. **Materials and methods:** A web-based survey of experts from melanoma centers in 27 European countries was conducted

from 1 February to 1 August, 2019. Data on diagnostic techniques, surgical and medical treatment, organisation of cancer care and education were collected and correlated with national health and economic indicators and mortality-to-incidence ratio (MIR) as a surrogate for survival. Univariate linear regression analysis was performed to evaluate the correlations. SPSS software was used. Statistical significance was set at $p < 0.05$. **Results:** The MIR was lower in countries with a high health expenditure per capita and with a higher numbers of general practitioners (GPs) and surgeons per million inhabitants. In these countries, GPs and dermatologists were involved in melanoma detection; high percentage of dermatologists used dermatoscopy and were involved in the follow-up of all melanoma stages; both medical oncologists and dermatologists administered systemic treatments and patients had better access to sentinel lymph node biopsy and were treated within multidisciplinary tumour boards. **Conclusion:** Based on these first estimates, the greater involvement of GPs in melanoma detection; the greater involvement of highly trained dermatologists in dermatoscopy, dermatosurgery, follow-up and the systemic treatment of melanoma; and the provision of ongoing dermato-oncology training for pathologists, surgeons, dermatologists and medical oncologists are necessary to provide an optimal melanoma care pathway. A comprehensive analysis of the melanoma care pathway based on clinical melanoma registries, will be needed to more accurately evaluate these first insights.

Introduction

In a world with an aging population and inadequate primary prevention strategies for UV protection, the incidence of melanoma and nonmelanoma skin cancer is increasing. This has placed a significant burden on societies and presented challenges for healthcare systems to provide efficient care for skin cancer patients and their families (1–6). In cooperation with several professional organisations, including the European Association for Dermato-Oncology, the European Society of Medical Oncology and the European Society of Surgical Oncology (7), the European Cancer Organisation (ECCO) recently published the essential requirements for quality melanoma care. They include the establishment of cancer care pathways that cover the entire patient journey. Also indicated are treatment by multidisciplinary teams in dedicated melanoma centres with patient-centred approaches, audits and quality assurance assessments of outcomes, the education of health

care professionals and the availability of a high-quality cancer registration system (7). Melanoma care pathways, similar to those described by ECCO, have been developed in the United Kingdom (UK) and Australia (8,9).

The data on the organisation of melanoma care in Europe were obtained from previous studies on melanoma and skin cancer care. In 2012, Trakatelli et al. analysed the patient care pathways in 10 countries. Their focus was dermatologist availability, time to dermatologic consultation and follow-up (10). A 2013 European Dermatology Health Care Survey evaluated the dermatology workforce and healthcare in 33 European countries (11). The Eurodermoscopy study of the International Dermoscopy Society provided a comprehensive analysis of the availability and clinical use of dermatoscopy in 32 European countries (12,13). A recent study analysed the global oncology workforce (14). These studies found a relationship between the provision of skin cancer care and disease outcomes (5,6). Furthermore, a recent article documented a lack of access to medicines for metastatic melanoma, that could exacerbate the survival disparities (15).

The present study gathered comprehensive data on skin cancer diagnosis and treatment practices in Europe to assess compliance with the essential requirements and to highlight the barriers to improving melanoma care.

Materials and methods

A web-based survey of 32 experts from melanoma centers (23 dermato-oncologists [i.e. dermatologists with a specialty in oncology], 8 medical oncologists and 1 oncological surgeon) in 27 European countries was conducted from 1 February to 1 August 2019. The participants were identified through their publications and leadership positions in national and European scientific organisations. A small proportion (15–25%) of the data were retrieved from the available national databases and scientific organisations, and a majority (75–85%) were estimations from current practice. The survey questionnaire collected data on melanoma care pathways (Table S1, supplementary material). This was supplemented with and examined against the physician workforce data from other sources (number of general practitioners and surgeons, 2016 European Commission report; number of dermatologists, Dermasurvey; and number of oncologists, the American Society of Clinical Oncology survey) (11,14,16,17–19). The data were further correlated with gross national income (GNI) per capita, health expenditure per capita (HEPC), universal health coverage

service (UHC; retrieved from the World Bank 2018 database) and mortality-to-incidence ratio (MIR) as a surrogate for survival for 2018 (17–19). The estimated European standard mortality and incidence rates for 2018 were retrieved from the European Cancer Information System (18). The countries were classified as Northern, Western, Southern and Eastern Europe on the basis of the United Nations geoscheme.

The correlations between the variables were estimated with Spearman's, point-biserial or rank-biserial correlation coefficients. The correlations between the dependent variables and the potential predictors were analysed with univariate linear regression in SPSS software. A *p*-value less than 0.05 was considered significant. Multivariate analysis was not performed because of the unfavourable ratio of potential predictors to outcomes.

Results

Medical specialties and diagnostic techniques regarding melanoma detection

The survey respondents indicated that the detection of melanoma and skin cancer was done mainly by dermatologists in 18 (67%) European countries (Table 1). In three countries (Denmark, UK and Hungary), general practitioners (GPs) also played a significant role. In Belarus, mainly oncologists were involved in skin cancer detection. In Montenegro and Poland, surgeons were mainly involved (Table 1).

The respondents in every country indicated that dermatoscopy was used for melanoma and skin cancer detection. However, the percentage of dermatologists using this technique varied from 10% in Belarus to nearly 100% in Germany, the Netherlands and Spain. There was a statistical difference in the use of dermatoscopy in Northern and Western Europe (NWE) and Southern and Eastern Europe (SEE; 98% vs. 77%, *p* < 0.05).

According to the respondents, computerised digital dermatoscopy was available in 19 (70%) countries. In NWE, computerised digital dermatoscopy was available in university centres (60%) and private practice settings (25%). In SEE, it was used mainly in private practice (48%) and less commonly in university centres (32%). Reflectance confocal microscopy was

available in 15 countries (7/11 in NWE and 8/15 in SEE, $p > 0.05$), and optical coherence tomography was available in 4 countries in university centres only.

