National Cancer Control Programme

Radiological Staging and Surveillance of Patients with Cutaneous Melanoma

National Clinical Guideline

May 2024

HSE National Clinical Guideline: Radiological Staging and Surveillance of Patients with Cutaneous Melanoma

Policy ☐ Procedure ☐ Protocol ☐ Guideline ☐ Clinical Guideline ☒

DOCUMENT GOVERNANCE [1]	
Document Owner (post holder title):	Head of Evidence and Quality Hub, National Cancer Control Programme
Document Owner name:	Dr Eve O'Toole
Document Owner email contact:	guidelines@cancercontrol.ie
Document Commissioner(s):	National Cancer Control Programme
Document Approver(s):	National Cancer Control Programme Executive
Lead responsibility for national implementation:	Hospital/Cancer Centre/Skin Cancer Tumour Conference
Lead responsibility for national monitoring and audit:	Hospital/Cancer Centre/Skin Cancer Tumour Conference
Development Group Name:	Cutaneous Melanoma Guideline Development Group
Development Group Chairperson:	Dr Sinead Field, Consultant Dermatologist, University Hospital Limerick and Dr Eve O'Toole, Head of Evidence and Quality Hub, NCCP

DOCUMENT MANAGEMENT [2]			
Date effective from:		13/05/2024	
Date set for next review:		13/05/2027	
Your Reference No: *(if applicable)*		Click or tap here to enter text.	
Current version no:	0	**Archived version no:**	Click or tap here to enter text.

[1] Records the senior management roles involved in the governance and development of the document.
[2] Records the control information about the document.

VERSION CONTROL UPDATE [3]			
Version No.	**Date reviewed**	**Section numbers changed**	**Approved by**
0	13/05/2024		NCCP Executive
Document management notes:			

PUBLICATION INFORMATION [4]
Title:
Radiological Staging and Surveillance of Patients with Cutaneous Melanoma
Topic:
Cutaneous Melanoma
National Group:
National Cancer Control Programme
Short summary:
Evidence-based recommendations on the staging and surveillance of patients with cutaneous melanoma
Description:
The purpose of this National Clinical Guideline is to provide evidence based recommendations on the staging and surveillance of patients with cutaneous melanoma through the integration of the best research evidence with clinical expertise, patient values and experiences.

[3] Records details when a document is reviewed, even if no changes are made.
[4] Records the document information required for publication on the HSE National Central Repository.

Disclaimer

This guideline (“the Guideline”) was developed by a multidisciplinary Guideline Development Group (“the Group”) and is based upon the best clinical evidence available together with the clinical expertise of the Group members. The Guideline supersedes all previous Health Service Executive (HSE), National Cancer Control Programme (NCCP) guidelines for the radiological staging and surveillance of patients with cutaneous melanoma. The NCCP is part of the HSE and any reference in this disclaimer to the NCCP is intended to include the HSE. Please note, the Guideline is for guidance purposes only. The appropriate application and correct use of the Guideline is the responsibility of each health professional. The Guideline Development Group’s expectation is that health professionals will use clinical knowledge and judgment in applying the principles and recommendations contained in this guideline. These recommendations may not be appropriate in all circumstances and it may be necessary to deviate from this guideline. Clinical judgment in such a decision must be clearly documented. Care options should be discussed with the patient, his/her significant other(s), and the multidisciplinary team on a case-by-case basis as necessary. The NCCP accepts no liability nor shall it be liable, whether arising directly or indirectly, to the user or any other third party for any claims, loss or damage resulting from any use of the Guideline.

Table of Content

1.0 Background

1.1 Purpose

The purpose of this National Clinical Guideline is to provide evidence based recommendations on the staging and surveillance of patients with cutaneous melanoma through the integration of the best research evidence with clinical expertise, patient values and experiences. This guideline aims to reduce variation in practice and improve patient experience.

1.2 Mandate

The National Cancer Strategy 2017-2026 (Department of Health, 2017) recommendation 37 states that: “The NCCP will develop further guidelines for cancer care in line with National Clinical Effectiveness Committee (NCEC) standards.”

1.3 Scope

The scope of the guideline is to provide clinical recommendations on the radiological staging and surveillance of patients with Cutaneous Melanoma. The scope of the guideline does not include clinical recommendations on surveillance of patients who are currently receiving adjuvant systemic anti-cancer therapy.

1.4 Target audience

This guideline is intended for all health professionals involved in the radiological staging and surveillance of patients with cutaneous melanoma. This guideline is also relevant to those involved in clinical governance, in both primary and secondary care, to help ensure that arrangements are in place to deliver appropriate care for the population covered by this guideline.

Whilst the guideline is focused on clinical care, it is expected to be of interest to patients with cutaneous melanoma and their significant others. An accompanying Plain Language Summary of this guideline is available in Appendix VI: Plain Language Summary.

While the CEO, General Manager and the Clinical Director of the hospital have corporate responsibility for the implementation of the recommendations in this guideline, each member of the multidisciplinary team is responsible for the implementation of the individual guideline recommendations relevant to their discipline.

1.5 Target population

- Adults (18 years or older) patients with cutaneous melanoma who are undergoing staging.
- Adults (18 years or older) patients with cutaneous melanoma who have completed treatment (surgical and systemic anti-cancer therapy) and are undergoing surveillance.

2.0 Clinical guideline

Clinical Question 2.1 – Radiological staging

In patients with newly diagnosed invasive cutaneous melanoma, who should have radiological staging investigations performed to detect metastases and what radiological imaging is recommended?

Quality of the evidence

A Cochrane systematic review (Dinnes et al., 2019), two meta-analyses (Rodriguez Rivera et al., 2014, Xing et al., 2011), a systematic review (Schröer-Günther et al., 2012), a randomised control trial (Long et al., 2022, Luke et al., 2022) and an international guideline (Gershenwald et al., 2017) addressed this clinical question.

The studies within the meta-analyses and systematic reviews are of low quality due to study design, small patient numbers and outdated study periods. Therefore, we cannot generalise findings on imaging modalities and operator experience to current practice. Evidence to address overall survival and influence of radiological imaging on patient management is lacking and there is little or no evidence comparing different imaging modalities.

Who should receive additional imaging as part of staging?

No high quality evidence was identified on which patients would benefit from additional imaging as part of staging. One systematic review did demonstrate that the diagnostic accuracy of PET-CT appears to increase with higher stages based on American Joint Committee on Cancer (AJCC) staging system (Schröer-Günther et al., 2012).

There is currently uncertainty around radiological staging investigations for patients with stage IIB and stage IIC cutaneous melanoma as there is no strong evidence base to answer this question. Adjuvant treatment for patients with stage IIB and stage IIC cutaneous melanoma is evolving with a recent phase III trial demonstrating a benefit (Long et al., 2022, Luke et al., 2022). Pembrolizumab has been granted a licence extension in Europe for use in adjuvant immunotherapy in resected stage IIB and IIC melanoma patients (children over 12 years of age and adults). Furthermore, the eight edition of the American Joint Committee on Cancer (AJCC) melanoma staging system suggests that patients with stage IIB and IIC melanoma are at a higher risk of recurrence than patients with stage IIIA disease (Table 1) (Gershenwald et al., 2017).

Table 1 Melanoma-specific survival rates from the Eighth Edition International Melanoma Database (Gershenwald et al., 2017)

Stage	5- year melanoma-specific survival	10-year melanoma-specific survival
Stage IIB	87%	82%
Stage IIC	82%	75%
Stage IIIA	93%	88%

The Guideline Development Group therefore recommend radiological staging investigations may be considered in patients with stage IIB and IIC cutaneous melanoma. Furthermore, the Guideline Development Group agree there is a paucity of high quality evidence to address radiological staging in stage III melanoma patients, however they acknowledge the expected potential clinical benefit of staging in this cohort.

