University of Latvia
Faculty of Medicine
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EVALUATION OF SKIN CANCER CONTROL ACTIVITIES AT THE PRIMARY HEALTHCARE LEVEL IN LATVIA

Diploma Thesis

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1 ABSTRACT

1.1 English version

Background: Studies show that skin cancer (non-melanoma and melanoma) is one of the most frequent diagnosed types of cancer, yet rates of skin cancer control activities performed by general practitioners do not correlate with the high incidence . In this research paper patient and general practitioner self-assessed questionnaire answer sets are evaluated to understand possible differences in the perception of performance as well as confounding factors for the skin cancer care in the general practitioners office in Latvia

Method: This research was an observational cross-sectional survey study based on 144 completed questionnaires. From all 144 participants, 85 were patients and 59 were general practitioners. The data was collected from both patient and general practitioner by random selection between December 2018 and March 2019 in Riga, Latvia.

Results: 18.8% of patients had a previous history of skin cancer or precancerous lesion. Older patients were more likely to have a history of skin cancer (Chi-square test 17.88 $p < 0.01$). Patients who were educated about skin cancer risk factors (Chi-square test 13.74 $p < 0.01$) and prevention (Chi-square test 15.08 $p < 0.01$) had a lower incidence of skin cancer. The majority of skin cancer cases (N = 10, 55.6%) were detected by a dermatologist while visits to the general practitioner are overall more frequent. The majority of patients (68.3%) would prefer the performance of Full body skin examination (FBSE) by a dermatologist in an additional visit. 22 of 59 General practitioners did not receive any further education about skin cancer and only physicians with further education were performing dermatoscopy (Chi-square 7.16 $p < 0.01$).Total rates of dermatoscopy performance were at 27%. The majority (N = 37, 64%) of general practitioners identifies as “moderately confident” in the performance of FBSE while confidence positively correlates with the actual performance of FBSE. Perception of performed skin cancer education as well as FBSE performance was significantly different between both groups (Chi square test - $p < 0.01$).

Conclusion: In this study, the perception of skin cancer education as well as FBSE performance was found to differ significantly between patients and general practitioners in Latvia. Our results indicate that there is large room for improvement of skin cancer control activities within the general practitioners office.

1.2 Latvian version

Ievads: Pētījumi liecina, ka ādas vēzis ir bieži sastopams audzējs pasaulē visās pasaules valstīs, tomēr ģimenes ārstu veikto ādas vēža kontroles pasākumu rādītāji nesaskan ar augsto saslimstību. Šajā pētījumā tiek izvērtētas pacientu un ģimenes ārstu atbildes uz sagatavotās anketas jautājumiem, lai izprastu iespējamās atšķirības profilakses pasākumu veikšanā, kā arī mijiedarbības faktorus ādas vēža diagnostikā un ārstēšanā ģimenes ārstu praksēs Latvijā.

Metode: Šis pētījums bija šķērsgriezuma pētījums, kura pamatā bija 144 aizpildītas anketas. No visiem 144 dalībniekiem 85 bija pacienti un 59 bija ģimenes ārsti. Dati tika iegūti gan no pacientiem, gan no ģimenes ārstiem pēc nejaušas izvēles no 2018. gada decembra līdz 2019. gada martam Rīgā, Latvijā.

Rezultāti:18,8% pacientu iepriekš ir diagnosticēts ādas vēzis vai pirmsvēža veidojumi. Gados vecākiem pacientiem biežāk novērots ādas vēzis (Pīrsona hī kvadrāta tests 17,88 p <0,01). Pacientiem, kas bija izglītoti par ādas vēža riska faktoriem (Pīrsona hī kvadrāta tests 13,74 p <0,01) un profilaksi (Pīrsona hī kvadrāta tests 15.08 p <0,01) ādas vēzis tika konstatēts retāk. Lielāko daļu ādas vēža gadījumu (N = 10, 55,6%) atklāja dermatologs, taču ģimenes ārsta apmeklējumu skaits ir lielāks. Lielākā daļa pacientu (68,3%) vēlētos, lai dermatologs papildus vizītē veiktu pilnu ķermeņa un ādas izmeklēšanu (angliski – *full body-skin examination* (FBSE). 22 no 59 ģimenes ārstiem nav saņēmuši tālākizglītību par ādas vēzi un dermatoskopiju veica tikai tie ārsti, kas bija papildus izglītoti (Pīrsona hī kvadrāta tests 7,16; p <0,01). Kopējais dermatoskopijas veikšanas rādītājs bija 27%. Lielākā daļa (37, 4%) ģimenes ārstu uzskata sevi par vidēji pārliecinātiem veikt FBSE ikdienas praksē, savukārt pārliecinātība pozitīvi korelē ar FBSE veikšanas efektivitāti. Abās grupās nozīmīgi atšķīrās veiktā tālākizglītošana par ādas vēzi un FBSE veikšanas process un efektivitāte (Pīrsona hī kvadrāta tests - p <0,01).

Secinājums:Šajā pētījumā tika konstatēts, ka Latvijā vērojama atšķirība starp pacientu izglītošanu par ādas vēzi, kā arī FBSE veikšanu. Iegūtie rezultāti liecina, ka ģimenes ārstu praksē ir nepieciešams uzlabot ādas vēža kontroles pasākumus.

List of Abbreviations:

ADP	Association of Dermatologic prevention
AJCC	American Joint Committee on Cancer
ALM	acral-lentiguous melanoma
BCC	basal cell carcinoma
BCNS	basal cell nevus syndrome
BD	Bowen's disease
BMI	Body Mass Index
CDK4	cyclin-dependent kinase 4
CDKN2A	cyclin-dependent kinase inhibitor 2A
CNN	convolutional neural network
DM	amelanocytic/desmoplastic melanoma
HCT	Hydrochlorothiazide
HPV	human papillomavirus
FBSE	full body skin examination
FDA	US Food and Drug Administration
FST	Fitzpatrick skin type
GP	general practitioner
LCMN	large congenital melanocytic nevi
LGAA	*Latvijas Ģimenes ārstu asociācija*
LMM	lentigo maligna melanoma
MM	malignant melanoma
MSC	melanocytic skin cancer
NM	nodular melanoma
NMSC	non-melanocytic skin cancer
PCP	primary care physician
PTCH1	patched gene 1
RAKUS	Riga East University Hospital
SCC	squamous cell carcinoma
SPF	sun protection factor

SSE	skin self-examination
SSM	superficial spreading melanoma
TBNC	total body nevus count
TNM	tumor, node and metastasis
UV	ultraviolet

2 INTRODUCTION

Skin cancer (non-melanoma and melanoma) is one of the most frequent diagnosed type of cancer overall with its incidence continuously increasing further.[47] While the mortality remains low in percentage terms, skin cancer still is an immense burden on patients and national healthcare systems[43]. Surprisingly, low rates of skin cancer evaluation by general practitioners / family physicians are discrepant to the high prevalence of skin cancer. [40]

General practitioners / family physicians form the backbone of our primary healthcare and are at a key position for the possible early detection and triage of skin cancer. Studies show that visits to the GP are more accessible and frequent than to any other specialist [22], yet many do not perform skin cancer control activities. In detail, studies suggest that only 15% of patients seen in the general practitioners office received an FBSE annually.[15] From a doctors point of view only 60% of general practitioners in total perform FBSE. General practitioners that do perform FBSE make up only 20% of all specialists participating in skin cancer control activities, illustrating the room for improvement within the level of primary healthcare. [58]

Persistent burdens that contribute to the low rate of performance are the limited skin cancer screening education during medical school and residency, low self-confidence in the performance of FBSE, lack of time during consultations, non-systematic methods of public screening and consumption of resources.[56] [32]

Further understanding these specific barriers is necessary to improve the implementation of skin cancer screening and early detection in the general practitioners office. Research evaluating the general practitioners opinions and diverse contextual factors is still inadequate. [45]

When looking at the effect of skin cancer control activities by general practitioners, it becomes evident that large-scale screening for melanoma is feasible and effective. Melanoma detection is higher in patients that are screened during FBSE; additionally the detection of skin cancer during screening directly correlates with thinner melanoma thickness and decreased likelihood of invasive stages of melanoma.[23] However, the sensitivity of melanoma detection by general practitioners is significantly low compared to dermatologists. [17] Nevertheless, the sensitivity is proven to positively correlate with previous experience in dermatology and educational interventions. [32]

While different individual educational interventions that improve skin cancer diagnostics already exist for general practitioners, large-scale, validated and standardized educational programs are yet to be implemented. [19] [48] Possible future practical interventions include the development and realization of new curricula for general practitioners and medical students, specific educational campaigns promoting FBSE performance and the inclusion of FBSE in a nationwide screening for patients older than 35 years of age.[15]

Overall, precise data on skin cancer screening programs, especially performed screening in the GPs office is lacking, indicating that more research in this field is needed. Improved early detection of skin cancer might ultimately decrease melanoma mortality and healthcare expenses on treatment. [23] [7]

2.1 Goals and objectives

Our research aims to evaluate the role of skin cancer in the general practitioners office in Latvia. We evaluate of to which extend general practitioners are involved in screening, diagnosis, and education of skin cancer. Furthermore, we evaluate the patient experiences of skin cancer screening and education in the primary health care setting to better understand possible weak points in skin cancer control activities.

We suspect that there are discrepancies between the general practitioners and patient perception when it comes to the quality and frequency of skin cancer diagnosis in Latvia.

Benefits of this study:

(i) New important information regarding the role of skin cancer in the primary healthcare in Latvia will be obtained. General practitioners with better knowledge and awareness of skin cancer will directly benefit patients during annual visits.

(ii) Understanding the current awareness for skin cancer in the primary healthcare setting will allow us to improve education of skin cancer detection, evaluation, screening and patient education for general practitioners in the future. Mortality and morbidity of skin cancer might ultimately be decreased.

2.2 Exposition of the thesis

We focus our analysis on the data collected from patient and general practitioner self-assessed questionnaire answer sets. In result of previous research, we formed following hypothesis for the present study.

Hypothesis A- There will be a difference between the patients and general practitioners perception of skin cancer care in the primary healthcare setting

Hypothesis B- There will be a low incidence of performed skin cancer detection, education and screening by general practitioners.

3 LITERATURE REVIEW

In this literature review, current information about the epidemiology; etiology and major risk factors; classification; clinical features and diagnostic evaluation of skin cancer is collected to evaluate the present approach to the issue in a primary healthcare setting.

Furthermore, I will elaborate measurements of preventive education for skin cancer, the role of patient education and empowerment by primary care physicians as well as their role in modern skin cancer screening schemes. This is to gain a broader understanding of the role of skin cancer in a primary health care setting as well as being able to accurately interpret the results conferred in this study.

3.1 Skin cancer epidemiology

Skin cancer (non-melanoma, NMSC and melanoma, MSC) is one of the most frequent diagnosed types of cancer. While non-melanoma skin cancer types are generally not collected in cancer registries, estimated numbers of new cancer cases and death in the US (2018) indicate that the number of people diagnosed with skin cancer (NMSC and MSC) each year exceed all other cases of cancer combined. [1] [47] The median age of disease occurrence is 67 in males and 59 in females with the incidence being approximately equal between both genders.

In recent years, the incidence of skin cancer was continuously rising further. Evaluation of Epidemics by the *Robert Koch Institut* in Germany show that between 1999 and 2012 counts of skin cancer increased from 13.7 to 26.5 per 100.000 male inhabitants and from 16.5 to 25.3 per 100.000 female inhabitants. These numbers are equivalent to a 6.1% / 2.8% rise of incidence every year within the last decade.[43] There is no other solid tumor with a higher increase of incidence than the malignant melanoma. Latvian statistics currently rank melanoma of the skin on place 18 of the most frequent cancers with 213 new cases each year.[59] When comparing the increase of incidence between European countries, a North-south gradient is described. Northern / Scandinavian countries such as Denmark, Norway and Sweden have the highest increase in incidence while Mediterranean countries are only mildly affected. Explanations for this phenomenon are thought to be the difference in skin pigmentation as well as general avoidance of direct sun exposure by the Mediterranean population [3]

Not only the Incidence but also the rate of mortality is continuously increasing within the last decades. Between 1999 and 2012, the mortality was increasing from 2.6 to 4.1 cases per 100.000 in male inhabitants and 2.3 - 3.0 cases per 100.000 female inhabitants. However, with a significant smaller increase in mortality compared to the incidence, a relative stabilization of mortality rates can be assumed. Most likely responsible for the relative stabilization is the improved early diagnosis of prognostically more favorable tumors. [3]

Looking at the reasons behind the steady increase of incidence, it can be partly explained by improvements in the skin cancer awareness and diagnostics. However, the prevalence of common risk factors still contribute largely to the development of skin cancer. [60] In connection with future development and implementation of skin cancer screening programs, the Association of Dermatological Prevention (ADP) analyzed the direct annual cost of skin cancer (MM,BCC,SCC) for Germany. Results evaluate the total financial burden at around €330 million per year.[61]

3.2 Skin cancer etiology and major risk factors

The major exogenous risk factor for the development of skin cancer is the induction of DNA damage by solar Ultraviolet-radiation. The sun emits UV radiation as part of the electromagnetic light spectrum. With wavelength below 400nm the radiation is invisible to the human eye. These wavelengths are further divided into UV-A (400-320nm), UV-B (320-290nm) and UV-C (290-200nm) [35]. While in theory UV-C radiation is the most energetic and bears the highest potential of DNA damage, wavelength below 295nm are effectively absorbed by the Earths outer atmospheric ozone layer. Radiation that remains and reaches the Earths surface mainly consists of UV-A (95%) [62] and UV-B (5%) radiation.

While both UV-A and B are proven to be human carcinogens, they differ in their physical properties and effect on the skin. UV-A radiation is able to penetrate the skin as far as the subcutaneous layer and is known to have dominantly photoaging and tanning effects while causing cumulative cell damage over time. UV-A radiation additionally is able to pass through glass and clouds. The intensity of radiation is equal during daylight hours and throughout the year.

In contrast to UV-A, UV-B radiation only penetrates the skin superficially within the epidermal layer. Due to its shorter wavelength and higher intensity, it is the major cause of imminent inflammation (erythema solare / sunburn) after direct overexposure. The intensity of UV-B varies by time of day and season and therefore particular attention should be paid to the avoidance of sun during peak levels. Principally the highest amounts of radiation are seen in summer month around noon. While the common perception persists that only acute sunburn has carcinoid effects, recent studies show the opposite. Already suberythemal UV-radiation dosing is enough to induce epithelial p53+ gene mutations[41].

The fact that squamous cell carcinoma and basal cell carcinoma is usually found in chronically UV-damaged skin areas that are permanent exposed to light further elucidates the connection between UV radiation and skin cancer. While the probability of developing squamous cell carcinoma is mostly associated with lifelong accumulative UV damage, intermittent UV exposure and severe sunburn episodes during childhood seems to be crucial for the development of basal cell carcinomas and even more melanomas[2].

Although total UV-radiation levels have been rising within the last decades in result of stratospheric ozone layer depletion[63], the major modifiable risk factor responsible for the increase in skin cancer incidence is thought to be the increased recreational sun exposure early in life[64].

Especially individuals with the phenotypic characteristic of Fitzpatrick skin type (FST) 1-2 are at a significantly higher risk of overexposure[65]. In comparison, patients with a FST equals to or larger three have a 83% risk reduction of developing skin cancer. Fitzpatrick classification is based on patient questionnaires on physical traits (E.g. hair color, eye color, skin color), UV sensitivity and UV exposure[66]. Results are grouped into six categories from FST 1-6 which ranges from very pale white sensitive skin- FST1 (E.g. Red hair with freckles) to deeply pigmented black skin -FST6 (E.g. Indigenous Australians). The score was found to be correlating with skin cancer risk and is still used widely in clinical practice and clinical trials[18].

Additionally to natural solar UV-radiation, artificial UV-radiation as used in indoor tanning studios carries a high risk, especially in young populations with their first sunbed use before the age of 35 (increased risk of >80%). The use and dosage of artificial UV radiation has a clear correlation with the risk of melanoma development. There is no evidence of protective effects

against following natural sun exposure. It is estimated that 3500 cases of melanoma are related to sunbed use in Europe each year [4].

Furthermore it needs to be paid attention to exogenous substances affecting the individual UV sensitivity. In recent years multiple FDA approved medications have been proven to increase the skin cancer risk directly. One example is Hydrochlorothiazide (HCT), a frequently prescribed antihypertensive and diuretic drug. Studies show that high use has a dose-response relationship with non-melanocytic skin cancers [36]. Likewise immunosuppressive therapy (eg. during renal post-transplant period) significantly raises the risk for NMSCs.[27]

While UV-radiation accounts for the majority of skin cancer development, approximately 10 % of Melanomas are caused by genetic predisposition[51]. Inherited germline mutations of the CDKN2A- or CDK4-gene carry an increased risk for the development of skin cancer, especially for cutaneous melanoma of up to 1000 fold. In addition, CDKN2A gene mutations are associated with pancreas carcinomas as well as other cancers, highlighting the importance of identifying risk groups early for preventive and genetic counseling. Families with an increased incidence of skin cancer should be advised to take genetic screening[38].

Similarly, basal cell carcinomas can be found in connection with various autosomal dominant inherited multisystem diseases. Most commonly (up to 1:56.000) a mutation in the PTCH1-gene (9q22.3) causes Basal cell nevus syndrome (BCNS) or Gorlin-Goltz syndrome that is characterized by proliferation of multiple BCCs before the age of 20 and malformations of the skeletal, central nervous and urogenital system.[49] Diagnosis of BCC before the age of 20 or findings of excessive amounts of BCC make up a major criteria for the diagnosis of the syndrome.[25]

When evaluating possible predispositions for malignant melanoma, specific nevi attributes can identify patients at increasing risk. While melanoma can develop newly from previous inconspicuous tissues, the presence of large numbers of benign (>100 total) or dysplastic nevi as well as large congenital melanocytic nevi (LCMN) predisposes the cancerous change[52]. Systemic studies show that any congenital nevi undergoes neoplastic transformation with a chance of 0.7% .Congenital nevi with a diameter larger than 20mm carry an even higher risk[28].

3.3 Classification and differentiation of skin cancer subtypes

Talking about skin cancer it is important to classify the main types. Two distinct types of cancer are categorically differentiated. Non-melanoma skin cancer or NMSC, originating from the unregulated neoplastic growth of epidermal keratinocytes and melanoma, originating from the unregulated neoplastic growth of melanocytes, mostly in the basal layer of the epidermis in any pigmented area. [67] NMSC is further divided into basal cell carcinoma and squamous cell carcinoma depending on the cell type of origin. While invasive malignant melanoma accounts for only 1% of all skin cancer incidences, it still carries the highest rate of malignancy and majority (>90%) of skin cancer related death. [68]

Melanoma

Most commonly (90%) malignant melanoma develops in the skin, nevertheless it can develop wherever melanin-producing cells exist. Uncommon sites that should be taken into consideration during differential diagnostics includes the nasal sinuses, intestinal mucosa, genital mucosa as well as ocular tissue. Unlike NMSC, melanoma occurrence does not exclusively correlate with the parts of the body exposed to the sun the most[69]. Following malignant transformation melanomas follow an invasive pattern of growth, both vertically and horizontally extending past the dermis.

Primary cutaneous malignant melanoma is further distinct by clinical and histopathological substantiation into five principle types: Superficial spreading Melanoma (SSM), nodular melanoma (NM), lentigo maligna melanoma (LMM), acral-lentiguous melanoma (ALM) and amelanocytic/desmoplastic melanoma (DM)[39]

Basal cell carcinoma (BCC)

Basal cell carcinoma (BCC) or basalioma is a malignant neoplasm of epidermal basal cells. BCC develops nearly exclusively in photo-exposed areas of the skin and shows a clear pattern of correlation with parts of the body having the largest cumulative UV-exposure. Predilection sites include the head and neck[70].

In spite of being malignant, metastatic spread is extremely rare with an estimated incidence of 0.0028-0.55%. However, local infiltration and invasive growth may still harm surrounding tissues and vital structures particularly in the head and neck area[31].

Clinical variants of BCCs include nodular BCC (60-80%), cystic BCC, sclerodermiform (morpheiform) BCC, Infiltrated BCC, micronodular BCC, superficial BCC, pigment BCC and Fibroepitheloma of Pinkus [12]

Squamous cell cancer (SCC)

Squamous cell cancer or spinalioma are malignant neoplasms originating from keratinocytes in the epidermis. While most of the cases (60%) are predisposed by actinic keratosis, SCC can arise from chronic lesions E.g. Ulcus Cruris or in situ.

One specific form of In situ SCC is Bowen's disease (BD). It is considered an early intraepidermal stage with slow progressive malignancy. Recent studies show an etiologic relation between oncogenic viruses (HPV, Merkel cell polyomavirus) and the development of BD. [34]

3.4 Clinical features of skin cancer

Correctly identifying the clinical features of skin cancer make up the major hallmark of early detection. Different types and subtypes vary greatly in their macroscopic appearance and make it difficult to diagnose precisely. Especially unpigmented amelanocytic nodular melanomas that appear pinkish and accounting for 5% of all cases are easily overlooked[8]. Common unspecific features of the early disease are often recognized first by the patients themselves. These features include newly discovered, fast growing skin lesions or visible changes in preexisting lesions. Frequently perceived changes are change of size, change of color, bleeding, ulcerations or changes in sensation E.g. pruritus and pain[71].

Overall, suspicious lesions are often perceived only for cosmetic reasons, attracting the attention as they differ from other nevi in the same individual. This so called "ugly duckling sign" should be paid particular attention to during skin examination due to proven diagnostic significance[16].