Melanoma surgery and histopathology

According to the respondents, excisions with primary closure and excisions with skin flaps for melanoma and skin cancer were performed by dermatologists, plastic, ENT/maxillofacial and oncological surgeons in 26 (96%) and 17 (63%) countries, respectively (Table 2). Surgical procedures with skin grafts were performed by plastic and ENT/maxillofacial surgeons in every country and also by dermatologists in 13 (48%) countries. Microscopically controlled surgery (Mohs micrographic surgery, surgery with 3D histology) was unavailable or not used in melanoma treatment in 10 (37%) countries. According to the respondents, this procedure was performed by dermatologists in 13 (48%) countries, plastic surgeons in 12 (44%) countries, maxillofacial surgeons in 3 (11%) countries and oncological surgeons in Poland. Sentinel lymph node biopsy (SLNB) was performed by oncological surgeons in 21 (78%) countries, plastic surgeons in 16 (59%), maxillofacial surgeons in 13 (48%) and dermatologists in 6 (22%) countries. In Poland and Belarus, there were medical specialty-related restrictions on skin cancer surgery.

Histopathology for skin cancer diagnosis was performed by dermatopathologists and pathologists in 9 (33%) countries. In 17 (63%) countries, dermatologists were not involved in the histopathological diagnosis of skin cancer because only pathologists were allowed to sign histopathological reports.

Systemic treatment of metastatic melanoma

Metastatic melanoma patients were treated by medical oncologists in all European countries and by dermato-oncologists in 9 (33%). The systemic treatment of stages III and IV melanoma was administered (for $\geq 70\%$ patients) mainly by medical oncologists in 21 countries and by dermato-oncologists in Austria, France, Germany, the Czech Republic and Hungary (Table 3). Intralesional treatment was administered by dermato-oncologists in 13 countries, medical oncologists in 14 and surgical oncologists in 7 countries. In 15 countries, there were legislative and/or reimbursement restrictions on the prescription of systemic melanoma treatment by specialists other than medical oncologists. Clinical trials were performed by specialists who were already involved in the systemic treatment of melanoma.

Organisation of melanoma care

In this survey, melanoma care units (i.e. pigment lesion clinics, urgent access melanoma specialty care clinics) were defined as clinics in which patients with suspected melanoma had fast access to and priority status for surgical treatment and diagnostic work-up on the basis of primary care (GPs, primary care dermatologists). It was estimated that quick access upon primary care referrals was available in 19 (70%) countries: all the countries in NWE and 8 (53%) in SEE (Table 4).

The follow-up for low-risk melanoma was organised in mainly general hospitals in 15 countries, in tertiary and comprehensive cancer centres in 10 countries and in mainly private practice settings in 2 countries (Table 5). Dermatologists were primarily responsible for the follow-up of low-risk melanoma (83% of countries of NWE, 67% of countries in SEE). For localized high-risk melanoma, dermatologists were responsible for follow-up in 9/12 (75%) of NWE countries, and 7/15 (47%) countries of SEE. Medical oncologists and surgeons were also involved in follow-up in 5/15 (33%) and 3/15 (20%) countries, respectively. In Portugal, GPs were reportedly responsible for follow-up of all localized melanoma cases. Patients with stage III melanoma were referred mainly to tertiary or comprehensive cancer centres. Oncologists were responsible for follow-up in 11 countries, dermatologists in 9 and surgeons in 5 countries.

Quality assurance, auditing and the accreditation of oncology centres are also essential to the establishment and maintenance of high-quality cancer care. The process of accreditation differs between countries. Any type of accreditation process for oncology centres were found to be established in 15 countries (67% in NWE, 47% in SEE). Thirteen of these countries had quality control processes (58% in NWE, 40% in SEE). MBT were organised by dermatologists in 16 countries, medical oncologists in 11 and by both in 3 countries, while surgeons were also involved in 7 countries.

The survey data indicated that melanoma patients had access to multidisciplinary tumour boards (MTBs) in 23/27 (85%) countries and the following core medical specialties: medical oncologists (27 countries), surgeons (27 countries), dermatologists (23 countries), radiotherapists (24 countries), pathologists (22 countries) and radiologists (22 countries). Molecular oncology tumour boards were available in 10 countries (4/12 in NWE and 6/15 in SEE; Table 4).

Melanoma registries in Europe

Table 6 presents the availability of melanoma registries in Europe. National population cancer registries were established in 17/24 (71%) countries (90% in NWE, 50% in SEE), and melanoma clinical registries were available in 13/24 (54%) countries (50% in NWE, 57% in SEE).

Education

Skin cancer detection educational programs for GPs were organised in 17 countries (73% in NWE, 60% in SEE). Dermatoscopy training was an official aspect of dermatology residency programs in 20 (74%) countries (Table 7). However, it was also provided in other countries through dermatoscopy courses and mentorship during residency (Table 7). Dermatosurgery training during dermatology residency was available in 22 countries (92% in NWE, 73% in SEE), and dermato-oncology training was available in 22 countries (75% in NWE, 87% in SEE). In 11 countries (50% in NWE, 33% in SEE), a dermatopathology subspecialty was available to dermatologists and pathologists, and in 2 countries, it was available to pathologists only. In the 11 countries in which this was not available, dermatologists faced legislative hurdles to perform histopathological analyses of skin cancer. Subspecialty training in dermatosurgery was available in 8 countries (5 in NWE, 3 in SEE), and subspecialty training in oncology was available for dermatologists in 8 countries (33% in NWE, 27% in SEE; Table 7).

Correlation of economic and healthcare organisation variables with melanoma mortality-to-incidence ratio

The MIR was calculated from data obtained from the European Cancer Information System (18,20). It was correlated with the data on 1-year, 5-year and conditional 5-year survival from the EURO CARE-5 study of 18 countries for the same year (5). A highly significant correlation was found, thus supporting the effectiveness of the MIR as a surrogate marker for survival in the absence of population-based survival data (supplementary material, Table S2). A higher MIR was associated with lower survival rates (Table 8).

The MIR was found to be significantly lower in countries with a higher GNI per capita, HEPC and UHC ($p < 0.001$) and in those with a higher number of GPs and surgeons per million inhabitants, higher number of GPs involvement in skin cancer detection and higher

percentage of dermatologists using dermatoscopy. In the countries where surgeons and oncologists were also involved in the clinical diagnosis of melanoma, the MIR was higher (Fig. 1). The percentage of melanoma patients who underwent SLND (if indicated) was higher in countries with a lower MIR. In the countries where surgical procedures with skin flaps and skin grafts were performed by dermatologists and the histopathology of skin cancer was performed by pathologists and dermato-pathologists, the MIR was significantly lower. The MIR was also lower in countries where dermatologists were involved in the follow-up of stage IB–IIC patients and dermatologists and oncologists were responsible for the follow-up and systemic treatment of stage III and IV patients. In countries where only medical oncologists were responsible for the follow-up of stage III patients, the MIR was significantly higher. The limitations in the prescription of systemic melanoma therapy and restrictions on reimbursement seemed to be correlated with a higher MIR (Table 8). Access to MTBs was significantly associated with a lower MIR, particularly in countries in which they were organised by dermatologists.