Radiological imaging for staging

In a Cochrane systematic review (Dinnes et al., 2019), six studies (n=492 people) exploring primary staging following a confirmed diagnosis of melanoma were identified. Two studies (Arrangoiz et al., 2012, Maubec et al., 2007) evaluating PET-CT in participants with melanomas >4 mm in thickness found sensitivities for the detection of any metastases were 30% (95% CI 7% to 65%) to 47% (95% CI 29% to 65%), and specificities were 73% (95% CI 45% to 92%) to 88% (95% CI 68% to 97%). One small prospective study (Veit-Haibach et al., 2009) comparing CT with PET-CT for the detection of nodal metastases demonstrated no false positive results for either CT or PET-CT (specificity 100%, 95% CI 92% to 100%); however, sensitivity was higher for PET-CT (38%, 95% CI 14% to 68%) compared to CT (23%, 95% CI 5% to 54%). For the detection of distant metastases, two additional cases were detected with PET-CT (sensitivity 42%, 95% CI 15% to 72%) in comparison to CT (25%, 95% CI 5% to 57%) with no difference in specificity (93%, 95% CI 81% to 99%). No data for MRI were identified. Results for ultrasound in the detection of nodal metastases (2 studies) were highly variable and likely subject to bias (Dinnes et al., 2019).

In addition, an older meta-analysis (Xing et al., 2011) found that PET-CT had a higher sensitivity (80%, 95% CrI = 53% to 93%) and specificity (87%, 95% CrI = 54% to 97%) compared to CT (sensitivity 51%, 95% CrI =24%-76%, specificity 69%, 95% CrI =30%-92%) for staging of distant metastases.

It must be noted that no survival benefit of PET-CT over CT has been identified. In the absence of strong evidence, limited radiology resources, access, cost, risk of asymptomatic distant disease and patient factors the consensus of the Guideline Development Group is that options for radiological staging when indicated include:

- whole body PET CT with either MRI brain or contrast enhanced CT brain

or

- contrast enhanced CT TAP with either contrast enhanced CT brain or MRI brain

Benefit and Harm

The overall benefits of radiological imaging include; the determination of prognostic information, stage and location of the tumour, identification of early metastaic disease, identification of clinically occult disease and guiding access to treatment.

The identification of benign incidental findings is a potential harm for both the patient and the health service. Incidential findings may cause increased anxiety for the patient and further unnecessary investigations including additional biopsies and radiation exposure. Investigation of some incidental findings can put pressure on the health service including the availability of radiology resources.

Radiation dose varies with imaging modality, the Health Information and Quality Authority (HIQA) sets out the diagnostic reference levels for medical exposure to ionising radiation (HIQA, 2023a). Increased exposure to radiation can cause greater harm in young people, pregnant women and patients with an underlying predisposition to cancer. Due to the higher radiation exposure with contrast enhanced CT TAP and PET-CT, in young people and pregnant women whole body and brain MRI is recommended. However, whole body MRI is a more difficult experience for some patients compared to contrast enhanced CT TAP and PET-CT. Some experiences described by patients include feeling claustrophobic and anxious in the MRI machine, finding it difficult to remain still for the duration of the scan and finding the noise of the MRI machine disturbing.

Whole body PET-CT v CT-TAP

The benefits of whole body PET-CT compared with contrast enhanced 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. The identification of small volume disease using PET-CT may also allow earlier initiation of treatment.

The potential harms of whole body PET-CT compared with contrast enhanced CT-TAP include a higher incidence of false positive results and a more difficult experience for some patients. Some experiences described by patients include discomfort from the radiopharmaceutical injection prior to the scan, the long time spent in the machine and the inconvenience associated with having to travel long distances due to the limited availability of PET-CT scanners. Patients also need to avoid close contact with babies, young children and pregnant women for a number of hours following a PET-CT. The advantages of PET-CT in commencement of earlier therapy have to be weighed against the potential side-effects of therapy.

Brain scans

The benefits of a brain MRI scan include identification of more subtle disease compared with contrast enhanced CT. However, contrast enhanced CT brain scans can be performed in conjunction with a whole body CT. This has a cost and practicality benefit compared to PET-CT which requires a separate brain MRI scan.

Preferences, values and acceptability

The multidisciplinary Guideline Development Group including patient representatives recognise knowledge as an important patient value.

The justification of why a patient is or is not having radiological staging investigations performed to detect metastases should be clearly communicated to the patient.

Communication around timelines, when results are available and how they will be communicated are important in managing patient's expectations and maintaining trust. It is also important that patients are informed of the benefits and harms including radiation exposure during radiological imaging. This means that the values of disclosure and understanding are embedded into patient/clinical communication. This has the benefit of reducing some of the patient's anxiety around staging investigation results. It also reassures the patients that they are receiving care based on the best current evidence.

Resources, capacity and other considerations

There was no relevant cost-effectiveness literature found to address this clinical question.

The following resources, capacity and other considerations were discussed in detail by the Guideline Development Group:

Radiology resources

The Guideline Development Group highlighted that the expansion of radiological staging may require additional radiology resources. 1,227 invasive melanomas (C43) were diagnosed in Ireland in 2019 (National Cancer Registry Ireland (NCRI), 2023). Approximately 70% of melanomas were stage IIA or less with 27% of melanomas falling into category IIB-IV. Previously based on NICE guidelines stage IIC with no sentinel lymph node biopsy (SLNB) and stage III and above were recommended to have radiological imaging as part of staging. If staging radiological imaging is extended to include earlier stages IIB (81 new cases per annum) and IIC (70 new cases per annum) an increase of approximately 150 extra patients nationally may be staged per annum based on NCRI incidence rates (NCRI, 2023).

Additional Clinical Nurse Specialists and Advanced Nurse Practitioners will also be required.

Equity

The Guideline Development Group highlighted the importance of equity in staging investigations for patients both within Ireland and when compared to other European countries. Limited radiology resources can result in delays with extensive waiting lists and therefore inequity in access for patients.

Radiological staging recommendations

Recommendation 2.1.1

In patients with stage IA cutaneous melanoma, radiological staging is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation:** Strong

Recommendation 2.1.2

In patients with stage IB cutaneous melanoma, radiological staging is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation:** Strong

Recommendation 2.1.3

In patients with stage IIA cutaneous melanoma, radiological staging is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation:** Strong

Recommendation 2.1.4

In patients with stage IIB and stage IIC cutaneous melanoma radiological staging may be considered. Options include:

- whole body PET-CT and brain scan with either MRI or contrast enhanced CT
- contrast enhanced CT TAP and brain scan with either MRI or contrast enhanced CT

Quality of evidence: Low **Grade of recommendation:** Weak

Recommendation 2.1.5

In patients with stage III or stage IV cutaneous melanoma radiological staging is recommended. Options include:

- whole body PET-CT and brain scan with either MRI or contrast enhanced CT
- contrast enhanced CT TAP and brain scan with either MRI or contrast enhanced CT

Quality of evidence: Low **Grade of recommendation:** Strong

Recommendation 2.1.6

In young adults (≤24 years) and pregnant women with stage IIB to IV melanoma, consider staging with whole body and brain MRI, instead of CT or PET-CT due to radiation risk.

Quality of evidence: Low **Grade of recommendation:** Strong

Good practice points

- When considering the modality of radiological imaging timely access, local factors and patient factor should be considered.
- If the primary melanoma is on the head and neck and a contrast enhanced CT TAP is performed for staging, a neck CT should be included.

Practical considerations around patient care

- All patients diagnosed with cutaneous melanoma should have timely access to a Clinical Nurse Specialist or Advanced Nurse Practitioner for communication around their diagnosis, staging, surveillance and timelines.
- The patient should be clearly informed of when staging results will be available and how their results will be communicated.
- The benefits and harms of radiological imaging for staging and surveillance should be discussed with the patient.
- All patients diagnosed with cutaneous melanoma should be given advice that is accurate and easy to understand on self skin examination, nodal basin examination and scar examination.
- All patients diagnosed with cutaneous melanoma should be given advice about sun exposure and how to protect themselves in the sun.

Clinical Question 2.2 – Radiological surveillance

In patients with cutaneous melanoma who have completed treatment (surgical ± adjuvant treatment) what radiological surveillance imaging and at what interval should radiological surveillance be carried out to detect locoregional disease or distant metastases?

Quality of the evidence

A meta-analysis (Xing et al., 2011), systematic review (Schröer-Günther et al., 2012), randomised controlled trial (Moncrieff et al., 2022), retrospective study (Turner et al., 2021) and international guidelines (National Institute for Health and Care Excellence (NICE), 2022, Rajagopal, 2023, National Comprehensive Cancer Network (NCCN), 2023, Gershenwald et al., 2017, Garbe et al., 2022) addressed this clinical question. Supporting evidence was also included from three randomised controlled trials (Long et al., 2022, Luke et al., 2022, Faries et al., 2017, Leiter et al., 2016). The quality of the evidence is low. There are no prospective randomised controlled trials specifically on radiological surveillance as these are difficult to construct due to ethical issues. Some of the literature is old and not applicable as the quality of CT imaging has improved since publication.

