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An Insight into the Implications of the NCCP 2024 Guideline on the Staging & Surveillance of Melanoma

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Abstract

Aims

In 2024, the NCCP introduced changes to the staging and surveillance of cutaneous melanoma. This study aims to evaluate the cost-effectiveness of this proposed change and the impact on future modelling of services.

Methods

Patients diagnosed with melanoma (Clinical Stage Ib and above) treated between 2017 and 2023 at Beaumont Hospital were identified from a prospectively maintained database. Data were analysed for their journey on an idealized pathway modelled over a 5-year follow-up period according to new guidelines. The increased number and cost of surveillance imaging required was estimated and compared with previous best practice.

Results

According to new guidelines, based on our patient population, an additional 110 surveillance whole-body CT and brain-CT scans could be required annually for stage IIb and IIc melanoma. Regarding PET-CT scans, this could lead to a potential additional annual expense of €176,000. An additional 390 surveillance MRI-Brain scans could potentially be required annually for stage III and IV melanoma patients.

Discussion

This study identifies cost and service access implications with the implementation of these guidelines. The clinical utility of increased surveillance imaging is yet to be determined. This

provides key information for planning future service delivery in the context of an aging population and increased prevalence of melanoma.

Introduction

Melanoma is the fourth most common cancer in Ireland with over 1,100 new melanoma cases in Ireland per year (2017-2021)[1]. Cutaneous melanoma cases mainly occur in pale-skinned people with intense sunlight exposure. Many developed Western countries are seeing an increase in cases which is thought to be attributable to increased sun exposure due to climate change and increased accessibility to sunny holiday destinations. This increased caseload in turn causes an increased workload for melanoma services[2].

The diagnosis, staging, treatment, and surveillance of melanoma is a resource-intensive pathway. Patients initially undergo a diagnostic excisional/incisional biopsy, which dictates histological staging. Depending on the stage of melanoma and other high-risk tumour features, a series of investigations such as sentinel lymph node biopsy (SLNB) and gene testing may be indicated, with potential further treatments including adjuvant systemic therapies, and potentially further surgery. With an increasing caseload, there is a clear need for robust clinical guidelines to ensure cost-effectiveness and to optimise patient care.

In May 2024, the National Cancer Control Programme (NCCP) published a National Clinical Guideline entitled "Radiological Staging and Surveillance of Patients with Cutaneous Melanoma"[3]. These guidelines were developed following the recommendation of the National Cancer Strategy 2017-2026 (Department of Health, 2017) to "develop further guidelines for cancer care in line with National Clinical Effectiveness Committee (NCEC) standards"[4]. The aim of this guideline is to reduce variation in practice and improve patient experience by providing evidence-based recommendations on the staging and surveillance of patients with cutaneous melanoma. However, implementation of these guidelines poses a challenge in terms of workload and financial implications. Key points include changes in indication and frequency of whole-body and brain-specific surveillance imaging for Stage II-IV disease.

This paper aims to assess the workload and cost implications of the 2024 NCCP guidelines at a regional skin cancer specialist centre, by taking a cohort of patients diagnosed with melanoma and modelling their journey according to new guidelines. By comparing the number of scans needed according to new guidelines with current practice, this gives an indication of the workload experienced by different departments involved in the melanoma patients, financial implications, and the effects it has on the patients diagnosed with melanoma. The paper is intended to serve as a tool for other hospitals to use for resource allocation to melanoma care with adherence to the new guidelines.

Methods

This study was conducted in a regional skin cancer centre with a retrospective review of patients who were diagnosed with cutaneous melanoma (Clinical stage Ib and above) between 1st January 2017 and 31st December 2022. All patients were stratified by melanoma stage according to the 8th edition of the American Joint Committee on Cancer (AJCC) staging system. Histopathology results were manually screened via the institution's electronic patient records system in order to determine Breslow thickness (BT). The cost of various imaging modalities was obtained from the hospital's finance department. Using ex-ante modelling, relevant cases from the retrospective database were analysed for their journey on idealized pathways modelled over a follow-up period of 5 years for the 2024 NCCP guidelines. The number of additional whole-body and brain-specific scans as indicated by the 2024 guideline for surveillance purposes for patients with stage II-IV disease was calculated and compared to the actual number of scans with current practice in our institution.