Because the economic parameters were significantly correlated with the MIR, further analysis was done to explore the effects of the relationship between HEPC and various aspects of the healthcare system on the melanoma care pathway (supplementary material, Table S3). In countries with a higher HEPC, the GPs and/or dermatologists were educated in the early detection of skin cancer; a higher percentage of dermatologists used dermatoscopy; a higher percentage had a higher level of education in dermatologic surgery, dermatopathology and the systemic treatment of melanoma; and they had a greater involvement in the follow-up and systemic treatment of stage IB–III cancer. In countries with a lower HEPC, oncologists or surgeons were responsible for skin cancer detection. In contrast, the workforce (number of dermatologists, pathologists, surgeons and oncologists) and the estimated access to computerised digital dermatoscopy and sentinel lymph node dissection were not correlated with the HEPC ($p > 0.05$).

Discussion

Melanoma was the seventh most frequently diagnosed cancer in the European Union in 2012. The highest incidence and mortality rates were recorded in the Nordic countries, and the lowest, in Southern Europe (1–4,21,22). However, when the mortality-to-incidence ratio (MIR) was used as a proxy for the fatality rate, the highest MIR was in Central and Eastern Europe, and the lowest was in Western Europe (6). In addition, the recorded

survival rates ranged from <50% in Eastern and Southeast Europe to >90% in the Nordic countries (5,22). Recent data from Germany indicated that the mortality rates were stabilising, and even decreasing, in the Northwest countries (22,23). This was attributed to nationwide screening campaigns and the widespread use of effective systemic treatments for metastatic disease (24). In most of Eastern Europe, the first prevention campaigns were introduced in 2008; less effective melanoma care and significant delays in access to effective systemic treatments led to lower survival rates (15,23,25).

The ECCO recently developed essential requirements for an optimal melanoma care pathway. However, the current survey found significant differences in the extent to which the countries had met these requirements (7). In the countries where GPs and dermatologists were educated and actively involved in clinical diagnosis of skin cancer and a higher percentage of dermatologists were using dermatoscopy, the MIR seemed to be lower (Fig. 1, Table 7). On the contrary, the countries in which surgeons and oncologists were also involved in clinical diagnosis of skin cancer had the highest MIR. This highlights the need for patients to have broader access to medical professionals who are skilled in the detection of skin cancer, with dermatologists trained in dermatoscopy being the leaders in the field. These results confirm those of recent studies in the United States where a lower MIR was found to be correlated with dermatologist and primary care provider density (26,27). The active collaboration of dermatologists and GPs in the early diagnosis of skin cancer is crucial to preventing dermatology offices from being overloaded with unselected patients, thereby making access for patients with skin cancer very difficult (28–30). In this regard, education of GPs in skin cancer detection and dermatologists in dermatosurgery and dermatopathology is very important. In the current survey, advanced education in dermatosurgery and dermatopathology was found to be available in countries with a lower MIR. Also, skin cancer educational programs for general practitioners were estimated to be available in 73% of the countries in NWE and 60% of those in SEE. Detailed analysis of dermato-oncology education in Europe was outside of the scope of this article and is planned for future studies.

A recent study found that not only late diagnosis but also less effective melanoma care can explain the persistent mortality disparities in Europe (31). In previous studies, quick access to pigmented lesion clinics was associated with higher rates and the earlier detection of melanoma (32–36). The current study found that melanoma care units with fast

access upon primary care referrals (i.e. pigment lesion clinics) were established in approximately 92% of the countries in NWE and 53% of those in SEE. In previous studies, the presence of active MTBs led to better outcomes for cancer patients (37). The current study found that the existence of MTBs was also significantly correlated with a lower MIR, particularly in countries where dermatologists were responsible for their organisation. In addition, the MIR was lower in countries in which there was better access to diagnostic SLND, dermatologists were involved in the follow-up of stage IB–IIC patients and dermatologists and oncologists were responsible for the follow-up and systemic treatment of stage III and IV melanoma patients. Limitations in the prescription of systemic melanoma therapy or medical specialty-related restrictions in reimbursement seemed to be correlated with a higher MIR (Table 7). This highlights the need for integrated melanoma patient care from diagnosis through follow-up and treatment in centres of excellence where dermatology services could play the primary role, as indicated in the ECCO's essential requirements (7).

Melanoma clinical registries, which are essential for the monitoring and quality control of diagnostic and treatment processes, were available in 54% of the countries (50% in NWE and 57% in SEE). This was consistent with the population-based registry data generated from more comprehensive analyses (18, 38, 39). In recent decades, significant improvements have been made in registration, particularly with the establishment of the European Cancer Information System. However, there is still a need for the further development of population and melanoma clinical registries to improve quality control in melanoma care (18, 38, 39).

A limitation of the current study is that it is an expert survey. A small proportion of the data were retrieved from the available national databases and national associations. The majority of the information was estimations from the current clinical practice of dermatologists, medical oncologists and surgeons. However, these estimates correspond to the findings of previous studies (11,14). They can therefore be considered relevant, especially for the countries in which clinical data registries and healthcare audit data were not available.

The use of MIR as a proxy for fatality rates is not ideal. Indeed, the best-organised health systems tend to collect more accurate incidence data, while most of the countries do collect mortality data; thus, artificially higher ratios were found in the less organised health

systems. Nevertheless, the MIR was found to be well correlated with the survival rates documented in the EURO CARE-5 study (supplementary material, Table S2). In the present study, many interacting variables were examined; thus, statistical reliability could not be achieved. However, some interesting trends were identified, and care was taken to avoid interpreting systematic associations and correlations as causal relationships.

The intention of the study was to provide an overview of the diagnosis and treatment of melanoma and skin cancer by the various medical specialties throughout Europe. In addition, the study aimed to estimate the extent to which the ECCO-recommended ideal melanoma care pathway had been implemented and to find exemplars that could guide improvements in the pathways in the various countries. In future studies, melanoma care pathways can be analysed on the basis of individual cases; however, national registries and/or European melanoma registry would need to be fully established in a majority of the countries to provide reliable data.

