North, South East and West of Scotland Cancer Networks

Sarcoma National Managed Clinical Network

Audit Report

Sarcoma Quality Performance Indicators

Clinical Audit Data:
01 April 2020 to 31 March 2021

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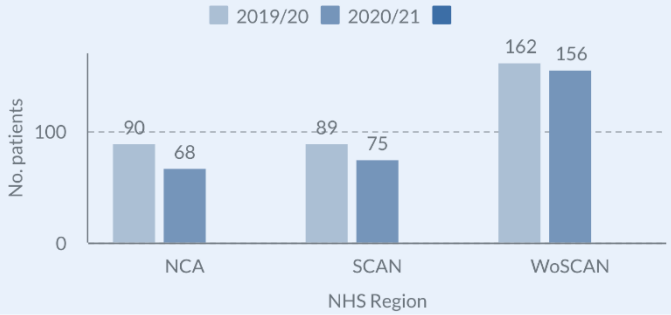
Sarcoma QPI Overview

Patients diagnosed April 2020 - March 2021

Number of patients	299
Gender of Patients:	
Male	54.8%
Female	45.2%
Median Age of Patients:	64

Where are patients diagnosed



Performance (%)

	Target Performance 2020/21	NCA	SCAN	WoS	Scotland
QPI 1:Histological Diagnosis	90%	93.3%	83.3%	97.1%	92.5%
QPI 2: MDT Meeting	95%	94.4%	81.8%	93.3%	90.6%
QPI3i: Clinical Staging CT Results Prior to Definitive Treatment	95%	90.9%	83.3%	96.8%	91.7%
QPI 3ii: Clinical Staging TNM Stage Recorded	95%	45.5%	44.4%	87.1%	66.7%
QPI 4: Surgical Margins	85%	80.0%	88.9%	97.0%	90.9%
QPI 5: Molecular staging of GIST	90%	50.0%	80.0%	92.9%	78.1%
QPI 6: Limb Sparing Surgery	85%	80.0%	94.7%	82.9%	85.3%
QPI 7: Primary flap reconstruction	85%	100%	100%	100%	100%
QPI 8: Post-Op Radiotherapy	90%	40.0%	83.3%	100%	77.8%
QPI 9i: Multi-Agent Chemotherapy for Osteosarcoma	90%	0.0%	N/A	66.7%	50.0%
QPI 9ii: Multi-Agent Chemotherapy for Ewings sarcoma	90%	N/A	100%	100%	100%
QPI 10i: Post Operative Oncological Treatment for GIST	90%	50.0%	100%	88.9%	86.7%
QPI 10ii: Post Op Oncological Treatment for GIST within 3 months of surgery	90%	100%	100%	100%	100%
QPI 11(i)a: 30 Day Mortality – Surgery	<10%	0.0%	0.0%	1.8%	1.3%
QPI 11(i)b: 30 Day Mortality – Radical Radiotherapy	<10%	0.0%	0.0%	0.0%	0.0%
QPI 11(i)d: 30 Day Mortality – Neoadjuvant Radiotherapy	<10%	0.0%	0.0%	0.0%	0.0%
QPI 11(i)f: 30 Day Mortality – Adjuvant Radiotherapy	<10%	0.0%	0.0%	0.0%	0.0%
QPI 11(i)h; 30 Day Mortality – Biological Therapy	<10%	0.0%	0.0%	0.0%	0.0%
QPI 11(ii)a: 30 Day Mortality – Palliative Radiotherapy	<15%	0.0%	20.0%	13.3%	12.5%

Key Achievments:

QPI results indicate that the quality of sarcoma services across Scotland is good with all regions achieving targets for primary flap reconstruction, multi-agent chemotherapy for Ewings sarcoma and 30 day mortality following curative treatment.

Areas for Improvement:

QPI 3(i) – Clinical Staging (Target 95%)
Performance across Scotland was 67% against the 95% QPI target with 40 of the 60 patients diagnosed with extremity soft tissue sarcoma being clinically staged using the TNM staging system.

QPI 5: Molecular Staging of GIST (Target 90%) -
Performance across Scotland was 78% against the 90% QPI target with 25 of the 32 patients diagnosed with GISTs having mutational analysis within 3 months of diagnosis.

QPI 8: Post Operative Radiotherapy within 3 months of Surgery (Target 90%) - Denominator numbers are small for this QPI therefore 3 year aggregated data has been analysed. None of the regions achieved the 90% QPI target with an overall national performance of 59%.

Executive Summary

Introduction

This report contains an assessment of the performance of Scotland wide sarcoma services using clinical audit data relating to patients diagnosed with sarcoma in the twelve months between 1st April 2020 and 31st March 2021.

In order to ensure the success of the cancer quality performance indicators (QPIs) in driving quality improvement in cancer care, QPIs will continue to be assessed for clinical effectiveness and relevance. The initial formal review of sarcoma QPIs took place in 2018. A 2nd cycle of review is currently underway. This clinically led review aims to identify potential refinements to the current QPIs and involves key clinicians from each of the Regional Cancer Networks.

Results

A summary of the sarcoma QPI performance for the 2020/21 audit period is presented below, with a more detailed analysis of the results set out in the main report. Data are analysed by location of diagnosis or treatment, and illustrate NHS Board or treatment-centre performance against each target and overall national performance for each performance indicator.

