DANISH MEDICAL JOURNAL

Original Article

Dan Med J 2024;71(2):A07230435. doi: 10.61409/A07230435

Diagnostic flow of patients in a national fast-track referral system for malignant melanoma

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Dan Med J 2024;71(2):A07230435. doi: 10.61409/A07230435

ABSTRACT

INTRODUCTION. Timely diagnosis of malignant melanoma (MM) is crucial for optimal patient outcomes. Thus, the Danish Health Authority implemented a fast-track referral system (FTRS) comprising a clinical diagnostic filter function (CDFF) and a cancer package. This study aimed to characterise the flow of patients with a tentative MM diagnosis referred through the CDFF to a department of dermatology.

METHODS. Retrospective data from the Danish patient and pathology file system were analysed for patients referred to the Department of Dermato-Venereology at Bispebjerg Hospital, Denmark, via the CDFF, with suspected MM in a one-year period.

RESULTS. Among 860 patients with 895 skin lesions, 283 (31.6%) were discharged with a clinical benign diagnosis after their initial consultation, whereas treatment of another 77 (8.6%) patients concluded following a three-month observation period. One-year follow-up of these 360 (283 + 77) clinically benign skin lesions showed no malignancy. Among 100 MM-suspicious lesions promptly referred for excision to a department of plastic surgery, 48% were MM.

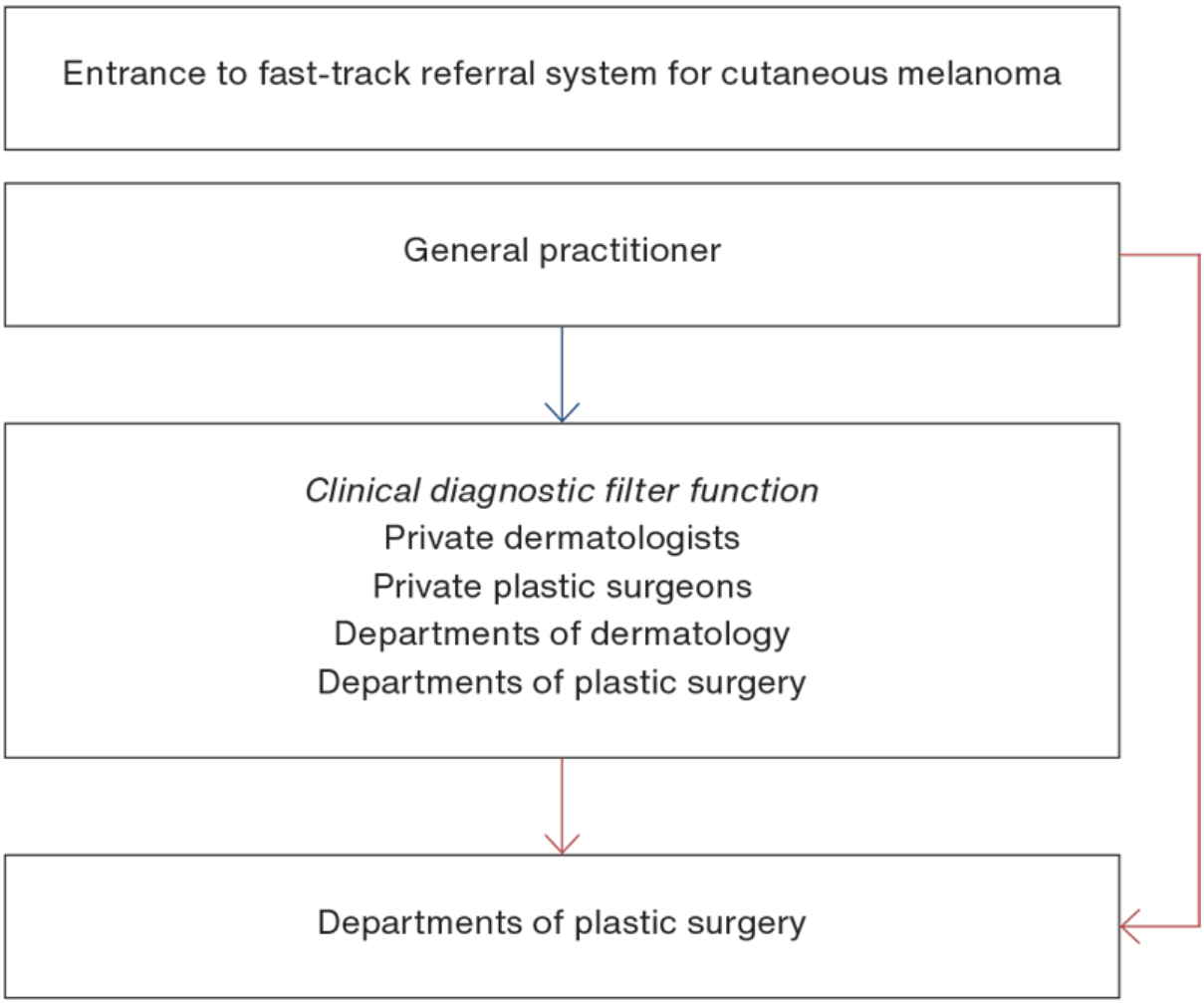
CONCLUSIONS. In a Danish population with tentative MM diagnosis referred through the CDFF to a dermatological hospital department, one-third of patients were discharged with a clinically benign diagnosis. Half of the skin lesions referred for excision to the department of plastic surgery were MM. This indicates a decreased burden of overdiagnosis and a potential reduction of unnecessary surgical scars when dermatologists serve as gate keepers of the FTRS for MM.