Radiological surveillance imaging

A meta-analysis from Xing and colleagues (2011), found that PET-CT had the highest sensitivity (86%, 95% CrI = 76% to 93%), specificity (91%, 95% CrI = 79% to 97%), and diagnostic odds ratio (67, 95% CrI = 20.42 to 229.7), compared to CT for surveillance of distant metastases. This was however based on older retrospective studies published between 1990 and 2009 where patient stage and treatment was unclear.

A retrospective study evaluating the diagnostic accuracy of follow-up surveillance imaging with CT or PET-CT in 332 patients with resected stage IIIA–D melanoma, found a sensitivity of 79% and specificity of 88% for the detection of distant metastases (Turner et al., 2021). There was evidence that CT had a significantly higher specificity compared with PET-CT, PET-CT had a higher sensitivity but this was not significant.

There is currently uncertainty around radiological surveillance for patients with stage IIB and stage IIC cutaneous melanoma as there is no strong evidence base to answer this question. Adjuvant treatment for patients with stage IIB and stage IIC cutaneous melanoma is evolving with a recent phase III trial demonstrating a benefit (Long et al., 2022, Luke et al., 2022). Pembrolizumab has been granted a licence extension in Europe for use in adjuvant immunotherapy in resected stage IIB and IIC melanoma patients (children over 12 years of age and adults). Furthermore, the eight edition of the American Joint Committee on Cancer (AJCC) melanoma staging system suggests that patients with stage IIB and IIC melanoma are at a higher risk of recurrence than

patients with stage IIIA disease (Table 2) (Gershenwald et al., 2017). The Guideline Development Group therefore recommend radiological surveillance in this cohort.

Table 2 Melanoma-specific survival rates from the Eighth Edition International Melanoma Database (Gershenwald et al., 2017)

Stage	5- year melanoma-specific survival	10-year melanoma-specific survival
Stage IIB	87%	82%
Stage IIC	82%	75%
Stage IIIA	93%	88%

It must be noted that no survival benefit of radiological surveillance has been identified. Radiological surveillance in asymptomatic patients should only be recommended if it will change a patient's management if asymptomatic disease is radiologically identified.

Frequency of radiological surveillance

The MELFO (MELanoma FOllow-up) an international phase III randomised controlled trial compared an experimental low-intensity schedule against current national guidelines in participants with stage IB-IIC disease (Moncrieff et al., 2022). No participants received routine imaging. At 5 years, patients assigned to the reduced, stage-adjusted clinical follow-up schedule reported no difference in levels of anxiety, cancer worry, and stress response symptoms, in addition to physical and mental health-related quality of life when compared with those assigned to the current national guidelines. This study also found no difference in any survival outcomes between the two study arms (disease-free survival: hazard ratio=1.00, 95% confidence interval: 0.49–2.07, P= 0.99).

The new category of stage IIID in the AJCC eight edition identifies a subgroup of patients at higher risk of recurrence/death within stage III disease. Stage IIID 5 year melanoma-specific survival is 32% and 10 year is 24% compared with 69% and 60% respectively for stage IIIC melanoma. Therefore, the recommendation of increased frequency of surveillance for this subgroup is in line with frequency for stage IV resected disease, also a group with high risk of recurrence/death (Gershenwald et al., 2017).

International guidelines included to address this clinical question (NICE, 2022, Rajagopal, 2023, NCCN, 2023, Garbe et al., 2022) demonstrate a consistency in the type and frequency of radiological surveillance. Radiological surveillance is recommended from stage IIB to stage IV melanoma patients (NICE, 2022, Rajagopal, 2023, NCCN, 2023). NICE recommends whole-body and brain contrast-enhanced CT scans, while Cancer Care Ontario 2023 and NCCN recommends contrast enhanced CT or PET-CT scans. Discharge at the end of year 5 is consistent across guidelines

(NICE, 2022, Rajagopal, 2023, NCCN, 2023). European consensus guidelines (Garbe et al., 2022) suggest a follow up schedule with radiological follow up of stage IB-IIB with ultrasound and CT neck, thorax, abdominal, pelvic or PET-CT and MRI brain for stage IIC and above, for up to three years.

In the absence of strong evidence, limited radiology resources and keeping in line with international guidelines, the consensus of the Guideline Development Group is to consider radiological surveillance in stage IIB-IIIC and to recommend surveillance for stage IIID and above.

Additionally, based on DeCOG-SLT and MSLT-II trials, the Guideline Development Group agree that in patients with sentinel lymph node metastases detected stage III disease, ultrasound scans of the draining nodal basin should be considered (Faries et al., 2017, Leiter et al., 2016).

Benefit and Harm

The benefits of radiological surveillance include detecting recurrent asymptomatic disease which can enable access to treatment. Capturing early disease may enhance treatment, however, there is no evidence to demonstrate that this improves outcomes. If no recurrence is detected it provides reassurance to patients and to clinicans at that point in time.

The identification of benign incidental findings is a potential harm for both the patient and the health service. Incidential findings may cause increased anxiety for the patient and further unnecessary investigations including additional biopsies and radiation exposure. In a study by Turner et al. 2021, evaluating surveillance imaging, false-positive findings generated a total of 684 further investigations, procedures, clinic visits, and referrals in 152 of 332 patients (46%). These further investigations generated more imaging studies and biopsies, with little additional benefit to these patients. Investigation of some incidental findings can put pressure on the health service including the availability of radiology resources.

Radiation dose varies with imaging modality, the Health Information and Quality Authority (HIQA) sets out the diagnostic reference levels for medical exposure to ionising radiation (HIQA, 2023a). Increased exposure to radiation can cause greater harm in young people, pregnant women and patients with an underlying predisposition to cancer. Due to higher radiation exposure with CT and PET-CT in young people and pregnant women, whole body and brain MRI should be considered. However, whole body MRI is a more difficult experience for some patients compared to CT and PET-CT. Some experiences described by patients include feeling claustrophobic and anxious in the MRI machine, finding it difficult to remain still for the duration of the scan and finding the noise of the MRI machine disturbing.

Whole body PET-CT v CT-TAP

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. The identification of small volume disease using PET-CT may also allow earlier initiation of treatment.

The potential harms of whole body PET-CT compared with CT-TAP include a higher incidence of false positive results and a more difficult experience for some patients. Some experiences described by patients include discomfort from the radiopharmaceutical injection prior to the scan, the long time spent in the machine and the inconvenience associated with having to travel long distances due to the limited availability of PET-CT scanners. Patients also need to avoid close contact with babies, young children and pregnant women for a number of hours following a PET-CT. The advantages of PET-CT in commencement of earlier therapy have to be weighed against the potential side-effects of therapy.

Brain scans

The benefits of a brain MRI scan include identification of more subtle disease compared with that of CE-CT. However, CE-CT brain scans can be performed in conjunction with a whole body CE-CT. This has a cost and practicality benefit compared to PET-CT which requires a separate brain MRI scan.

Preferences, values and acceptability

The multidisciplinary Guideline Development Group including patient representatives recognise knowledge and trust as important patient values.

The justification of why a patient is or is not having radiological surveillance performed to detect recurrence should be clearly communicated. The justification of the frequency of follow-up appointments should also be explained to the patient. This is important as a reduced number of follow-up appointments may cause anxiety and fear in some patients especially during the early stages after treatment when there are uncertainties surrounding the future of their condition. Similarily an increased number of follow-up appointments may cause cause anxiety and fear in some patients.

Communication around timelines, when results are available and how they will be communicated are important in managing patient's expectations and maintaining trust. It is also important that patients are informed of the benefits and harms including radiation exposure during radiological imaging. This means that the values of disclosure and understanding are embedded into patient/clinical communication. This has the benefit of reducing some of the patient anxiety around radiological surveillance results. It also reassures the patient that they are receiving the care based on the best current evidence.

Resources, capacity and other considerations

There were no relevant cost-effectiveness literature found to address this clinical question.