National - Performance Summary Report

Colour Key	
	Above QPI target
	Below QPI target

Quality Performance Indicator (QPI)	Performance by NHS Board					
	QPI target	Year	NCA	SCAN	WoSCAN	Scotland
QPI 1 – Histological Diagnosis Proportion of patients with extremity sarcoma who have a histological diagnosis before undergoing a planned surgical resection.	90%	2020/21	93.3%	83.3%	97.1%	92.5%
		2019/20	85.7%	73.9%	96.0%	85.5%
		2018/19	90.0%	88.9%	93.1%	91.2%
QPI 2 – Multi-Disciplinary Team (MDT) Meeting Proportion of patients with extremity sarcoma who are discussed at a MDT meeting before definitive treatment.	95%	2020/21	94.4%	81.8%	93.3%	90.6%
		2019/20	87.0%	76.9%	96.4%	87.0%
		2018/19	84.6%	84.2%	90.6%	87.5%
QPI 3(i) – Clinical Staging Proportion of patients with extremity soft tissue who undergo staging CT where the results are available prior to definitive treatment.	95%	2020/21	90.9%	83.3%	96.8%	91.7%
		2019/20	86.7%	80.0%	84.0%	83.3%
		2018/19	91.7%	71.4%	95.2%	87.2%
QPI 3(ii) – Clinical Staging Proportion of patients whose extremity soft tissue sarcoma is staged using the TNM staging system.	95%	2020/21	45.5%	44.4%	87.1%	66.7%
		2019/20	66.7%	55.0%	92.0%	73.3%
		2018/19	33.3%	57.1%	85.7%	63.8%
QPI 4 – Surgical Margins (Hospital of Surgery) Proportion of patients with extremity sarcoma, who undergo surgical resection where R0* resection is achieved.	85%	2020/21	80.0%	88.9%	97.0%	90.9%
		2019/20	88.9%	91.3%	95.8%	92.3%
		2018/19	88.9%	75.0%	82.1%	80.7%
QPI 5 – Molecular Staging of GIST Proportion of patients with GISTs who have mutational analysis within 3months of diagnosis.	90%	2020/21	50.0%	80.0%	92.9%	78.1%
		2019/20	88.9%	78.6%	55.0%	69.8%
		2018/19	75.0%	73.3%	33.3%	59.0%

Quality Performance Indicator (QPI)	Performance by NHS Board					
	QPI target	Year	NCA	SCAN	WoSCAN	Scotland
QPI 6 – Limb Sparing Surgery Proportion of patients with extremity sarcoma who undergo a primary limb-sparing surgery.	85%	2020/21	80.0%	94.7%	82.9%	85.3%
		2019/20	84.2%	87.5%	95.8%	89.6%
		2018/19	100%	95.0%	89.7%	93.2%
QPI 7 – Primary Flap Reconstruction Proportion of patients with extremity sarcoma who undergo successful primary flap reconstruction following surgical resection.	85%	2020/21	100%	-	100%	100%
		2019/20	-	-	100%	100%
		2018/19	-	-	100%	100%
QPI 8 – Post Operative Radiotherapy Proportion of patients with an extremity sarcoma who receive post-operative radiotherapy within 3 months of surgery.	90%	2020/21	40.0%	83.3%	100%	77.8%
		2019/20	-	-	71.4%	57.1%
		2018/19	-	-	80.0%	71.4%
QPI 9(i) – Multi-Agent Chemotherapy for Osteosarcoma Proportion of patients with osteosarcoma who receive multi-agent chemotherapy.	90%	2020/21	-	n/a	-	-
		2019/20	-	n/a	60.0%	71.4%
		2018/19	-	n/a	-	-
QPI 9(ii) – Multi-Agent Chemotherapy for Ewing's sarcoma Proportion of patients with Ewing's sarcoma who receive multi-agent chemotherapy.	90%	2020/21	n/a	-	-	-
		2019/20	-	n/a	-	-
		2018/19	n/a	-	-	-
QPI 10(i) – Post Operative Oncological Treatment for GIST Proportion of patients with high risk GIST who commence post-operative imatinib.	90%	2020/21	-	-	88.9%	86.7%
		2019/20	100%	-	100%	100%
		2018/19	-	75.0%	87.5%	84.6%
QPI 10(ii) – Post Operative Oncological Treatment for GIST Proportion of patients with high risk GIST who commence post-operative imatinib within 3 months of surgery.	90%	2020/21	-	-	100%	100%
		2019/20	100%	100%	85.7%	93.3%
		2018/19	-	-	100%	100%

**Small numbers in some Boards/Regions - percentage comparisons over a single year should be viewed with caution.*
(-) dash denotes a denominator of less than 5. Figures have been removed to ensure confidentiality.

Quality Performance Indicator (QPI)	Performance by NHS Board					
	QPI target	Year	NCA	SCAN	WoSCAN	Scotland
QPI 11a – 30 Day Mortality – Surgery Proportion of patients with sarcoma who undergo surgical resection who die within 30 days of surgical treatment.	<10%	2020/21	0.0%	0.0%	1.8%	1.3%
		2019/20	0.0%	0.0%	0.0%	0.0%
		2018/19	0.0%	0.0%	0.9%	0.6%
QPI 11b – 30 Day Mortality – Radical Radiotherapy Proportion of patients with sarcoma who undergo radical radiotherapy with curative intent who die within 30 days of treatment.	<10%	2020/21	-	-	-	0.0%
		2019/20	-	-	-	0.0%
		2018/19	-	n/a	n/a	-
QPI 11d – 30 Day Mortality – Neo-adjuvant Radiotherapy Proportion of patients with sarcoma who undergo neo-adjuvant radiotherapy with curative intent who die within 30 days.	<10%	2020/21	-	-	0.0%	0.0%
		2019/20	-	0.0%	0.0%	0.0%
		2018/19	-	0.0%	-	0.0%
QPI 11f – 30 Day Mortality – Adjuvant Radiotherapy Proportion of patients with sarcoma who undergo adjuvant radiotherapy with curative intent who die within 30 days	<10%	2020/21	0.0%	0.0%	0.0%	0.0%
		2019/20	0.0%	0.0%	6.3%	3.0%
		2018/19	0.0%	0.0%	0.0%	0.0%
QPI 11h – 30 Day Mortality – Biological Therapy Proportion of patients with sarcoma who undergo biological therapy with curative intent who die within 30 days.	<10%	2020/21	-	0.0%	0.0%	0.0%
		2019/20	-	0.0%	0.0%	0.0%
		2018/19	-	0.0%	0.0%	0.0%
QPI 11(ii)a – 30 Day Mortality – Palliative Radiotherapy Proportion of patients with sarcoma who undergo palliative radiotherapy die within 30 days of treatment.	<15%	2020/21	-	20.0%	13.3%	12.5%
		2019/20	-	33.3%	16.7%	24.1%
		2018/19	20.0%	-	-	8.3%
QPI 12: Clinical Trial Access Proportion of patients diagnosed with sarcoma who are consented* for a clinical trial / research study.	15%	2020	5.4%	3.0%	8.0%	5.9%
		2019	5.4%	4.0%	11.7%	7.9%
		2018	3.3%	2.0%	4.9%	3.7%

(-) dash denotes a denominator of less than 5. Figures have been removed to ensure confidentiality.