Conclusions

The incidence of skin cancer has been increasing throughout Europe; thus, healthcare systems should strive to fulfil the essential requirements for optimal care. The first estimates from this study suggest that skin cancer patients need integrated care that involves dermatologists and GPs skilled in skin cancer detection, as well as surgeons (e.g. dermatosurgeons, plastic surgeons, ENT/maxillofacial surgeons and surgical oncologists) in the initial surgical treatment. For lower-risk patients, optimal care also includes referrals to dermatologists for follow-up, and for patients with metastatic disease, it includes referrals to dermatologists and oncologists for follow-up and treatment. The involvement of a higher number of professionals in patient care could contribute to lower mortality rates. It seems, that the greater involvement of dermatologists who are highly trained in dermatoscopy, dermatosurgery and follow-up and treatment of melanoma may secure an optimal melanoma care pathway for patients. To confirm these estimates, melanoma care pathways can be analysed on the basis of individual cases and this should be explored in future studies.

List of abbreviations: ECCO, European Cancer Organisation; EADO, European Association of Dermato-Oncology; NICE, UK National Institute for health and care excellence; GP, general practitioner; GNI, gross national income; HEPC, health expenditure

per capita; UHC, universal health coverage; NWE, North and Western Europe; CEE, Central and Eastern Europe; SEE, Southeastern Europe; MIR, mortality to incidence ratio; SLND, sentinel lymph node biopsy; DER, dermatologists; SURG, surgeons; ONC, medical oncologists; CDD, computerised digital dermatoscopy; RCM, reflectance confocal microscopy; OCT, optical coherence tomography; D, dermatologists; PS, plastic surgeons; MFS, maxillofacial surgeons; OS, oncological surgeons; GS, general surgeons; P, pathologist; R, radiologist; RT, radiotherapist; SLND, sentinel lymph node dissection; MTB, multidisciplinary tumor board; ALB, Albania; AUT, Austria; BLR, Belarus; BEL, Belgium; BIH, Bosnia and Herzegovina; HRV, Croatia; CZE, Czech Republic; DNK, Denmark; EST, Estonia; FRA, France; DEU, Germany; GRC, Greece; HUN, Hungary; IT, Italy; LVA, Latvia; LTU, Lithuania; MNE, Montenegro; NLD, the Netherlands; POL, Poland; PRT, Portugal; ROU, Romania; SRB, Serbia; SVN, Slovenia; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom.

Acknowledgements

Statistical analysis and interpretation were completed with the assistance of Zoran Bukumiric, Associate Professor of Statistics, Institute of Medical Statistics, Faculty of Medicine, University of Belgrade, Serbia.

Appendix. Supplementary data

References:

1. Sacchetto L, Zanetti R, Comber H, et al. Trends in incidence of thick, thin and in situ melanoma in Europe. *Eur J Cancer* 2018;**92**:108–18.
2. Ferlay J, Colombet M, Soerjomataram I, et al. Cancer incidence and mortality patterns in Europe: Estimates for 40 countries and 25 major cancers in 2018. *Eur J Cancer* 2018;**103**:356–87.
3. Stang A, Khil L, Kajüter H, et al. Incidence and mortality for cutaneous squamous cell carcinoma: comparison across three continents. *J Eur Acad Dermatol Venereol* 2019;**33**(8):6–10.
4. Leiter U, Keim U, Eigentler T, et al. Incidence, mortality, and trends of nonmelanoma skin cancer in Germany. *J Invest Dermatol* 2017;**137**:1860–7.

5. Crocetti E, Mallone S, Robsahm TE, et al.; EUROCARE–5 Working Group:. Survival of patients with skin melanoma in Europe increases further: results of the EUROCARE–5 study. *Eur J Cancer* 2015;**51**(15):2179–90.
6. Forsea AM, Del Marmol V, Stratigos A, Geller AC. Melanoma prognosis in Europe:far from equal. *Br J Dermatol* 2014;**171**(1):179–82.
7. Wouters MW, Michielin O, Bastiaannet E, et al. ECCO essential requirements for quality cancer care: melanoma. *Crit Rev Oncol Hematol* 2018;**122**:164–78.
8. NICE Pathways: managing melanoma NICE, 2020. Available at: <http://pathways.nice.org.uk/pathways/melanoma>
9. Optimal cancer care pathway for people with melanoma. Cancer Council Australia. Available at: www.cancer.org.au/ocp
10. Trakatelli M, Siskou S, Proby C, et al.; EPIDERM. The patient journey: a report of skin cancer care across Europe. *Br J Dermatol* 2012;**167**(2):43–52.
11. DERMASurvey, European Dermatology Health Care Survey 2013. Institute for Health Services Research in Dermatology and Nursing. Available at: <https://www.dermasurvey.eu/derma-survey/>
12. Forsea AM, Tschandl P, Zalaudek I, et al. The impact of dermoscopy on melanoma detection in the practice of dermatologists in Europe: results of a pan-European survey. *J Eur Acad Dermatol Venereol* 2017;**31**(7):1148–56.
13. Forsea AM, Tschandl P, Del Marmol V, Zalaudek I, Soyer HP; Eurodermoscopy Working Group, Geller AC, Argenziano G. Factors driving the use of dermoscopy in Europe: a pan-European survey. *Br J Dermatol* 2016;**175**(6): 1329–37.
14. Mathew A. Global survey of clinical oncology workforce. *J Glob Oncol* 2018;**4**:1–12.
15. Kandolf Sekulovic L, Guo J, Agarwala S, et al. Access to innovativemedicines for metastatic melanoma worldwide: Melanoma World Society and European Association of Dermato-oncology survey in 34 countries. *Eur J Cancer*;**104**:201–9.
16. World Bank Group. Available at: <http://www.worldbank.org/>.
17. Healthcare personnel statistics – physicians. European Commission report, 2017. Available at: <https://ec.europa.eu/eurostat>
18. European Cancer Information system – incidence and mortality estimates. Available at: <https://ecis.jrc.ec.europa.eu/>
19. Mortality to incidence ratio. Available at: ncci.canceraustralia.gov.au/outcomes/mortality-incidence-ratio/mortality-incidence-ratio