3.5 Diagnostic evaluation of skin cancer

When examining a patient for skin cancer, all of the skin surface needs to be evaluated under good lighting following the full body skin examination (FBSE) scheme. Areas that are

frequently skipped but should not be missed include the scalp and sensitive body areas such as the ano-genital region.

Most cases of skin cancer are detected during routine FBSE rather than during examination following a patients' suspicion or complaint. Detection during FBSE is associated with smaller melanoma thickness and decreased likelihood of invasive melanoma, highlighting the possible benefits of regular FBSE evaluation in the general practitioners office.[23] Considering the risk factor of high nevus count for melanoma, the performance of total body nevus count (TBNC) is valuable for the detection of affected patients. While TBNC can be time consuming and unpractical during normal patient consultations, several studies have shown that the selection of a proxy site (E.g. one arm) to predict the TBNC is a functional and fast method for assessing related melanoma risk in the primary healthcare setting. Nevi counts on the arm are the most predictive with more than 11 nevi indicating a total nevi count larger than 100 with a 95% confidence.[42]

When visually evaluating nevi for their pathologic significance, suspicious lesions are evaluated following the "ABCD" rule. In detail, the cancerous indications are asymmetry of the lesion; borders that are uneven, scalloped or notched; color in multiple different shades or unusual pigmentation (E.g. red, blue, white discoloration); and dynamic growth (E.g. elevation, size, color).

The former "D" factor of size in diameter was discarded in recent guidelines as micro-adenomas <5mm are a common clinical picture today and feasible for accurate clinical diagnosis.[5] While "ABCD" rules give guidance to doctors, the diagnostic differentiation between harmless nevi and cancerous lesion in a primary care setting can still be challenging. Studies show that diagnosing melanoma with the unaided eye is imprecise with an accurate of about only 60%.

The use of dermatoscopy is proven to significantly improve (30%) the accuracy of diagnosis (level of evidence III) and furthermore reduces the amount of unneeded biopsies[6].A Dermatoscope is a non-invasive, handheld device to magnify skin lesions (commonly 10X magnification) as well as visualizing subsurface skin structures. It needs to be noted that accuracy of diagnosis is only improved when performed by experienced/ trained examiners. Accuracy by untrained dermatoscopy use was found to be equal to diagnosis by the unaided eye. [26]

However, trials have shown that general practitioners with a one-day training course in skin cancer detection and dermatoscopic evaluation already have a significantly improved ability to correctly triage cancerous skin lesions[37]. Research suggests that: "All PCP in countries where melanoma leads to significant mortality should be trained in skin surface microscopy" [54]

Modern digital dermatoscopy systems that additionally allow the direct documentation of nevi for surveillance and long-term follow-up of the lesion's dynamics, further improve the diagnostic value of the procedure.[50] A completely new approach to dermatoscopy was established by Stanford University. Their research team created an artificial intelligence, facilitating deep learning convolutional neural networks (CNNs) that correctly triage skin cancer from pictures with the same accuracy as trained experts / board certified dermatologist.[13] The prospect of aforementioned CNN in the form of personal computer or even smartphone applications could greatly influence the early diagnosis of skin cancer in the primary healthcare setting. Especially general practitioners without additional training in dermatoscopy could benefit from such development in the future.

Regardless of the first diagnostic method, if a lesion is considered suspicious for melanoma (MSC) or even when in doubt, full thickness skin biopsy with side margins must be performed to secure the exact diagnosis and staging of the disease histologically. When suspecting a NMSC, punch biopsy is the indicated method for histologic sampling. Staging and classification of the histology report follows the most recent American Joint Committee on Cancer (AJCC) 8th edition in 2018 TNM staging system. [24]

3.6 Significance of interventional education

Most cases of skin cancer can be effectively prevented by photo-protective measures, making education about the possibilities of protection and their importance extremely meaningful during related patient consultations. Patient education of skin cancer prevention in the general practitioners office, especially sun protective advice during normal consultation is feasible and advantageous for the improvement of sun protection behavior. [14] [53]

Effective photo-protective measures are the use of sunscreen SPF >15, UV- impermeable clothing and sunglasses, avoidance of sun exposure during midday (when radiation levels reach its peak), seeking shade when possible to avoid sunburn and the complete avoidance of artificial

UV-radiation (tanning beds). [44] In detail, studies show that daily use of sunscreen (SPF>15) reduces the incidence of SCC for up to 40% [21] Risk groups, for example children, outdoor workers and athletes (water & mountain-sports) should be particularly encouraged to engage in photo protective behavior. [33]

While these preventive measures to reduce excessive UV radiation seem uncomplicated and straightforward, nevertheless photo-protective behavior has proven to be low within the general population (23%). The likelihood of protective behavior correlates positively with the personal skin complexion. Patients of Fitzpatrick skin type (FST) 1-2 are more likely to engage in UV skin protection. Negative correlation was found with cigarette smoking and elevated BMI.[55]

In addition to physical UV-protection, Nicotinamide (Vitamin B3) protects against cellular UV damage. Patients who already have a history of NMSC or actinic keratosis are proven to suffer reduced relapses of skin cancer by the use of oral Nicotinamide as chemoprevention.[9]

3.7 Patient education and empowerment by general practitioners

While patients generally are aware of most forms of photo-protective measures, the main burden remains to educate and empower patients to engage in these behaviors. Studies suggest that positive empowerment is more successful in guiding sun protective behavior compared to a paternalistic approach of prohibiting or discouraging certain harmful attitudes. One example approach could be the promotion of anti-aging effects due to decreased UV-exposure. Individuals with an increased concern about photo-aging, show to be more likely to adapt their protective behavior in a positive way.[11]

However, findings in the literature demonstrate that knowledge and skin cancer awareness do not directly correlate with the actual execution of behavioral changes. Patient behaviors greatly differ due to personal beliefs, especially when it comes to the perception of suntan related physical attractiveness. Therefore, patients should receive attitude specific counseling by their general practitioners.[30] Intervening and changing the behavior of associated groups might ultimately contribute to less tanning-associated skin cancer and therefore to longer and healthier lives[72].

Furthermore, the patient education of skin self-examination (SSE) proves an additional way to detect skin cancer early and raise awareness for the patients' own health. SSE provides a significant reduction in the incidence of advanced melanoma (63%). The mortality of melanoma has shown to directly correlate with the patients' skin awareness[3].

3.8 Significance of skin cancer screening schemes in the primary healthcare setting

Skin cancer patient education and screening by FBSE are major measures for the reduction of skin cancer mortality; nevertheless, skin cancer screening rates remain low in total, rendering patients vulnerable for the late detection of skin cancer.[29]

Up to today national skin cancer screening schemes have been established in only few of the European countries. At this time Germany is the only European country that offers skin cancer screening as part of the general health insurance. Perhaps guiding the way for other countries all insured German patients are offered the benefit of specific skin cancer screening every two years, beginning from age 35. The screening itself consists of FBSE together with dermatoscopy of suspicious lesions.

Qualified general practitioners or dermatologists, whereby currently dermatologists form 80%, are entitled to perform examinations of the screening scheme. [58] Overall, there is a significant discrepancy between the high prevalence of skin cancer and low rates of medical evaluations regarding the issue by general practitioners. In fact, only 60% of general practitioners perform FBSE regularly, illustrating the room for improvement regarding skin cancer screening within the level of primary healthcare[40].

Problems that contribute to the low skin cancer examinations by general practitioners persist. Significant obstacles include the limited skin cancer screening education during medical school, low confidence, lack of time during consultations, non-systematic methods of public screening, consumption of general practitioners resources and high number of unnecessary biopsies.[56] While general practitioners also have a lower detection rate of skin cancer compared to dermatologists, the collaboration between both specialists, including the referral for skin exam (GP to dermatologist), is associated with an improved diagnostic accuracy of skin cancer.[57] General practitioners may act as important factor for primary suspicion and skin cancer triage, as

patient visits to their general practitioner are in average 3 times more frequent than to a dermatologist.

When evaluating the patients' experience of skin cancer screening in a primary healthcare setting, studies found out that no harm (E.g. discomfort of undressing) is perceived. While overall preferring regular FBSE performance by the dermatologist to the general practitioner, the majority of patients understands any FBSE performance as valuable addition to their healthcare[46].

4 METHOD AND MATERIALS

4.1 Method

The data of both surveys was anonymous and analyzed statistically in aggregated form. All filled surveys were collected and analyzed manually. The data this survey is based on was collected from both patient and general practitioner between December 2018 and March 2019 in Riga, Latvia. All the results were manually collected using SPSS 25th version (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). Additionally it was utilized to evaluate average answer outcomes and statistical significance using descriptive evaluation and cross tabulation with Chi-square test. Significance level < 0.05 was considered as statistically significant for statistical analyses. For the statistical analyzes each question was transformed directly into a correlating variable.

For the purpose of comparison between attitudes of general practitioners and patients we transformed the general practitioners variables of "patient education of skin cancer risk factors", "patient education of preventive measures for skin cancer" and "patient education of skin cancer self-examination methods" into dichotomous putting categories of "never" and "rare" together and forming a new "No" category, and categories of "sometimes", "often" and "Always" to the second one forming the new "Yes" category.

Additionally we combined both variables of performed and received FBSE annually to form a new variable of combined FBSE perception (FBSEtotal) for direct comparison of attitudes of performance. Clustered column chart diagrams were generated using Windows word 2016 to visualize the results. 3D scatter charts were generated using SPSS 25th version to visualize the results of multiple variables.

1. Descriptive statistics was performed for all study variables. For dichotomous variables, we investigated N and the percentage for each group, as well as individually for patients and doctors. For group variables, we investigated the median value for the variable itself as well as by dividing it into groups of patients and general practitioners.

2. We compared between the attitude of patients and general practitioners on the variables of "education of skin cancer risk factors", "education of preventive measures for skin cancer" and "education of skin cancer self-examination methods" using Chi-square analysis.

   We also compared differences in age and gender between patients and general practitioners using Chi-square analysis.

   Furthermore, we analyzed the differences in the performance/experience of FBSE of general practitioners and patients using Chi-square analysis.

3. We additionally compared between older and younger patients and general practitioners looking on their attitude of patients and general practitioners on the variables of "education of skin cancer risk factors", "education of preventive measures for skin cancer" and "education of skin cancer self-examination methods" using Chi-square analysis.

4. For the group of patients we investigated relationships between patients who were educated about skin cancer risk factors and prevention by their general practitioner with the patients actual history of skin cancer using Chi-square analysis

   Furthermore, we investigated correlations between the patient age groups with the history of skin cancer using Chi-square analysis

   Additionally we evaluated relationships between the patient education of skin cancer risk factors and prevention by their general practitioner as well as skin cancer prevention and self-examination using Chi-square analysis

   We also investigated relationships between the choice of patient to undergo skin cancer screening during a routine family doctor visit or having it done by a dermatologist as an additional visit and previous visit to the dermatologist in the last 12 months using Chi-square analysis.

5. For the group of general practitioners we investigated relationships between further education of skin cancer and the clinical use of dermatoscopy on patients with suspicious lesions, the performance of FSBE during annual patient visits and self-assessment of confidence in the performance of FBSE using Chi-square analysis.

   In addition, we investigated relationships between the confidence of general practitioners in their performance of FBSE and the actual performance of FBSE on an annual basis using the Chi-square analysis.

   Furthermore, we investigated relationships between the long-term follow up of patients' skin lesions by general practitioners and their rate of referral to dermatologists in the past 12 month using the Chi-square analysis.

   We also investigated relationships between the general practitioners age and gender in relation to their confidence of performing FBSE using Chi-square analysis.

4.2 Materials

This study was an observational cross-sectional survey study. Questions were closed-ended. With likert-type scales and multiple choice answers possible. The surveys were developed utilizing the open source survey platform- https://esurv.org/

We created two different survey versions, one addressed at patients and one addressed at General practitioners. Both questionnaires were available in Latvian and English and preferred language could be chosen. For the collection of data, the surveys were handed out individually and personally in printed-paper form. Patients were asked for participation by random selection between December 2018 and March 2019 Riga East University Hospital (RAKUS) and "Veselības centrs 4" -"Dermatoloģijas klīnika". General Practitioners were asked for participation by random selection during the 2018 December and 2019 March – "Latvijas Ģimenes ārstu asociācija" (LGAA) conference. The survey was designed to be completed in 5-10 minutes on average to increase the willingness of participation while still covering the most crucial questions for our research.

The final research material is based on the analysis of completed patient and general practitioner answer sets. Both questionnaires contained an introduction and short explanation of the research, its aims, consequences of participation and contact information of the research team in compliance with the LU ethics regulations.

The patient version included the following twelve questions and consecutive answers:

1. How old are you?
(18-29, 30-49, 50-69, >70)

2. Gender?
(Male, Female)

3. How often did you visit your family doctor in the last 12 month approximately?
(Never, 1 time, 2-3 times, 4-6 times, >7 times)

4. How often did you visit the dermatologist in the last 12 month approximately?
(Never 1 time 2-3 times 4-6 times >7 times)

5. Does your family doctor perform full body screening for skin cancer?
(Never, Rarely, Sometimes, Often, Always)

6. Have you ever been diagnosed with any form of skin cancer / precancerous lesion?
(Yes, No)

7. IF YES (question 8), who diagnosed this lesion?
(Family doctor, Dermatologist, Other)

8. Has your family doctor ever referred you to a dermatologist for a suspicious lesion?
(Yes, No)

9. Did your family doctor ever educate you about skin cancer risks factors?
(Yes, No)

10. Did your family doctor ever educate you about preventive measures for skin cancer?
(Yes, No)

11. Did your family doctor ever educate you about skin cancer self-examination techniques, including how to self-assess for suspicious lesions?
(Yes, No)

12. When given the choice of undergoing skin cancer screening during a routine family doctor visit or having it done by a dermatologist at an additional visit, which one would you prefer?
(Family doctor / single visit, Dermatologist / additional visit, No preferences)

The General practitioner version included the following eleven questions and consecutive answers:

1. How old are you?
(18-29, 30-49, 50-69, >70)

2. Gender:
(Male, Female)

3. Do you follow the development of moles and skin lesions of long time patients?
(Yes, No)

4. How often do you perform full body skin examination (FBSE) during annual patient visits?
(Never, Rarely, Sometimes, Often, Always)

5. How often did you refer patients to a dermatologist for suspected cancerous/precancerous lesions in the past 12 month?
(Never, 1-3 times, 4-9 times, 10-19 times, >20 times)

6. Do you perform dermatoscopy on patients with suspicious lesions?
(Yes, No)

7. Did you ever undergo further education, seminars or special programs for the detection of skin cancer?
(Yes, No)

8. Do you educate your patients about skin cancer risks factors?
(Never, Rarely, Sometimes, Often, Always)

9. Do you educate your patients about preventive measures for skin cancer?
(Never, Rarely, Sometimes, Often, Always)

10. Do you educate your patients about skin cancer self-examination techniques, including how to self-assess for suspicious lesions?
(Never, Rarely, Sometimes, Often, Always)

11. How confident are you in the ability to perform full body skin examination (FBSE) for the detection of skin cancer?
(Not confident, Slightly confident, Moderately confident, Confident, Very confident)

Both questionnaires in Latvian and English can additionally be found in the appendices six and seven – page 94-101

5 RESULTS

Overall, 144 completed questionnaires were collected. Out of the total 144 participants, 85 were patients and 59 were general practitioners

5.1 Patient descriptive answers

Table 1. *Shows the patients age groups. The majority of patients (43.5%) were between 30 and 49 years of age.*

Variable	Categories	N (%)
Age N (%)	18 – 29	13 (15.3)
	30 – 49	37 (43.5)
	50 – 69	25 (29.4)
	>70	10 (11.8)

Table 2. *Shows the patients gender. The majority of patients (81.2%) were female.*

Variable	Categories	N (%)
Gender N (%)	Male	15 (17.6)
	Female	69 (81,2)
	Missing answers	1 (1.2)

Table 3. *Shows the average number of visits to a general practitioner in the last 12 month. The majority of patients (21.5%) visited their general practitioner 2-3 times.*

Variable	Categories	N (%)
GP visits in the last 12 month	Never	18 (12.5)
	1 time	26 (18.1)
	2-3 times	31 (21.5)
	4-6 times	8 (5.6)
	>7 times	2 (1.4)

Table 4. *Shows the average number of visits to a dermatologist in the last 12 month. The majority of patients (25.0%) did not visit the dermatologist.*

Variable	Categories	N (%)
Dermatology visits in the last 12 month	Never	36 (25.0)
	1 time	22 (15.3)
	2-3 times	20 (13.9)
	4-6 times	5 (3.5)
	>7 times	2 (1.4)

Table 5. *Shows the experience of annual full body skin cancer screening (FBSE). The majority of patients (87.1%) do not receive annual full body skin cancer screening.*

Variable	Categories	N (%)
Annual FSBE examination by GP	Never	74 (87.1)
	Rarely	9 (10.6)
	Sometimes	1 (1.2)
	Often	0 (0)
	Always	1 (1)

Table 6. *Shows the patients previous diagnosis of skin cancer. Most of patients (81.2%) did not have a history of skin cancer.*

Variable	Categories	N (%)
Previous Dg of skin cancer	Yes	16 (18.8)
	No	69 (81.2)

Table 7. *Shows who gave the initial diagnosis in patients with a history of skin cancer. Most of the patients with skin cancer (55.6%) were diagnosed by their dermatologist.*

Variable	Categories	N (%)
Initial detection of skin cancer	General Practitioner Dermatologist Other	5 (27.8) 10 (55.6) 3 (16.7)

Table 8. *Shows the referral of patients to a dermatologist by their general practitioner. Most of the patients (78.6%) were never referred.*

Variable	Categories	N (%)
Referral to a dermatologist by the general practitioner	Yes No	18 (21.4) 66 (78.6)

Table 9. *Shows the patients received education of skin cancer risk factors by their general practitioner. The majority of patients (87.1) did not receive any education.*

Variable	Categories	N (%)
Education of skin cancer risk factors N (%)	Yes No	10 (11.8) 74 (87,1)

Table 10. *Shows the patients received education of skin cancer prevention by their general practitioner. The majority of patients (89.4%) did not receive any education.*

Variable	Categories	N (%)
Education of skin cancer prevention N (%)	Yes No	9 (10.6) 76 (89,4)

Table 11. *Shows the patients received education of skin cancer self-examination techniques by their general practitioner. The majority of patients (88.2%) did not receive any education.*

Variable	Categories	N (%)
Education of skin cancer self-examination techniques N (%)	Yes No	9 (10,6) 75 (88.2)

Table 12. *Shows the preferred patients choice of undergoing skin cancer screening. Either having it performed by their general practitioner during an annual single visit or by a dermatologist in an additional visit or without any preference. The majority of patients (68.3) would prefer the performance by a dermatologist.*

Variable	Categories	N (%)
Choice of skin cancer screening	General Practitioner (single visit) Dermatologist (additional visit) No preference	10 (12.2) 56 (68.3) 16 (19.5)

5.2 General practitioner specific answers:

Table 13. *Shows the general practitioners age groups. The majority of general practitioners (62.7%) were between 50-69 years of age.*

Variable	Categories	N (%)
Age N (%)	18 – 29 30 – 49 50 – 69 >70	2 (3.4) 19 (32.2) 37 (62.7) 1 (1,7)

Table 14. *Shows the general practitioners gender. The majority of general practitioners (62.7%) were female.*

Variable	Categories	N (%)
Gender N (%)	Male	21 (35.6)
	Female	37 (62.7)
	Missing answers	1 (1.7)

Table 15. *Shows the general practitioners long term follow up of patients moles and skin lesions. The majority of general practitioners (72.4%) do evaluate the development.*

Variable	Categories	N (%)
Long term follow up of skin lesions	Yes	42 (72.4)
	No	16 (27.6)

Table 16. *Shows the general practitioners performance of FBSE during annual patient visits. The majority of general practitioners (35.6%) do sometimes perform FBSE.*

Variable	Categories	N (%)
Performance of FBSE during annual patient visits	Never	2 (3.4)
	Rarely	11 (18.6)
	Sometimes	21 (35.6)
	Often	17 (28.8)
	Always	8 (13.6)

Table 17. *Shows the referral of patients to a dermatologist by general practitioners in the last 12 month. Most general practitioners (39.7%) did 4-9 referrals.*

Variable	Categories	N (%)
Referral of patient to a dermatologist in the last 12 month	Never	2 (3.4)
	1-3 times	8 (13.8)
	4-9 times	23 (39.7)
	10-19 times	14 (24.1)
	>20 times	11 (19.0)

Table 18. *Shows the general practitioners performance of dermatoscopy. The majority of general practitioners (83.1%) do not use a dermatoscope.*

Variable	Categories	N (%)
Performance of dermatoscopy	Yes	10 (16.9)
	No	49 (83.1)

Table 19. *Shows the amount of general practitioners that received specific further education about skin cancer. The majority of general practitioners (62.7%) received further education.*

Variable	Categories	N (%)
Further education about skin cancer	Yes	37 (62.7)
	No	22 (37.3)

Table 20. *Shows the general practitioners education of skin cancer risk factors to the patients. Most of the general practitioners (89.8%) educate their patients.*

Variable	Categories	N (%)
Education of skin cancer risk factors N (%)	Yes	53 (89.8)
	No	5 (8.5)

Table 21. *Shows the general practitioners education of skin cancer prevention to the patients. Most of the general practitioners (93.2%) educate their patients.*

Variable	Categories	N (%)
Education of skin cancer prevention N (%)	Yes No	55 (93.2) 3 (5.1)

Table 22. *Shows the general practitioners education of skin cancer self-examination techniques to the patients. Most of the general practitioners (88.1%) educate their patients.*

Variable	Categories	N (%)
Education of skin cancer self-examination techniques N (%)	Yes No	52 (88.1) 6 (10.2)

Table 23. *Shows the general practitioners self-assessment of confidence in the ability to perform FBSE for the detection of skin cancer and suspicious lesions. The majority (64.9) identified as moderately confident.*

Variable	Categories	N (%)
Confidence in the ability to perform FBSE for skin cancer detection	Not confident Slightly confident Moderately confident Confident Very confident	6 (10.5) 3 (5.3) 37 (64.9) 10 (17.5) 1 (1.8)

5.3 Cross evaluation of patients vs. general practitioner

Table 24. Comparison between age and gender as well as the attitude on the variables of "education of skin cancer risk factors", "education of preventive measures for skin cancer" and "education of skin cancer self-examination methods" of patients and general practitioners.