Conclusions and Action Required

The development of national QPIs for sarcomas has helped drive continuous quality improvement in patient care whilst ensuring that activity is focussed on those areas that are most important in terms of improving survival and patient experience. In addition, the introduction of QPIs and the associated governance structure has facilitated regular monitoring and reporting of data to ensure equitable care across the country.

It is evident that many of the QPI targets set have been challenging for centres to achieve and a number of areas for improvement have been highlighted. It should however be noted that given the rarity of sarcoma, numbers included within the measurement of the majority of indicators are small and therefore percentages should be compared with caution.

Data capture has improved over the six year period which provides a good foundation from which to measure service improvement. All regions met QPI targets for primary flap reconstruction, multi agent chemotherapy for Ewing's sarcoma and 30 day mortality following curative treatment.

Some variance in performance does exist across the regions and, as per the agreed Regional governance process, each NHS Board was asked to complete a Performance Summary Report, providing a documented response where performance was below the QPI target. NHS Boards provided detailed comments indicating valid clinical reasons, or in some cases patient choice or co-morbidities, have influenced patient management. Remaining actions are summarised below and outlined in the main report under the relevant section.

Action required:

QPI3 – Clinical Staging

- All centres to ensure recording of TNM for all sarcomas.

Completed Action Plans should be returned to West of Scotland Cancer Network (WoSCAN) within two months of publication of this report. Progress against these plans will be monitored by the National Managed Clinical Network (NMCN) Steering Group and any service or clinical issue which the Steering Group considers not to have been adequately addressed will be escalated to the NHS Board Territorial Lead Cancer Clinician and Regional Lead Cancer Clinician.

The NMCN will actively take forward national actions identified and NHS Boards are asked to develop local Action/Improvement Plans in response to the findings presented in the report.

1. Introduction

This report contains an assessment of the performance of Scotland wide sarcoma services using clinical audit data relating to patients diagnosed with sarcoma in the twelve months between 1st April 2020 and 31st March 2021. These audit data underpin much of the regional development/service improvement work of the National Managed Clinical Network (NMCN) and regular reporting of activity and performance is a fundamental requirement of a NMCN to assure the quality of care delivered across the three regions.

Twelve months of data were measured against v3.0 of the sarcoma quality performance indicators (QPIs) which were implemented for patients diagnosed on or after 01 April 2017. This was the seventh consecutive year of analysis following the initial Healthcare Improvement Scotland (HIS) publication of sarcoma QPIs in 2014.

In order to ensure success of the National Cancer QPIs in driving quality improvement in cancer care across NHS Scotland it is critical that QPIs continue to be clinically relevant and focus on areas which will result in improvements to the quality of patient care. As part of the national process it was agreed that indicators would be formally reviewed following 3 years of national comparative reporting. The initial formal review of Sarcoma QPIs took place in 2018. With 7 years of reporting now complete, a 2nd cycle of review commenced in December 2021, this follows an agreed delay of 1 year to allow for COVID-19 related pressures on services and clinical availability. This clinically led review aims to identify potential refinements to the current QPIs and involves key clinicians from each of the Regional Cancer Networks. It is anticipated that this will be a more focussed review given the changes that have been made to the indicators to date. The review will focus on any significant changes to the QPIs that are required due to changes in evidence or clinical practice, as well as an opportunity to make adjustments to the new indicators developed at the initial formal review.

2. Background

Sarcomas are a rare group of cancers that arise from connective tissue, including: bone, cartilage, muscle, blood vessels, nerves and fat[5] which are broadly divided into bone, soft tissue and gastrointestinal stromal tumour (GIST). In 2020/21 the audit identified 299 patients diagnosed with a new primary invasive sarcoma in Scotland.

Sarcomas account for around 1% of all new cancer diagnoses in the UK[5]. In Scotland bone and connective tissue cancers are ranked 25th most common cancer, accounting for only 0.5% of all cancers diagnosed in 2018[3]. The most common site of sarcoma is the extremeties[5] which provides the focus for the majority of QPI data analysis.

Incidence of bone sarcomas has been stable in the UK since the late 1970s whilst incidence of soft tissue sarcoma has increased overall since the late 1990s. This likely reflects improved diagnosis and data recording rather than a true increase in incidence[4]. There has been improvement in survival over the past few decades, with 5 year survival rising from 51% in 1996-2000 to 55% in 2006-2010 for soft tissue sarcoma[5]. The picture is very similar for bone sarcoma.

Unlike many other cancers, bone and soft tissue sarcomas can affect people of any age. From 2012 to 2014 in the UK 47% of all bone sarcomas occurred in people under the age of 45, whilst 57% of soft tissue sarcomas occurred in the under 65s in 2010[4].

GISTs are rare with an estimated occurrence of 1/100,000[6]. These tumours are extremely rare in children and young people, with the median age reported as 60-65[5].

The table below details the five centres carrying out sarcoma treatment in Scotland. These are considered the centres for specialist treatment, which includes surgery, systemic anti-cancer therapy

(SACT) and radiotherapy. Patients may receive diagnostic and palliative care in their local hospital where appropriate; however the majority of patients are referred to one of the five centres for specialist management.