FUNDING. None

TRIAL REGISTRATION. Data obtained with permission from BBH j. no. 20078406.

Cutaneous malignant melanoma (MM) is an aggressive cancer whose incidence has doubled in Denmark in a 25-year period [1]. Given the correlation between early diagnosis and good prognosis, the Danish Health Authority implemented a national fast-track referral system (FTRS) to avoid undue delay between presentation, diagnosis and treatment of MM. According to this FTRS, two paths can be chosen by the referring physician: 1) direct referral within the cancer care package including a diagnostic biopsy to a department of plastic surgery or 2) referral via a clinical diagnostic filter function (CDFF). The CDFF is handled by dermatologists and plastic surgeons [2] (**Figure 1**).

FIGURE 1 Modified figure of the fast-track referral system from the Danish Health Authority for patients with a tentative diagnosis of malignant melanoma. The blue arrow illustrates the clinical diagnostic filter function, while the red arrow shows the direct cancer package path.



Initial diagnosis of MM is based on clinical-and dermatoscopic evaluation with the latter improving diagnostic accuracy, but for the trained physician only [3]. The final diagnostic gold standard relies on histopathologic examination, which requires surgical excision of the entire melanocytic lesion. The number needed to biopsy (NNB) ratio for MM is the total number of biopsies taken in attempt to diagnose melanomas (true and false positives) divided by the actual number of melanomas (true positive). This varies worldwide and between physicians with a weighted mean NNB of 14.8 for all clinicians and 7.5 for dermatologists worldwide [4]. Specialised examination by a dermatologist is therefore recommended if in doubt of a diagnosis with a dermatologist trained in dermascopy as an integrated part of the Danish Dermatological specialisation programme.

With this study, we wanted to characterise the skin lesions referred to the Department of Dermato-Venereology at Bispebjerg Hospital, Denmark, within one year to evaluate the efficacy of the FTRS with dermatologists serving as gatekeepers. This was explored by evaluation of the number of patients discharged after first consultation, the overall number of melanomas and NNB.

METHODS

Study design

We included patients referred to the Department of Dermato-Venereology, Bispebjerg Hospital, Denmark, in the FTRS with a tentative diagnosis of MM during the one-year period from October 2019 to September 2020. We excluded patients who were already followed regularly in our naevus clinic due to increased risk of melanoma.

Participants

Data were obtained from the Danish patient file system Sundhedsplatformen, including the referral, the journal and any pathology files relevant to the suspected MM. Data from the Danish Pathology Data Bank (Patobank) were used to extract data on the histopathological diagnosis. For patients discharged after the first or second consultation where no tissue sample was taken for histopathological analysis, follow-up was performed after one year with investigation of the pathology file. This approach was adopted as an indirect measure to rule out subsequent malignant skin diagnosis in the same anatomical region.