Variable	Category	Groups		P value
		Patients	**General practitioners**	
Age N (%)	18 – 29 30 – 49 50 – 69 >70	13 (15.3) 37 (43.5) 25 (29.4) 10 (11.8)	2 (3.4) 19 (32.2) 37 (62.7) 1 (1,7)	< 0.01
Gender N (%)	Male Female Missing answers	15 (17.6) 69 (81,2) 1 (1.2)	21 (35.6) 37 (62.7) 1 (1.7)	< 0.05
Education of skin cancer risk factors N (%)	Yes No	10 (11.8) 74 (87,1)	53 (89.8) 5 (8.5)	< 0.01
Education of skin cancer prevention N (%)	Yes No	9 (10.6) 76 (89,4)	55 (93.2) 3 (5.1)	< 0.01
Education of skin cancer self-examination techniques N (%)	Yes No	9 (10,6) 75 (88.2)	52 (88.1) 6 (10.2)	< 0.01

a. We observed statistical significance between patients and general practitioners concerning their age (Chi square test 19.5, $p < 0.01$). Most of the patients (43,5%) were 30-49 years old, while most of general practitioners (62.7%) were 50-69 years old (Table 24, first row)

b. We observed statistical significance between patients and doctors concerning their gender (Chi square test 6.8, $p < 0.05$). Most of the patients (81.2%) as well as general practitioners (62.7%) were female. (Table 24, second row)

c. We observed statistical significance between patients and general practitioners concerning the education of skin cancer risk factors (Chi square test 87.8, $p < 0.01$). Most of the patients (87.1%) said they did not receive education by their general practitioner, while most of the general practitioners (89.8%) said they are educating their patients. (Table 24, third row)

d. We observed statistical significance between patients and general practitioners concerning the education of skin cancer prevention (Chi square test 98.9, $p < 0.01$). Most of the patients (89.4%) said they did not receive education by their general practitioner, while most of the general practitioners (93.2%) said they are educating their patients. (Table 24, fourth row)

e. We observed statistical significance between patients and general practitioners concerning the education of skin cancer self-examination (Chi square test 87.2, $p < 0.01$). Most of the patients (88.2%) said they did not receive education by their general practitioner, while most of the general practitioners (88.1%) said they are educating their patients. (Table 24, fifth row)

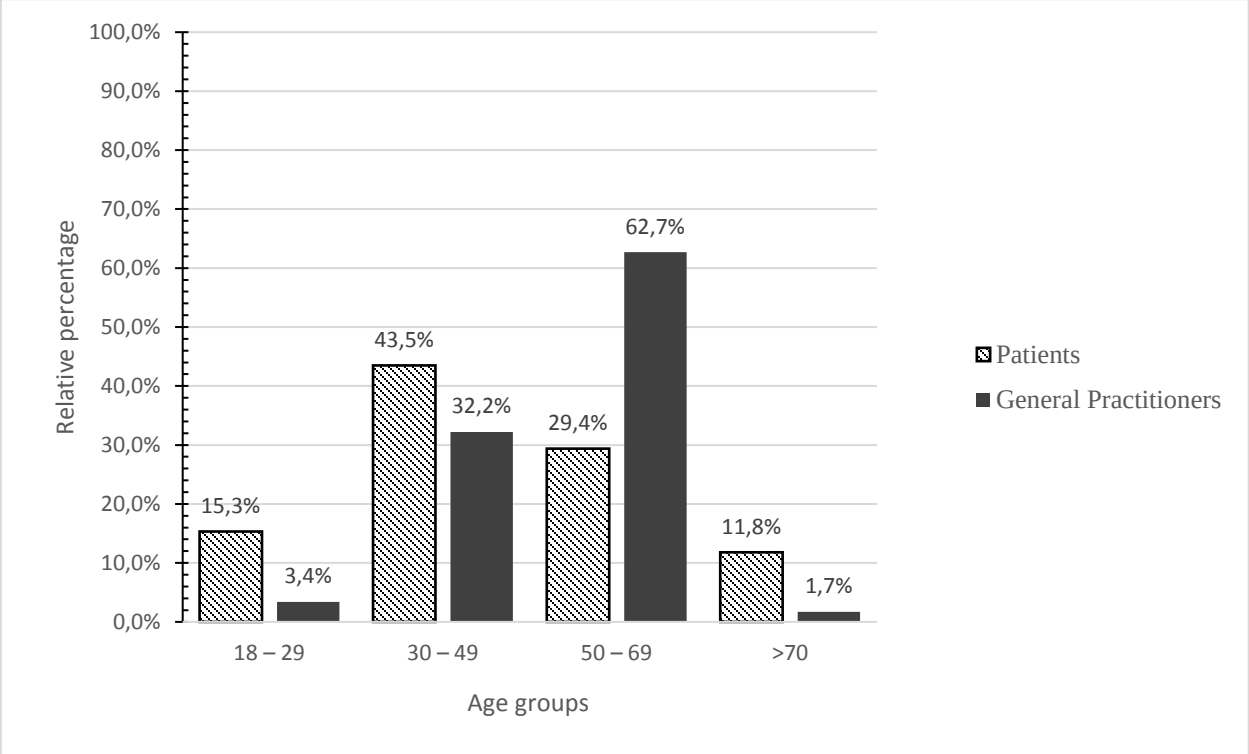

Figure 1. *Clustered column chart demonstrating the data of table 24- first row.*

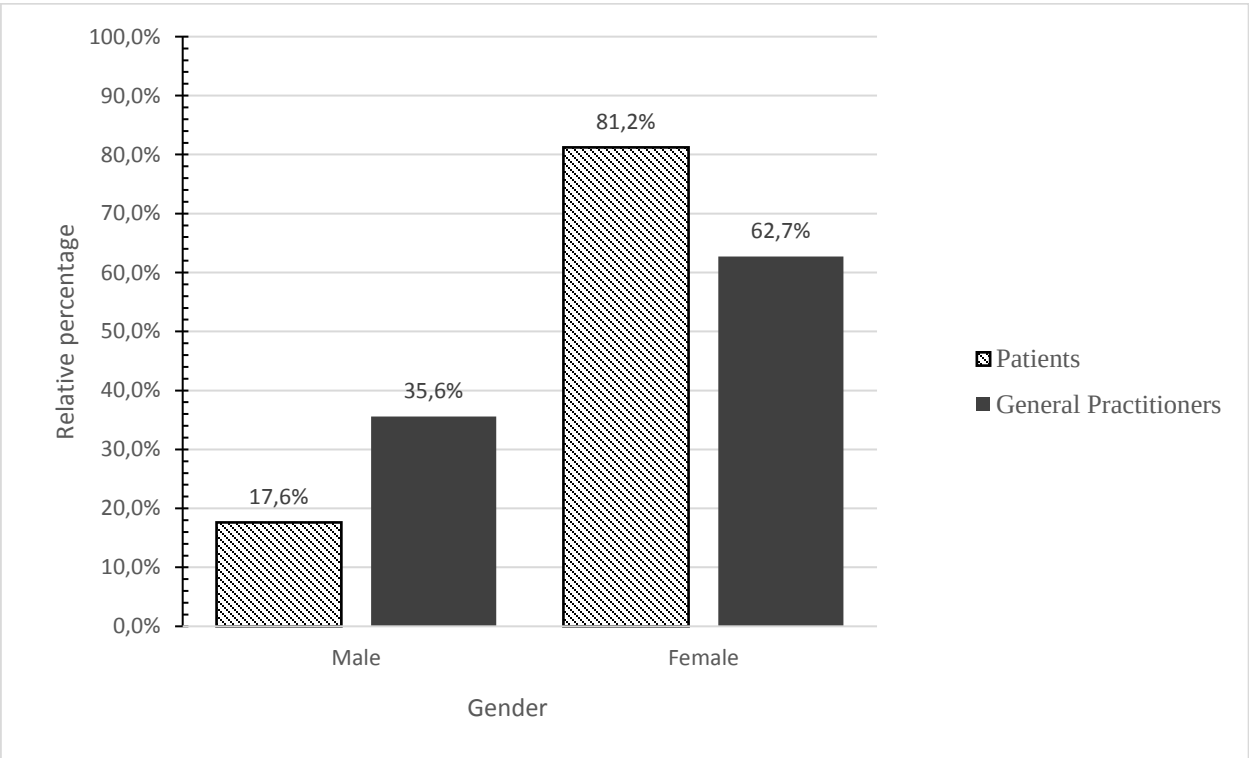

Figure 2. *Clustered column chart demonstrating the data of table 24- second row.*

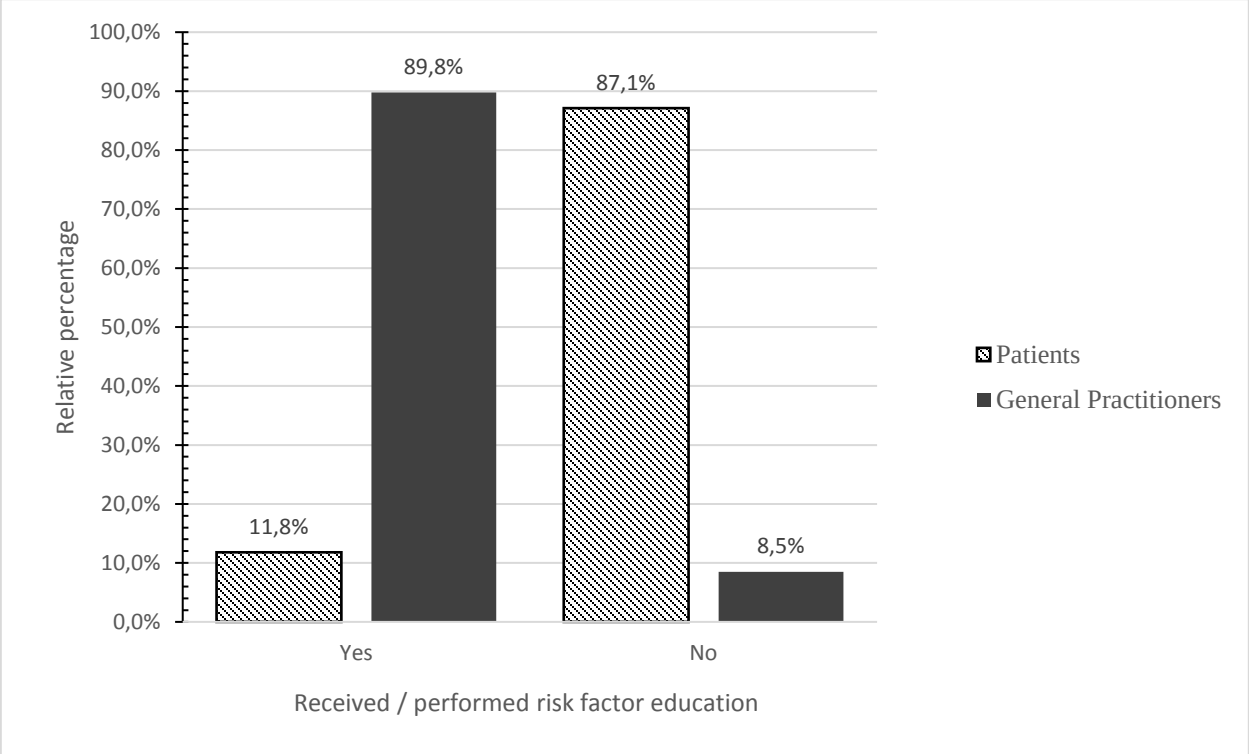

Figure 3. *Clustered column chart demonstrating the data of table 24- third row.*

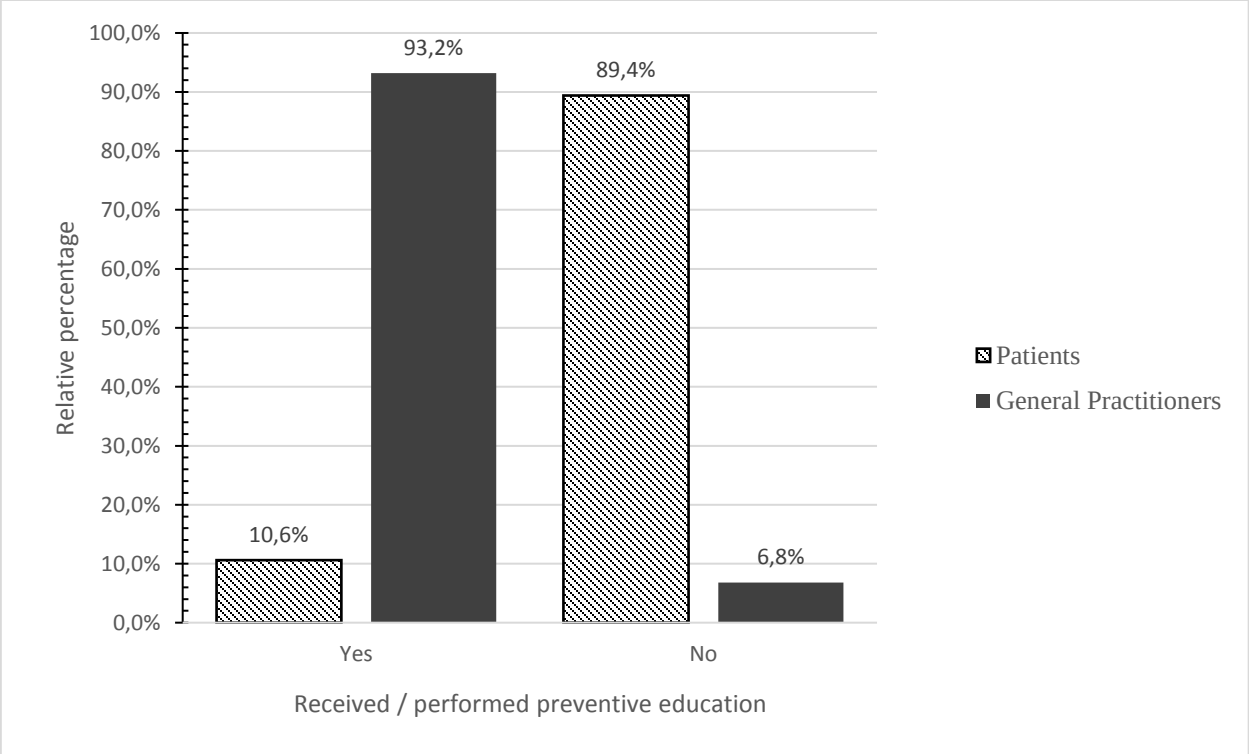

Figure 4. *Clustered column chart demonstrating the data of table 24- fourth row.*

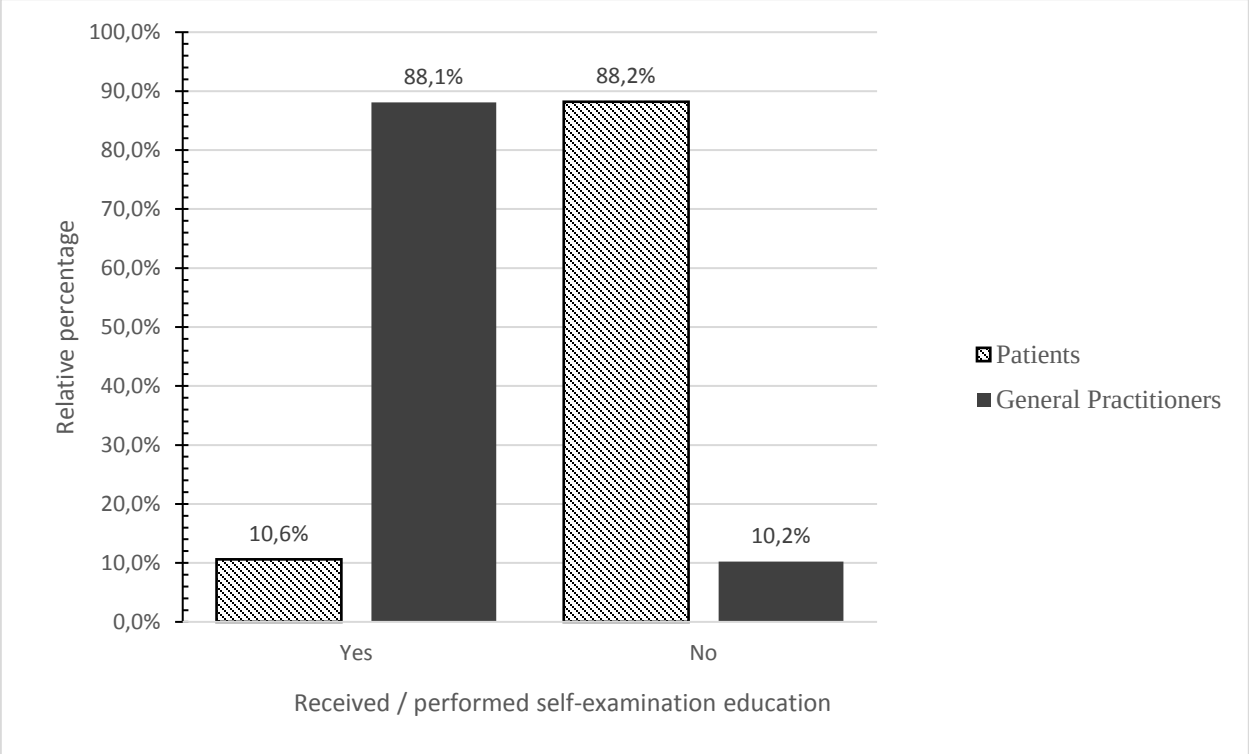

Figure 5. *Clustered column chart demonstrating the data of table 24- fifth row.*

f. We observed statistical significance between patients and general practitioners concerning the annual performance of FBSE (Chi square test 107.8, $p < 0.01$). Most of the patients (87.1%) said they never receive FBSE, while most of the general practitioners (35.6%) said they are performing FBSE sometimes.

Table 26: *Survey groups and their experience of FBSE (receiver or performed) in the general practitioners office (p < 0.01).*

Groups		**FBSE performance (total)**					**p value**
		Never N(%)	Rarely N(%)	Sometimes N(%)	Often N(%)	Always N(%)	
	Patients (received)	74 (97.4)	9 (45.0)	1 (4.5)	0 (0)	1 (11.1)	p < 0.01
	General practitioners (performed)	2 (2.6)	11 (55.0)	21 (95.5)	17 (100)	8 (88.9)	
Total		76 (100)	20 (100)	22 (100)	17 (100)	9 (100)	

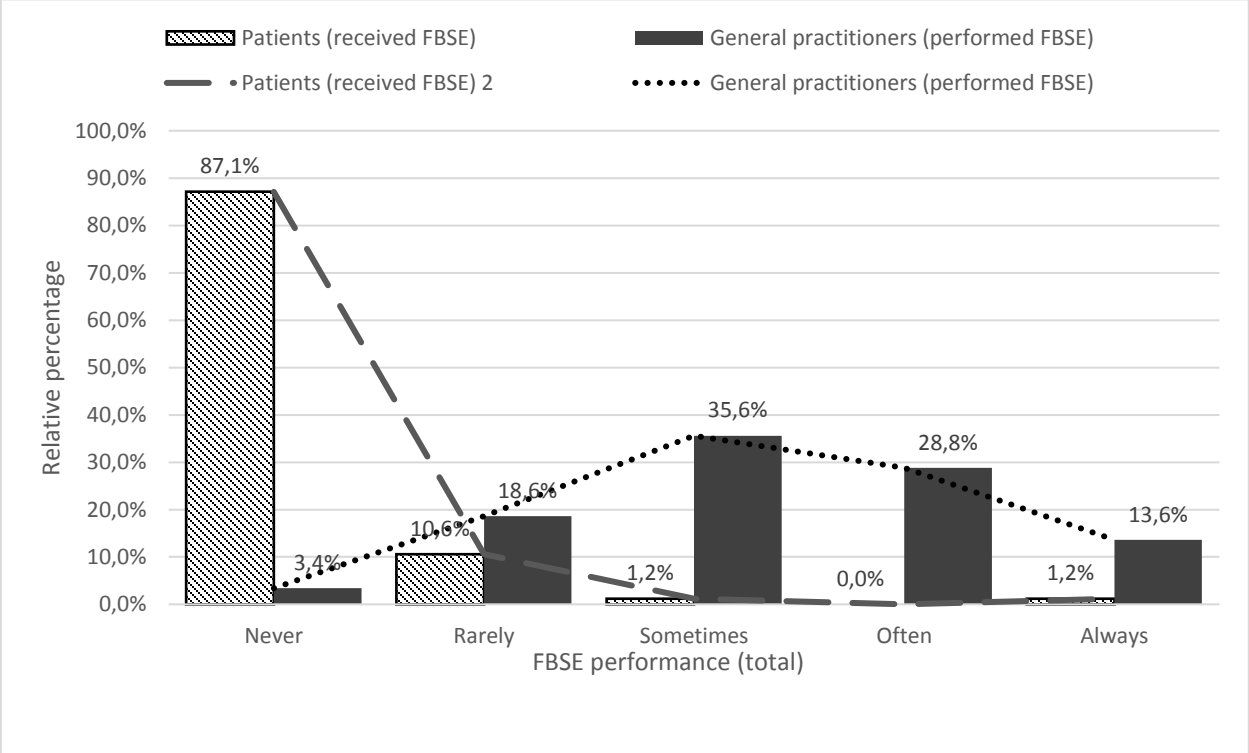

Figure 6: *Clustered column chart demonstrating the data shown in table 26. Data is in relative percent to the answer count of each group.*

5.4 Cross evaluation "Age" vs. multiple variables

We did not observed significant difference between age groups both of patients and General physicians concerning three major factors: self-examination (Chi square 1.75 p =0.63 for patients and chi square test 1.19 p = 0.76 for general practitioners), prevention (Chi square 2.99 p =0.39 for patients and chi square test 1.92 p = 0.59 for general practitioners) and risk factors (Chi square 3.11 p =0.37 for patients and chi square test 0.44 p = 0.93 for general practitioners),

5.5 Patient variable cross evaluation

a. We did not observed significant relationships between patients who were educated about skin cancer self-examination by their general practitioner and their actual history of skin cancer (Chi-square test 1.33 p = 0.28)

b. We observed significant relationships between patients who were educated about skin cancer risk factors by their general practitioner and their actual history of skin cancer (Chi-square test 13.74 p < 0.01). From patients who had a history of skin cancer (N = 15, 17.9%) 40% had a received risk factor education while 60% were without education.