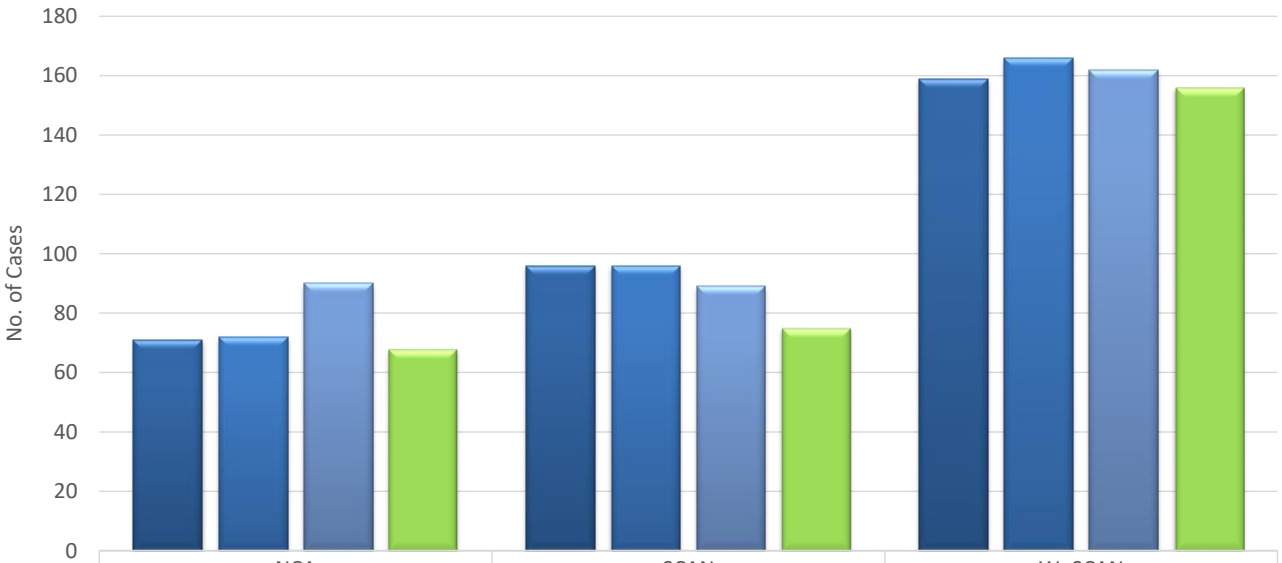
Table 1: Sarcoma treatment centres.

Centre	Constituent Hospital(s)
Aberdeen	Aberdeen Royal Infirmary (ARI), Royal Aberdeen Children's Hospital (RACH), Woodend Hospital
Dundee	Ninewells Hospital (NWH)
Edinburgh	Surgery: Royal Infirmary of Edinburgh (RIE) Oncology: Western General Hospital (WGH) Royal Hospital for Sick Children (RHSC)
Glasgow	Surgery: Gartnavel General Hospital (GGH); Queen Elizabeth University Hospital (QEUH); Glasgow Royal Infirmary (GRI); and Golden Jubilee National Hospital (GJNH) Royal Hospital for Children (RHC) Oncology: Beatson West of Scotland Cancer Centre (BWoSCC)
Inverness	Raigmore Hospital

2.1 National Context

A total of 299 cases of sarcoma were recorded through audit as diagnosed in Scotland between 01 April 2020 and 31 March 2021. The number of patients diagnosed within each NHS Region is presented in Figure 1.

Figure 1: Number of patients diagnosed with sarcoma by NHS Region of diagnosis.

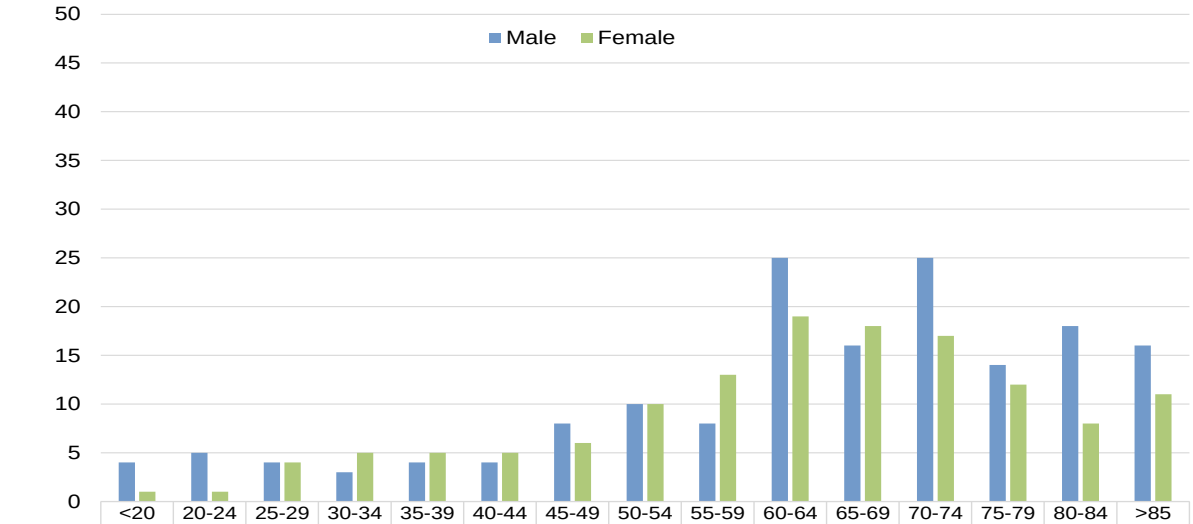


	NCA	SCAN	WoSCAN
Year 4	71	96	159
Year 5	72	96	166
Year 6	90	89	162
Year 7	68	75	156

2.2 Age and Gender Distribution

Figure 2 illustrates the distribution of sarcoma cases by age group and gender. In Year 7 occurrence of sarcoma is slightly higher in males (54.8% of cases) than in females (45.2% of cases). 80.2% of cases diagnosed in Year 7 were in patients' ≥ 50 years.

Figure 2: Age/gender distribution of sarcoma patients in Scotland April 2020 to March 2021.