Statistics

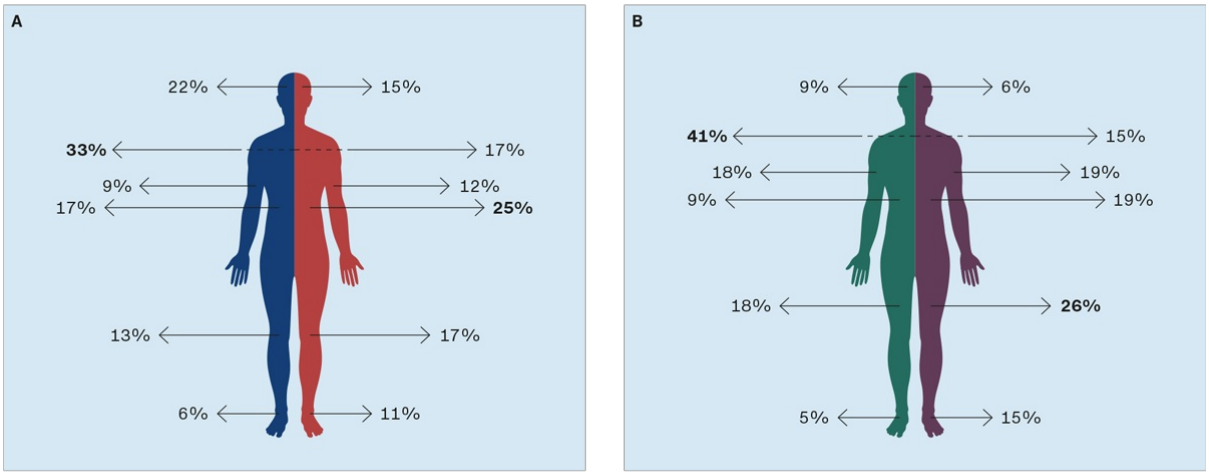
Data are presented by descriptive statistics. For categorical data, absolute and relative frequencies were calculated, whereas median values were calculated for nominal data. Data were analysed using SPSS for Windows (Version 25; IBM Corp.).

Trial registration: data obtained with permission from BBH j. no. 20078406.

RESULTS

In total, 860 patients with a median age of 41.2 years (0-94 years) with 895 skin lesions (548 in females and 347 in males) were referred in the one-year period, among which 30 (3.5%) had previously been diagnosed with MM. The localisation of the skin lesions is illustrated in **Figure 2** A showing a preponderance of lesions localised to the back for men and to the lower extremities for women. The corresponding Figure 2 B shows the anatomical localisation of the melanomas.

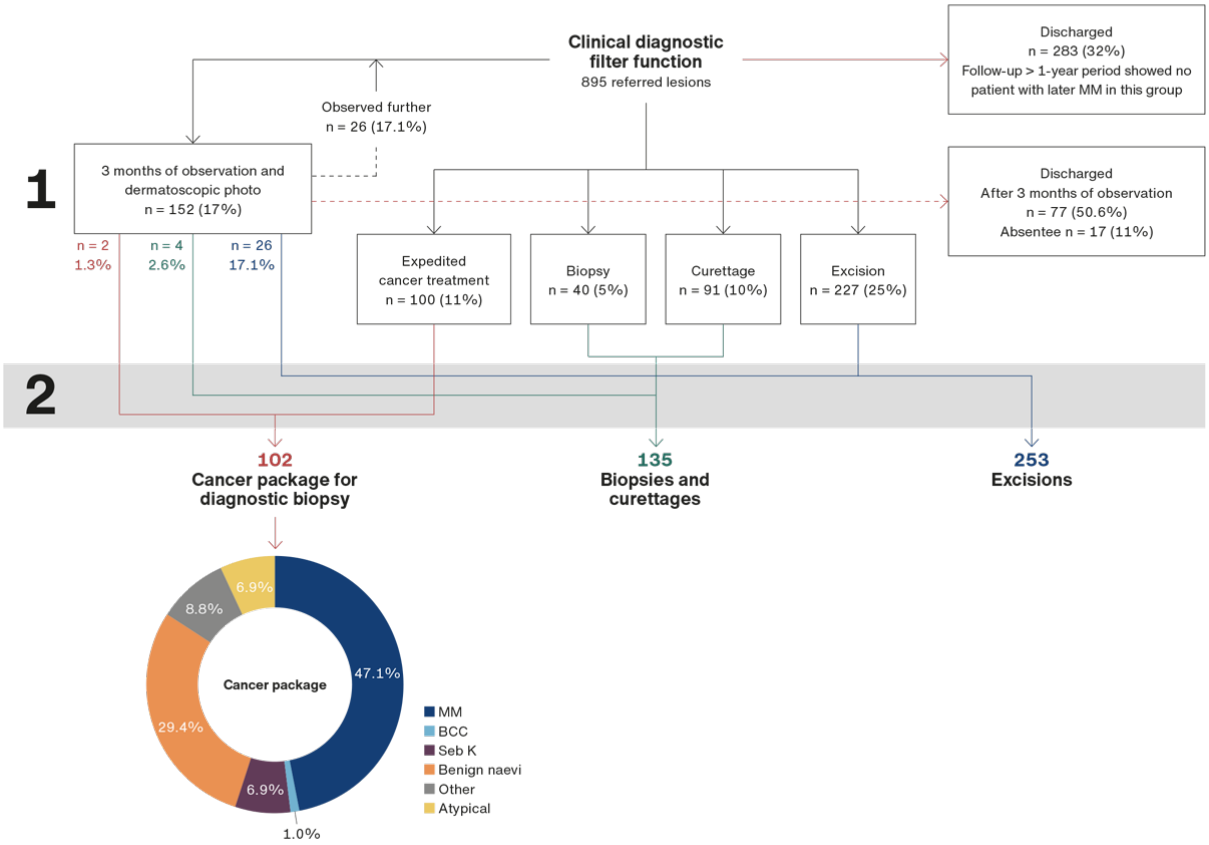
FIGURE 2 A. The anatomical localisation of all skin lesions referred through the clinical diagnostic filter function. **B**. The anatomical localisation of the detected melanomas.