Table 27: *Patients with further education about skin cancer risk factors and their actual history of skin cancer or not. (P = < 0.01).*

Risk factor education		**Skin cancer history**		**p value**
		Yes N(%)	No N(%)	
	Yes N(%)	6 (40.0)	4 (5.8)	p < 0.01
	No N(%)	9 (60.0)	65 (94.2)	
Total		15 (100)	69 (100)	

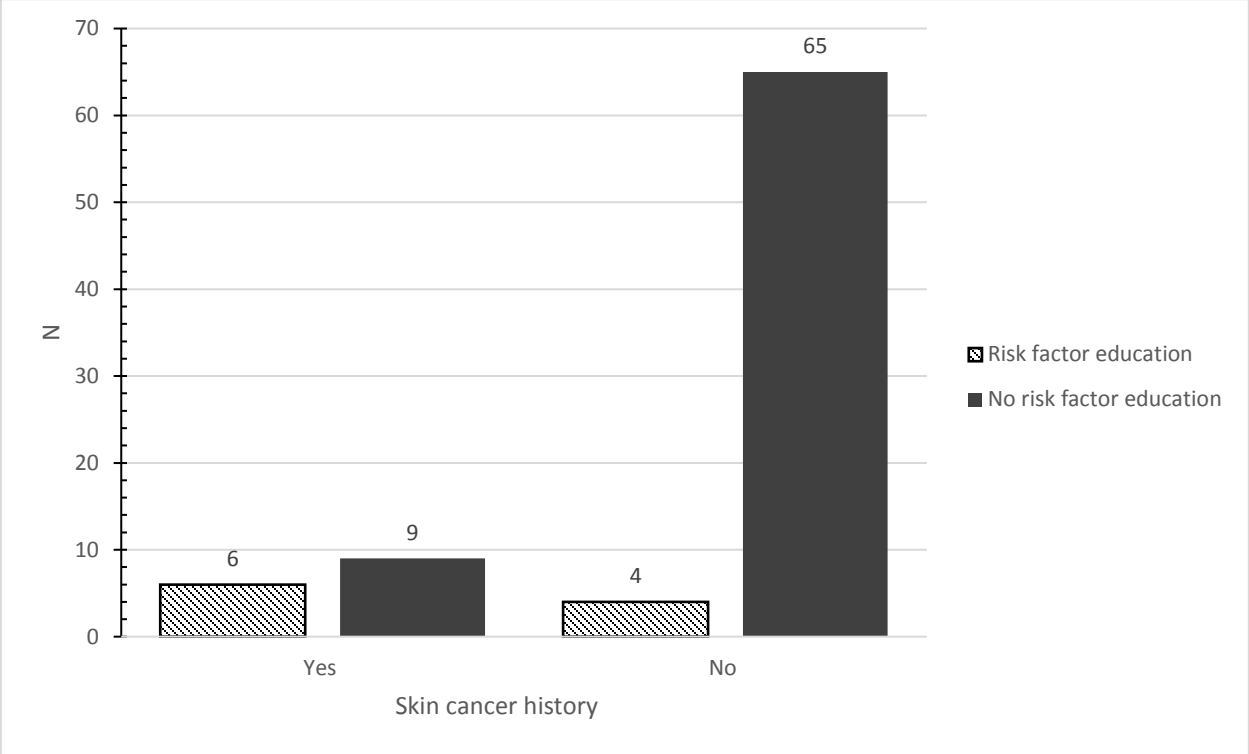

Figure 7: *Clustered column chart demonstrating the data shown in table 27.*

c. We observed significant relationships between patients who were educated about skin cancer prevention by their general practitioner and their actual history of skin cancer (Chi-square test 15.08 $p < 0.01$). From patients who had a history of skin cancer (N = 16, 18.8%) 37.5% had a received preventive education while 62.5% were without education.

Table 28: *Patients with further education about skin cancer prevention and their actual history of skin cancer or not. (P = < 0.01).*

Preventive education		**Skin cancer history**		**p value**
		Yes N(%)	No N(%)	
	Yes N(%)	6 (37.5)	3 (4.3)	p < 0.01
	No N(%)	10 (62.5)	66 (95.7)	
Total		16 (100)	69 (100)	

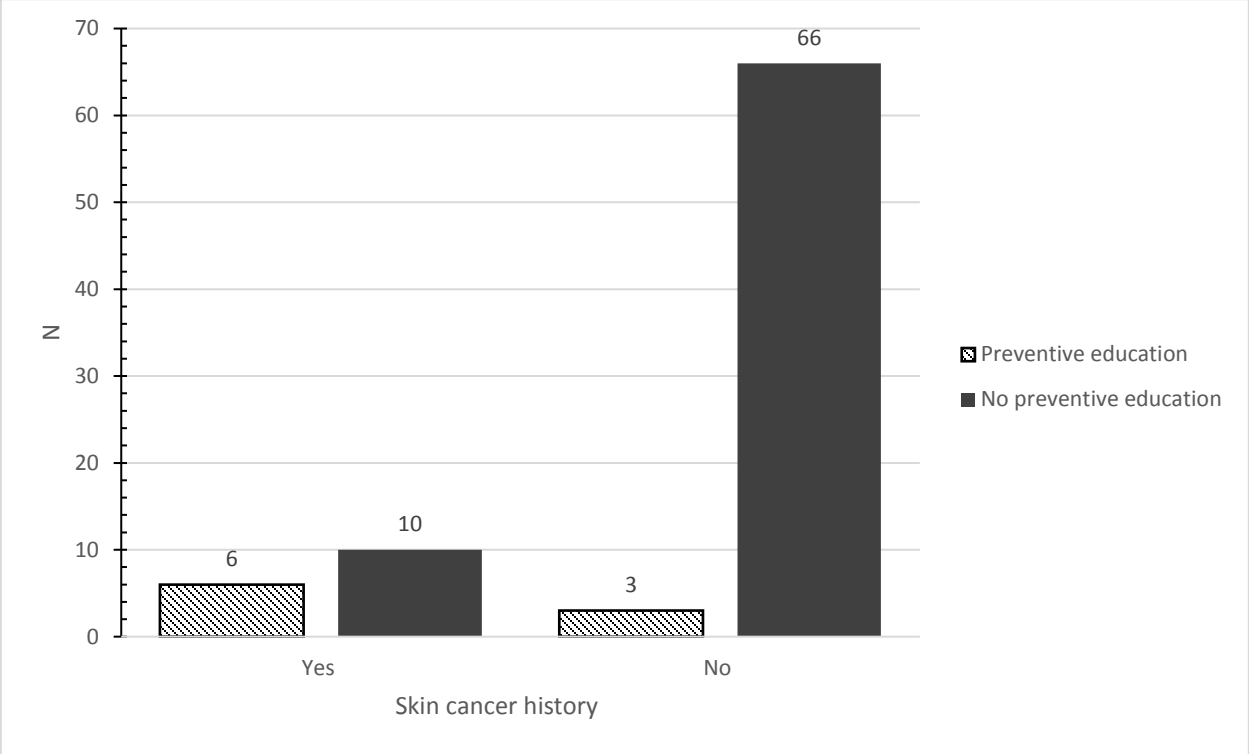

Figure 8: *Clustered column chart demonstrating the data shown in table 28.*

d. We observed significant relationships between the age of patients and their actual history of skin cancer (Chi-square test 17.88 $p < 0.01$). Patients in the age group of >70 had the highest rate of skin cancer history (N=6, 60.0%) From patients in the age group of 18-29 7.7% had a history of skin cancer.

Table 29: *Patients age groups and their actual history of skin cancer or not. (P = < 0.01).*

Skin cancer history		**Age groups**				**p value**
		18-29 N(%)	30-49 N(%)	50-69 N(%)	>70 N(%)	
	No N(%)	12 (92.3)	35 (94.6)	18 (72.0)	4 (40.0)	p < 0.01
	Yes N(%)	1 (7.7)	2 (5.4)	7 (28.0)	6 (60.0)	
Total		13 (100)	37 (100)	25 (100)	10 (100)	

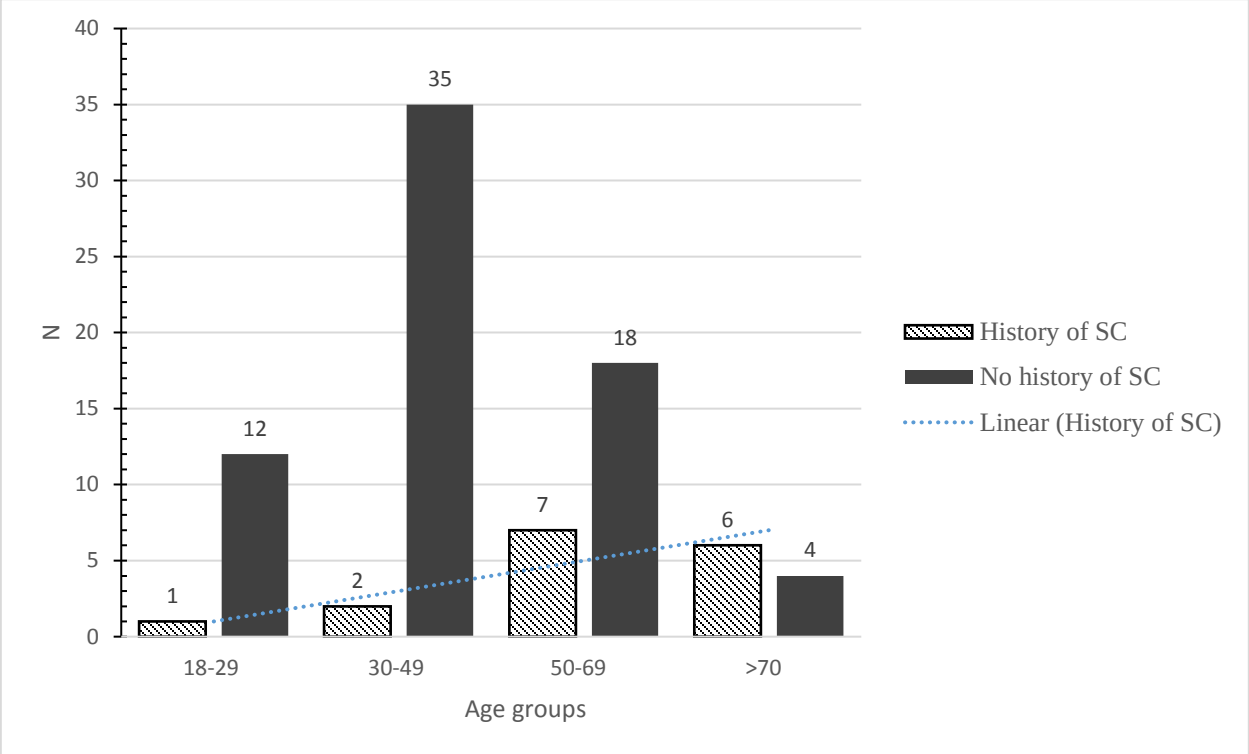

Figure 9: *Clustered column chart demonstrating the data shown in table 29. Trend line indicating the development of skin cancer history with increasing age.*

e. We observed significant relationships between patients who were educated about skin cancer prevention and risk factors by their general practitioner (Chi-square test 56,96 p < 0.01). From patients who did not receive preventive education (N = 75, 89.3%) 98.6% also did not received risk factor education.

Table 30: *Patients with further education about skin cancer prevention and education about risk factors or not. (P = < 0.01).*

Preventive education		**Risk factor education**		**p value**
		Yes N(%)	No N(%)	
	Yes N(%)	8 (80.0)	1 (1.4)	p < 0.01
	No N(%)	2 (20.0)	73 (98.6)	
Total		10 (100)	74 (100)	

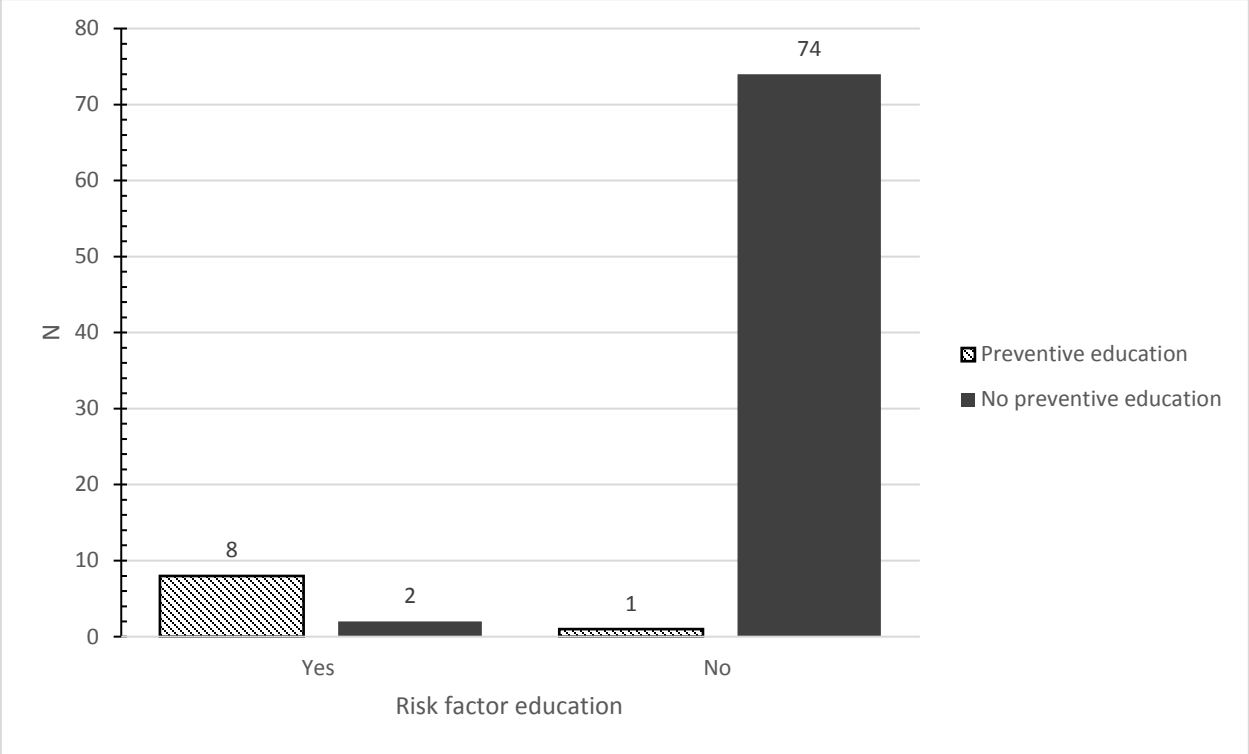

Figure 10: *Clustered column chart demonstrating the data shown in table 30.*

f. We observed significant relationships between patients who were educated about skin cancer prevention and self-examination by their general practitioner (Chi-square test 11,98p < 0.01).

From patients who did not receive preventive education (N = 75, 89.3%) 93.3% also did not received self-examination education.

Table 31: *Patients with further education about skin cancer prevention and education examination or not. (P = < 0.01).*

Preventive education		**Self-examination education**		**p value**
		Yes N(%)	No N(%)	
	Yes N(%)	4 (44.4)	5 (6.7)	p < 0.01
	No N(%)	5 (55.6)	70 (93.3)	
Total		9 (100)	75 (100)	

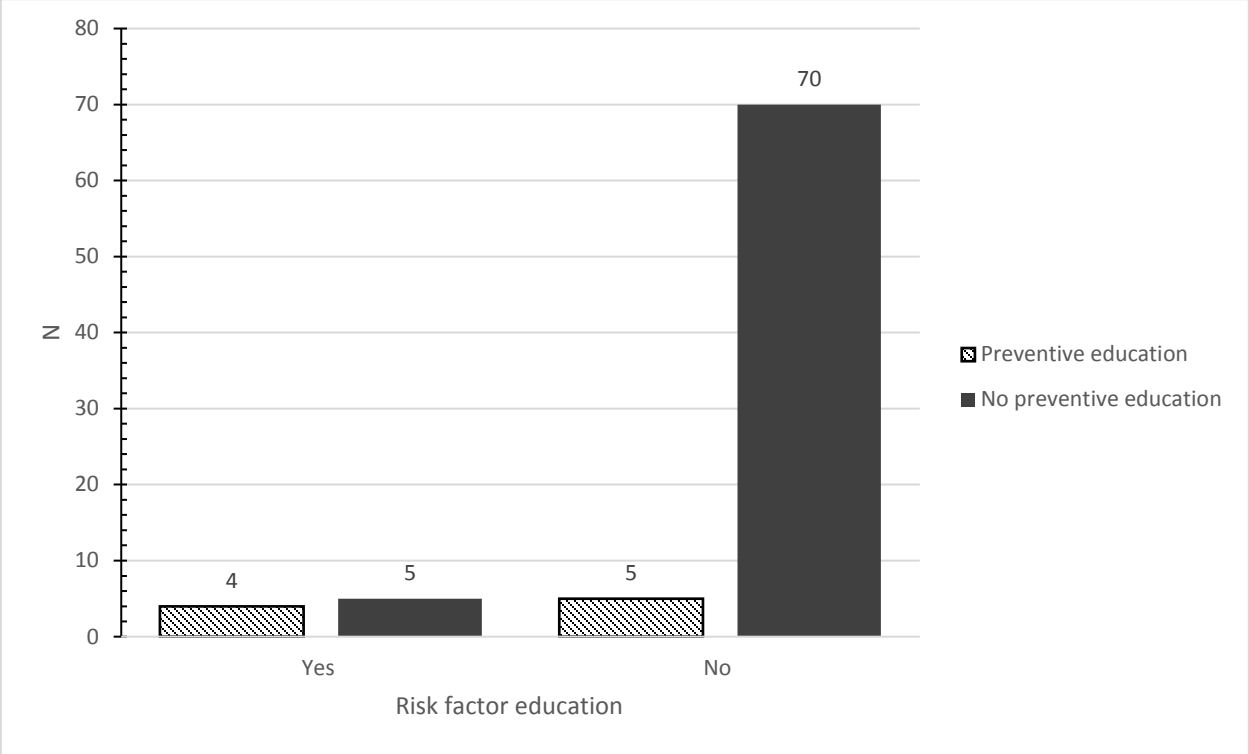

Figure 11: *Clustered column chart demonstrating the data shown in table 30.*

g. No significant relationships were observed between the choice of patient to undergo skin cancer screening during a routine family doctor visit or having it done by a dermatologist as an additional visit and eight major variables: previous visit to the dermatologist in the last 12 months (chi-square 17.97 p = 0.326); previous visits to the general practitioner in the last 12 month (chi-square 14.86p = 0.062); history of skin cancer (chi-square 0.713 p = 0.700); previous diagnosis of skin cancer (chi-square 7.17 p = 0.127); general practitioner referral to the dermatologist (chi-square 4.25 p = 0.119); received FBSE screening annually by the general practitioner (chi-square 10.416 p = 0.108); age (chi-square 7.31 p = 0.293); gender (chi-square 4.51 p = 0.341)

5.6 General practitioner variable cross evaluation

a. We observed significant relationships between the further education of the diagnosis of skin cancer of general practitioners and the clinical use of dermatoscopy on suspicious lesions (Chi-square 7.16 $p < 0.01$). From general practitioners that did not have any further education (N = 22, 37.3%) nobody performed dermatoscopy. From all that underwent further education (N = 37, 62.7%) 27.0% used dermatoscopy. All 100% of general practitioners that perform dermatoscopy were with further education.