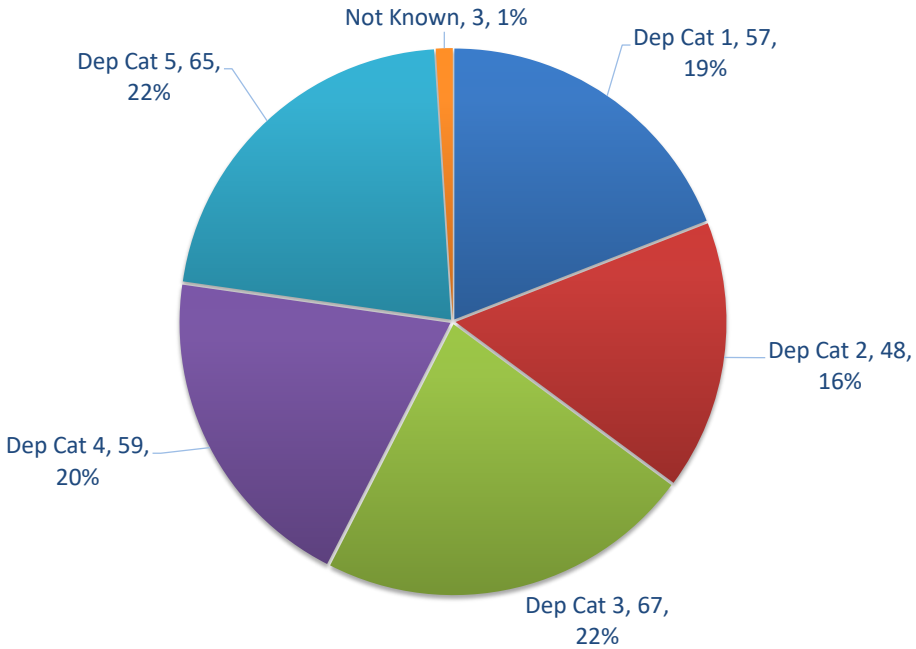


	<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	>85
Male	4	5	4	3	4	4	8	10	8	25	16	25	14	18	16
Female	1	1	4	5	5	5	6	10	13	19	18	17	12	8	11

2.3 Deprivation Category

Deprivation category is calculated using the Scottish Index of Multiple Deprivation (SIMD). Deprivation category 1 represents the most deprived and category 5 the least deprived areas.

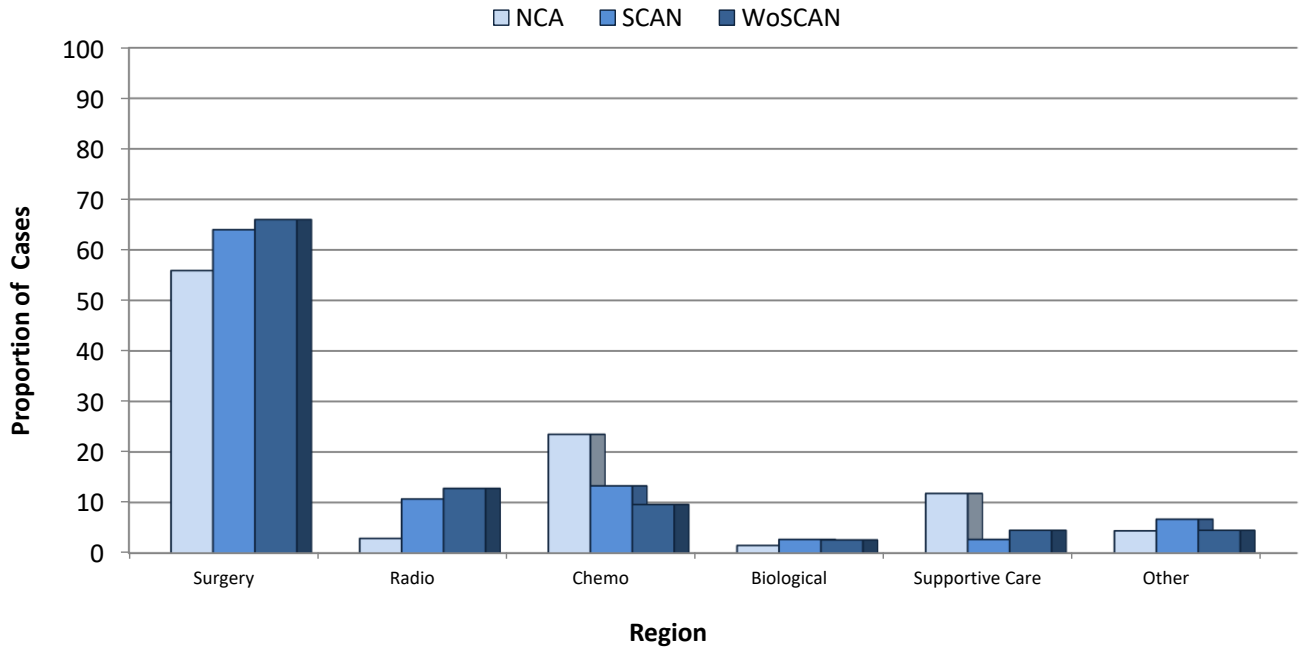
Figure 3: Deprivation category of patients diagnosed with sarcoma between April 2020 to March 2021.



2.4 Mode of First Treatment

Figure 4 shows the distribution of first treatment for patients diagnosed with sarcoma. In all three regions the majority of sarcoma patients received surgery as their first treatment.

Figure 4: Mode of First Treatment of sarcoma patients in Scotland April 2020 to March 2021.



	Surgery	Radio	Chemo	Biological	Supportive Care	Other	Total
NCA	38	2	16	1	8	3	68
SCAN	48	8	10	2	2	5	75
WoSCAN	103	20	15	4	7	7	156
Scotland	189	30	41	7	17	15	299

The other category includes watchful wait, patient refused treatment, patient died before treatment and treatment not recorded.

3. Methodology

Further detail on the audit and analysis methodology and data quality is available in the meta data within appendix 1.