20. Ferlay J, Steliarova-Foucher E, Lortet-Tieulent J, et al. Cancer incidence and mortality patterns in Europe: estimates for 40 countries in 2012. *Eur J Cancer* 2013;**49**(6):1374–403.
21. Nikolaou, V, Stratigos AJ. Emerging trends in the epidemiology of melanoma. *Br J Dermatol* 2014;**170**(1):11–9.
22. Barbaric J, de Vries E, Bray FI, et al. Changing epidemiology of malignant cutaneous melanoma in Europe 1953–1997: rising trends in incidence and mortality but recent stabilizations in Western Europe and decreases in Scandinavia. *Int J Cancer* 2003;**107**(1):119–26.
23. Znaor A, van den Hurk C, Primic-Zakelj M, et al. Cancer incidence and mortality patterns in Southeastern Europe in the last decade: gaps persist compared with the rest of Europe. *Eur J Cancer* 2013;**49**(7):1683–91.
24. Hübner J, Hübner F, Terheyden P, Katalinic A. Turning point in skin cancer mortality: an analysis of the trend in Germany from 1998 to 2017. *Hautarzt* 2019;**70**(12):989–92.
25. Stratigos AJ, Forsea AM, van der Leest RJ, et al. Euromelanoma: a dermatology-led European campaign against nonmelanoma skin cancer and cutaneous melanoma. Past, present and future. *Br J Dermatol* 2012;**167**(2):99–104.
26. Fleming NH, Grade MM, Bendavid E. Impact of primary care provider density on detection and diagnosis of cutaneous melanoma. *PLoS One*. 2018;**13**(7):e0200097.
27. Hopkins ZH, Moreno C, Carlisle R, Secrest AM. Melanoma prognosis in the United States: identifying barriers for improved care. *J Am Acad Dermatol* 2019;**80**(5):1256–62.
28. Duarte AF, da Costa-Pereira A, Del-Marmol V, Correia O. Are general physicians prepared for struggling skin cancer? Cross-sectional study. *J Cancer Educ* 2018;**33**(2):321–4.
29. Argenziano G, Giacomel J, Abramavicus A, et al. Improving triage and management of patients with skin cancer: challenges and considerations for the future. *Expert Rev Anticancer Ther* 2012;**12**(5):609–21.
30. Moscarella E, Lallas A, Longo C, et al. Five-point checklist for skin cancer detection in primary care. *G Ital Dermatol Venereol* 2019;**154**(5):523–8.
31. Minicozzi P, Walsh PM, Sánchez MJ, et al; EURO CARE-5 Working Group. Is low survival for cancer in Eastern Europe due principally to late stage at diagnosis? *Eur J Cancer* 2018;**93**:127–37.

32. Lipworth AD, Park JM, Trefrey BL, et al. Urgent access to a specialty care melanoma clinic is associated with a higher rate of melanoma detection. *J Am Acad Dermatol* 2011;**64**(6):1060–7.
33. Pacifico MD, Pearl RA, Grover R. The UK government two-week rule and its impact on melanoma prognosis: an evidence-based study. *Ann R Coll Surg Engl* 2007;**89**(6):609–15.
34. Pacifico MD, Grover R, Sanders R. Use of an early-detection strategy to improve disease control in melanoma patients. *Br J Plast Surg* 2004;**57**(2):105–11.
35. Lynch M, Tierney E, Roche L, et al. Melanoma diagnosis and management after the introduction of a pigmented lesion clinic in the Mid-West of Ireland. *Ir J Med Sci* 2017;**186**(3):671–5.
36. Carli P, De Giorgi V, Nardini P, et al. Melanoma detection rate and concordance between self-skin examination and clinical evaluation in patients attending a pigmented lesion clinic in Italy. *Br J Dermatol* 2002;**146**(2):261–6.
37. Prades J, Remue E, van Hoof E, Borrás JM. Is it worth reorganising cancer services on the basis of multidisciplinary teams (MDTs)? A systematic review of the objectives and organisation of MDTs and their impact on patient outcomes. *Health Policy* 2015;**119**(4):464–74.
38. Forsea AM. Cancer registries in Europe – going forward is the only option. *Ecanermedicalscience*. 2016;**10**:641.
39. European Network of Cancer Registries. Available at: <https://www.enrcr.eu>

Author Manuscript

Country	Medical specialty involved (%)*				Dermatologist using dermatoscopy (%)	Availability of diagnostic techniques		
	DER	GP	SURG	ONC		CDD	RCM	OCT
Northern Europe								
Denmark	45	45	5	5	92	no	no	no
Estonia	70	10	20	0	-	no	no	no
Latvia	75	10	1	10	80	yes	yes	no
Lithuania	30	0	30	10	51	yes	no	no
Sweden	30	20	0	0	100	no	no	no
UK	50	30	15	5	99	yes	yes	yes
Western Europe								
Austria	30	15	5	0	97	yes	yes	no
Belgium	100	0	0	0	90	yes	yes	no
France	30	5	5	0	65	yes	yes	no
Germany	30	20	0	0	100	yes	yes	yes
The Netherlands	70	30	0	0	100	yes	yes	yes
Switzerland	70	20	10	0	99	no	no	no
Southern Europe								
Albania	50	10	30	10	96	yes	yes	yes
Bosnia and Herzegovina	38	2	0	0	60	no	no	no
Croatia	30	10	5	2	69	yes	no	no
Greece	70	5	20	5	75	yes	yes	no

This article is protected by copyright. All rights reserved

Italy	70	5	10	5	80	/es	yes	yes
Montenegro	30	10	40	20	25	ro	no	no
Portugal	30	15	4	1	90	/es	yes	no
Serbia	35	5	20	10	70	ro	no	no
Slovenia	30	20	0	0	90	/es	no	no
Spain	100		0	0	80	/es	yes	no
Eastern Europe								
Belarus	5	5	5	80	10	/es	no	no
Czech Republic	30	2	6	2	80	/es	no	no
Hungary	30	25	10	5	90	/es	yes	no
Poland	50	5	5	10	60	/es	yes	no
Romania	30	5	10	0	-	/es	yes	no
Median/total (%)	73	10	10	5	80	20	15	5