Most of the patients (84%) were referred from the patient's general practitioner, whereas 7% of the referrals were provided by private dermatological clinics.

Figure 3 illustrates the overall flow of patients after referral to the Department of Dermatology, Bispebjerg Hospital. After the first examination, 283 (31.6%) of the skin lesions were diagnosed as clinically benign, and the patients were immediately discharged. Another 77 lesions (8.6%) were diagnosed as benign and the patients were discharged following three months of observation with dermatoscopic photography at the first consultationrepeated after 3-4 months. This group comprised half of the patients that we chose to observe. Thus, out of 895 referred skin lesions, 360 (40%) were diagnosed as clinically benign with no need for tissue sampling for histopathologic analysis. Follow-up after one year in the pathology file detected no malignancy of the skin in the same anatomical region.

FIGURE 3 Graphical overview of the lesion flow for patients referred to the Department of Dermatology, Bispebjerg Hospital. The pie chart illustrates the diagnoses of the 102 skin lesions referred for excision to a department of plastic surgery due to the dermatologists' suspicion of malignant melanoma (MM). Nearly half of the referred lesions suspected to be MM were diagnosed as MM.



BCC = basal cell carcinoma; seb K = seborrhoeic keratoses.

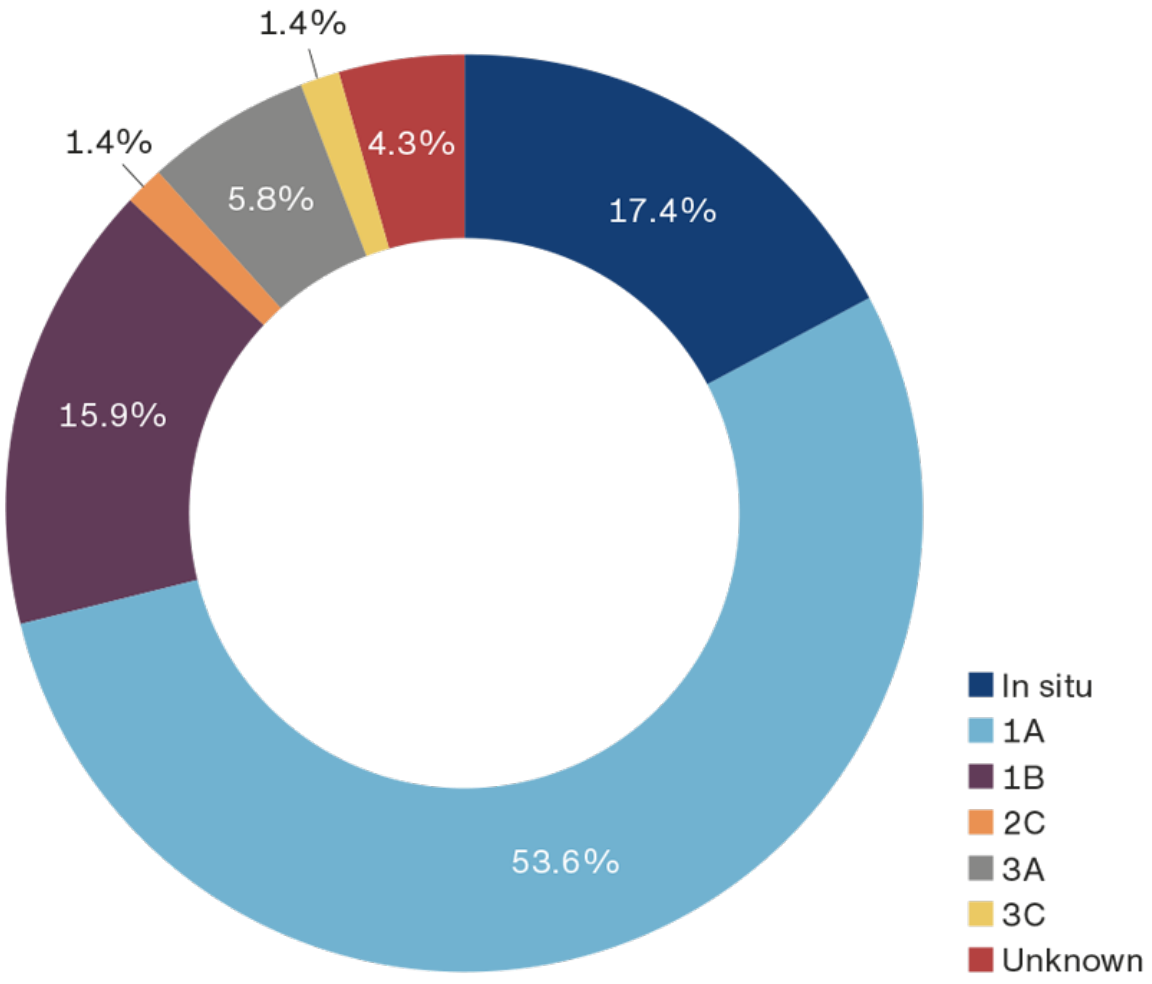
Among the 895 examined skin lesions, 100 (11%) were immediately referred to a department of plastic surgery within the cancer care package for excision upon the dermatologist's tentative diagnosis of MM. Additionally, two were forwarded following three months of observation including dermatoscopic photography due to evolution in the naevus and thus suspicion of MM. Among these 102 referred skin lesions, 48 (47.1%) were diagnosed as MM (Figure 3). For the remaining excised skin lesions that were forwarded to a department of plastic surgery, diagnoses were mostly naevi (benign (29.4%) and atypical (6.9%)), whereas seborrhoeic keratoses comprised 6.9%, basal cell carcinoma (BCC) 1.0% and 8.8% were a combination of different benign diagnoses (Figure 3).