The following resources, capacity and other considerations were discussed in detail by the Guideline Development Group:

Radiology resources

The Guideline Development Group highlighted the expansion of radiological surveillance may require additional radiology resources. 1,227 invasive melanomas (C43) were diagnosed in Ireland in 2019 (National Cancer Registry Ireland (NCRI), 2023). Approximatley 73% of melanomas were stage IIA or less with 27% of melanomas falling into category IIB-IV. Previously based on NICE guidelines stage IIC with no sentinel lymph node biopsy (SLNB) and stage III and above were recommended to have radiological surveillance. If radiological surveillance is extended to include earlier stages IIB (81 new cases per annum) and IIC (70 new cases per annum) an increase of approximately 150 extra patients nationally may be included in radiological surveillance based on NCRI incidence rates (NCRI, 2023).

Additional Clinical Nurse Specialists and Advanced Nurse Practitioners will also be required.

Equity

The Guideline Development Group highlighted the importance of equity in staging investigations for patients both within Ireland and when compared to other European countries. Limited radiology resources can result in delays with extensive waiting lists and therefore inequity in access for patients.

Radiological surveillance recommendations

Recommendation 2.2.1

In patients with cutaneous melanoma in-situ radiological imaging as part of post-treatment surveillance is not recommended.

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.2

In patients with stage IA cutaneous melanoma routine imaging as part of post-treatment surveillance is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.3
In patients with stage IB cutaneous melanoma routine imaging as part of post-treatment surveillance is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.4
In patients with stage IIA cutaneous melanoma routine imaging as part of post-treatment surveillance is not recommended in the absence of signs and symptoms.

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.5
In patients with stage IIB and stage IIC cutaneous melanoma, radiological imaging as part of post-treatment surveillance may be considered every 6 months for year 1 to year 3 and then yearly for year 4 and year 5. Options include:

- whole body PET-CT and brain scan with either MRI or contrast enhanced CT
- contrast enhanced CT TAP and brain scan with either MRI or contrast enhanced CT

Quality of evidence: Low **Grade of recommendation: Weak**

Recommendation 2.2.6
In patients with stage III cutaneous melanoma radiological imaging as part of post-treatment surveillance should be considered every 6 months for year 1 to year 3 and then yearly for year 4 and year 5. Options include:

- whole body PET-CT and brain scan with either MRI or contrast enhanced CT
- contrast enhanced CT TAP and brain scan with either MRI or contrast enhanced CT

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.7
In addition to radiological imaging, in patients with stage III positive sentinel lymph node cutaneous melanoma that have not had a complete lymph node dissection, ultrasound scans of the draining nodal basin should be considered every four to six months for years 1 to 3, and then every six months for years 4 to 5**.**

Quality of evidence: Moderate **Grade of recommendation: Strong**

Recommendation 2.2.8
In patients with stage IIID and stage IV cutaneous melanoma, radiological imaging as part of post-treatment surveillance is recommended every 3 months for year 1 to year 3 and then 6 monthly for year 4 and year 5. Options include:

- whole body PET-CT and brain scan with either MRI or contrast enhanced CT
- contrast enhanced CT TAP and brain scan with either MRI or contrast enhanced CT

Quality of evidence: Low **Grade of recommendation: Strong**

Recommendation 2.2.9
In young adults (≤24 years) and pregnant women with stage IIB to IV melanoma, consider radiological surveillance with whole body and brain MRI, instead of CT or PET-CT due to radiation risk.
Quality of evidence: Low **Grade of recommendation: Strong**

Good practice points

- Radiological surveillance in asymptomatic patients should only be considered if the patient is suitable for treatment and if it will change the management of radiologically identified asymptomatic disease.
- When considering the modality of radiological imaging timely access, local factors and patient factor should be considered.
- If the primary melanoma is on the head and neck, a neck CT should be included.
- If a patient is eligible for a sentinel lymph node biopsy but does not have a sentinel lymph node biopsy due to personal choice the addition of ultrasound scans of the draining nodal basin may be considered following discussion at a tumour conference (MDM).
- There should be clear communication between clinicians in follow-up imaging to avoid duplication.
- If the patient is receiving adjuvant therapy, imaging should be done in accordance with treatment protocols whilst receiving treatment.

Practical considerations around patient care
• All patients diagnosed with cutaneous melanoma should have timely access to a Clinical Nurse Specialist or Advanced Nurse Practitioner for communication around their diagnosis, staging, surveillance and timelines. The patient should be clearly informed of when surveillance results will be available and how their results will be communicated. • The benefits and harms of radiological imaging for staging and surveillance should be discussed with the patient. • All patients diagnosed with cutaneous melanoma should be given advice that is accurate and easy to understand on self skin examination, nodal basin examination and scar examination. • All patients diagnosed with cutaneous melanoma should be given advice about sun exposure and how to protect themselves in the sun. • All patients diagnosed with cutaneous melanoma receiving radiological surveillance, should contact their Clinical Nurse Specialist if they develop any signs or symptoms in between surveillance scans.

3.0 Methodology

3.1 List of clinical questions

The guideline initially commenced with the development of four clinical questions, presented below in PICO format. These four clinical questions were used to develop the literature search and data extraction were completed for all four questions. At the recommendation stage it was decided that the four questions could be merged into two clinical questions as presented in section 2.0 Clinical guideline.

Clinical Question code: MEL_STAG1

In patients with invasive cutaneous melanoma, who should have radiological staging investigations performed to detect metastases?

Population:	Patients with invasive cutaneous melanoma: • Stage IA • Stage IB • Stage IIA • Stage IIB • Stage IIC • Stage IIIA • Stage IIIB • Stage IIIC • Stage IIID • Stage IV
Intervention:	Staging investigations (e.g. CT, CT-TAP, chest x-ray, MRI, PET-CT, U/S)
Comparison:	No staging investigations
Outcome:	Detection of metastatic disease Planning of adjuvant therapy

Clinical Question code: MEL_STAG2

In patients with invasive cutaneous melanoma requiring staging what radiological imaging is recommended?

Population:	Patients with invasive cutaneous melanoma (specific to each stage identified in clinical question MEL_STAG1)
Intervention:	Radiological imaging e.g. CT, CT brain, CT-TAP, chest x-ray, MRI, MRI brain, PET-CT, U/S
Comparison:	Radiological imaging e.g. CT, CT brain, CT-TAP, chest x-ray, MRI, MRI brain PET-CT, U/S
Outcome:	Initial staging

Clinical Question code: MEL_SURV3
In patients who have completed surgical treatment but where immunotherapy or targeted therapy is not indicated for cutaneous melanoma what radiological surveillance imaging and at what interval should radiological surveillance be carried out to detect locoregional disease or distant metastases?

Population:	Patients who have completed surgical treatment but where immunotherapy or targeted therapy is not indicated for cutaneous melanoma
Intervention:	Radiological surveillance imaging (e.g. CT, CT brain, CT-TAP, chest x-ray, MRI, MRI brain, PET-CT, U/S) and interval
Comparison:	
Outcome:	Detection of locoregional disease Detection of metastases

Clinical Question code/number: MEL_SURV4
In patients who have completed adjuvant immunotherapy or targeted therapy for cutaneous melanoma what radiological surveillance imaging and at what interval should radiological surveillance be carried out to detect locoregional disease or distant metastases?

Population:	Patients who have completed adjuvant immunotherapy or targeted therapy for cutaneous melanoma
Intervention:	Radiological surveillance imaging e.g. CT, CT brain, CT-TAP, chest x-ray, MRI, MRI brain, PET-CT, U/S) and interval
Comparison:	
Outcome:	Detection of locoregional disease Detection of metastases
Time:	

3.2 Describe and document the evidence search
The clinical questions outlined above were used to conduct literature searches of the primary literature. A systematic literature review protocol was developed for the guideline development process by the HSE librarians in conjunction with the NCCP and is available upon request. The literature search strategies for each key question are available upon request.

3.3 Describe the method of screening and evidence appraisal
Two NCCP senior research officers screened the literature searches independently to identify relevant primary papers. Any disagreements on primary paper inclusion were agreed through discussion.

All included primary papers were appraised using a validated checklists developed by the Scottish Intercollegiate Guideline Network (SIGN).

There were three main points considered when appraising all the research evidence:

- Are the results valid? (internal validity)
- What are the results? (statistical and clinical significance)
- Are the results applicable/generalisable to the patient/population of the guideline? (external validity)

No relevant cost-effectiveness literature was identified to address the clinical questions.

3.4 Resource implications

Any potential barriers or resource implications of implementing the recommendations were identified by the guideline development group during meetings to discuss and agree the clinical recommendations. These are documented under 'Resources, capacity and other considerations' for each clinical question in Section 2.0 Clinical guideline.