Country	Type of surgery					SLNB availability* (%)
	Surgery with primary closure	Surgery with skin flaps	Surgery with skin grafts	Microscop. controlled surgery	SLNB	
Northern Europe						
Denmark	D, PS, GS	PS	PS	Not used	PS	98
Estonia	D, PS, MFS/ENT, OS	PS, MFS/ENT, GS, OS	MFS/ENT, OS, PS	Not used	MFS/ENT, OS	95
Latvia	D, PS, MFS/ENT, OS, GS	D, MFS/ENT	PS, MFS	Not available	OS	75
Lithuania	D, PS, MFS/ENT, OS	PS, MFS/ENT, OS, GS	PS, OS, MFS/ENT	PS	PS, OS	60
Sweden	D, PS, MFS/ENT, GS	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	D	MFS/ENT, GS	90
UK	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	D, PS, MFS/ENT, OS	D, PS	PS	80
Western Europe						
Austria	D, PS, GS	D, PS, GS	D, PS, GS	D, PS	D, PS	95
Belgium	D, PS, MFS/ENT, OS	D, PS, MFS/ENT	D, PS, MFS/ENT	D, PS	OS	85
France	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	PS, MFS/ENT, OS	PS, MFS/ENT, OS	PS, MFS/ENT, OS	90
Germany	D, PS, MFS/ENT, OS	D, PS, MFS/ENT, GS	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	D, MFS/ENT	90
The Netherlands	D, PS, MFS/ENT	D, PS, MFS/ENT	D, PS, MFS/ENT, OS, GS	D	MFS/ENT, OS	90
Switzerland	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	D, PS, MFS/ENT	D, PS	PS, MFS/ENT	80
Southern Europe						
Albania	D, PS, MFS/ENT, OS, GS	PS, OS, GS	PS, OS	PS	OS	20
Bosnia and Herzegovina	D, PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS, GS	PS, MFS/ENT	Not available	PS	95
Croatia	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS	Not available	PS, MFS/ENT, OS	95
Greece	D, PS, MFS/ENT, OS, GS	D, PS, OS, GS	D, PS, OS	Not available	PS, OS	95

Italy	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS, GS	D, PS, MFS/ENT	D, PS, MFS/ENT, OS, GS	50
Montenegro	PS, GS	PS	PS	Not available	PS	90
Portugal	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT, OS	D	D, PS, OS	90
Serbia	D, PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS	PS, MFS/ENT, OS	D**	PS, MFS/ENT, OS	40
Slovenia	D, PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS, GS	PS, MFS/ENT, OS	Not available	OS	95
Spain	D, PS, MFS/ENT, GS	D, PS	D, PS	D	D, PS, MFS/ENT, GS	95
Eastern Europe						
Belarus	MFS/ENT, OS, GS	PS, MFS/ENT, OS	PS, MFS/ENT, OS	Not available	OS	20
Czech Republic	D, PS, MFS/ENT, GS	D, PS, MFS/ENT, GS	D, PS, MFS/ENT	D	D, PS, MFS/ENT, OS, GS	95
Hungary	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT	D, PS, MFS/ENT	PS	PS, MFS/ENT, OS, GS	70
Poland	D, PS, OS, GS	PS, OS	PS, OS	PS, OS	OS	90
Romania	D, PS, MFS/ENT, OS, GS	D, PS, MFS/ENT, OS, GS	D, PS, OS, GS, MFS/ENT	D**, PS**	OS	30

Author Manuscript

Country	Adjuvant		Intralesional			Systemic for unresectable stage III and stage IV melanoma	
	Medical oncologists	Dermato-oncologist	Medical oncologists	Dermato-oncologist	Surgical oncologist	Medical oncologists	Dermato-oncologist
Northern Europe							
Denmark	100	0	100	0	0	100	0
Estonia	100	0	0	0	0	100	0
Lithuania	100	0	0	0	0	100	0
Latvia	100	0	0	0	0	95	5
Sweden	100	0	50	0	50	100	0
UK	100	0	100	0	0	100	0
Western Europe							
Austria	5	95	0	100	0	5	95
Belgium	100	0	100	0	0	100	0
France	10	90	0	90	10	10	90
Germany	20	80	0	95	5	20	80
The Netherlands	100	0	0		0	100	0
Switzerland	50	50	20	80	0	60	40
Southern Europe							
Albania	100	0	10	60	30	100	0
Bosnia and Herzegovina	100	0	0	100	0	100	0

Croatia	100	0	0	0	0	100	0
Greece	100	0	70	30	0	100	0
Italy	70	30	100	0	0	50	50
Montenegro	100	0	0	0	0	100	0
Portugal	95	5	50	50	0	95	5
Serbia	70	25	0	15	85	75	25
Slovenia	100	0	100	0	0	100	0
Spain	80	20	0	100	0	80	20
Eastern Europe							
Belarus	100	0	0	0	100	100	0
Czech Republic	20	80	50	50	0	30	70
Hungary	20	80	0	100	0	20	80
Poland	100	0	100	0	0	100	0
Romania	100	0	5	80	10	100	0

Country	Melanoma care units	Accreditation of oncology centers	Quality control process of oncology centers	Multidisciplinary tumor board	Core specialties in MTB	Molecular oncology tumor board
Northern Europe						
Denmark	yes	no	no	yes	MO**, PS, P, R, RT	no
Estonia	yes	yes	no	yes	D, MO**, OS, P, R, RT	yes
Latvia	yes	no	no	no	MO**, OS**	no
Lithuania	no	no	no	yes	D, MO**, OS, PS, P, R, RT	no
Sweden	yes	no	no	yes	D**, MO**, OS**, PS, P, R, RT	no
UK	yes	yes	yes	yes	D, MO, OS, PS, P, R, RT	
Western Europe						
Austria	yes	yes	yes	yes	D**, MO, OS, PS, P, R, RT	no
Belgium	yes	yes	yes	yes	D**, MO, OS, PS, P, R, RT	no
France	yes	yes	yes	yes	D**, MO, OS, PS, P, R, RT	yes
Germany	yes	yes	yes	yes	D**, MO, OS, PS, R, RT	yes
The Netherlands	yes	yes	yes	yes	D**, MO*, OS, PS, R, RT, P	no
Switzerland	yes	yes	yes	yes	D**, MO, PS, P, R, RT	yes
Southern Europe						
Albania	no	no	no	yes	D, MO**, OS, PS, P, R, RT	no
Bosnia and Herzegovina	no	no	no	yes	D, MO**, PS, P, RT	no
Croatia	yes	yes	yes	yes	D**, MO**, OS, PS, P, R, RT	no

This article is protected by copyright. All rights reserved

Greece	no	no	no	yes	D, MO**, OS, PS, RT	no
Italy	yes	yes	yes	yes	D, MO**, OS, PS, P, R, RT	yes
Montenegro	yes	no	yes	yes	D, MO, PS**, RT	no
Portugal	no	yes	no	yes	D**, MO, OS, PS, P, R, RT	yes
Serbia	no	no	no	yes	D**, MO**, OS**, PS, P, R, RT	no
Slovenia	no	yes	yes	yes	D, MO**, OS**, P, R, RT	yes
Spain	yes	no	no	yes	D**, MO**, PS, P, R, RT	no
Eastern Europe						
Belarus	yes	yes	yes	yes	MO**, OS**, P, R, RT	yes
Czech Republic	yes	no	no	yes	D**, MO, OS, PS, P, RT	no
Hungary	yes	yes	yes	yes	D**, MO, OS, PS, P, R, RT	yes
Poland	yes	yes	no	yes	MO, OS**, P, R, RT	yes
Romania	no	yes	yes	yes	D, MO**, OS, P, R	no