Cancer patients under the age of 16 are treated in specialist children's' centres in Aberdeen, Edinburgh and Glasgow, separately from the adult services. Although QPI audit data are collected for patients under 16, this group is excluded from published QPI figures due to the very low numbers. However regions may report these separately to their clinical groups for internal management purposes.

4. Results and Action Required

4.1 Performance against Quality Performance Indicators

Results of the analysis of sarcoma QPIs are set out in the following sections. Graphs and charts have been provided where this aids interpretation and, where appropriate, numbers have also been included to provide context.

Data are presented for each QPI at a national or regional level both graphically and in table format. Centre level data has been reviewed by local teams however given the small numbers involved it has not been presented at this level. Aggregated centre level data is also presented to make more robust conclusions on performance. Specific regional and national actions have been identified to address issues highlighted through the data analysis.

Where the number of cases meeting the denominator criteria for any indicator is between one and four, the percentage calculation has not been shown on any associated charts or tables. This is to avoid any unwarranted variation associated with small numbers and to minimise the risk of disclosure. Any charts or tables impacted by this are denoted with a dash (-). Any commentary provided by NHS Boards relating to the impacted indicators is however included as a record of continuous improvement.

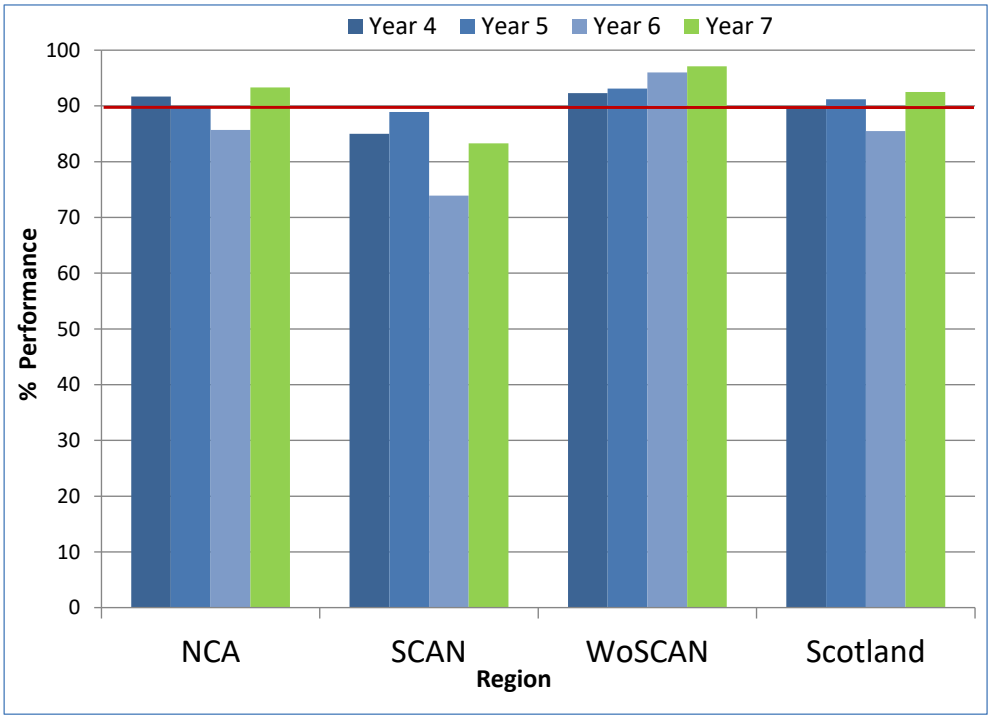
The sarcoma QPIs focus on extremity sarcomas as determined by the Sarcoma QPI Development Group, unless otherwise specified. Data is however collected on all sarcomas diagnosed in Scotland. Extremity sarcoma is defined as sarcoma of the: upper limb, shoulder girdle to fingers or lower extremity, iliac crest/buttock to toes. Extremity sarcomas account for 50-60% of all sarcomas[2].

QPI 1 – Histological Diagnosis

Histological typing of extremity sarcomas is essential for planning appropriate treatment and to provide important information relating to prognosis[1]. A histological diagnosis should be obtained before a planned surgical resection takes place as unplanned surgery has been shown to affect morbidity and mortality[1]. The 90% target set for the QPI accounts for small superficial lesions where the diagnosis of sarcoma may not be reasonably suspected clinically[1].

QPI Title:	Patients with extremity sarcoma should have a histological diagnosis before undergoing a planned surgical resection.
Numerator:	Number of patients with extremity sarcoma who undergo a planned surgical resection who have a histological diagnosis before surgical resection takes place.
Denominator:	All patients with extremity sarcoma who undergo a planned surgical resection.
Exclusions:	Patients with cutaneous sarcomas.
Target:	90%

Figure 5: Proportion of patients with extremity sarcoma that should have a histological diagnosis before undergoing a planned surgical resection.



	Performance (%)	Numerator	Denominator
NCA	93.3%	14	15
SCAN	83.3%	15	18
WoSCAN	97.1%	33	34
Scotland	92.5%	62	67

Performance across Scotland was 92.5% against the 90% target with 62 of 67 patients with extremity sarcoma undergoing a planned surgical resection having a histological diagnosis before surgical resection took place. WoSCAN and NCA both achieved the target with SCAN just below target with 83.3% of patients meeting the QPI criteria.

SCAN commented that all cases not meeting the QPI have been reviewed. Three cases were diagnosed at surgery and sarcoma was not suspected at the time of excision.