3.5 Consultation

3.5.1 National Review

The draft guideline was signed-off by the Guideline Development Group before going to national stakeholder review.

It was placed on the NCCP website and circulated to relevant organisations and individuals for comment between 25th September 2023 and the 31st of October 2023.

Stakeholders were asked to comment on the comprehensiveness of evidence used to form the recommendations. Stakeholders were required to submit feedback with supporting evidence on a form provided along with a completed conflict of interest form.

3.5.2 International review

The draft guideline was also submitted for international expert review. The guideline development group nominated to provide feedback on the draft guideline:

- Dr Rubeta N Matin, Consultant Dermatologist, Oxford University Hospital
- Prof. John F Thompson, Consultant Surgical Oncologist, Melanoma Institute Australia

The reviewers were chosen by the Guideline Development Group based on their in-depth knowledge of the subject area and guideline development processes. The review followed the same procedure as the National Review. The draft guideline was circulated to the international reviewers between the 25th September 2023 and the 31st of October 2023.

All feedback received was reviewed by the guideline development group. Suggested amendments and supporting evidence were reviewed and consensus reached to accept or reject the amendments. All modifications were documented and the report is available upon request.

3.6 National implementation plan

An implementation plan was developed based on the NCEC Implementation guide (DoH, 2018). It outlines the actions required to implement each recommendation, who has lead responsibility for delivering the action, the timeframe for completion and the expected outcomes of implementation (see Appendix III National Implementation Plan).

This National Clinical Guideline including the implementation plan should be reviewed by the multidisciplinary team and senior management in the hospital as it outlines the actions required to implement the recommendations.

The CEO, General Manager and the Clinical Director of each hospital/cancer centre have corporate responsibility for the implementation of the National Clinical Guideline and to ensure that all relevant staff are appropriately supported to implement the guideline.

The National Clinical Guideline will be circulated and disseminated through the professional networks who participated in developing and reviewing this document.

3.7 Governance and approval

The guideline was submitted to the NCCP Executive on the 13th of May 2024 for approval.

A full list of the members of the NCCP Executive can be found in Appendix II: Membership of .

3.8 Communication and dissemination plan

This National Clinical Guideline is available on the HSE National Central Repository.

A Communication and Dissemination Plan was developed by the Guideline Development Group to raise awareness of the development of this guideline, to ensure effective communication and collaboration with all key stakeholders throughout the various stages of guideline development process and to maintain momentum for the widespread adoption of the guideline.

In conjunction with the HSE Communications Division, key stakeholders were identified and a list of strategies was developed to inform them of the new guideline

(see Appendix IV: Communication and Dissemination Plan). The implementation of the guideline will also be supported by communication, training and education.

3.9 Sustainability

3.9.1 Plan for national monitoring and audit

3.9.1.1 Monitoring

Each hospital/Cancer Centre should implement a systematic process of gathering information and tracking over time to achieve the objectives of this guideline.

The Skin Cancer Tumour Conference in each hospital/cancer centre should monitor the implementation of recommendations specific to their practice.

3.9.1.2 Audit

It is important that implementation of this National Clinical Guideline is audited to ensure that this guideline positively impacts patient care. Each hospital/Cancer Centre should audit implementation of this guideline at least annually.

3.9.2 National audit tool

A National Audit Tool has been developed for this guideline (Appendix V: National Audit Tool), which can be used by hospitals/cancer centres to audit their compliance with the recommendations in this guideline.

It is intended that this audit tool will provide each Skin Cancer Tumour Conference with a baseline tool through which they can identify areas that require improvements. Users of this audit tool are free to add in additional statements, as they deem appropriate and adopt this tool for use in their own setting. This audit tool is to be used to retrospectively audit processes and the presented audit statements are examples to support audit.

3.10 Review / update

This guideline was issued in May 2024 and will be considered for review by the NCCP in three years.

Surveillance of the literature base will be carried out periodically by the NCCP. Any updates to the guideline in the interim period or as a result of three year review will be noted in the guidelines section of the NCCP websites.

Appendix I: Members of the Guideline Development Group

A conflict of interest form was signed by all members the guideline development group. No conflicts of interest were declared by the members of the guideline development group.

Name	Title/Position	Role on guideline group
Chairs of the Guideline Development Group		
Dr Sinead Field	Consultant Dermatologist, University Hospital Limerick	Co-chair and writing member
Dr Eve O'Toole	Head of Evidence and Quality Hub, NCCP	Co-chair and writing member
Patient representatives		
Ms Miriam Staunton	Patient Representative	Writing member
Ms Kay Curtin	Patient Representative	Writing member
Dermatology		
Prof Anne-Marie Tobin	Consultant Dermatologist, Tallaght University Hospital	Writing member
Prof Aoife Lally	St. Vincent's University Hospital	Member
Radiology		
Prof Conor Collins	Consultant Radiologist, St. Vincent's University Hospital	Writing member
Prof Seamus Looby	Consultant Radiologist, Beaumont Hospital	Writing member
Dr Richard Kavanagh	Consultant Radiologist, Cork University Hospital	Writing member
Dr Conor Keady	Specialist Registrar, Radiology	Member
Dr Ronan Lee	Specialist Registrar, Radiology	Member
Dr Niall McVeigh	Specialist Registrar, Radiology	Member
Surgery		
Ms Amy Gillis	Consultant General Surgeon, Tallaght University Hospital	Writing member
Mr Brian Kneafsey	Consultant Plastic Surgery, Beaumont Hospital	Member
Ms Shirley Potter	Consultant Plastic Surgery, Mater Misericordiae University Hospital	Member
Medical Oncology		
Prof Paul Donnellan	Consultant Medical Oncologist, Galway University Hospital	Writing member
Nursing		
Ms Evelyn Power	Skin Cancer Clinical Nurse Specialist, University Hospital Limerick	Writing member

Ms Louise Fleming	Skin Cancer Clinical Nurse Specialist, St. Vincent's University Hospital	Writing member
Histopathology		
Dr Cynthia Heffron	Consultant Histopathologist, Cork University Hospital	Writing member
Library		
Ms Dymphna McGettigan	HSE Librarian	Information services
NCCP		
Dr Helena Gibbons	Senior Research Officer, NCCP	Project manager, senior researcher and writing member
Ms Catherine Duffy	Programme Manager Skin, NCCP	Programme manager and writing member
Ms Louise Murphy	Senior Research Officer, NCCP	Senior researcher and writing member

Appendix II: Membership of NCCP Executive

Name	Role and position
Professor Risteárd Ó Laoide (Chair)	National Director, NCCP
Ms Fiona Bonas	Assistant National Director, NCCP
Mr Pat Cafferty	Head of Planning, Performance, and Programme Management, NCCP
Ms Terry Hanan	National Clinical Lead for Cancer Nursing, NCCP
Ms Patricia Heckmann	Assistant National Director & Chief Pharmacist, NCCP
Dr Triona McCarthy	Assistant National Director - Community Oncology / Primary Care / Prevention, NCCP
Dr Tony Holohan	Head of Cancer Intelligence, NCCP
Professor Arnold Hill	National Surgical Oncology Programme Clinical Advisor
Professor Maccon Keane	National Medical Oncology Programme Clinical Advisor
Professor Clare Faul	National Radiation Oncology Programme Clinical Advisor

Sign-off by Chair of Approval Governance Group

National Clinical Guideline: Radiological staging and surveillance of patients with cutaneous melanoma was formally ratified and recorded in the minutes of the Approval Governance Group on 13/05/2024

Name: (print)	Professor Risteárd Ó Laoide
Title:	National Director, National Cancer Control Programme
Signature: **(e-signatures accepted)**	

Appendix III: National Implementation Plan

National 3PG Title: National Clinical Guideline: Radiological staging and surveillance of patients with cutaneous melanoma

Date National 3PG approved: 13/05/2024

Expected date of full implementation: 2027

National 3PG implementation lead/role: Hospital/Cancer Centre/Skin Cancer Tumour Conference

IMPLEMENTATION ACTION	**Implementation barriers / enablers**	**List of tasks to implement the action**	**Lead responsibility for delivery of the action**	**Expected completion date**	**Expected outcomes**
Access to additional resources - access to imaging equipment - increase imaging capacity - access to ANPs and CNSs	Barrier: Lack of radiology resources - access to imaging equipment and staff. Enabler: National Cancer Strategy recommendation 14: *The NCCP, working with the other Directorates in the HSE and with the Department of Health, will develop a rolling capital*	Secure funding through the HSE service planning process for equipment and access to imaging capacity. Secure funding through the HSE service planning process for further staffing.	Health Regions NCCP as per National Cancer Strategy recommendation 14, 16, 50.	2027	Outcome: All patients with cutaneous melanoma will have equal access to the appropriate diagnostic equipment and staff. Accurate diagnosis and timely staging. Accurate surveillance.