Country	Melanoma stage					
	Low-risk localized (IA)		Intermediate and high risk localized (IB-IIC)		Metastatic stage III	
	Medical specialty*	Institution**	Medical specialty*	Institution**	Medical specialty*	Institution**
Northern Europe						
Denmark	GP	SGH	S	TOC	S	TOC
Estonia	D	CCC	D	CCC	MO	CCC
Latvia	GP	TOC	GP	TOC	MO	TOC
Lithuania	D	TOC	MO	TOC	MO	TOC
Sweden	D	DGH	D	TOC	S	TOC
UK	D	TOC	D	CCC	MO	CCC
Western Europe						
Austria	D	DGH	D	GH	D	GH
Belgium	D	SGH	D	TOC	MO	TOC
France	D	PP	D	TOC	D	TOC
Germany	D	DGH	D	CCC	D	CCC
The Netherlands	D	DGH	D	DGH	D, MO, S	TOC
Switzerland	D	PP	D	CCC	D	CCC
Southern Europe						
Albania	S	DGH	MO	CCC	MO	CCC
Bosnia and Herzegovina	D	TOC	MO	TOC	MO	TOC
Croatia	D	DGH	D	CCC	MO	CCC
Greece	D	Dermatology hospitals	MO	TOC	MO	TOC
Italy	D	DGH	D	CCC	D	CCC

This article is protected by copyright. All rights reserved

Montenegro	S	CCC	MO	CCC	MO	CCC
Portugal	GP	DGH	GP	TOC	GP	TOC
Slovenia	S	CCC	S	CCC	S	CCC
Serbia	D, S	TOC	D, S	TOC	D, S	TOC
Spain	D	DGH	D	GH	D	GH
Eastern Europe						
Belarus	MO	TOC	MO	CCC	MO	CCC
Czech Republic	D	DGH	D	TOC	D	TOC
Hungary	D	DGH	D	CCC	D	CCC
Poland	D	TOC	S	CCC	S	CCC
Romania	D	DGH	D	TOC	MO	TOC

Country	Melanoma registry		
	National cancer registry	Clinical registry	Stage of melanoma recorded
Northern Europe			
Denmark	Yes	Yes	Stage I-IV
Estonia	Yes	No	Stage I-IV
Lithuania	Yes	No	
Sweden	Yes	Yes	Stage I-IV
UK	Yes	No	
Western Europe			
Austria	Yes	No	
Belgium	Yes	No	Stage I-IV
France	No*	Yes	Stage I-IV
Germany	Yes	Yes	Stage I-IV
The Netherlands	Yes	Yes	Stage I-IV
Switzerland	Yes	Yes	Stage I-IV
Southern Europe			
Albania	No	No	
Bosnia and Herzegovina	No*	No	
Croatia	Yes	Yes	Stage I-IV

This article is protected by copyright. All rights reserved

Greece	No*	No	
Italy	No*	No	
Montenegro	Yes	No	
Portugal	Yes	Yes	Stage I-IV
Serbia	No*	Yes	Stage I-IV
Slovenia	Yes	Yes	Stage I-IV
Spain	Yes	Yes	
Eastern Europe			
Belarus	Yes	Yes	Stage I-IV
Czech Republic	Yes	Yes	Stage I-IV
Poland	Yes	Yes	Stage I-IV
Romania	No*	No	

Country	Educational programs for GPs	Training in dermatology as official part of dermatology residency	Training in dermatology during dermatology residency	Training in dermatology during dermatology residency	Subspecialty training in dermatopathology	Subspecialty training in dermatologic surgery	Subspecialty training in oncology for dermatologists
Northern Europe							
Denmark	yes	yes		no	no	no	no
Estonia	no	no	yes	yes	no	no	no
Latvia	no	no	no	yes	no	no	no
Lithuania	yes	yes	yes	yes	no	no	no
Sweden	yes	yes	yes	yes	no	no	no
UK	yes	yes	yes	yes	yes	yes	yes
Western Europe							
Austria	yes	yes	yes	yes	yes	no	no
Belgium	yes	no	yes	no	no	yes	no
France	yes	no	yes	yes	yes	yes	yes
Germany	yes	yes	yes	yes	yes	yes	yes
The Netherlands	no*	yes	yes	yes	yes	yes	yes
Switzerland	yes	yes	yes	yes	yes	no	no
Southern Europe							
Albania	no	yes	no	yes	no	no	no
Bosnia and Herzegovina	no	yes	no	yes	yes	no	yes
Croatia	yes	yes	yes	yes	no	no	yes
Greece	no	yes	yes	yes	no	no	no

This article is protected by copyright. All rights reserved

Italy	no	yes	yes	yes	yes	yes	yes
Montenegro	yes	no	yes	yes	no	no	no
Portugal	yes	yes	yes	yes	yes	no	no
Serbia	yes	yes	yes	yes	no	no	yes
Slovenia	yes	yes	yes	no	no	no	no
Spain	yes	no	yes	yes	no	no	no
Eastern Europe							
Belarus	yes	no	no	yes	no	no	no
Czech Republic	no	yes	yes	yes	yes	yes	no
Hungary	no	yes	yes	yes	yes	no	no
Poland	yes	yes	yes	yes	no	no	no
Romania	yes	yes	yes	no	no	yes	no
Total (yes/no+yes), %	18/27, 66%	20/27, 74%	23/27, 85%	23/27, 85%	11/27, 40%	8/27, 30%	8/27, 30%