At the Department of Dermatology, Bispebjerg Hospital, 253 skin lesions were excised of which 17 (6.7%) were diagnosed as melanoma, whereas most of the remaining elements were naevi (benign 140 (55%), hereof 31 (12.3%) were naevi with atypical proliferation). Seborrhoeic keratoses comprised 23 (9.1%), BCC four (1.6%), squamous cell carcinoma (SCC) two (0.8%) and 36 (14.2%) were a mixture of different benign skin tumours and other non-malignant diagnoses. In 135 skin elements, a punch biopsy or curettage was performed. Among these, four (3%) were diagnosed as MM, 68 (50.3%) were seborrhoeic keratoses, 14 (10.4%) were naevi (12 benign naevi, two with atypical proliferation), 15 (11.1%) were keratinocyte carcinomas (BCC or SCC), whereas 34 (25.2%) comprised varying benign diagnoses, including dermatofibromas, ulceration, etc.

Overall, a total of 69 melanomas were diagnosed (48 were referred within the cancer care package to a

department of plastic surgery, 21 were removed in a department of dermatology). The vast majority of these 69 melanomas were in an early stage with 12 (17.4%) being *in situ* melanomas, 37 (53.6%) stage 1A, 11 (15.9%) stage 1B, 1 (1.4%) stage 2C, 1 (1.4%) stage 3C, 4 (5.8%) stage 3A, and, finally, 3 (4.3%) of unknown stage (**Figure 4**).

FIGURE 4 The pie chart shows the stages for all the melanomas referred through the clinical diagnostic filter function in a department of dermatology in one year. Most melanomas were caught early as illustrated in the figure with the distribution of the stages of malignant melanoma, showing that 86.9% were in situ or stage 1A/B, 7.2% (5.8% + 1.4%) in stage 3, whereas no melanomas were stage 4.



Given that we discharged patients with a total of 360 lesions in cases where no skin biopsy was needed, the NNB was reduced from 13 (895/69) to 7.8 ((895-360)/69) upon examination in a dermatological hospital department prior to referral for excision to a department of plastic surgery.