IMPLEMENTATION ACTION	Implementation barriers / enablers	List of tasks to implement the action	Lead responsibility for delivery of the action	Expected completion date	Expected outcomes
	investment plan, to be reviewed annually, with the aim of ensuring that cancer facilities meet requirements. National Cancer Strategy recommendation 16: *The NCCP will ensure that consultant appointments for radiology, endoscopy and histopathology, where necessary, are made in conjunction with appointments in other disciplines such as surgery and medical oncology.* National Cancer Strategy recommendation 50:				

IMPLEMENTATION ACTION	Implementation barriers / enablers	List of tasks to implement the action	Lead responsibility for delivery of the action	Expected completion date	Expected outcomes
	The NCCP, aided by a cross sector group, will draw up a comprehensive workforce plan for cancer services. This will include an interim assessment of staffing needs at medical, nursing and health & social care professional levels by mid-2018.				

Appendix IV: Communication and Dissemination Plan

Key stakeholders were identified by the Guideline Development Group and in conjunction with the HSE Communications Division, a list of strategies was developed to inform these stakeholders of the new guideline. Some strategies will include:

- Official publication and launch of the guideline.
- Direct communication from NCCP Director/CCO to hospital and cancer network managers raising awareness and setting out expectations/actions.
- Circulation to the networks who participated in developing and reviewing the guideline.
- Circulation to NCCP staff.
- Liaison with HSE Clinical Programmes, academic faculties and professional bodies for dissemination to their members.
- Liaison with the Irish Cancer Society and relevant voluntary organisations and patient advocacy groups to ensure guidelines are represented in their patient and public information.
- Promotion through the HSE/NCCP website, internal HSE media, social and print media.
- NCCP to include details of the guideline in presentations by clinical leads, sub-group chairs, NCCP Director.
- NCCP to promote the guideline at conferences, workshops, and CPD sessions.

A plain language summary of the guideline will be included as a key element of the Communication and Dissemination Plan - for patients, their families and other non-specialists who may be interested in the potential implications of the recommendations within the guideline and what it may mean for them.

Description of stakeholder communications	Communication method	Owner	Timeline
Patients			
Plain language summary	Guideline	Project team	Pre 'go live'
Guideline Development Group			
New guideline alert	Email	Project team	Pre 'go live'
National stakeholders			
New guideline to Hospital Managers/Cancer Network Managers	Email	Director NCCP/CCO	Pre 'go live'
New guideline to relevant stakeholders (incl. National groups, organisations, faculties, patient support &	Email	Project team	Pre 'go live'

advocacy groups, international reviewers)			
New guideline to NCCP staff	Email	Project team	Pre ‘go live’
Press Release (HSE website)	Article	Project team/HSE Comms	'go live'
HSE All Staff Update via Health Service News	Email	Project team/HSE Comms	Within 2 weeks of 'go live'
Health Matters article	Article	Project team/Health Matters	Within 2 months of 'go live'
Medical Independent article	Article	Project team/Medical Independent	Within 2 months of 'go live'

Appendix V: National Audit Tool

Objective of Audit Tool

National procedures and guidance on how to conduct a clinical audit are available from HIQA (2023b) and the HSE (2023).

Each statement in this audit tool has been taken from the accompanying 'National Clinical Guideline: Radiological Staging and Surveillance of Patients with Cutaneous Melanoma' focusing on developments in practice.

Each cancer centre/hospital can assess to what degree they comply with the statements within their own skin cancer tumour conference.

It is intended that this audit tool will provide each cancer centre with a baseline tool through which they can assess their own practice and identify areas which require improvements.

Users of this audit tool are free to add in additional statements, as they deem appropriate and adopt this tool for use in their own setting. This audit tool is to be used to retrospectively audit practices and the presented audit statements are examples to support audit.

Methodology

Population:	Patients with cutaneous melanoma discussed at a skin cancer tumour conference
Sampling:	A total of 20% or 20 patients, whichever is greater, should be selected
Frequency:	At least annually
Method:	Record **Y** for **Yes**, if the criteria are met. Record **N** for **No**, if criteria are not met. Record **N/A** for **Not applicable**.
Calculation of Compliance Rate %:	The score, expressed as a percentage, is calculated by dividing the number of "yes" and "no" answers. "Not applicable" answers are excluded from the calculation of the percentage score. **Example:** If there are 6 "yes" and 2 "no" answers, the score is calculated as follows: 6 (yes answers) divided by 8 (total of yes and no answers) multiplied by 100 = 75%
Compliance requirement:	Set out by statement in the tool below.

Audit Topic and Title:					
Hospital:	[Name]				
Audit lead by:	[Name and title]				
Date of audit:	[dd/mm/yyyy]				
Evidence source:					
Is standard/criteria being met for the following statements:	**Compliance requirement**	**Yes**	**No**	**N/A**	**Compliance Rate**
Statement 1 (Recommendation 2.1.1-2.1.3) Patients with stage IA-IIA cutaneous melanoma who do not have signs or symptoms were not offered radiological staging.	90%				
Statement 2 (Recommendation 2.1.4) Patients with stage IIB-IIC cutaneous melanoma were considered for radiological staging at tumour conference.	90%				
Statement 3 (Recommendation 2.2.1-2.2.4) Patients with in situ or IA-IIA cutaneous melanoma, who do not have signs and symptoms, were not offered routine imaging as part of post-treatment surveillance.	90%				
Statement 4 (Recommendation 2.2.5) Patients with stage IIB-IIC cutaneous melanoma were considered at tumour conference for routine imaging as part of post-treatment surveillance.	90%				

Appendix VI: Plain Language Summary

Summary of National Clinical Guideline

This National Clinical Guideline contains evidence based recommendations. For patients with melanoma, it covers:

- who should be considered for scans to determine if their cancer has spread to other parts of the body (staging)
- who should continue to have scans after they have finished their treatment to check for recurrence or relapse (surveillance)

The recommendations describe which imaging tests (scans/ x-rays or ultrasound) may be used, how often to use them, and for how long. Not all patients will need or decide to have scans this is a joint decision with their doctor. Ask your doctor if you want to know what your cancer stage is, this is information which should be made available to you.

This guideline does not cover patients who are currently receiving treatment with their oncologist. It also does not cover patients who are experiencing signs or symptoms related to their cancer.

What does this mean for you?

Questions you may want to ask your healthcare professionals?

- Who will arrange my scan?
- When will I get the results and who will give them to me?
- Do I have choices or options for treatment?
- What happens next?
- How long will the treatment take?
- Will there be side-effects?
- Will this impact my day to day life?
- Who do I contact if something doesn't feel right or I am feeling unwell?

Understanding the language

Medical Term	Plain language explanation
CT-TAP	This is a CT scan of the torso
PET-CT	This is a scan of the full body using a small amount of radioactive substance.
Staging	Assessment of how far your cancer has progressed

Glossary of terms

Adjuvant Therapy	Additional cancer treatment given after the primary treatment to lower the risk that the cancer will come back. Adjuvant therapy may include chemotherapy, radiation therapy, hormone therapy, targeted therapy, or biological therapy. (NCI dictionary)
Biopsy	The removal of cells or tissues for examination by a pathologist. (NCI dictionary)
Cochrane systematic review	A Cochrane Review is a systematic review that attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a specific research question. Researchers conducting systematic reviews use explicit, systematic methods that are selected with a view aimed at minimizing bias, to produce more reliable findings to inform decision-making (Cochrane Library Website).
Cohort study	A research study that compares a particular outcome in groups of individuals who are alike in many ways but differ by a certain characteristic. (NCI dictionary)
CT Scan/CE-CT Scan	A procedure that uses a computer linked to an x-ray machine to make a series of detailed pictures of areas inside the body. (NCI dictionary). CE-CT is a contrast enhanced CT, contrast allows certain structures in the body to become more visible.
CT-TAP	A CT-TAP scan is a scan of the thorax (chest), abdomen and pelvis.
Disease-free Survival	In cancer, the length of time after primary treatment for a cancer ends that the patient survives without any signs or symptoms of that cancer. (NCI dictionary)
Draining nodal basin	A group of lymph nodes that receives and filters lymph that flows from a certain area of the body. (NCI dictionary)
Hazard ratio	A measure of how often a particular event happens in one group compared to how often it happens in another group, over time. (NCI dictionary)
Imaging Modality	Modality is the term used in radiology to refer to one form of imaging, e.g. x-ray, fluoroscopy, nuclear medicine, ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI), hybrid modalities, (PET-CT, PET-MRI, SPECT-CT). (Radiopedia website)