Table 32: *General Practitioners with further education about skin cancer and their use of dermatoscopy or not. (P = < 0.01).*

Dermatoscopy use		**Further education**		**p value**
		Yes N(%)	No N(%)	
	Yes N(%)	10 (27.0)	0 (0)	
	No N(%)	27 (73.0)	22 (100)	p < 0.01
Total		37 (100)	22 (100)	

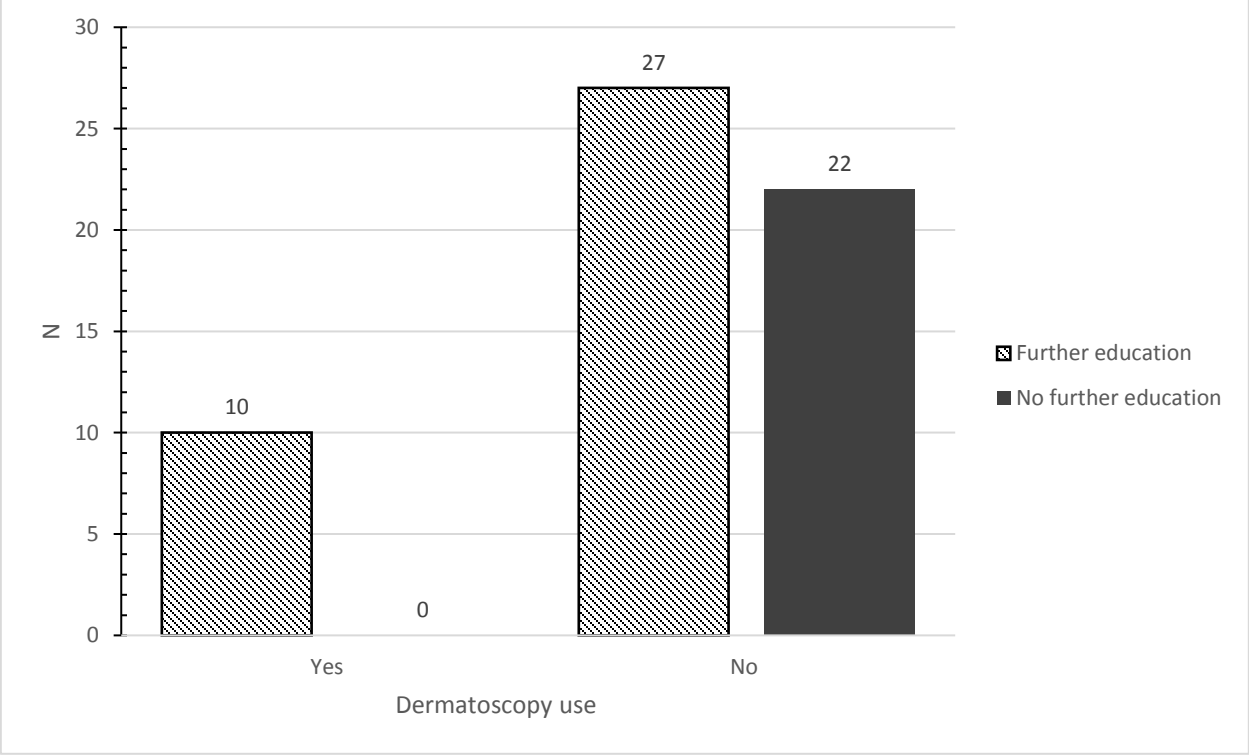

Figure 12: *Clustered column chart demonstrating the data shown in table 32.*

b. We observed significant relationships between the confidence of general practitioners in their performance of FBSE and the actual performance of FBSE on an annual basis (Chi-square 41.73 $p < 0.01$). From general practitioners that identified as moderately confident (N = 35, 31,6%) 48% stated to perform FBSE sometimes. All 100% of general practitioners that always perform FBSE were very confident.

Table 33: *General Practitioners confidence in their ability to perform FBSE and their performance of FBSE annually or not. ($P < 0.01$).*

FBSE performance		**Confidence**					**p value**
		Not confident N(%)	Slightly confident N(%)	Moderately confident N(%)	Confident N(%)	Very confident N(%)	
	Never N(%)	2 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)	$p < 0.01$
	Rarely N(%)	3 (50.0)	1 (33.3)	5 (13.5)	0 (0)	0 (0)	
	Sometimes N(%)	1 (16.7)	0 (0)	18 (48.6)	2 (20.0)	0 (0)	
	Often N(%)	0 (0)	2 (66.7)	10 (27.0)	5 (50.0)	0 (0)	
	Always N(%)	0 (0)	0 (0)	4 (10.8)	3 (30.0)	1 (100)	
Total		6 (100)	3 (100)	37 (100)	10 (100)	1 (100)	

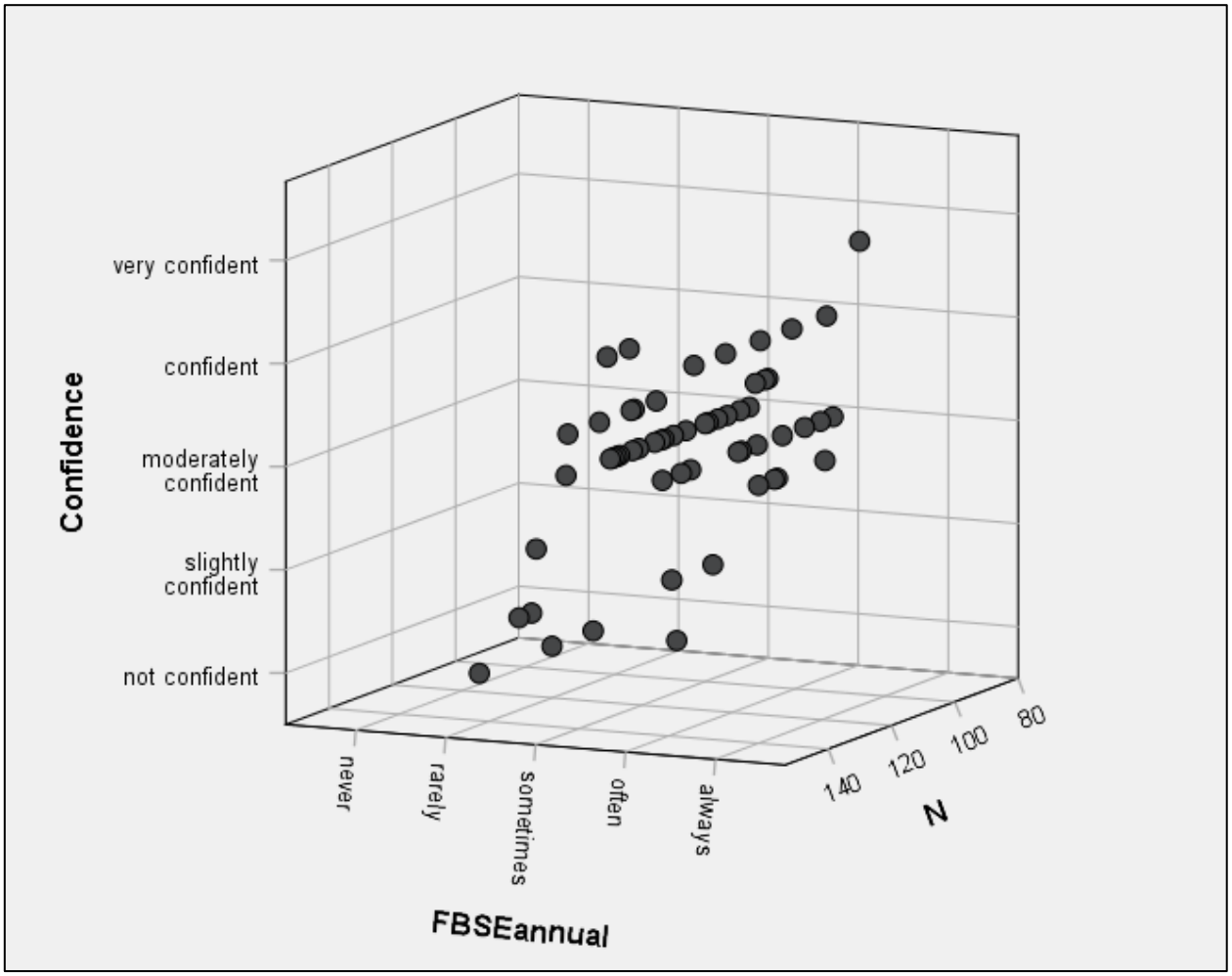

Figure 13: *3D-scatter chart demonstrating the data shown in table 33.*

c. We observed significant relationships between the long term follow up of patients skin lesions by general practitioners and their rate of referral to dermatologists in the past 12 month (Chi-square test 13.633 $p < 0.01$). From general practitioners that do long term follow up of patients skin lesions (N = 42, 73.3%) the majority (N 18 = 42.9%) referred patients 4-9 times to a dermatologist in the last 12 month.

Table 34: *General Practitioners who* perform long term follow up on patients' skin lesions and their rate of referral to dermatologists in the past 12 month. *(P < 0.01).*

Patient referrals to a Dermatologist in the past 12 month N(%)		**Long term follow up of Patient skin lesions N(%)**		**p value**
		Yes N(%)	No N(%)	
	Never N(%)	0 (0)	2 (13.3)	p < 0.01
	1-3 times N(%)	8 (19.0)	0 (0)	
	4-9 times N(%)	18 (42.9)	4 (26.7)	
	10-19 times N(%)	7 (16.7)	7 (46.7)	
	>20 times N(%)	9 (21.4)	2 (13.3)	
Total		42 (100)	15 (100)	

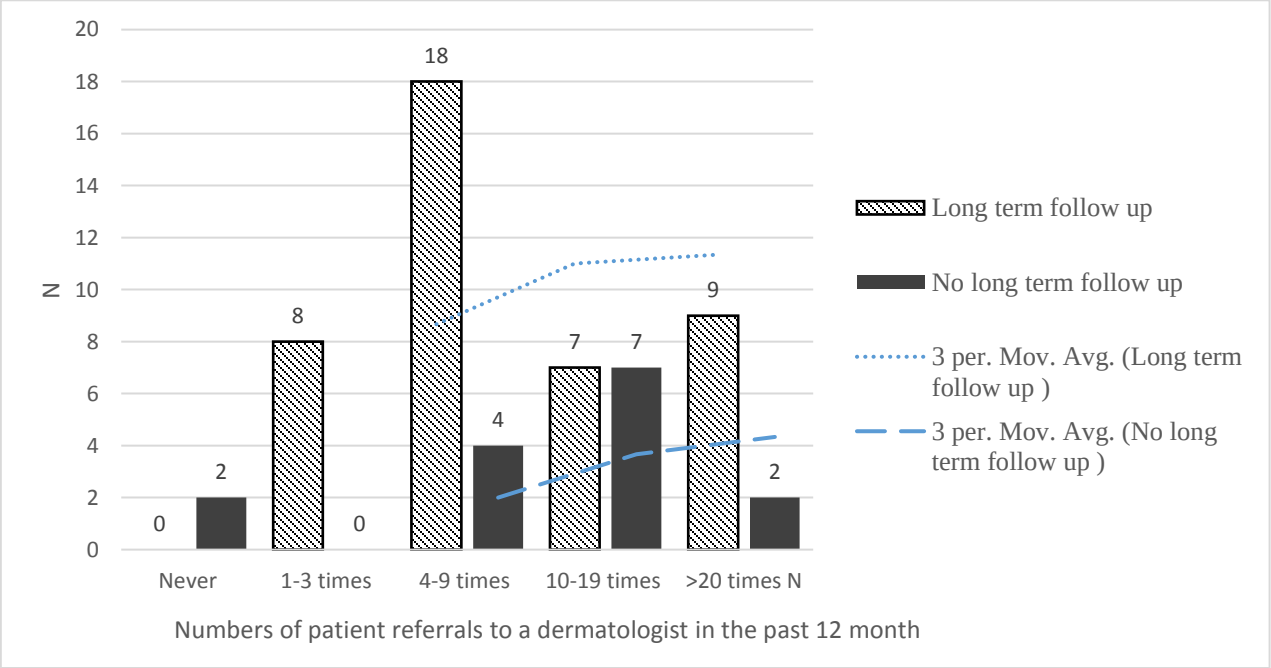

Figure 14: *Clustered column chart and average trend line demonstrating the data shown in table 34.*

d. We did not observed significant relationships between the age of general practitioners and their confidence of performing FBSE for the detection of skin cancer (Chi-square test 9.17 p = 0.68).

e. We did not observed significant relationships between the gender of general practitioners and their confidence of performing FBSE for the detection of skin cancer (Chi-square test 2.4 p = 0.66).

f. We did not observed significant relationships between further education of skin cancer and their confidence of performing FBSE for the detection of skin cancer (Chi-square test 6,05 p = 0.19).

6 DISCUSSION

In this research paper, patient and general practitioner questionnaire answer sets were analyzed to evaluate the current role of skin cancer control activities in the primary healthcare in Latvia. Referring to the current state of research, skin cancer control activities are effective in increasing early detection of skin cancer and lowering the overall related mortality. Yet there is a significant discrepancy between the high prevalence of skin cancer and low rates of specific education and medical evaluations regarding the issue by general practitioners.[40]

Therefore we formed two hypothesis for this research paper: Hypothesis A- "There will be a difference between the patients and general practitioners perception of skin cancer care in the primary healthcare setting" and hypothesis B- "There will be a low incidence of performed skin cancer detection, education and screening by general practitioners". SPSS Pearson Chi-Square tests of the comparative variables of "education of skin cancer risk factors", "education of preventive measures for skin cancer", "education of skin cancer self-examination methods" and "evaluation of FBSE annually *(received or performed)"* showed that all test results were statistically significant different. Consequently, results indicate that there are large discrepancies in the perception of skin cancer control activities between patients and general practitioners. Described findings should be further evaluated in future studies to understand the complex problematic

6.1 Quality of data

This research is based on 144 complete questionnaire answer sets. 85 versions were obtained from patients and 59 versions from general practitioners.
This is an overall small sample size and both groups differ in their sample size.
Furthermore, it needs to be paid attention to the fact that questionnaires were self-assessed. Even though the collection of data was anonymous and participants are expected to answer truthfully, certain bias and the avoidance of low answer scores for personal and skill related questions might be persistent and interfering with the collection of evident data.
Therefore, the results might not be representative for the complete Latvian population and generalized statements cannot be made about the skin cancer control activities performed by general practitioners.

Nevertheless, our results reflect the current role of skin cancer and the perception of performed control activities in the primary healthcare setting. Consequently, our results might guide future in-depth research of this topic.

6.2 Quality of evaluation

The direct evaluation of descriptive findings of both answer sets gave a broad overview of the role of skin cancer in the primary healthcare in Latvia.

1. Patient variables-descriptive results

The direct evaluation of descriptive findings of patient answers illustrates the patients' current healthcare habits and preferences as well as the perception of skin cancer control activities in the general practitioners office.

Comparing the results of patient visits to the general practitioner and dermatologist in the past 12 month, the collected data shows that visits to the general practitioner are more frequent. The overall percentage of consultations at least once within the past year was 87.5% to the general practitioner and 75% to the dermatologist. Our results confirm current data, mentioned in the literature review, that general practitioners are at a key position for skin cancer control activities due to their increased patient contact and accessibility.

Collected data on the history of skin cancer shows that 18 out of 85 (18.8%) of patients had a previous history of skin cancer or precancerous lesion. These results exceed the current evaluation of incidence of skin cancer by far. Reasons for this abnormality are thought to be due to the partial collection of data in the oncologic ward of Riga East University Hospital (RAKUS). Yet the findings illustrate the overall high incidence of skin cancer worldwide.
In this context the data on the initial detection of skin cancer (from patients with a history of skin cancer- N = 16) shows that while the majority of cases (N = 10, 55.6%) were detected by the dermatologist, 27.8% (N = 5) were first detected by their general practitioner. Referral to the dermatologist by the general practitioner for a suspicious skin lesion were made for 21.4% (N = 18) of all patients. These results match previous studies, showing that dermatologists have a

higher rate of skin cancer detection. Nevertheless, referral rates indicate a collaboration between both specialists. As described in the literature review, increased collaboration is associated with an improved diagnostic accuracy of skin cancer.[57]

From the preferred patient choice of where to undergo skin cancer screening, the majority of patients (68.3%) would prefer the performance by a dermatologist in an additional visit. Our findings are compatible with previous studies that found overall preference of FBSE performance by a dermatologist. Explanations in the literature indicate that patients consider their dermatologist more skilled in the diagnosis of skin cancer and therefore would accept the additional effort of a second consultation.[46] Further studies are needed to better understand the patient choice in order to promote skin cancer control activities by the general practitioner.

2. General practitioners variables-descriptive results

The direct evaluation of descriptive findings of general practitioner answer sets illustrates their self-assessment of performance and involvement in screening, diagnosis, and education of skin cancer.

From the results regarding the referral of patients to a dermatologist in the last 12 month, we see that while 96.4% referred at least one patient, the variation of results was broadly distributed with referral numbers of 1-3 times of 13.8%, 4-9 times of 39.7%, 10-19 times 24.1% and >20 times of 19%. As described in the literature review the referral rate can indicate efficient cooperation between the two specialists and decrease skin cancer mortality.[57] It remains unclear as to why the results vary in their occurrence. Other studies conclude that the median referral rate is at 21 patients per 1000 patients in one year and that rates might be connected to education and specialist cover[10]. However, we did not include other variable to investigate referral rates further.

22 of 59 General practitioners did not receive any further education about skin cancer. While many isolated educational interventions exist and are proven to positively impact the performance of skin cancer detection there is still no systematic and unified educational intervention implemented as further education [20]. Our results highlight the need for the development of an improved curriculum in the future.

Evaluation of the physicians' confidence in the ability to perform FBSE for the detection of skin cancer shows that the majority (N = 37, 64%) identifies as "moderately confident". 10.5% identified as "not confident".

We did not investigate specific reasons affecting the individual confidence; however past publications saw significant limitations in the dermatologic education of general practitioners. [56] Future studies should further investigate the correlation of specific education and the impact on the physicians' confidence.

3. Comparative analysis between patients and general practitioners

The results of our comparative analysis and SPSS Pearson Chi-Square tests between patients and general practitioners for the variables of "education of skin cancer risk factors", "education of preventive measures for skin cancer" and "education of skin cancer self-examination methods" showed that all test results were statistically significant different between the two groups. (Chi square test - $p < 0.01$) Thus we accept hypothesis A: "There will be a difference between the patients and general practitioners perception of skin cancer care in the primary healthcare setting."

Our results show that for all three variables patients and general practitioners have a completely contradicting perception of performance. A strong majority of patients stated that they did not receive any education about skin cancer risk factors (87.1%), prevention (89.4%) and self-examination (88.2%) while a strong majority of general practitioners stated that they do perform education about skin cancer risk factors (89.8%), prevention (93.2%) and self-examination (88.1%). No similar findings have been described in the literature.

Due to the contradicting evaluation, we cannot conclude on the realistic number of performed skin cancer education in the general practitioners office. Therefore, we reject hypothesis B- "There will be a low incidence of performed skin cancer detection, education and screening by general practitioners". Nevertheless, if education was performed or not, the patient answers indicate a lack of knowledge of skin cancer risk factors, prevention and self-examination. One might suspect an overall low performance and effect of educational interventions. These discoveries demand further large-scale investigation as to why the perception differs to such extend between both groups.

Comparative analysis between patients and general practitioners for their evaluation of FBSE annually *(received or performed)* showed that results were statistically significant different between the two groups. (Chi square test 107.8, $p < 0.01$).

The majority of patients (87.1%) said they never receive FBSE, while most of the general practitioners said they are performing FBSE sometimes or often. Again, the evaluation differs

greatly between both groups and an overall low performance and quality of FBSE might be suspected. While no data on patient perception of the performance of FBSE is found in the literature, other studies found the rate of general practitioners that perform FBSE regularly at around 60%. [40]

4. Comparison between age vs multiple variables

The results from Pearson Chi- Square analyses showed that here is no statistical significant difference between age groups both of patients and general physicians and the education of the three factors: self-examination (Chi square 1.75 p =0.63 for patients and chi square test 1.19 p = 0.76 for general practitioners), prevention (Chi square 2.99 p =0.39 for patients and chi square test 1.92 p = 0.59 for general practitioners) and risk factors (Chi square 3.11 p =0.37 for patients and chi square test 0.44 p = 0.93 for general practitioners). The general practitioners and patient age has not been accurately investigated in relation to educational skin cancer control activities in the past. While one might suspect a difference in skin awareness and attitude between the generations, our findings do not back any hypothesis.

5. Patient variables- cross evaluation

We observed significant relationships between the age of patients and their actual history of skin cancer (Chi-square test 17.88 $p < 0.01$). Patients in the age group of >70 had the highest rate of skin cancer history (N=6, 60.0%). This findings match with the known epidemiology of skin cancer. As UV-damage accumulates over time, older patients carry the highest risk for the development skin cancer. The median age of disease occurrence is 67 in males and 59 in females.[43]

Our analysis found statistically significant relationships between patients who were educated about skin cancer risk factors (Chi-square test 13.74 $p < 0.01$) as well as prevention (Chi-square test 15.08 $p < 0.01$) by their general practitioner with their actual history of skin cancer. From sixteen patients with a history of skin cancer, six were with risk factor education and nine without. Similar finding were found for preventive education. Six were with education and ten without.

These results might indicate a decreased skin cancer incidence in patients who received skin cancer specific education. Data from current studies supports this interpretation.

Education of skin cancer prevention in the general practitioners office was found to be improving the patients sun protection behavior [14] [53]
Still our evaluation of education is limited. The disease related timing of education and complex context of behavioral change after an educational intervention needs a more in-depth analysis by future studies.