DISCUSSION

With this study, we have characterised the flow and diagnoses of skin lesions clinically suspected as MM and referred through the DCFF of the FTRS to a dermatological hospital department within one year. With the immediate discharge of one third of the patients without any need for a skin biopsy, we have illustrated the efficacy and benefit of dermatologists acting as primary gatekeepers of the FTRS. Additionally, diagnostic accuracy was high with nearly half of the lesions immediately forwarded for surgical excision to a department of plastic surgery being diagnosed as MM.

Clinical identification of an advanced MM is often straightforward. Early identification, however, may be challenging; it is, however, crucial to hinder progression and limit the risk of metastasis [5]. The importance of identifying a melanoma at an early stage compared with later may ultimately be the difference between cure and death. Clinical diagnosis is based on anamnesis and macroscopic examination combined with dermoscopy, with the latter improving the diagnostic accuracy but only for the trained physician [3]. Whereas dermatologists are trained in dermoscopy in their specialisation period, this is not the case for most general practitioners. A study from 2016 from the Department of Plastic Surgery, Zealand University Hospital, Denmark, prospectively evaluated patients referred to their department via the FTRS. The diagnostic accuracy of general practitioners was 29%, whereas it was 45% for referring dermatologists [6] corresponding well to the results of this study. Compared with dermatologists, general practitioners possess reduced clinical experience with skin tumours, and, in general, they are not trained in dermoscopy. On a related point, fear of overlooking a melanoma probably affects the relatively high number of benign skin elements referred acutely as MM.

In the present study, most detected melanomas were thin and thus caught early. There is currently debate concerning potential overdiagnosis of early melanoma [7] and the value of regular screening for melanoma in populations at increased risk of developing melanoma (familiar disposition, previous melanoma, genetic mutations related to melanoma development) is discussed. This is because population-based melanoma screenings are associated with increased detection of thin melanomas with discrepancies on incidence and mortality [8]. Despite discussions concerning potential overdiagnosis of melanoma, the prognosis for each individual melanoma is undoubtedly correlated with early staging with thin melanomas having an excellent prognosis with a five-year survival of 95% (stage 1A) in contrast to thick melanomas, which have a five-year survival of 40% (stage 4) [9]. Irrespective of this debate, had it not been for this CDFF, the patients would have been referred immediately for excision and thus the NNB would have been 13 (895/69). This number corresponds well to reported NNB in the literature with a weighted mean NNB of 14.8 for all clinicians. Upon discharge of 360 patients from our department of dermatology without any need for skin biopsy, the NNB was reduced to 7.8 ((895-360)/69). This number is conservatively estimated since only patients who did not have a diagnostic skin biopsy done were included in the reduced estimate of NNB, irrespective of the suspected diagnosis. Some lesions were excised in our department without suspicion of MM but were still included in the NNB estimate. Thus, due to the design of our study, we are able to reliably provide only a very conservative estimate of NNB reduction. Additionally, the cases referred through the CDFF are the more challenging ones as the obviously suspected MMs are referred directly via the cancer package. In view of this setting, one might suspect a relatively higher NNB. This, however, was not the case. Of interest, upon evaluation of the anatomical localisation of the referred lesions, we found a relatively high number of lesions in the face compared with the actual number of melanomas with facial localisation. The reason for this may be that melanomas can be more challenging to diagnose when localised to the face, just as one might imagine that GPs are generally less prone to excise lesions in the face themselves.

Given the results of the study, one might argue that the CDFF of the FTRS should be obtained by clinicians educated and trained in clinical and dermatoscopic evaluation of cutaneous lesions to improve the diagnostic accuracy of melanoma diagnosis and lower the number of benign lesions referred to a department of plastic surgery for surgical excision, thereby using the expertise available in our healthcare system more wisely.

CONCLUSIONS

In a one-year period, 895 skin lesions were referred to the Department of Dermatology at Bispebjerg Hospital, one of six dermatological hospital departments in Denmark. One third were immediately discharged upon their first consultation and 11% were acutely forwarded to a department of plastic surgery for excision, of which almost half were diagnosed as MM. This highlights the efficacy of dermatologist serving as gatekeepers in the FTRS, reducing NNB dramatically. Given the pressure on our healthcare system, it is increasingly important to treat the right patients, saving patients with benign lesions for redundant surgical scars and reducing the healthcare costs and burdens related to the overdiagnosis of benign skin lesions.

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Accepted 28 November 2023

Conflicts of interest Potential conflicts of interest have been declared. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

Cite this as Dan Med J 2024;71(2):A07230435

doi 10.61409/A07230435

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