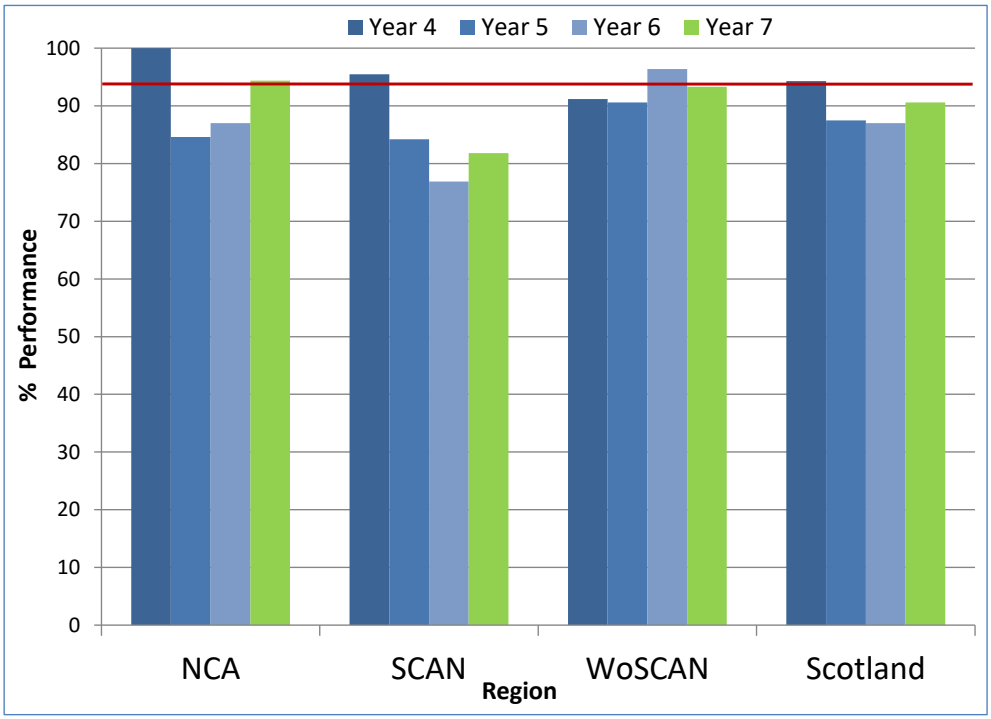
QPI 2 – Multidisciplinary Team Meeting

Evidence suggests that patients with cancer managed by a multidisciplinary team have a better outcome. There is also evidence that the multidisciplinary management of patients increases their overall satisfaction with their care[1].

Discussion prior to definitive treatment decisions being made provides reassurance that patients are being managed appropriately[1]. The target for this QPI is 95%, which accounts for situations where patients require treatment urgently[1].

QPI Title:	Patients with extremity sarcoma should be discussed by a multidisciplinary team (MDT) prior to definitive treatment.
Numerator:	Number of patients with extremity sarcoma discussed at the MDT before definitive treatment.
Denominator:	All patients with extremity sarcoma.
Exclusions:	Patients who died before first treatment. Patients with cutaneous sarcomas.
Target:	95%

Figure 6: Proportion of patients with extremity sarcoma that should be discussed by a multidisciplinary team (MDT) prior to definitive treatment.



	Performance (%)	Numerator	Denominator
NCA	94.4%	17	18
SCAN	81.8%	18	22
WoSCAN	93.3%	42	45
Scotland	90.6%	77	85

Performance across Scotland was 90.6% against the 95% QPI target with 77 of 85 patients diagnosed with extremity sarcoma in Year 7 being discussed at MDT meeting before definitive treatment. NCA and WoSCAN were both marginally under the QPI target achieving 94.4% and 93.3% respectively.

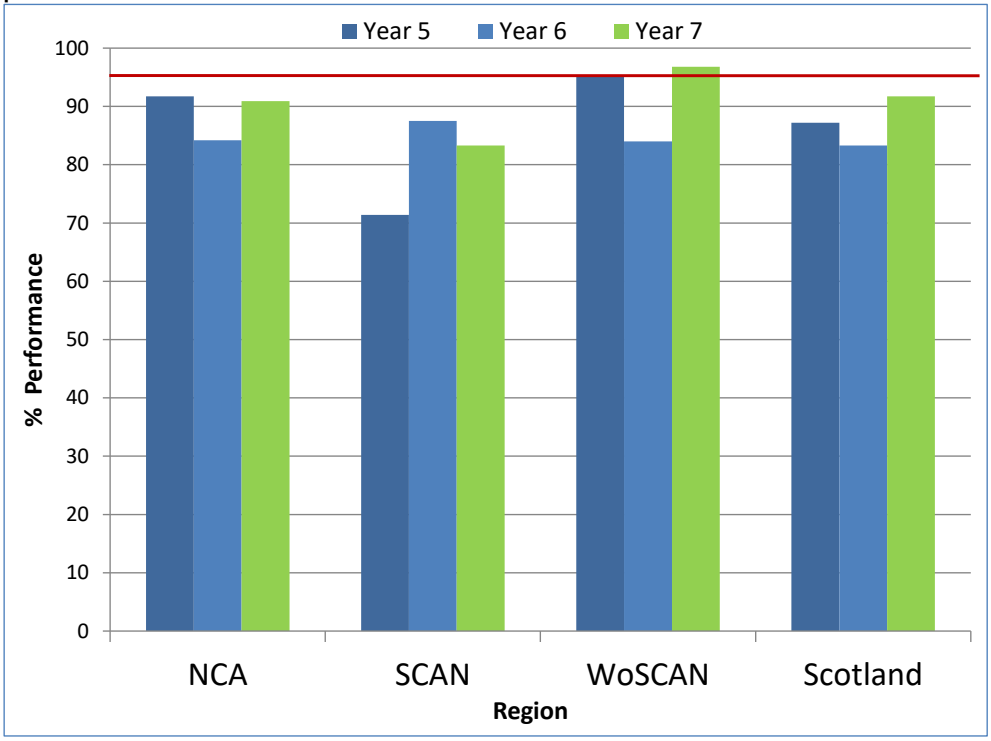
All regions reviewed cases not meeting the QPI and detailed clinical explanations provided. Factors such as cases where malignancy was not suspected at time of surgery and cases where patients were treated promptly due to symptoms of metastatic sarcoma impacted upon performance. All cases were discussed at MDT after surgery.

QPI 3 – Clinical Staging

Staging has an important role in determining the most effective treatment for soft tissue sarcoma and provides information on prognosis[1]. Patients with a confirmed soft tissue sarcoma should be staged with a CT chest to exclude pulmonary metastases prior to definitive treatment. Clinical staging should follow the principles of TNM classification; this aids the determination of prognosis and choice of therapy[1].