An analysis was conducted of the retrospective database analysing rates of disease progression for specific disease stages. Due to key changes in the 2024 NCCP Guideline recommending additional surveillance imaging for Stage IIb & IIc disease, rates of progression to metastatic disease were examined in this cohort.

Results

Overall, 540 patients were diagnosed with cutaneous melanoma at stage Ib or above at the authors' institution between 2017 and 2022. Table 1 shows the practice for staging and surveillance imaging employed in this regional skin cancer specialist centre, with proposed changes highlighted in bold to show the additional scans that are required with implementation of the new NCCP guidelines. The unit costs of relevant scans have been determined as follows: a brain CT €270, a PET-CT €1,600, and a brain MRI €360. Table 2 shows the estimated annual increase in these scans for surveillance imaging over a 5-year follow-up period based on the new NCCP guideline and the cost implications of these changes. This shows that the new guidelines would require an annual increase of 110 PET-CT or CT-TAP scans and 110 brain CT scans for follow-up of patients with stage IIb and IIc disease. PET-CT or CT-TAP have both been recommended as potential options for whole body surveillance in Stage IIb and IIc disease and the potential cost of performing these scans for surveillance in these patients is shown in Table 2. For follow-up of patients with stage III and IV disease, the new guidelines would require an additional 390 annual brain MRI scans for surveillance purposes, leading to an estimated additional cost of €140,400.

Table 3 shows the rate of patients with stage IIb and IIc, who developed metastatic disease within 5 years from the retrospective database. 27% of patients with pT3b N0 tumours, 19% of patients with pT4a N0 tumours, and 34% of patients with pT4b N0 tumours progressed to metastatic disease.

Discussion

With advancements in melanoma research over recent years, the treatment pathway is constantly adapting to conform to evidence-based practice. Following the publication of the MSLT-II trial[5], active surveillance with ultrasound monitoring has become an option for certain patients with sentinel node metastases, rather than completion lymph node dissection[6]. Increasing knowledge of the genetic makeup of various histological subtypes of melanoma has led to advances in immunotherapy[7]. Due to the complex nature of this disease, and evolving diagnostic and treatment modalities, it is important that healthcare professionals involved in the care of patients with melanoma have clear guidance on the appropriate diagnostic, staging, treatment, and surveillance pathway for these patients. The development of a National Clinical Guideline for the staging and surveillance of melanoma patients is welcomed in order to reduce variation in practice and to ensure patients receive evidence-based treatment.

The recommendations in the new NCCP Guideline generally encourage a higher imaging demand for radiology departments with an increased number of CT, PET-CT and MRI scans for surveillance purposes. At the time of writing, the authors' institution does not have a PET-CT scanner on site. All these scans are outsourced. The benefits of whole body PET-CT compared with CT-TAP include a higher sensitivity for the detection of metastases, the ability to analyse metabolic activity and the ability for whole body radiological imaging to be performed[3]. However, for patients with Stage IIb & IIC disease, either PET-CT or CT-TAP is recommended in the new guideline for surveillance purposes. Despite the lower sensitivity for the detection of metastases in melanoma, CT-TAP is associated with better availability and lower cost which is reflected in Table 2. A significant proportion of MRI scans are also outsourced to alternative sites due to lack of capacity to perform these scans in the hospital. Our results show that implementation of the new guidelines for surveillance of Stage IIb & IIc disease, would lead to an estimated increase of 110 PET-CT and CT Brain scans annually. An estimated 390 additional MRI Brain scans would be required annually in this centre for patients with Stage III & IV disease. According to guidance on reporting time from the Faculty of Radiologists[8], this could lead to an additional 305 hours needed to interpret these scans. We feel it is important to have an awareness of these figures for workforce planning to accommodate the increasing radiology demands. The Medical Workforce Report from 2023-2024 showed that there is 0.5 radiology trainees per consultant radiologist, and 43 consultant radiology posts unfilled as of December 2023[9]. The 2024 NCCP Guideline states that the NCCP aims to secure funding from the HSE to ensure adequate service planning and equal and timely access to diagnosis, staging, and surveillance by 2027. Figures from our study give an indication of the increased workload and cost likely to be associated with adhering to new guidelines, and this increased workload will likely be similar in other Irish hospitals delivering care to melanoma patients.