Surprisingly results for the educational factor of skin cancer self-examination varied from previous described findings. We did not observed statistically significant relationships concerning the history of skin cancer (Chi-square test 1.33 $p = 0.28$). In the current literature, skin self-examination is substantiated to significant reduction in the incidence of advanced melanoma. [3]. Education of skin self-examination in Latvia should be further studied and included in larger trials. Additional evaluation of the specific educational intervention and content mediated by general practitioners might give a better insight into the value of such practice.

The Results of relationships between the different educational interventions, risk factors & prevention and prevention & self-examination, showed statistical significance. Chi-square test 56,96 $p < 0.01$ and 11,98$p < 0.01$ respectively. While the overall rate of education remained low (N= 10, 11.9%), 80% of patients received education about both interventions (risk factor and prevention). This might indicate that received education includes multiple interventions rather then isolated information.

Evaluating the preferred choice of patients where to undergo skin cancer screening results show that the majority of patients (68.3%) would prefer the performance by a dermatologist in an additional visit. Similar preferences were found in the literature yet the majority of patients was described to understands any FBSE performance as valuable addition to their healthcare [46]. Results of relationships between the choice and multiple variables (previous visit to the dermatologist in the last 12 months, previous visits to the general practitioner in the last 12 month, history of skin cancer, previous diagnosis of skin cancer, general practitioner referral to the dermatologist, received FBSE screening annually by the general practitioner, age and gender) all showed no statistical significance. From our results it remains unclear as to why the majority of patients prefer skin cancer screening performance by their dermatologist. Understanding the preferences might be crucial to the improvement of screening performances by general practitioners therefore future studies should investigate reasons behind the patient choice.

6. General practitioner variables-cross evaluation

Analysis of Pearson Chi- Square test showed that results were statistically significant between the further education of the diagnosis of skin cancer of general practitioners and the clinical use of dermatoscopy on suspicious lesions (Chi-square test 7.16 $p < 0.01$). While only 27% of general practitioners in total used dermatoscopy in their office, all 100% that perform dermatoscopy were with further education. On one side results show the low prevalence and implementation of dermatoscopy in the GP office in Latvia, on the other they show the direct link to skin cancer specific education. The use of dermatoscopy by trained general practitioners is proven to improve the accuracy of skin cancer. Other studies conclude that the training of dermatoscopy should be part of the standard curriculum for general practitioners. [54] Making educational interventions mandatory in the future might increase the performance of dermatoscopy and ultimately lower the incidence of late stage skin cancer.

Correlations between the confidence of general practitioners in their performance of FBSE and the actual performance of FBSE on an annual basis were found to be statistically significant. Overall, increased confidence correlated with increased numbers of FBSE performance. We did not observe any significant relationships between the age and gender concerning the confidence. Further studies are needed to evaluate factors that influence confidence of FBSE performance as cases of skin cancer that are detected during FBSE are associated with decreased stages of invasive skin cancer [1]

The results between the long-term follow up of patients skin lesions by general practitioners and their rate of referral to dermatologists in the past 12 month showed statistical significance (Chi-square test 13.633 $p < 0.01$). General practitioners that do follow up on skin lesions have an overall higher rate of referrals to a dermatologist. As described in the literature review, referrals for skin examination to a dermatologist are associated with an improved diagnostic accuracy of skin cancer. Based our results one might conclude that general practitioners who reevaluate skin lesions and follow their development over a longer period increase the early detection of skin cancer.

6.3 Future improvements

Overall the participation of this study was relatively limited with a sample size of 144 in total (85/59). The collection of patient data was only performed in two different clinics. In the future national large-scale survey collection could increase the statistical significance of findings. Furthermore the amount of questions was kept limited to ensure the willingness of participation. Adding additional in-depth questions in regard to described problematic will help to better investigate the found correlations.

According to the literature review, the overall performance of skin cancer control activities remains low in the general practitioners office. To be able to evaluate the significant difference of perception of performance between both groups, further studies should investigate and compare the true numbers of skin cancer control activities.

The evaluation of true numbers of patient referrals, use of dermatoscopy, performed skin cancer control activities and related procedures in the general practitioners office, possibly by account statements and insurance data, would give a better insight into the role of skin cancer in the primary healthcare level. Moreover, the general practitioners knowledge of skin cancer and rate of detection could be assessed by further specific multiple choice and image evaluation tests. New national statistics on skin cancer incidence & mortality could additionally be used for this purpose.

Since the general practitioner answer sets were collected in person, bias and false avoidance of low scores are possible. To improve this point, large-scale anonymous online surveys conducted by the Latvian general practitioner association could lead to results that are more reliable.

7 CONCLUSION

The overall results collected in this paper show that there are large discrepancies in the perception of performed skin cancer control activities between patients and general practitioners. Therefore we accepted hypothesis A “There will be a difference between the patients and general practitioners perception of skin cancer care in the primary healthcare setting”.
Due to contradicting evaluation of performance between both groups, we rejected hypothesis B- “There will be a low incidence of performed skin cancer detection, education and screening by general practitioners”.

Descriptive results of the patient group show that the majority of patient prefers the performance of annual FBSE skin cancer screening by a dermatologist in an additional visit. Still visits to the General practitioner are more frequent. Descriptive results of the general practitioner group show that 37.3% never received any further education about skin cancer control activities.

Our comparative results between both groups show that for all three variables of skin cancer education (risk factors, prevention and self-examination) the perception of performance was contradicting. Similar results were found for the perception of performance of FBSE annually. Comparative results within the patient group show correlations between the education of skin cancer risk factors and prevention concerning their history of skin cancer. The incidence of skin cancer was lower in educated patient groups. Furthermore, educational interventions correlate with each other. This indicates that patients that do receive specific information usually receive an extensive education about multiple factors.

Comparative results within the general practitioner group show that only physicians with further education about skin cancer perform dermatoscopy in their office. The overall use of dermatoscopy remains low. Another interesting finding was that the confidence of general practitioners in their performance of FBSE and the actual performance of FBSE annually have a positive correlation. Additionally we found that general practitioners that do follow up on skin lesions have an overall higher rate of referrals to a dermatologist.

In conclusion, the perception of skin cancer education as well as FBSE performance differs greatly between patients and general practitioners in Latvia. Our results indicate that there is large room for improvement of skin cancer control activities within the general practitioners office.

Further research about possible improvements and the implementation of skin cancer related educational interventions in the primary healthcare should be made. The common goal is the increased early detection and overall lower mortality of skin cancer.

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9 BIBLIOGRAPHY

[1] al RH et. Incidence Estimate of Nonmelanoma Skin Cancer (Keratinocyte Carcinomas) in the U.S. Population, 2012. - PubMed - NCBI [Internet]. [cited 2019 Feb 27];Available from: https://www.ncbi.nlm.nih.gov/pubmed/25928283

[2] Armstrong BK, Kricker A. The epidemiology of UV induced skin cancer. Journal of Photochemistry and Photobiology B: Biology. 2001 Oct 1;63(1):8–18.

[3] Berwick M, Begg CB, Fine JA, Roush GC, Barnhill RL. Screening for cutaneous melanoma by skin self-examination. J. Natl. Cancer Inst. 1996 Jan 3;88(1):17–23.

[4] Boniol M, Autier P, Boyle P, Gandini S. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. BMJ. 2012 Jul 24;345:e4757.

[5] Bono A, Tolomio E, Trincone S, Bartoli C, Tomatis S, Carbone A, et al. Micro-melanoma detection: a clinical study on 206 consecutive cases of pigmented skin lesions with a diameter < or = 3 mm. Br. J. Dermatol. 2006 Sep;155(3):570–573.

[6] Carli P, de Giorgi V, Chiarugi A, Nardini P, Weinstock MA, Crocetti E, et al. Addition of dermoscopy to conventional naked-eye examination in melanoma screening: a randomized study. J. Am. Acad. Dermatol. 2004 May;50(5):683–689.

[7] Castillo-Arenas E, Garrido V, Serrano-Ortega S. Skin conditions in primary care: an analysis of referral demand. Actas Dermosifiliogr. 2014 Apr;105(3):271–275.

[8] Chamberlain AJ, Fritschi L, Kelly JW. Nodular melanoma: patients' perceptions of presenting features and implications for earlier detection. J. Am. Acad. Dermatol. 2003 May;48(5):694–701.

[9] Chen AC, Martin AJ, Choy B, Fernández-Peñas P, Dalziell RA, McKenzie CA, et al. A Phase 3 Randomized Trial of Nicotinamide for Skin-Cancer Chemoprevention [Internet]. http://dx.doi.org/10.1056/NEJMoa1506197. 2015 Oct 21 [cited 2019 Mar 28];Available from: https://www.nejm.org/doi/10.1056/NEJMoa1506197

[10] Christensen B, Søsrensen HT, Mabeck CE. Referral from General Practice to Dermatologists. Scandinavian Journal of Primary Health Care. 1988 Jan;6(1):29–32.

[11] Coups EJ, Stapleton JL, Manne SL, Hudson SV, Medina-Forrester A, Rosenberg SA, et al. Psychosocial Correlates of Sun Protection Behaviors among U.S. Hispanic Adults. J Behav Med. 2014 Dec;37(6):1082–1090.

[12] Dourmishev LA, Rusinova D, Botev I. Clinical variants, stages, and management of basal cell carcinoma. Indian Dermatol Online J. 2013;4(1):12–17.

[13] Esteva A, Kuprel B, Novoa RA, Ko J, Swetter SM, Blau HM, et al. Dermatologist-level classification of skin cancer with deep neural networks. Nature. 2017 Feb;542(7639):115.

[14] Falk M, Magnusson H. Sun protection advice mediated by the general practitioner: an effective way to achieve long-term change of behaviour and attitudes related to sun exposure? Scand J Prim Health Care. 2011 Sep;29(3):135–143.

[15] Ferris LK, Saul MI, Lin Y, Ding F, Weinstock MA, Geller AC, et al. A Large Skin Cancer Screening Quality Initiative: Description and First-Year Outcomes. JAMA Oncol. 2017 Aug 1;3(8):1112–1115.

[16] Gaudy-Marqueste C, Wazaefi Y, Bruneu Y, Triller R, Thomas L, Pellacani G, et al. Ugly Duckling Sign as a Major Factor of Efficiency in Melanoma Detection. JAMA Dermatol. 2017 01;153(4):279–284.

[17] Gerbert B, Maurer T, Berger T, Pantilat S, McPhee SJ, Wolff M, et al. Primary care physicians as gatekeepers in managed care. Primary care physicians' and dermatologists' skills at secondary prevention of skin cancer. Arch Dermatol. 1996 Sep;132(9):1030–1038.

[18] Gogia R, Binstock M, Hirose R, Boscardin WJ, Chren M-M, Arron ST. Fitzpatrick skin phototype is an independent predictor of squamous cell carcinoma risk after solid organ transplantation. J Am Acad Dermatol. 2013 Apr;68(4):585–591.

[19] Goulart JM, Quigley EA, Dusza S, Jewell ST, Alexander G, Asgari MM, et al. Skin cancer education for primary care physicians: a systematic review of published evaluated interventions. J Gen Intern Med. 2011 Sep;26(9):1027–1035.

[20] Goulart JM, Quigley EA, Dusza S, Jewell ST, Alexander G, Asgari MM, et al. Skin Cancer Education for Primary Care Physicians: A Systematic Review of Published Evaluated Interventions. J Gen Intern Med. 2011 Sep;26(9):1027–1035.

[21] Green A, Williams G, Neale R, Hart V, Leslie D, Parsons P, et al. Daily sunscreen application and betacarotene supplementation in prevention of basal-cell and squamous-cell carcinomas of the skin: a randomised controlled trial. Lancet. 1999 Aug 28;354(9180):723–729.

[22] Hansen AH, Halvorsen PA, Aaraas IJ, Førde OH. Continuity of GP care is related to reduced specialist healthcare use: a cross-sectional survey. Br J Gen Pract. 2013 Jul;63(612):e482–e489.

[23] Kantor J, Kantor DE. Routine dermatologist-performed full-body skin examination and early melanoma detection. Arch Dermatol. 2009 Aug;145(8):873–876.

[24] Keohane SG, Proby CM, Newlands C, Motley RJ, Nasr I, Mohd Mustapa MF, et al. The new 8th edition of TNM staging and its implications for skin cancer: a review by the British Association of Dermatologists and the Royal College of Pathologists, U.K. Br. J. Dermatol. 2018 Oct;179(4):824–828.

[25] Kimonis VE, Goldstein AM, Pastakia B, Yang ML, Kase R, DiGiovanna JJ, et al. Clinical manifestations in 105 persons with nevoid basal cell carcinoma syndrome. Am. J. Med. Genet. 1997 Mar 31;69(3):299–308.

[26] Kittler H, Pehamberger H, Wolff K, Binder M. Diagnostic accuracy of dermoscopy. Lancet Oncol. 2002 Mar;3(3):159–165.

[27] Krásová M, Sečníková Z, Göpfertová D, Hercogová J, Viklický O, Jůzlová K, et al. Immunosuppressive therapy in the posttransplant period and skin cancer. Dermatol Ther. 2016 Nov;29(6):433–436.

[28] Krengel S, Hauschild A, Schäfer T. Melanoma risk in congenital melanocytic naevi: a systematic review. Br. J. Dermatol. 2006 Jul;155(1):1–8.

[29] Lakhani NA, Saraiya M, Thompson TD, King SC, Guy GP. Total body skin examination for skin cancer screening among U.S. adults from 2000 to 2010. Prev Med. 2014 Apr;61:75–80.

[30] 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 Feb 1;154(3):190–201.

[31] McCusker M, Basset-Seguin N, Dummer R, Lewis K, Schadendorf D, Sekulic A, et al. Metastatic basal cell carcinoma: Prognosis dependent on anatomic site and spread of disease. European Journal of Cancer. 2014 Mar;50(4):774–783.

[32] Mikkilineni R, Weinstock MA, Goldstein MG, Dube CE, Rossi JS. The impact of the basic skin cancer triage curriculum on providers' skills, confidence, and knowledge in skin cancer control. Prev Med. 2002 Feb;34(2):144–152.

[33] Moehrle M. Outdoor sports and skin cancer. Clin. Dermatol. 2008 Feb;26(1):12–15.

[34] Neagu TP, Botezatu D, Enache V, Cobilinschi CO, Vâlcea-Precup S, Grin IM. Clinical, histological and therapeutic features of Bowen's disease. :8.

[35] Pattison DI, Davies MJ. Actions of ultraviolet light on cellular structures [Internet]. In: Cancer: Cell Structures, Carcinogens and Genomic Instability. Basel: Birkhäuser Basel; 2006 [cited 2019 Mar 15]. p. 131–157.Available from: https://doi.org/10.1007/3-7643-7378-4_6

[36] Pedersen SA, Gaist D, Schmidt SAJ, Hölmich LR, Friis S, Pottegård A. Hydrochlorothiazide use and risk of nonmelanoma skin cancer: A nationwide case-control study from Denmark. J. Am. Acad. Dermatol. 2018;78(4):673-681.e9.

[37] Plüddemann A, Heneghan C, Thompson M, Wolstenholme J, Price CP. Dermoscopy for the diagnosis of melanoma: primary care diagnostic technology update. Br J Gen Pract. 2011 Jun;61(587):416–417.

[38] Ransohoff KJ, Jaju PD, Tang JY, Carbone M, Leachman S, Sarin KY. Familial skin cancer syndromes: Increased melanoma risk. Journal of the American Academy of Dermatology. 2016 Mar 1;74(3):423–434.

[39] Rastrelli M, Tropea S, Rossi CR, Alaibac M. Melanoma: Epidemiology, Risk Factors, Pathogenesis, Diagnosis and Classification. In Vivo. 2014 Nov 1;28(6):1005–1011.

[40] Rat C, Houd S, Gaultier A, Grimault C, Quereux G, Mercier A, et al. General practitioner management related to skin cancer prevention and screening during standard medical encounters: a French cross-sectional study based on the International Classification of Primary Care. BMJ Open [Internet]. 2017 Jan 30 [cited 2019 Apr 1];7(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5293869/

[41] Rebel H, Mosnier LO, Berg RJW, Vries AW, Steeg H van, Kranen HJ van, et al. Early p53-positive Foci as Indicators of Tumor Risk in Ultraviolet-exposed Hairless Mice: Kinetics of Induction, Effects of DNA Repair Deficiency, and p53 Heterozygosity. Cancer Res. 2001 Feb 2;61(3):977–983.

[42] Ribero S, Zugna D, Osella-Abate S, Glass D, Nathan P, Spector T, et al. Prediction of high naevus count in a healthy U.K. population to estimate melanoma risk. Br. J. Dermatol. 2016 Feb;174(2):312–318.

[43] Robert-Koch-Institut, Gesellschaft der epidemiologischen Krebsregister in Deutschland, editors. Krebs in Deutschland 2011/2012. 10. Ausg. Berlin: 2015.

[44] Saraiya M, Glanz K, Briss PA, Nichols P, White C, Das D, et al. Interventions to prevent skin cancer by reducing exposure to ultraviolet radiation: a systematic review. Am J Prev Med. 2004 Dec;27(5):422–466.

[45] Shaub AR, Lewis ET, Nevedal AL, Swetter SM. Physician Perceptions of Primary Care-based Skin Cancer Screening in a Veterans Affairs Pilot Study. Br. J. Dermatol. 2019 Jan 29;

[46] Shaub AR, Lewis ET, Swetter SM. Patient Perceptions of Primary Care–Based Skin Cancer Screening. JAMA Dermatol. 2017 Nov;153(11):1192–1193.

[47] Street W. Cancer Facts & Figures 2018. 1930;76.

[48] Swetter SM, Chang J, Shaub AR, Weinstock MA, Lewis ET, Asch SM. Primary Care-Based Skin Cancer Screening in a Veterans Affairs Health Care System. JAMA Dermatol. 2017 01;153(8):797–801.

[49] Thalakoti S, Geller T. Basal cell nevus syndrome or Gorlin syndrome. Handb Clin Neurol. 2015;132:119–128.

[50] Thomas L, Puig S. Dermoscopy, Digital Dermoscopy and Other Diagnostic Tools in the Early Detection of Melanoma and Follow-up of High-risk Skin Cancer Patients. Acta Derm. Venereol. 2017 Jul 5;

[51] Thompson JF, Scolyer RA, Kefford RF. Cutaneous melanoma. Lancet. 2005 Feb 19;365(9460):687–701.

[52] Viana ACL, Goulart EMA, Gontijo B, Bittencourt FV. A prospective study of patients with large congenital melanocytic nevi and the risk of melanoma. An Bras Dermatol. 2017;92(2):200–205.

[53] Vuong K, Trevena L, Bonevski B, Armstrong BK. Feasibility of a GP delivered skin cancer prevention intervention in Australia. BMC Fam Pract. 2014 Jul 28;15:137.

[54] Westerhoff K, McCarthy WH, Menzies SW. Increase in the sensitivity for melanoma diagnosis by primary care physicians using skin surface microscopy. Br. J. Dermatol. 2000 Nov;143(5):1016–1020.

[55] Wheless L, Ruczinski I, Alani RM, Clipp S, Hoffman-Bolton J, Jorgensen TJ, et al. The association between skin characteristics and skin cancer prevention behaviors. Cancer Epidemiol Biomarkers Prev. 2009 Oct;18(10):2613–2619.

[56] Wise E, Singh D, Moore M, Hayes B, Biello KB, Dickerson MC, et al. Rates of skin cancer screening and prevention counseling by US medical residents. Arch Dermatol. 2009 Oct;145(10):1131–1136.

[57] Wolfe J. Total Body Skin Exams: Don't Abandon Them. :2.

[58] Screening [Internet]. European Skin Cancer Foundation. [cited 2019 Mar 29];Available from: http://www.escf-network.eu/en/welcome/projects/tatort-haut/screening.html

[59] 428-latvia-fact-sheets.pdf [Internet]. [cited 2019 Apr 25];Available from: http://gco.iarc.fr/today/data/factsheets/populations/428-latvia-fact-sheets.pdf

[60] (PDF) Prevention of skin cancer in primary healthcare: An evaluation of three different prevention effort levels and the applicability of a phototest [Internet]. ResearchGate. [cited 2019 Feb 26];Available from: https://www.researchgate.net/publication/23267981_Prevention_of_skin_cancer_in_primary_healthcare_An_evaluation_of_three_different_prevention_effort_levels_and_the_applicability_of_a_phototest

[61] 2008-03-31-Abschluss-Hautkrebsscreening.pdf [Internet]. [cited 2019 Mar 25];Available from: https://www.g-ba.de/downloads/40-268-580/2008-03-31-Abschluss-Hautkrebsscreening.pdf

[62] UVA & UVB - SkinCancer.org [Internet]. [cited 2019 Mar 15];Available from: https://www.skincancer.org/prevention/uva-and-uvb

[63] NASA - UV Exposure Has Increased Over the Last 30 Years, but Stabilized Since the Mid-1990s [Internet]. [cited 2019 Mar 16];Available from: https://www.nasa.gov/topics/solarsystem/features/uv-exposure.html

[64] Ozone and UV: Where Are We Now? - SkinCancer.org [Internet]. [cited 2019 Feb 27];Available from: https://www.skincancer.org/prevention/uva-and-uvb/ozone

[65] (PDF) SOLAR RADIATION AND SKIN CANCER RISK – BIOPHYSICAL INSIGHTS [Internet]. ResearchGate. [cited 2019 Mar 16];Available from: https://www.researchgate.net/publication/283084574_SOLAR_RADIATION_AND_SKIN_CANCER_RISK_-_BIOPHYSICAL_INSIGHTS

[66] FitzpatrickSkinType.pdf [Internet]. [cited 2019 Mar 16];Available from: https://www.arpansa.gov.au/sites/g/files/net3086/f/legacy/pubs/RadiationProtection/FitzpatrickSkinType.pdf

[67] Basal Cell Carcinoma - Dermatologic Disorders [Internet]. Merck Manuals Professional Edition. [cited 2019 Feb 27];Available from: https://www.merckmanuals.com/professional/dermatologic-disorders/cancers-of-the-skin/basal-cell-carcinoma

[68] Melanoma - Dermatologic Disorders [Internet]. MSD Manual Professional Edition. [cited 2019 Feb 27];Available from: https://www.msdmanuals.com/professional/dermatologic-disorders/cancers-of-the-skin/melanoma

[69] S3-Leitlinie Melanom. 2018;275.