Immunotherapy	A type of therapy that uses substances to stimulate or suppress the immune system to help the body fight cancer, infection, and other diseases. (NCI dictionary)
Incidental finding	An incidental finding is an abnormality discovered on an imaging exam being performed for an unrelated reason. These findings in a normal population may represent an underlying malignancy, simply an anatomic variant, or a finding of no clinical consequence. (NCI dictionary)
Invasive cutaneous melanoma	Cutaneous or skin melanoma develops in pigment cells called melanocytes. Cutaneous melanoma occurs when cancerous cells grow out of control (mutate) and crowd out normal cells. Usually, cutaneous melanoma begins in the epidermis—the top layer of skin—and can become invasive from there. (NCI dictionary)
Locoregional	An occurrence that is limited to a certain part of the body or a narrowly-defined body region. (NCI dictionary)
Meta-analysis	A process that analyses data from different studies done about the same subject. The results of a meta-analysis are usually stronger than the results of any study by itself. (NCI dictionary)
Metabolic	Having to do with metabolism (the total of all chemical changes that take place in a cell or an organism to produce energy and basic materials needed for important life processes). (NCI dictionary)
Metastatic	Having to do with metastasis, which is the spread of cancer from the primary site (place where it started) to other places in the body. (NCI dictionary)
MRI	Magnetic Resonance Imaging (MRI) is a procedure that uses radio waves, a powerful magnet, and a computer to make a series of detailed pictures of areas inside the body. (NCI dictionary)
NCEC	The National Clinical Effectiveness Committee
NICE	The National Institute for Health and Care Excellence (NICE) is an executive non-departmental public body of the Department of Health and Social Care.
Nodal metastases	Nodal metastasis when cancer has spread to nearby lymph glands. (NCI dictionary)

Occult disease	Occult is used in radiology to refer to pathology that cannot be seen on one or more modalities (Radiopedia website).
Odds Ratio	An odds ratio (OR) is a measure of association between an exposure and an outcome. The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure. (NCI dictionary)
Overall Survival	The length of time from either the date of diagnosis or the start of treatment for a disease, such as cancer, that patients diagnosed with the disease are still alive. (NCI dictionary)
PET Scan	A positron emission tomography (PET) scan is a procedure in which a small amount of radioactive glucose (sugar) is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is taken up. (NCI dictionary)
PET-CT	A computed tomography (CT) scan is a procedure that combines the pictures from a positron emission tomography (PET) scan and a computed tomography (CT) scan. The PET and CT scans are done at the same time with the same machine. (NCI dictionary)
Phase III Trial	A study that tests the safety and how well a new treatment works compared with a standard treatment. For example, phase III clinical trials may compare which group of patients has better survival rates or fewer side effects. In most cases, treatments move into phase III clinical trials only after they meet the goals of phase I and phase II clinical trials. Phase III clinical trials may include hundreds of people. Also called phase 3 clinical trial. (NCI dictionary)
PICO	The PICO model is a method for framing an evidence based clinical question. PICO stands for patient/population, intervention, comparison and outcomes. (HSE website)
Radiopharmaceutical	A drug that contains a radioactive substance and is used to diagnose or treat disease, including cancer. (NCI dictionary)
Randomised control trial	An epidemiological experiment in which subjects in a population are randomly allocated into groups, usually called study and control groups, to receive or not receive an experimental preventive or therapeutic procedure, manoeuvre, or intervention. The results are assessed by rigorous comparison of rates of disease, death, recovery, or other

	appropriate outcome in the study and control groups. (CEBM website)
Recurrence	Cancer that has recurred (come back), usually after a period of time during which the cancer could not be detected. (NCI dictionary)
Retrospective Study	A study that compares two groups of people: those with the disease or condition under study (cases) and a very similar group of people who do not have the disease or condition (controls). Researchers study the medical and lifestyle histories of the people in each group to learn what factors may be associated with the disease or condition. For example, one group may have been exposed to a particular substance that the other was not. Also called case-control study. (NCI dictionary)
Sensitivity	Sensitivity describes how well a test can detect a specific disease or condition in people who actually have the disease or condition. (NCI dictionary)
Sentinel lymph node biopsy	A sentinel lymph node biopsy (SLNB) is a procedure in which the sentinel lymph node is identified, removed, and examined to determine whether cancer cells are present. (NCI dictionary)
Specificity	When referring to a medical test, specificity refers to the percentage of people who test negative for a specific disease among a group of people who do not have the disease. (NCI dictionary)
Staging	Performing exams and tests to learn the extent of the cancer within the body, especially whether the disease has spread from where it first formed to other parts of the body. (NCI dictionary)
Surveillance	In medicine, closely watching a patient's condition but not treating it unless there are changes in test results. (NCI dictionary)
Systematic review	The application of strategies that limit bias in the assembly, critical appraisal, and synthesis of all relevant studies on a specific topic. Systematic reviews focus on peer-reviewed publications about a specific health problem and use rigorous, standardised methods for selecting and assessing articles. A systematic review differs from a meta-analysis in not including a quantitative summary of the results. (CEBM website)

Targeted therapy	A type of treatment that uses drugs or other substances to target specific molecules that cancer cells need to survive and spread. (NCI dictionary)
Ultrasound	A procedure that uses high-energy sound waves to look at tissues and organs inside the body. (NCI dictionary)

References

ARRANGOIZ, R., PAPAVASILIOU, P., STRANSKY, C. A., YU, J. Q., TIANYU, L., SIGURDSON, E. R., BERGER, A. C. & FARMA, J. M. 2012. Preoperative FDG-PET/CT Is an Important Tool in the Management of Patients with Thick (T4) Melanoma. *Dermatol Res Pract,* 2012**,** 614349.

DEPARTMENT OF HEALTH 2017. National Cancer Strategy 2017-2026.

DINNES, J., FERRANTE DI RUFFANO, L., TAKWOINGI, Y., CHEUNG, S. T., NATHAN, P., MATIN, R. N., CHUCHU, N., CHAN, S. A., DURACK, A., BAYLISS, S. E., GULATI, A., PATEL, L., DAVENPORT, C., GODFREY, K., SUBESINGHE, M., TRAILL, Z., DEEKS, J. J. & WILLIAMS, H. C. 2019. Ultrasound, CT, MRI, or PET-CT for staging and re-staging of adults with cutaneous melanoma. *Cochrane Database Syst Rev,* 7**,** Cd012806.

FARIES, M. B., THOMPSON, J. F., COCHRAN, A. J., ANDTBACKA, R. H., MOZZILLO, N., ZAGER, J. S., JAHKOLA, T., BOWLES, T. L., TESTORI, A., BEITSCH, P. D., HOEKSTRA, H. J., MONCRIEFF, M., INGVAR, C., WOUTERS, M., SABEL, M. S., LEVINE, E. A., AGNESE, D., HENDERSON, M., DUMMER, R., ROSSI, C. R., NEVES, R. I., TROCHA, S. D., WRIGHT, F., BYRD, D. R., MATTER, M., HSUEH, E., MACKENZIE-ROSS, A., JOHNSON, D. B., TERHEYDEN, P., BERGER, A. C., HUSTON, T. L., WAYNE, J. D., SMITHERS, B. M., NEUMAN, H. B., SCHNEEBAUM, S., GERSHENWALD, J. E., ARIYAN, C. E., DESAI, D. C., JACOBS, L., MCMASTERS, K. M., GESIERICH, A., HERSEY, P., BINES, S. D., KANE, J. M., BARTH, R. J., MCKINNON, G., FARMA, J. M., SCHULTZ, E., VIDAL-SICART, S., HOEFER, R. A., LEWIS, J. M., SCHERI, R., KELLEY, M. C., NIEWEG, O. E., NOYES, R. D., HOON, D. S. B., WANG, H. J., ELASHOFF, D. A. & ELASHOFF, R. M. 2017. Completion Dissection or Observation for Sentinel-Node Metastasis in Melanoma. *N Engl J Med,* 376**,** 2211-2222.