It is hoped that with the implementation of a guideline aimed at improving radiological surveillance of melanoma patients, that this could lead to a survival benefit to patients. At present, PET-CT has been shown to have a higher sensitivity for detecting distant metastases than CT in stage IIIa-d melanoma[10]. Looking at Stage IIb & IIc melanoma, there is little evidence at present showing a definite survival benefit to radiological surveillance in this cohort. There is however an increased risk of recurrence in stage IIb & IIc disease when compared to stage IIIa[11]. Figures from our database show rates of progression to metastatic disease within 5 years in patients with stage IIb & IIc disease (Table 3). According to our current clinical practice, these patients received no routine surveillance imaging. With implementation of the new guidelines, these patients will now receive 6-monthly brain-specific and whole-body imaging for the first three years, and yearly imaging for the two remaining years of surveillance. The authors believe that prospective data collection to examine outcomes would be needed once the guideline has been implemented. These data could accurately assess the outcomes on patients from the recommended radiological surveillance.

The costs identified of facilitating increased radiological surveillance represent are based on the estimated numbers of additional scans required and unit costs provided by our finance department. The estimated cost consequences are likely to be on the low side, as the unit cost only include the cost of staff time related to the scans and do not include broader add-on costs, capital cost and overheads. At present, there is no relevant cost-effectiveness literature which addresses the cost-effectiveness of the new guidelines, but our cost estimates give an insight into some of the additional costs associated with implementing the guidelines.

Other missing costs are those following incidental findings. Incidental pulmonary embolisms (PE) are reported in 1%–5% of chest CTs. Therapeutic anti-coagulation in the treatment of asymptomatic PEs is associated with a risk of major bleeding of 7.2 per 100 patient years, particularly in high-risk patients with cancer[12]. Survival rates of patients with asymptomatic PEs, who do not receive therapeutic anticoagulation, are similar to age-matched patients who are treated. Mixed results are found however in patients with active cancer[13-15]. It is possible that incidental findings on routine CT or MRI could lead to a higher level of anxiety and over-investigation in melanoma patients. Although this study does not directly investigate the potential costs of managing incidental findings on staging and surveillance imaging, it is an important factor to consider for service planning.

A key limitation of this study is that is our projections assume an idealised patient trajectory, where every patient receives all scheduled appointments within the 5-year timeframe. Our model does not consider confounding factors which may prevent patients from receiving all surveillance scans due to disease recurrence, lack of compliance, or death. It is important to note that this study does not present a cost-effectiveness analysis. Data on the potential survival benefit or avoidance of adverse effects by implementing this guideline is lacking and could be estimated with prospective data collection with implementation of the guideline.

It is important to acknowledge that part of the time period used to reference our melanoma patient numbers included the COVID-19 pandemic. This period saw reduced numbers of presentations of melanoma to general practitioners[16]. This was not accounted for in our calculations, and therefore they might slightly underestimate the true incidence of melanoma in our patient population. This paper does not account for population growth into the future which may also impact the numbers of patients accessing the new Melanoma Guidelines.

Overall, the aim of implementation of the 2024 NCCP Guideline is to improve outcomes for melanoma patients. This paper aims to provide insights into the increased demand which will be imposed by these guidelines in the delivery of melanoma services. It is important that the NCCP secures appropriate funding from the HSE to deliver these additional services, and that this funding should encompass access to equipment, imaging capacity, staffing, and training. In order to optimise the patient outcomes, it is also vital to monitor patient outcomes and assess the impact of implementing these changes.