[70] 032-021l_S2k_Basalzellkarzinom-der-Haut_2018-09_01.pdf [Internet]. [cited 2019 Mar 20];Available from: https://www.awmf.org/uploads/tx_szleitlinien/032-021l_S2k_Basalzellkarzinom-der-Haut_2018-09_01.pdf

[71] Melanoma - Dermatologic Disorders [Internet]. MSD Manual Professional Edition. [cited 2019 Mar 21];Available from: https://www.msdmanuals.com/professional/dermatologic-disorders/cancers-of-the-skin/melanoma

[72] College tanning behaviors, attitudes, beliefs, and intentions: A systematic review of the literature. - PubMed - NCBI [Internet]. [cited 2019 Apr 3];Available from: https://www.ncbi.nlm.nih.gov/pubmed/28867504

APPENDIXES

Appendix 1: Descriptive evaluation of patient answers

Appendix 1.1

SkinCancer					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	69	47,9	81,2	81,2
	yes	16	11,1	18,8	100,0
	Total	85	59,0	100,0	
Missing	System	59	41,0		
Total		144	100,0		

Appendix 1.2

DiagnosisOfSC					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative-Q6/no answer	67	46,5	78,8	78,8
	GP	5	3,5	5,9	84,7
	Dermatologist	10	6,9	11,8	96,5
	Other	3	2,1	3,5	100,0
	Total	85	59,0	100,0	
Missing	System	59	41,0		
Total		144	100,0		

Appendix 1.3

Referral					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	66	45,8	78,6	78,6
	yes	18	12,5	21,4	100,0
	Total	84	58,3	100,0	
Missing	System	60	41,7		
Total		144	100,0		

Appendix 1.4

Choice					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No preferences	16	11,1	19,5	19,5
	GP- single visit	10	6,9	12,2	31,7
	Derma-additional visit	56	38,9	68,3	100,0
	Total	82	56,9	100,0	
Missing	System	62	43,1		
Total		144	100,0		

Appendix 1.5

GPvisits12					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	18	12,5	21,2	21,2
	1 time	26	18,1	30,6	51,8
	2-3 times	31	21,5	36,5	88,2
	4-6 times	8	5,6	9,4	97,6
	>7 times	2	1,4	2,4	100,0
	Total	85	59,0	100,0	
Missing	System	59	41,0		
Total		144	100,0		

Appendix 1.6

DERMAvisits12					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	36	25,0	42,4	42,4
	1 time	22	15,3	25,9	68,2
	2-3 times	20	13,9	23,5	91,8
	4-6 times	5	3,5	5,9	97,6
	>7 times	2	1,4	2,4	100,0
	Total	85	59,0	100,0	
Missing	System	59	41,0		
Total		144	100,0		

Appendix 1.7

GPscreening					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	74	51,4	87,1	87,1
	rarely	9	6,3	10,6	97,6
	sometimes	1	,7	1,2	98,8
	always	1	,7	1,2	100,0
	Total	85	59,0	100,0	
Missing	System	59	41,0		
Total		144	100,0		

Appendix 2: Descriptive evaluation of general practitioners answers

Appendix 2.1

LongTermPatients					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	16	11,1	27,6	27,6
	yes	42	29,2	72,4	100,0
	Total	58	40,3	100,0	
Missing	System	86	59,7		
Total		144	100,0		

Appendix 2.2

FurtherEducation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	22	15,3	37,3	37,3
	yes	37	25,7	62,7	100,0
	Total	59	41,0	100,0	
Missing	System	85	59,0		
Total		144	100,0		

Appendix 2.3

FSBEannual					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	2	1,4	3,4	3,4
	rarely	11	7,6	18,6	22,0
	sometimes	21	14,6	35,6	57,6
	often	17	11,8	28,8	86,4
	always	8	5,6	13,6	100,0
	Total	59	41,0	100,0	
Missing	System	85	59,0		
Total		144	100,0		

Appendix 2.4

ReferalToDerma12					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	2	1,4	3,4	3,4
	1-3 times	8	5,6	13,8	17,2
	4-9 times	23	16,0	39,7	56,9
	10-19 times	14	9,7	24,1	81,0
	> 20 times	11	7,6	19,0	100,0
	Total	58	40,3	100,0	
Missing	System	86	59,7		
Total		144	100,0		

Appendix 2.4

Dermatoscopy					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	49	34,0	83,1	83,1
	yes	10	6,9	16,9	100,0
	Total	59	41,0	100,0	
Missing	System	85	59,0		
Total		144	100,0		

Appendix 2.5

Confidence					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not confident	6	4,2	10,5	10,5
	slightly confident	3	2,1	5,3	15,8
	moderately confident	37	25,7	64,9	80,7
	confident	10	6,9	17,5	98,2
	very confident	1	,7	1,8	100,0
	Total	57	39,6	100,0	
Missing	System	87	60,4		
Total		144	100,0		

Appendix 3: Cross tabulation of patient vs. general practitioner answers

Appendix 3.1

PAT_Doc * Age Crosstabulation							
			Age				Total
			18-29	30-49	50-69	>70	
PAT_Doc	1,00	Count	13	37	25	10	85
		% within PAT_Doc	15,3%	43,5%	29,4%	11,8%	100,0%
		% within Age	86,7%	66,1%	40,3%	90,9%	59,0%
		% of Total	9,0%	25,7%	17,4%	6,9%	59,0%
	2,00	Count	2	19	37	1	59
		% within PAT_Doc	3,4%	32,2%	62,7%	1,7%	100,0%
		% within Age	13,3%	33,9%	59,7%	9,1%	41,0%
		% of Total	1,4%	13,2%	25,7%	0,7%	41,0%
Total		Count	15	56	62	11	144
		% within PAT_Doc	10,4%	38,9%	43,1%	7,6%	100,0%
		% within Age	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	10,4%	38,9%	43,1%	7,6%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19,479[a]	3	,000
Likelihood Ratio	21,068	3	,000
Linear-by-Linear Association	3,558	1	,059
N of Valid Cases	144		
a. 1 cells (12,5%) have expected count less than 5. The minimum expected count is 4,51.			

Appendix 3.2

PAT_Doc * Gender Crosstabulation						
			Gender			Total
			male	female	4,00	
PAT_Doc	1,00	Count	15	69	1	85
		% within PAT_Doc	17,6%	81,2%	1,2%	100,0%
		% within Gender	41,7%	65,1%	100,0%	59,4%
		% of Total	10,5%	48,3%	0,7%	59,4%
	2,00	Count	21	37	0	58
		% within PAT_Doc	36,2%	63,8%	0,0%	100,0%
		% within Gender	58,3%	34,9%	0,0%	40,6%
		% of Total	14,7%	25,9%	0,0%	40,6%
Total		Count	36	106	1	143
		% within PAT_Doc	25,2%	74,1%	0,7%	100,0%
		% within Gender	100,0%	100,0%	100,0%	100,0%
		% of Total	25,2%	74,1%	0,7%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6,805[a]	2	,033
Likelihood Ratio	7,075	2	,029
Linear-by-Linear Association	6,390	1	,011
N of Valid Cases	143		
a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is ,41.			

Appendix 3.3

PAT_Doc * RiskFactor Crosstabulation					
			RiskFactor		Total
			no	yes	
PAT_Doc	1,00	Count	74	10	84
		% within PAT_Doc	88,1%	11,9%	100,0%
		% within RiskFactor	93,7%	15,9%	59,2%
		% of Total	52,1%	7,0%	59,2%
	2,00	Count	5	53	58
		% within PAT_Doc	8,6%	91,4%	100,0%
		% within RiskFactor	6,3%	84,1%	40,8%
		% of Total	3,5%	37,3%	40,8%
Total		Count	79	63	142
		% within PAT_Doc	55,6%	44,4%	100,0%
		% within RiskFactor	100,0%	100,0%	100,0%
		% of Total	55,6%	44,4%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	87,798[a]	1	,000		
Continuity Correction[b]	84,608	1	,000		
Likelihood Ratio	99,657	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	87,180	1	,000		
N of Valid Cases	142				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 25,73.					
b. Computed only for a 2x2 table					

Appendix 3.4

PAT_Doc * Prevention Crosstabulation					
			Prevention		Total
			no	yes	
PAT_Doc	1,00	Count	76	9	85
		% within PAT_Doc	89,4%	10,6%	100,0%
		% within Prevention	96,2%	14,1%	59,4%
		% of Total	53,1%	6,3%	59,4%
	2,00	Count	3	55	58
		% within PAT_Doc	5,2%	94,8%	100,0%
		% within Prevention	3,8%	85,9%	40,6%
		% of Total	2,1%	38,5%	40,6%
Total		Count	79	64	143
		% within PAT_Doc	55,2%	44,8%	100,0%
		% within Prevention	100,0%	100,0%	100,0%
		% of Total	55,2%	44,8%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	98,948[a]	1	,000		
Continuity Correction[b]	95,570	1	,000		
Likelihood Ratio	115,622	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	98,256	1	,000		
N of Valid Cases	143				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 25,96.					
b. Computed only for a 2x2 table					

Appendix 3.5

PAT_Doc * SelfExamination Crosstabulation					
			SelfExamination		Total
			no	yes	
PAT_Doc	1,00	Count	75	9	84
		% within PAT_Doc	89,3%	10,7%	100,0%
		% within SelfExamination	92,6%	14,8%	59,2%
		% of Total	52,8%	6,3%	59,2%
	2,00	Count	6	52	58
		% within PAT_Doc	10,3%	89,7%	100,0%
		% within SelfExamination	7,4%	85,2%	40,8%
		% of Total	4,2%	36,6%	40,8%
Total		Count	81	61	142
		% within PAT_Doc	57,0%	43,0%	100,0%
		% within SelfExamination	100,0%	100,0%	100,0%
		% of Total	57,0%	43,0%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	87,254[a]	1	,000		
Continuity Correction[b]	84,062	1	,000		
Likelihood Ratio	98,243	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	86,639	1	,000		
N of Valid Cases	142				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 24,92.					
b. Computed only for a 2x2 table					

Appendix 3.6

PAT_Doc * FBSEtotal Crosstabulation								
			FBSEtotal					Total
			never	rarely	sometimes	often	always	
PAT_Doc	1,00	Count	74	9	1	0	1	85
		% within PAT_Doc	87,1%	10,6%	1,2%	0,0%	1,2%	100,0%
		% within FBSEtotal	97,4%	45,0%	4,5%	0,0%	11,1%	59,0%
		% of Total	51,4%	6,3%	0,7%	0,0%	0,7%	59,0%
	2,00	Count	2	11	21	17	8	59
		% within PAT_Doc	3,4%	18,6%	35,6%	28,8%	13,6%	100,0%
		% within FBSEtotal	2,6%	55,0%	95,5%	100,0%	88,9%	41,0%
		% of Total	1,4%	7,6%	14,6%	11,8%	5,6%	41,0%
Total		Count	76	20	22	17	9	144
		% within PAT_Doc	52,8%	13,9%	15,3%	11,8%	6,3%	100,0%
		% within FBSEtotal	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	52,8%	13,9%	15,3%	11,8%	6,3%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	107,859[a]	4	,000
Likelihood Ratio	134,468	4	,000
Linear-by-Linear Association	91,483	1	,000
N of Valid Cases	144		
a. 1 cells (10,0%) have expected count less than 5. The minimum expected count is 3,69.			

Appendix 4: Cross tabulation of patients' variables

Appendix 4.1

SkinCancer * SelfExamination Crosstabulation					
			SelfExamination		Total
			no	yes	
SkinCancer	no	Count	62	6	68
		% within SkinCancer	91,2%	8,8%	100,0%
		% within SelfExamination	82,7%	66,7%	81,0%
		% of Total	73,8%	7,1%	81,0%
	yes	Count	13	3	16
		% within SkinCancer	81,3%	18,8%	100,0%
		% within SelfExamination	17,3%	33,3%	19,0%
		% of Total	15,5%	3,6%	19,0%
Total		Count	75	9	84
		% within SkinCancer	89,3%	10,7%	100,0%
		% within SelfExamination	100,0%	100,0%	100,0%
		% of Total	89,3%	10,7%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,334[a]	1	,248		
Continuity Correction[b]	,498	1	,480		
Likelihood Ratio	1,174	1	,279		
Fisher's Exact Test				,363	,229
Linear-by-Linear Association	1,318	1	,251		
N of Valid Cases	84				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,71.					
b. Computed only for a 2x2 table					

Appendix 4.2

SkinCancer * RiskFactor Crosstabulation					
			RiskFactor		Total
			no	yes	
SkinCancer	no	Count	65	4	69
		% within SkinCancer	94,2%	5,8%	100,0%
		% within RiskFactor	87,8%	40,0%	82,1%
		% of Total	77,4%	4,8%	82,1%
	yes	Count	9	6	15
		% within SkinCancer	60,0%	40,0%	100,0%
		% within RiskFactor	12,2%	60,0%	17,9%
		% of Total	10,7%	7,1%	17,9%
Total		Count	74	10	84
		% within SkinCancer	88,1%	11,9%	100,0%
		% within RiskFactor	100,0%	100,0%	100,0%
		% of Total	88,1%	11,9%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13,744[a]	1	,000		
Continuity Correction[b]	10,676	1	,001		
Likelihood Ratio	10,588	1	,001		
Fisher's Exact Test				,002	,002
Linear-by-Linear Association	13,580	1	,000		
N of Valid Cases	84				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,79.					
b. Computed only for a 2x2 table					

Appendix 4.3

SkinCancer * Prevention Crosstabulation					
			Prevention		Total
			no	yes	
SkinCancer	no	Count	66	3	69
		% within SkinCancer	95,7%	4,3%	100,0%
		% within Prevention	86,8%	33,3%	81,2%
		% of Total	77,6%	3,5%	81,2%
	yes	Count	10	6	16
		% within SkinCancer	62,5%	37,5%	100,0%
		% within Prevention	13,2%	66,7%	18,8%
		% of Total	11,8%	7,1%	18,8%
Total		Count	76	9	85
		% within SkinCancer	89,4%	10,6%	100,0%
		% within Prevention	100,0%	100,0%	100,0%
		% of Total	89,4%	10,6%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15,078[a]	1	,000		
Continuity Correction[b]	11,780	1	,001		
Likelihood Ratio	11,579	1	,001		
Fisher's Exact Test				,001	,001
Linear-by-Linear Association	14,901	1	,000		
N of Valid Cases	85				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,69.					
b. Computed only for a 2x2 table					

Appendix 4.4

SkinCancer * Age Crosstabulation							
			Age				Total
			18-29	30-49	50-69	>70	
SkinCancer	no	Count	12	35	18	4	69
		% within SkinCancer	17,4%	50,7%	26,1%	5,8%	100,0%
		% within Age	92,3%	94,6%	72,0%	40,0%	81,2%
		% of Total	14,1%	41,2%	21,2%	4,7%	81,2%
	yes	Count	1	2	7	6	16
		% within SkinCancer	6,3%	12,5%	43,8%	37,5%	100,0%
		% within Age	7,7%	5,4%	28,0%	60,0%	18,8%
		% of Total	1,2%	2,4%	8,2%	7,1%	18,8%
Total		Count	13	37	25	10	85
		% within SkinCancer	15,3%	43,5%	29,4%	11,8%	100,0%
		% within Age	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	15,3%	43,5%	29,4%	11,8%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17,888[a]	3	,000
Likelihood Ratio	16,501	3	,001
Linear-by-Linear Association	14,065	1	,000
N of Valid Cases	85		
a. 3 cells (37,5%) have expected count less than 5. The minimum expected count is 1,88.			

Appendix 4.5

Prevention * RiskFactor Crosstabulation					
			RiskFactor		Total
			no	yes	
Prevention	no	Count	73	2	75
		% within Prevention	97,3%	2,7%	100,0%
		% within RiskFactor	98,6%	20,0%	89,3%
		% of Total	86,9%	2,4%	89,3%
	yes	Count	1	8	9
		% within Prevention	11,1%	88,9%	100,0%
		% within RiskFactor	1,4%	80,0%	10,7%
		% of Total	1,2%	9,5%	10,7%
Total		Count	74	10	84
		% within Prevention	88,1%	11,9%	100,0%
		% within RiskFactor	100,0%	100,0%	100,0%
		% of Total	88,1%	11,9%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	56,963[a]	1	,000		
Continuity Correction[b]	49,038	1	,000		
Likelihood Ratio	36,601	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	56,284	1	,000		
N of Valid Cases	84				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,07.					

Appendix 4.6

Prevention * SelfExamination Crosstabulation					
			SelfExamination		Total
			no	yes	
Prevention	no	Count	70	5	75
		% within Prevention	93,3%	6,7%	100,0%
		% within SelfExamination	93,3%	55,6%	89,3%
		% of Total	83,3%	6,0%	89,3%
	yes	Count	5	4	9
		% within Prevention	55,6%	44,4%	100,0%
		% within SelfExamination	6,7%	44,4%	10,7%
		% of Total	6,0%	4,8%	10,7%
Total		Count	75	9	84
		% within Prevention	89,3%	10,7%	100,0%
		% within SelfExamination	100,0%	100,0%	100,0%
		% of Total	89,3%	10,7%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11,988[a]	1	,001		
Continuity Correction[b]	8,364	1	,004		
Likelihood Ratio	8,099	1	,004		
Fisher's Exact Test				,006	,006
Linear-by-Linear Association	11,845	1	,001		
N of Valid Cases	84				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is ,96.					
b. Computed only for a 2x2 table					

Appendix 4.7

DERMAvisits12 * Choice Crosstabulation						
			Choice			Total
			No preferences	GP-single visit	Derma-additional visit	
DERMAvisits12	never	Count	10	4	21	35
		% within DERMAvisits12	28,6%	11,4%	60,0%	100,0%
		% within Choice	62,5%	40,0%	37,5%	42,7%
		% of Total	12,2%	4,9%	25,6%	42,7%
	1 time	Count	3	2	15	20
		% within DERMAvisits12	15,0%	10,0%	75,0%	100,0%
		% within Choice	18,8%	20,0%	26,8%	24,4%
		% of Total	3,7%	2,4%	18,3%	24,4%
	2-3 times	Count	1	4	15	20
		% within DERMAvisits12	5,0%	20,0%	75,0%	100,0%
		% within Choice	6,3%	40,0%	26,8%	24,4%
		% of Total	1,2%	4,9%	18,3%	24,4%
	4-6 times	Count	1	0	4	5
		% within DERMAvisits12	20,0%	0,0%	80,0%	100,0%
		% within Choice	6,3%	0,0%	7,1%	6,1%
		% of Total	1,2%	0,0%	4,9%	6,1%
	>7 times	Count	1	0	1	2
		% within DERMAvisits12	50,0%	0,0%	50,0%	100,0%
		% within Choice	6,3%	0,0%	1,8%	2,4%
		% of Total	1,2%	0,0%	1,2%	2,4%

Total	Count	16	10	56	82
	% within DERMAvisits12	19,5%	12,2%	68,3%	100,0%
	% within Choice	100,0%	100,0%	100,0%	100,0%
	% of Total	19,5%	12,2%	68,3%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7,556[a]	8	,478
Likelihood Ratio	8,728	8	,366
Linear-by-Linear Association	1,202	1	,273
N of Valid Cases	82		
a. 11 cells (73,3%) have expected count less than 5. The minimum expected count is ,24.			