GARBE, C., AMARAL, T., PERIS, K., HAUSCHILD, A., ARENBERGER, P., BASSET-SEGUIN, N., BASTHOLT, L., BATAILLE, V., DEL MARMOL, V., DRÉNO, B., FARGNOLI, M. C., FORSEA, A. M., GROB, J. J., HÖLLER, C., KAUFMANN, R., KELLENERS-SMEETS, N., LALLAS, A., LEBBÉ, C., LYTVYNENKO, B., MALVEHY, J., MORENO-RAMIREZ, D., NATHAN, P., PELLACANI, G., SAIAG, P., STRATIGOS, A. J., VAN AKKOOI, A. C. J., VIEIRA, R., ZALAUDEK, I. & LORIGAN, P. 2022. European consensus-based interdisciplinary guideline for melanoma. Part 1: Diagnostics: Update 2022. *Eur J Cancer,* 170**,** 236-255.

GERSHENWALD, J. E., SCOLYER, R. A., HESS, K. R., SONDAK, V. K., LONG, G. V., ROSS, M. I., LAZAR, A. J., FARIES, M. B., KIRKWOOD, J. M., MCARTHUR, G. A., HAYDU, L. E., EGGERMONT, A. M. M., FLAHERTY, K. T., BALCH, C. M. & THOMPSON, J. F. 2017. Melanoma staging: Evidence-based changes in the American Joint Committee on Cancer eighth edition cancer staging manual. *CA Cancer J Clin,* 67**,** 472-492.

HEALTH INFORMATION AND QUALITY AUTHORITY (HIQA) 2023a. Diagnostic Reference Levels Guidance on the establishment, use and review of diagnostic reference levels for medical exposure to ionising radiation.

HEALTH INFORMATION AND QUALITY AUTHORITY (HIQA) 2023b. National procedures for clinical audit of radiological procedures involving medical exposure to ionising radiation.

HEALTH SERVICE EXECUTIVE (HSE) 2023. National Centre for Clinical Audit, Clinical Audit - A Practical Guide 2023. National Quality and Patient Safety Directorate.

LEITER, U., STADLER, R., MAUCH, C., HOHENBERGER, W., BROCKMEYER, N., BERKING, C., SUNDERKÖTTER, C., KAATZ, M., SCHULTE, K. W., LEHMANN, P., VOGT, T., ULRICH, J., HERBST, R., GEHRING, W., SIMON, J. C., KEIM, U., MARTUS, P. & GARBE, C. 2016. Complete lymph node dissection versus no dissection in patients with sentinel lymph node biopsy positive melanoma (DeCOG-SLT): a multicentre, randomised, phase 3 trial. *Lancet Oncol,* 17**,** 757-767.

LONG, G. V., LUKE, J. J., KHATTAK, M. A., DE LA CRUZ MERINO, L., DEL VECCHIO, M., RUTKOWSKI, P., SPAGNOLO, F., MACKIEWICZ, J., CHIARION-SILENI, V., KIRKWOOD, J. M., ROBERT, C., GROB, J. J., DE GALITIIS, F., SCHADENDORF, D., CARLINO, M. S., MOHR, P., DUMMER, R., GERSHENWALD, J. E., YOON, C. H., WU, X. L., FUKUNAGA-KALABIS, M., KREPLER, C., EGGERMONT, A. M. M. & ASCIERTO, P. A. 2022. Pembrolizumab versus placebo as adjuvant therapy in resected stage IIB or IIC melanoma (KEYNOTE-716): distant metastasis-free survival results of a multicentre, double-blind, randomised, phase 3 trial. *Lancet Oncol,* 23**,** 1378-1388.

LUKE, J. J., RUTKOWSKI, P., QUEIROLO, P., DEL VECCHIO, M., MACKIEWICZ, J., CHIARION-SILENI, V., DE LA CRUZ MERINO, L., KHATTAK, M. A., SCHADENDORF, D., LONG, G. V., ASCIERTO, P. A., MANDALA, M., DE GALITIIS, F., HAYDON, A., DUMMER, R., GROB, J. J., ROBERT, C., CARLINO, M. S., MOHR, P., POKLEPOVIC, A., SONDAK, V. K., SCOLYER, R. A., KIRKWOOD, J. M., CHEN, K., DIEDE, S. J., AHSAN, S., IBRAHIM, N. & EGGERMONT, A. M. M. 2022. Pembrolizumab versus placebo as adjuvant therapy in completely resected stage IIB or IIC melanoma (KEYNOTE-716): a randomised, double-blind, phase 3 trial. *Lancet,* 399**,** 1718-1729.

MAUBEC, E., LUMBROSO, J., MASSON, F., SUCIU, V., KOLB, F., MAMELLE, G., CAVALCANTI, A., BOITIER, F., SPATZ, A., AUPÉRIN, A., LEBOULLEUX, S. & AVRIL, M. F. 2007. F-18 fluorodeoxy-D-glucose positron emission tomography scan in the initial evaluation of patients with a primary melanoma thicker than 4 mm. *Melanoma Res,* 17**,** 147-54.

MONCRIEFF, M. D., BASTIAANNET, E., UNDERWOOD, B., FRANCKEN, A. B., GARIOCH, J., DAMUDE, S., HEATON, M., DECKERS, E. A., PATEL, N., HOEKSTRA-WEEBERS, J. E. & HOEKSTRA, H. J. 2022. Follow-up Schedule for Patients With Sentinel Node-negative Cutaneous Melanoma (The MELFO Study): An International Phase III Randomized Clinical Trial. *Ann Surg,* 276**,** e208-e216.

NATIONAL CANCER REGISTRY IRELAND (NCRI) July 2023. NCRI unpublished analysis.

NATIONAL COMPREHENSIVE CANCER NETWORK (NCCN) 2023. Melanoma: Cutaneous Version 2.

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE (NICE) 2022. Melanoma: assessment and management [G] Evidence review for the follow-up of people with melanoma

RAJAGOPAL, S. Y., X. ABADIR, W. BAETZ, T. EASSON, A. KNIGHT, G.. 2023. Surveillance of Patients with Stage I, II, III, or Resectable IV Melanoma Who

Were Treated with Curative Intent. . Toronto (ON): Ontario Health (Cancer Care Ontario).

RODRIGUEZ RIVERA, A. M., ALABBAS, H., RAMJAUN, A. & MEGUERDITCHIAN, A. N. 2014. Value of positron emission tomography scan in stage III cutaneous melanoma: a systematic review and meta-analysis. *Surg Oncol,* 23**,** 11-6.

SCHRÖER-GÜNTHER, M. A., WOLFF, R. F., WESTWOOD, M. E., SCHEIBLER, F. J., SCHÜRMANN, C., BAUMERT, B. G., SAUERLAND, S. & KLEIJNEN, J. 2012. F-18-fluoro-2-deoxyglucose positron emission tomography (PET) and PET/computed tomography imaging in primary staging of patients with malignant melanoma: a systematic review. *Syst Rev,* 1**,** 62.

TURNER, R. M., DIENG, M., KHANNA, N., NGUYEN, M., ZENG, J., NIJHUIS, A. A. G., NIEWEG, O. E., EINSTEIN, A. J., EMMETT, L., LORD, S. J., MENZIES, A. M., THOMPSON, J. F., SAW, R. P. M. & MORTON, R. L. 2021. Performance of Long-Term CT and PET/CT Surveillance for Detection of Distant Recurrence in Patients with Resected Stage IIIA-D Melanoma. *Ann Surg Oncol,* 28**,** 4561-4569.

VEIT-HAIBACH, P., VOGT, F. M., JABLONKA, R., KUEHL, H., BOCKISCH, A., BEYER, T., DAHMEN, G., ROSENBAUM, S. & ANTOCH, G. 2009. Diagnostic accuracy of contrast-enhanced FDG-PET/CT in primary staging of cutaneous malignant melanoma. *Eur J Nucl Med Mol Imaging,* 36**,** 910-8.

XING, Y., BRONSTEIN, Y., ROSS, M. I., ASKEW, R. L., LEE, J. E., GERSHENWALD, J. E., ROYAL, R. & CORMIER, J. N. 2011. Contemporary diagnostic imaging modalities for the staging and surveillance of melanoma patients: a meta-analysis. *J Natl Cancer Inst,* 103**,** 129-42.