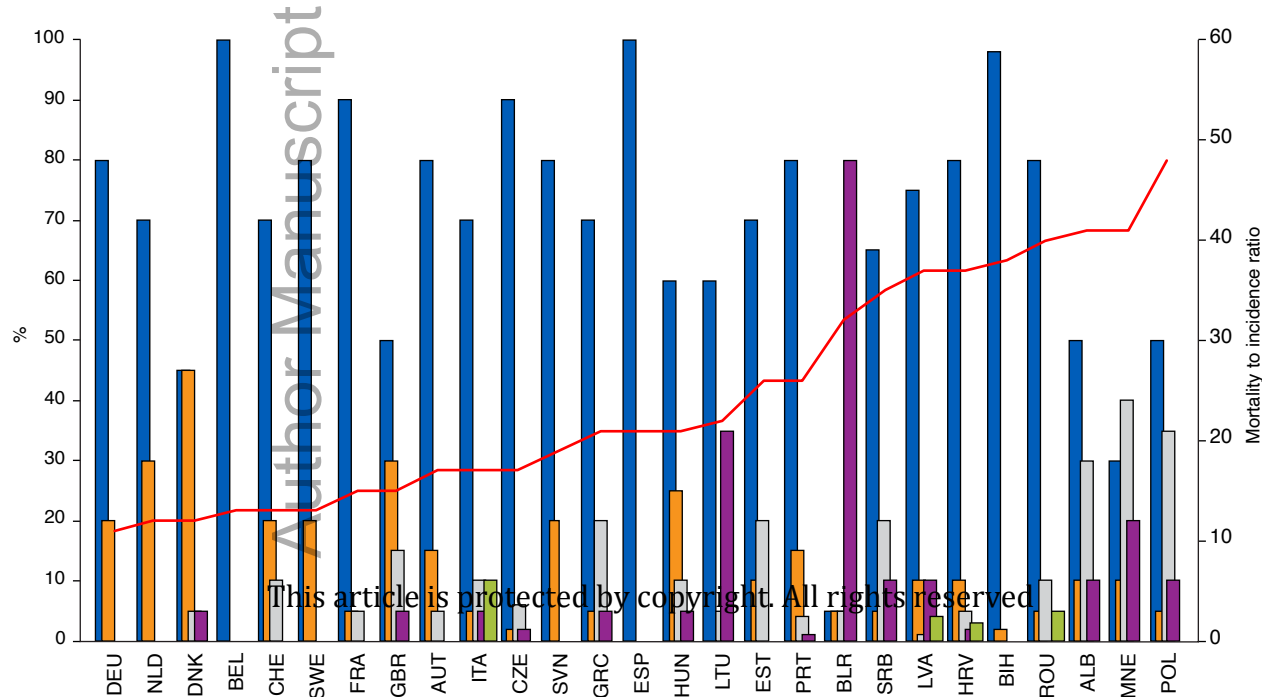
Variable	Correlation mortality to incidence ratio (MIR) in European countries*		
	B	95% CI	P-value
Economic variables			
Gross national income per capita*	-0.001	-0,001 to <0,001	<0.001
Universal healthcare coverage*	-1.295	-1.728 to -0.862	<0.001
Health expenditure per capita*	-0.005	-0.006 to -0.004	<0.001
Physicians workforce (number per 1 million inhabitants)			
General practitioners	<0.001	<0.001 to <0.001	0.079
Surgeons	<0.001	<0.001 to <0.001	0.091
Pathologist	-0.004	-0.024 to 0.017	0.703
Dermatologists	-0.182	-0.405 to 0.042	0.105
Oncologists	-0.003	-0.009 to 0.004	0.378
Medical specialties involved and diagnostic techniques used in clinical diagnosis of melanoma			
General practitioners	-0.451	-0.829 to -0.073	0.021
GPs access to educational programs for skin cancer detection	-3.188	-12.866 to 6.491	0.503
Dermatologists	-0.156	-0.363 to 0.051	0.132
Percentage of dermatologists using dermatoscopy	-0.273	-0.444 to -0.103	0.003
Surgeons	0.577	0.234 to 0.920	0.002
Oncologists	0.187	-0.085 to 0.46	0.169
Access to computerized digital dermatoscopy	0.987	-9.003 to 10.977	0.840
Access to reflectance confocal microscopy	-1.750	-10.909 to 7.409	0.697
Melanoma surgery			
Access to microscopically controlled surgery	6.296	-3.36 to 15.952	0.191
Access to SLND (% of patients with performed SLND when indicated)	-0.186	-0.372 to -0.001	0.049
Dermatologists performing surgical procedures with skin flaps	-11.047	-19.334 to -2.760	0.011
Dermatologists performing surgical procedures with skin grafts	-13.729	-21.305 to -6.154	0.001
Histopathology			
Histopathology performed by both dermatopathologists and pathologists	-8.333	-17.389 to 0.722	0.070
Follow-up of melanoma patients			
Dermatologists responsible for follow-up of stage IA_	-7.767	-17.785 to 2.251	0.123
Dermatologists responsible for follow-up of stage IB-IIC	-11.436	-19.579 to -3.293	0.008
Dermatologists responsible for follow-up of stage stage IIIA	-12.294	-20.644 to -3.944	0.006
Oncologists responsible for follow-up of stage stage IIIA	11.536	3.517 to 19.555	0.007
Systemic treatment for metastatic melanoma			

Adjuvant treatment prescribed by both dermatooncologists and medical oncologists	-0.140	-0.265 to -0.014	0.031
Adjuvant treatment prescribed only by medical oncologists	2.176	-2.682 to 7.034	0.364
Systemic treatment prescribed by both dermatooncologists and medical oncologists	-0.141	-0.269 to -0.012	0.033
Systemic treatment prescribed only by medical oncologists	0.145	0.013 to 0.276	0.032
Legislative restrictions to prescribe systemic melanoma therapy based on medical specialty	8.533	-0.146 to 17.213	0.054
Limitations to reimbursement of systemic melanoma therapy based on medical specialty	10.889	2.143 to 19.635	0.017
Organization of melanoma care			
Melanoma care units with fast access from primary care	-6.921	-16.941 to 3.098	0.167
Accreditation process of oncology centers	-6.079	-15.187 to 3.03	0.181
Access to multidisciplinary tumor boards	-14.464	-28.038 to -0.889	0.038
Dermatologists' responsible for organization of multidisciplinary tumor boards	-11.214	-19.314 to -3.115	0.009
Medical oncologists' responsible for organization of multidisciplinary tumor boards	2.526	-7.24 to 12.292	0.598
Education of dermatologists			
Availability of subspecialisation in oncology	-4.549	-14.912 to 5.814	0.374
Availability of subspecialisation in dermatologic surgery	-9.868	-19.003 to -0.734	0.035
Availability of subspecialisation in dermatopathology	-10.261	-18.536 to -1.987	0.017

Which medical specialties are performing skin cancer detection in your country and in what percentage?

jd_v_17086_f1.pdf

Dermatologists General practitioner Surgeons
Oncologists Other Mir



This article is protected by copyright. All rights reserved.