Declarations of Conflicts of Interest:

A. O'Shea is a deputy editor for the journal Radiology Advances and receives payment for the Radiological Society of North America (RSNA). All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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References:

1. Ireland NCR. Incidence Statistics 2022.
2. Lakshmi A, Shah R, Begaj A, Jayarajan R, Ramachandran S, Morgan B, et al. NICE 2022 guidelines on the management of melanoma: Update and implications. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2023;85:401-13.

3. National Cancer Control Programme N. Radiological Staging and Surveillance of Patients with Cutaneous Melanoma. 2024.
4. Health Do. National Cancer Strategy 2017-2026. 2017.
5. Faries MB, Thompson JF, Cochran AJ, Andtbacka RH, Mozzillo N, Zager JS, et al. Completion dissection or observation for sentinel-node metastasis in melanoma. New England Journal of Medicine. 2017;376(23):2211-22.
6. Broman KK, Hughes T, Dossett L, Sun J, Kirichenko D, Carr MJ, et al. Active surveillance of patients who have sentinel node positive melanoma: an international, multi-institution evaluation of adoption and early outcomes after the Multicenter Selective Lymphadenectomy Trial II (MSLT-2). Cancer. 2021;127(13):2251-61.
7. Alicea GM, Rebecca VW. Emerging strategies to treat rare and intractable subtypes of melanoma. Pigment cell & melanoma research. 2021;34(1):44-58.
8. Faculty of Radiologists R. Diagnostic Radiology: Guidance on Radiologist Workload Figures. 2020.
9. Planning HNDT. Medical Workforce Analysis Report 2023-2024. 2024.
10. Turner RM, Dieng M, Khanna N, Nguyen M, Zeng J, Nijhuis AA, et al. Performance of long-term CT and PET/CT surveillance for detection of distant recurrence in patients with resected stage IIIA–D melanoma. Annals of Surgical Oncology. 2021;28:4561-9.
11. Gershenwald JE, Scolyer RA, Hess KR, Sondak VK, Long GV, Ross MI, et al. Melanoma staging: evidence-based changes in the American Joint Committee on Cancer eighth edition cancer staging manual. CA: a cancer journal for clinicians. 2017;67(6):472-92.
12. Linkins L-A, Choi PT, Douketis JD. Clinical impact of bleeding in patients taking oral anticoagulant therapy for venous thromboembolism: a meta-analysis. Annals of internal medicine. 2003;139(11):893-900.
13. den Exter PL, Hooijer J, Dekkers OM, Huisman MV. Risk of recurrent venous thromboembolism and mortality in patients with cancer incidentally diagnosed with pulmonary embolism: a comparison with symptomatic patients. Journal of Clinical Oncology. 2011;29(17):2405-9.
14. O'Connell CL, Razavi PA, Liebman HA. Symptoms adversely impact survival among patients with cancer and unsuspected pulmonary embolism. Journal of Clinical Oncology. 2011;29(31):4208-9.
15. O'Sullivan JW, Muntinga T, Grigg S, Ioannidis JP. Prevalence and outcomes of incidental imaging findings: umbrella review. bmj. 2018;361.
16. Trepanowski N, Chang MS, Zhou G, et al. Delays in melanoma presentation during the COVID-19 pandemic: a nationwide multi-institutional cohort study. Journal of the American Academy of Dermatology. 2022;87(5):1217-1219.

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Tables

Table 1. Table detailing the current practice for staging and surveillance imaging employed in the authors' institution, with proposed changes highlighted in bold to show the additional scans that are required to implement the new NCCP guidelines.