Appendix 5: Cross tabulation of general practitioners' variables

Appendix 5.1

Dermatoscopy * FurtherEducation Crosstabulation					
			FurtherEducation		Total
			no	yes	
Dermatoscopy	no	Count	22	27	49
		% within Dermatoscopy	44,9%	55,1%	100,0%
		% within FurtherEducation	100,0%	73,0%	83,1%
		% of Total	37,3%	45,8%	83,1%
	yes	Count	0	10	10
		% within Dermatoscopy	0,0%	100,0%	100,0%
		% within FurtherEducation	0,0%	27,0%	16,9%
		% of Total	0,0%	16,9%	16,9%
Total		Count	22	37	59
		% within Dermatoscopy	37,3%	62,7%	100,0%
		% within FurtherEducation	100,0%	100,0%	100,0%
		% of Total	37,3%	62,7%	100,0%

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7,159[a]	1	,007		
Continuity Correction[b]	5,368	1	,021		
Likelihood Ratio	10,518	1	,001		
Fisher's Exact Test				,009	,006
Linear-by-Linear Association	7,038	1	,008		
N of Valid Cases	59				
a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,73.					
b. Computed only for a 2x2 table					

Appendix 5.2

FBSEannual * Confidence Crosstabulation								
			Confidence					Total
			not confident	slightly confident	moderately confident	confident	very confident	
FBSEannual	never	Count	2	0	0	0	0	2
		% within FBSEannual	100,0%	0,0%	0,0%	0,0%	0,0%	100,0%
		% within Confidence	33,3%	0,0%	0,0%	0,0%	0,0%	3,5%
		% of Total	3,5%	0,0%	0,0%	0,0%	0,0%	3,5%
	rarely	Count	3	1	5	0	0	9
		% within FBSEannual	33,3%	11,1%	55,6%	0,0%	0,0%	100,0%
		% within Confidence	50,0%	33,3%	13,5%	0,0%	0,0%	15,8%
		% of Total	5,3%	1,8%	8,8%	0,0%	0,0%	15,8%

	sometimes	Count	1	0	18	2	0	21
		% within FBSEannual	4,8%	0,0%	85,7%	9,5%	0,0%	100,0%
		% within Confidence	16,7%	0,0%	48,6%	20,0%	0,0%	36,8%
		% of Total	1,8%	0,0%	31,6%	3,5%	0,0%	36,8%
	often	Count	0	2	10	5	0	17
		% within FBSEannual	0,0%	11,8%	58,8%	29,4%	0,0%	100,0%
		% within Confidence	0,0%	66,7%	27,0%	50,0%	0,0%	29,8%
		% of Total	0,0%	3,5%	17,5%	8,8%	0,0%	29,8%
	always	Count	0	0	4	3	1	8
		% within FBSEannual	0,0%	0,0%	50,0%	37,5%	12,5%	100,0%
		% within Confidence	0,0%	0,0%	10,8%	30,0%	100,0%	14,0%
		% of Total	0,0%	0,0%	7,0%	5,3%	1,8%	14,0%
Total		Count	6	3	37	10	1	57
		% within FBSEannual	10,5%	5,3%	64,9%	17,5%	1,8%	100,0%
		% within Confidence	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	10,5%	5,3%	64,9%	17,5%	1,8%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41,730[a]	16	,000
Likelihood Ratio	34,648	16	,004
Linear-by-Linear Association	19,621	1	,000
N of Valid Cases	57		
a. 21 cells (84,0%) have expected count less than 5. The minimum expected count is ,04.			

Appendix 5.2

ReferalToDerma12 * LongTermPatients Crosstabulation					
			LongTermPatients		Total
			no	yes	
ReferalToDerma12	never	Count	2	0	2
		% within ReferalToDerma12	100,0%	0,0%	100,0%
		% within LongTermPatients	13,3%	0,0%	3,5%
		% of Total	3,5%	0,0%	3,5%
	1-3 times	Count	0	8	8
		% within ReferalToDerma12	0,0%	100,0%	100,0%
		% within LongTermPatients	0,0%	19,0%	14,0%
		% of Total	0,0%	14,0%	14,0%
	4-9 times	Count	4	18	22
		% within ReferalToDerma12	18,2%	81,8%	100,0%
		% within LongTermPatients	26,7%	42,9%	38,6%
		% of Total	7,0%	31,6%	38,6%
	10-19 times	Count	7	7	14
		% within ReferalToDerma12	50,0%	50,0%	100,0%
		% within LongTermPatients	46,7%	16,7%	24,6%
		% of Total	12,3%	12,3%	24,6%

	> 20 times	Count	2	9	11
		% within ReferalToDerma12	18,2%	81,8%	100,0%
		% within LongTermPatients	13,3%	21,4%	19,3%
		% of Total	3,5%	15,8%	19,3%
Total		Count	15	42	57
		% within ReferalToDerma12	26,3%	73,7%	100,0%
		% within LongTermPatients	100,0%	100,0%	100,0%
		% of Total	26,3%	73,7%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13,633[a]	4	,009
Likelihood Ratio	15,001	4	,005
Linear-by-Linear Association	,037	1	,847
N of Valid Cases	57		
a. 5 cells (50,0%) have expected count less than 5. The minimum expected count is ,53.			

Appendix 5.3

Age * Confidence Crosstabulation								
			Confidence					Total
			not confident	slightly confident	moderately confident	confident	very confident	
Age	18-29	Count	0	0	2	0	0	2
		% within Age	0,0%	0,0%	100,0%	0,0%	0,0%	100,0%
		% within Confidence	0,0%	0,0%	5,4%	0,0%	0,0%	3,5%
		% of Total	0,0%	0,0%	3,5%	0,0%	0,0%	3,5%

	30 - 49	Count	2	1	9	5	0	17
		% within Age	11,8%	5,9%	52,9%	29,4%	0,0%	100,0 %
		% within Confidence	33,3%	33,3%	24,3%	50,0%	0,0%	29,8%
		% of Total	3,5%	1,8%	15,8%	8,8%	0,0%	29,8%
	50 - 69	Count	4	2	26	4	1	37
		% within Age	10,8%	5,4%	70,3%	10,8%	2,7%	100,0 %
		% within Confidence	66,7%	66,7%	70,3%	40,0%	100,0%	64,9%
		% of Total	7,0%	3,5%	45,6%	7,0%	1,8%	64,9%
	>70	Count	0	0	0	1	0	1
		% within Age	0,0%	0,0%	0,0%	100,0%	0,0%	100,0 %
		% within Confidence	0,0%	0,0%	0,0%	10,0%	0,0%	1,8%
		% of Total	0,0%	0,0%	0,0%	1,8%	0,0%	1,8%
Total		Count	6	3	37	10	1	57
		% within Age	10,5%	5,3%	64,9%	17,5%	1,8%	100,0 %
		% within Confidence	100,0%	100,0%	100,0%	100,0%	100,0%	100,0 %
		% of Total	10,5%	5,3%	64,9%	17,5%	1,8%	100,0 %

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9,170[a]	12	,688
Likelihood Ratio	8,810	12	,719
Linear-by-Linear Association	,000	1	,989
N of Valid Cases	57		
a. 17 cells (85,0%) have expected count less than 5. The minimum expected count is ,02.			

Appendix 5.4

Gender * Confidence Crosstabulation								
			Confidence					Total
			not confident	slightly confident	moderately confident	confident	very confident	
Gender	male	Count	3	1	11	5	0	20
		% within Gender	15,0%	5,0%	55,0%	25,0%	0,0%	100,0%
		% within Confidence	50,0%	33,3%	30,6%	50,0%	0,0%	35,7%
		% of Total	5,4%	1,8%	19,6%	8,9%	0,0%	35,7%
	female	Count	3	2	25	5	1	36
		% within Gender	8,3%	5,6%	69,4%	13,9%	2,8%	100,0%
		% within Confidence	50,0%	66,7%	69,4%	50,0%	100,0%	64,3%
		% of Total	5,4%	3,6%	44,6%	8,9%	1,8%	64,3%
Total		Count	6	3	36	10	1	56
		% within Gender	10,7%	5,4%	64,3%	17,9%	1,8%	100,0%
		% within Confidence	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	10,7%	5,4%	64,3%	17,9%	1,8%	100,0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2,402[a]	4	,662
Likelihood Ratio	2,681	4	,613
Linear-by-Linear Association	,090	1	,764
N of Valid Cases	56		
a. 7 cells (70,0%) have expected count less than 5. The minimum expected count is ,36.			

Appendix 5.5

FurtherEducation * Confidence Crosstabulation								
			Confidence					Total
			not confident	slightly confident	moderately confident	confident	very confident	
FurtherEducation	no	Count	4	1	14	1	0	20
		% within FurtherEducation	20,0%	5,0%	70,0%	5,0%	0,0%	100,0%
		% within Confidence	66,7%	33,3%	37,8%	10,0%	0,0%	35,1%
		% of Total	7,0%	1,8%	24,6%	1,8%	0,0%	35,1%
	yes	Count	2	2	23	9	1	37
		% within FurtherEducation	5,4%	5,4%	62,2%	24,3%	2,7%	100,0%
		% within Confidence	33,3%	66,7%	62,2%	90,0%	100,0%	64,9%
		% of Total	3,5%	3,5%	40,4%	15,8%	1,8%	64,9%
Total		Count	6	3	37	10	1	57
		% within FurtherEducation	10,5%	5,3%	64,9%	17,5%	1,8%	100,0%

	% within Confidence	100,0 %	100,0 %	100,0%	100,0 %	100,0 %	100, 0%
	% of Total	10,5%	5,3%	64,9%	17,5%	1,8%	100, 0%

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6,058[a]	4	,195
Likelihood Ratio	6,830	4	,145
Linear-by-Linear Association	5,098	1	,024
N of Valid Cases	57		
a. 7 cells (70,0%) have expected count less than 5. The minimum expected count is ,35.			

Appendix 6: Patient questionnaires

Appendix 6.1

Diagnosis of skin cancer in primary health care

LATVIJAS UNIVERSITĀTE

Hello,
My name is Maximilian Schulz and I am one of the creators of this questionnaire.
I am a medical student at Latvijas Universitate and the questionnaire is part of my doctoral thesis.
Together with Dr. Aizsilniece we want to research the role of family doctors in the early recognition of skin cancer. Our aim is to improve skin cancer screening quality and quantity performed by family doctors in the future. Therefore all of your answers will be of great value for us. Obtained data will stay anonymous and only be used in aggregated form for statistical analyzes within the thesis topic.
Participation in this study is voluntary. You have the right to refuse to participate in the study or to stop participating in the study at any time.Refusing the paticipation will not lead to any negative effect on the quality of healthcare provided to you.
If you have any further questions about this study, please contact: "birojs@dr.aizsilniece.lv". This study is approved by the Latvian Ethics Committee.
Please note that by filling out and handing in this questionnaire you agree with the mentioned use for research.
Thank you for taking the time !

1. How old are you ?
○ 18-29
○ 30-49
○ 50-69
○ >70

2. Gender:
○ Male
○ Female

3. How often did you visit your family doctor in the last 12 month approximately ?

	Never	1 time	2-3 times	4-6 times	>7 times
Rating:	○	○	○	○	○

4. How often did you visit the dermatologist in the last 12 month approximately ?

	Never	1 time	2-3 times	4-6 times	>7 times
Rating:	○	○	○	○	○

5. Does your family doctor perform full body screening for skin cancer ?

	Never	Rarely	Sometimes	Often	Always
Rating:	○	○	○	○	○

6. Have you ever been diagnosed with any form of skin cancer / precancerous lesion ?
○ Yes
○ No

7. IF YES (question 8), who diagnosed this lesion ?
○ Family doctor
○ Dermatologist
○ Other

8. Has your family doctor ever referred you to a dermatologist for a suspicious lesion ?
○ Yes
○ No

9. Did your family doctor ever educate you about skin cancer risks factors ?
○ Yes
○ No

10. Did your family doctor ever educate you about preventive measures for skin cancer ?
○ Yes
○ No

11. Did your family doctor ever educate you about skin cancer self-examination techniques, including how to self-assess for suspicious lesions?

- ◯ Yes
- ◯ No

12. When given the choice of undergoing skin cancer screening during a routine family doctor visit or having it done by a dermatologist at an additional visit, which one would you prefer ?

- ◯ Family doctor (single visit)
- ◯ Dermatologist (additional visit)
- ◯ No preferences

Thank you for your participation !

Appendix 6.2

Ādas vēža diagnostika primārajā veselības aprūpē

LATVIJAS UNIVERSITĀTE

Sveiki,
Mans vārds ir Maksimilians Šulcs (Maximilian Schulz), esmu izveidojis
šo aptaujas anketu. Esmu medicīnas students Latvijas Universitātē. Aptauja tiks veikta, lai
varētu izstrādāt diplomdarbu. Kopā ar Dr. Aizsilnieci mēs vēlamies izpētīt ģimenes ārstu lomu ādas
vēža agrīnā atpazīšanā, tāpēc visas Jūsu atbildes mums būs ļoti
noderīgas. Iegūtie dati paliks anonīmi un tiks izmantoti tikai
statistikas analīzēm promocijas darbā, lai izveidotu kopsavilkumu statistikas analīzēm promocijas darba tēmā.
Piedalīšanās šajā pētījumā ir brīvprātīga. Jums ir tiesības atteikties piedalīties pētījumā vai jebkurā brīdī pārtraukt piedalīties pētījumā. Atteikšanās zaudēšana neradīs negatīvu ietekmi uz sniegto veselības aprūpes kvalitāti. Ja jums ir vēl kādi jautājumi par šo pētījumu, lūdzu, sazinieties ar: "birojs@dr.aizsilniece.lv". Šo pētījumu apstiprinājusi Latvijas Ētikas komiteja.Lūdzu, ņemiet vērā, ka, aizpildot un nododot šo anketu, Jūs piekrītat, ka tā tiks izmantoti pētījumā.
Paldies!

1. Kāds ir Jūsu vecums ?
○ 18-29
○ 30-49
○ 50-69
○ >70

2. Dzimums:
○ Vīrietis
○ Sieviete

3. Cik bieži jūs apmeklējāt savu ģimenes ārstu pēdējo 12 mēnešu laikā ?

	Nevienu reizi	1 reizi	2-3 reizes	4-6 reizes	>7 reizes
Vērtējums:	○	○	○	○	○

4. Cik bieži esat apmeklējis dermatologu pēdējo 12 mēnešu laikā ?

	Nevienu reizi	1 reizi	2-3 reizes	4-6 reizes	>7 reizes
Vērtējums:	○	○	○	○	○

5. Vai jūsu ģimenes ārsts veic pilnu ķermeņa skrīningu par ādas vēzi?

	Nekad	Reti	Dažreiz	Bieži	Vienmēr
Vērtējums:	○	○	○	○	○

6. Vai jums kādreiz ir diagnosticēta jebkāda veida ādas vēzis / pirmsvēža bojājumi?
○ Jā
○ Nē

7. Ja JĀ (8. jautājums), kurš diagnosticējis šo bojājumu?
○ Ģimenes ārsts
○ Dermatologs
○ Cits

8. Vai jūsu ģimenes ārsts jebkad ir nosūtījis jūs pie dermatologa par aizdomīgu bojājumu?
○ Jā
○ Nē

9. Vai jūsu ģimenes ārsts kādreiz izglītoja jūs par ādas vēža riska faktoriem?
○ Jā
○ Nē

10. Vai jūsu ģimenes ārsts kādreiz izglītoja jūs par profilakses pasākumiem ādas vēzim?
○ Jā
○ Nē

11. Vai jūsu ģimenes ārsts kādreiz izglītoja jūs par ādas vēža pašpārbaudes paņēmieniem, tostarp par to, kā pašam/pašai novērtēt aizdomīgus bojājumus?

○ Jā
○ Nē

12. Ja tiek izvēlēta ādas vēža skrīninga pārbaude ikdienas ģimenes ārsta apmeklējuma laikā vai ja to veic kāds dermatologs papildus apmeklējuma laikā, kādu no tām jūs vēlētos?

○ Ģimenes ārsts (viens apmeklējums)
○ Dermatologs (papildu apmeklējums)
○ Nav preferenču

Paldies par dalību!

Appendix 7: General practitioner questionnaire

Appendix 7.1

Diagnosis of skin cancer in primary health care (for GP)

LATVIJAS UNIVERSITĀTE

Hello,
My name is Maximilian Schulz and I am one of the creators of this questionnaire.
I am a medical student at Latvijas Universitate and the questionnaire is part of my doctoral thesis.
Together with Dr. Aizsilniece we want to research the role of family doctors in the early recognition of skin cancer. Our aim is to improve skin cancer screening quality and quantity performed by family doctors in the future. Therefore all of your answers will be of great value for us. Obtained data will stay anonymous and only be used in aggregated form for statistical analyzes within the thesis topic.
Participation in this study is voluntary. You have the right to refuse to participate in the study or to stop participating in the study at any time.Refusing the paticipation will not lead to any negative effect on the quality of healthcare provided to you.
If you have any further questions about this study, please contact: "birojs@dr.aizsilniece.lv". This study is approved by the Latvian Ethics Committee.
Please note that by filling out and handing in this questionnaire you agree with the mentioned use for research.
Thank you for taking the time !

1. How old are you ?
○ 18-29
○ 30-49
○ 50-69
○ >70

2. Gender:
○ Male
○ Female

3. Do you follow the development of moles and skin lesions of long time patients ?
○ Yes
○ No

4. How often do you perform full body skin examination (FBSE) during annual patient visits ?

	Never	Rarely	Sometimes	Often	Always
Rating	○	○	○	○	○

5. How often did you refer patients to a dermatologist for suspected cancerous/precancerous lesions in the past 12 month ?

	Never	1-3 times	4-9 times	10-19 times	>20 times
Rating	○	○	○	○	○

6. Do you perform dermatoscopy on patients with suspicious lesions ?
○ Yes
○ No

7. Did you ever undergo further education, seminars or special programs for the detection of skin cancer ?
○ Yes
○ No

8. Do you educate your patients about skin cancer risks factors ?

	Never	Rarely	Sometimes	Often	Always
Rating:	○	○	○	○	○

9. Do you educate your patients about preventive measures for skin cancer ?

	Never	Rarely	Sometimes	Often	Always
Rating	○	○	○	○	○

10. Do you educate your patients about skin cancer self-examination techniques, including how to self-assess for suspicious lesions?

	Never	Rarely	Sometimes	Often	Always
Rating	○	○	○	○	○

11. How confident are you in the ability to perform full body skin examination (FBSE) for the detection of skin cancer ?

	Not confident	Slightly confident	Moderately confident	Confident	Very confident
Rating	○	○	○	○	○

Thank you for your participation !

Appendix 7.2

Ādas vēža diagnostika primārajā veselības aprūpē (for GP)

LATVIJAS UNIVERSITĀTE

Sveiki,
Mans vārds ir Maksimilians Šulcs (Maximilian Schulz), esmu izveidojis
šo aptaujas anketu. Esmu medicīnas students Latvijas Universitātē. Aptauja tiks veikta, lai
varētu izstrādāt diplomdarbu. Kopā ar Dr. Aizsilnieci mēs vēlamies izpētīt ģimenes ārstu lomu ādas
vēža agrīnā atpazīšanā, tāpēc visas Jūsu atbildes mums būs ļoti
noderīgas. Iegūtie dati paliks anonīmi un tiks izmantoti tikai
statistikas analīzēm promocijas darbā, lai izveidotu kopsavilkumu statistikas analīzēm promocijas darba tēmā.
Piedalīšanās šajā pētījumā ir brīvprātīga. Jums ir tiesības atteikties piedalīties pētījumā vai jebkurā brīdī pārtraukt piedalīties pētījumā. Atteikšanās zaudēšana neradīs negatīvu ietekmi uz sniegto veselības aprūpes kvalitāti. Ja jums ir vēl kādi jautājumi par šo pētījumu, lūdzu, sazinieties ar: "birojs@dr.aizsilniece.lv". Šo pētījumu apstiprinājusi Latvijas Ētikas komiteja.Lūdzu, ņemiet vērā, ka, aizpildot un nododot šo anketu, Jūs piekrītat, ka tā tiks izmantoti pētījumā.
Paldies!

1. Kāds ir Jūsu vecums ?
○ 18-29
○ 30-49
○ 50-69
○ >70

2. Dzimums:
○ Vīrietis
○ Sieviete

3. Vai jūs pati/pats novērojat pacientus ar ādas veidojumiem?
○ Jā
○ Nē

4. Cik bieži jūs veicat pilnu ķermeņa ādas pārbaudi (FBSE) ikgadējo apmeklējumu laikā?

	Nevienu reizi	Reti	Dažreiz	Bieži	Vienmēr
Vērtējums:	○	○	○	○	○

5. Cik bieži esat nosūtījis pacientu pie dermatologu ar aizdomām par iespējamiem vēža / pirmsvēža bojājumiem pēdējo 12 mēnešu laikā?

	Nevienu reizi	1-3 reizes	4-9 reizes	10-19 reizes	>20 reizes
Vērtējums:	○	○	○	○	○

6. Vai jūs veicat dermatoskopiju pacientiem ar aizdomīgiem bojājumiem?
○ Jā
○ Nē

7. Vai jūs kādreiz esat izgājis tālākizglītību, seminārus vai īpašas programmas ādas vēža noteikšanai?
○ Jā
○ Nē

8. Vai jūs izglītojat savus pacientus par ādas vēža riska faktoriem?

	Nekad	Reti	Dažreiz	Bieži	Vienmēr
Vērtējums:	○	○	○	○	○

9. Vai jūs izglītojat savus pacientus par profilakses pasākumiem ādas vēža novēršanai?

	Nekad	Reti	Dažreiz	Bieži	Vienmēr
Vērtējums:	○	○	○	○	○

10. Vai jūs izglītojat savus pacientus par ādas vēža pašpārbaudes paņēmieniem, tostarp par to, kā pašnovērtēt aizdomīgus bojājumus?

	Nekad	Reti	Dažreiz	Bieži	Vienmēr
Vērtējums:	○	○	○	○	○

11. Cik jūs esats pārliecināts par savām prasmēm veikt pilnu ķermeņa ādas pārbaudi (FBSE), lai atklātu ādas vēzi?

	Neesmu pārliecināts	Nedaudz pārliecināts	Daļēji pārliecināts	Pārliecināts	Ļoti pārliecināts
Vērtējums:	○	○	○	○	○

Paldies par dalību!

DOCUMENTATION PAGE

This Diploma Thesis

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_____
_____”

was developed at the Faculty of Medicine of the University of Latvia.

With my signature, I attest, that this research has been carried out without aid or assistance. Used information was obtained only from indicated sources and the electronically submitted copy of this diploma work complies with printout.

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(name, surname) (*signature)*

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Supervisor: _____ _____ _____

(position, name, surname, degree) *(siganture)* *(date)*

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