Pathological Classification	**Pathological / Clinical Classification**	**Staging Scans**	**Radiology Surveillance**	**Ultrasound Surveillance**
pT1A <0.8mm without ulceration	IA	No	None	None
pT1b <0.8mm with ulceration 08-1.0mm +/- ulceration	IB	No	None	None
pT2a without ulceration	IB	No	None	None
pT2b with ulceration	IIA	No	None	None

pT3a without ulceration	IIA	No	None	None
pT3b with ulceration	IIB	PET-CT & MRI Brain	***Year 1-3: 6-monthly whole-body CT and brain CT with contrast.** ***Year 4-5: Yearly whole-body CT and brain CT with contrast** **(**If pregnant or < 24 years consider MRI whole body and brain due to radiation risk)	None
pT4a without ulceration	IIB	PET-CT & MRI Brain	***Year 1-3: 6 monthly whole-body CT and brain CT with contrast.** ***Year 4-5: Yearly whole-body CT and brain CT with contrast** **(**If pregnant or < 24 years consider MRI whole body and brain due to radiation risk)	None
pT4b with ulceration	IIC	PET-CT & MRI Brain	***Year 1-3: 6-monthly whole-body CT and brain CT with contrast.** ***Year 4-5: Yearly whole-body CT and brain CT with contrast** **(**If pregnant or < 24 years consider MRI whole body and brain due to radiation risk)	None
Any pathological classification with lymph node involvement / satellite /	III	PET-CT & MRI Brain	**Year 1-3:** 6-Monthly PET-CT / whole body CT ***6-Monthly MRI Brain** **Year 4-5:** Yearly PET-CT /whole body CT ***Yearly MRI Brain** **(**If pregnant or < 24 years, consider MRI whole body and brain due to radiation risk)	In patients with a positive SLNBx that have not had complete node dissection Ultrasound surveillance recommended:

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in-transit metastasis				Year 1-3: 4-6 months Year 4-5: 6 monthly
>4 positive nodes without widespread metastasis or multiple matted nodes	IIID	PET-CT & MRI Brain	**Year 1-3:** 3-Monthly PET-CT /whole body CT ***3-Monthly MRI Brain** **Year 4-5:** 6-Monthly PET-CT /whole body CT ***6-Monthly MRI Brain** **(**if pregnant or < 24 years, consider MRI whole body and brain due to radiation risk)	In patients with a positive SLNBx that have not had complete node dissection Ultrasound surveillance recommended: Year 1-3: 4-6 months Year 4-5: 6 monthly
Widespread metastasis	IV	PET-CT & MRI Brain	**Year 1-3:** 3-Monthly PET-CT /whole body CT ***3 Monthly MRI Brain** **Year 4-5:** 6-Monthly PET-CT /whole body CT ***6-Monthly MRI Brain** **(**If pregnant or < 24 years, consider MRI whole body and brain due to radiation risk)	In patients with a positive SLNBx that have not had complete node dissection Ultrasound surveillance recommended: Year 1-3: 4-6 months Year 4-5: 6 monthly

Table 2. Table showing the estimated increase of surveillance scans required annually for patients with melanoma in this regional skin cancer specialist centre, the estimated additional direct cost, and the estimated increase in required reporting time. Note that in patients with Stage IIB & IIc disease, PET-CT or CT-TAP is recommended, hence the table presents the cost of performing either scan for this patient cohort.

Imaging Modality	Additional Number per year	Additional yearly Costs	Additional yearly reporting Time (hr)
PET-CT or CT-TAP	110	€176,000 (PET-CT) or €29,700 (CT-TAP)	55
CT Brain	110	€29,700	55
MRI Brain	390	€140,400	195
Total	610	€346,100 (utilising PET-CT) or €199,800 (utilising CT-TAP)	305

Table 3. Table showing the rate of patients with stage IIb and IIc, who developed metastatic disease within 5 years. Data obtained from the retrospective database collected at our institution.

Disease Stage	Number of patients (2017-2022)	Patients who developed metastatic disease within 5 years	% of patients who developed metastatic disease within 5 years (%)
pT3b N0 (IIb)	22	6	27.3
pT4a N0 (IIb)	16	3	18.8
pT4b N0 (IIc)	44	15	34.1