QPI Title:	(i) Patients with extremity soft tissue sarcoma should be staged by CT scan.
Numerator:	Number of patients with extremity soft tissue sarcoma who undergo staging CT scan where the results are available prior to definitive treatment.
Denominator:	All patients with extremity soft tissue sarcoma.
Exclusions:	Patients with rhabdomyosarcomas, patients with cutaneous sarcomas.
Target:	95%

Figure 7: Proportion of patients with extremity soft tissue sarcoma who undergo staging CT scan where the results are available prior to definitive treatment.



	Performance (%)	Numerator	Denominator
NCA	90.9%	10	11
SCAN	83.3%	15	18
WoSCAN	96.8%	30	31
Scotland	91.7%	55	60

Overall in Scotland, 91.7% of patients with extremity soft tissue sarcoma who underwent staging CT scan had the results available prior to definitive treatment. Only WoSCAN met the target achieving 96.8%.

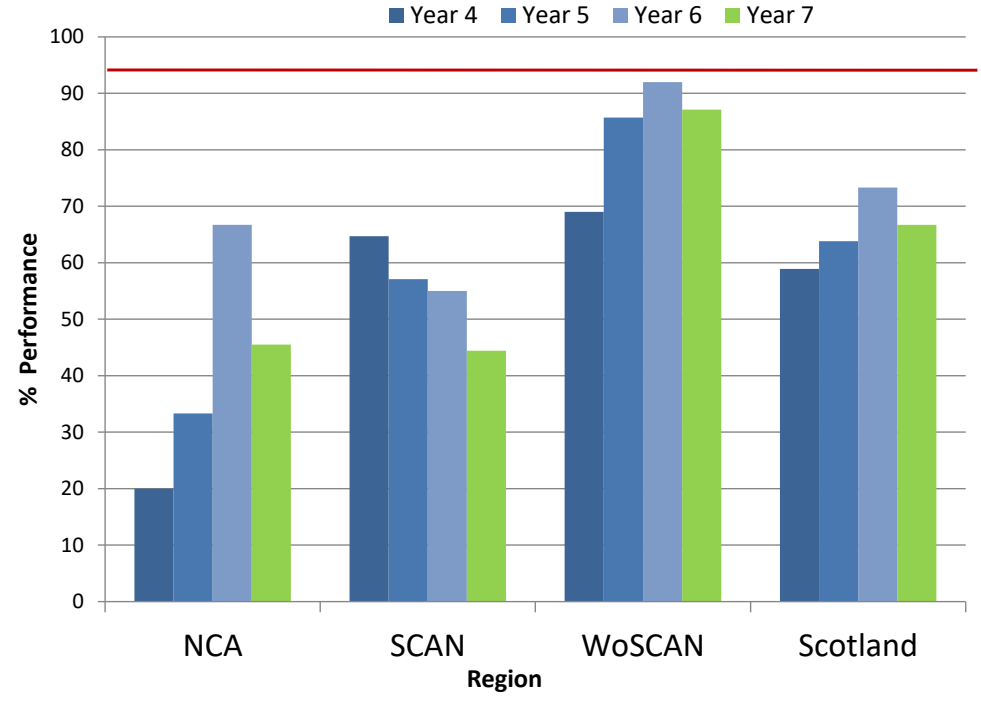
NCA were just below target with 90.9% however this represents one patient not meeting the target. This case was reviewed and detailed clinical commentary provided.

SCAN achieved 83.3% against the QPI target and noted that all cases not meeting the QPI had been reviewed. Reasons provided included cases that were diagnosed at surgery and staging CTs were carried out and reported afterwards and one case where CT chest was completed after surgery and prior to adjuvant radiotherapy; patient was known to MDM team and discussed prior to treatment.

Part two looks at the number of patients with extremity soft tissue sarcoma who were clinically staged using TNM staging system.

QPI Title:	(ii) Patients with extremity soft tissue sarcoma should be clinically staged using the TNM staging system.
Numerator:	Number of patients with extremity soft tissue sarcoma who are clinically staged using the TNM staging system.
Denominator:	All patients with extremity soft tissue sarcoma.
Exclusions:	Patients with rhabdomyosarcomas, patients with cutaneous sarcomas.
Target:	95%

Figure 8: Proportion of whose extremity soft tissue sarcoma is staged using the TNM staging system.



	Performance (%)	Numerator	Denominator
NCA	45.5%	5	11
SCAN	44.4%	8	18
WoSCAN	87.1%	27	31
Scotland	66.7%	40	60

Recording of TNM staging at MDT is extremely variable across Scotland. National performance is 66.7% which is a slight decrease on Year 6 results but still well below the QPI target of 95%. No region met the target and all regions showed a decrease on the previous year's result.

NCA reported that in the majority of cases clinical staging using TNM was not documented at the Scottish sarcoma MDT prior to treatment.

SCAN reviewed all cases not meeting the QPI and reasons provided included; 10 cases that did not have TNM recorded before the definitive treatment. In 6 of these cases the MDM decision was to proceed with treatment if staging CT was clear. These patients went to have CT chest followed by surgery and were not discussed again at MDM before the definitive treatment. Four of these cases had TNM recorded at MDM at the first opportunity after the staging CT had been done, but after the surgical treatment. Reasons for the remaining cases included cases where TNM was recorded after the surgery, but patients did have preoperative staging carried out prior to definitive treatment, cases where TNM was not recorded, but the patient did have preoperative staging carried out prior to definitive treatment and cases where CT chest was done after the surgery, so no TNM was recorded.

WoSCAN reported that all cases were reviewed. Reasons provided for cases not meeting the QPI criteria included cases where it was thought to be benign disease until after surgery, staging done after surgery; cases where staging was deemed unnecessary as patient was not fit for radical treatment and cases where staging was completed before MDT but not recorded in correct format.

Action Required:

- All centres to ensure recording of TNM for all sarcomas.

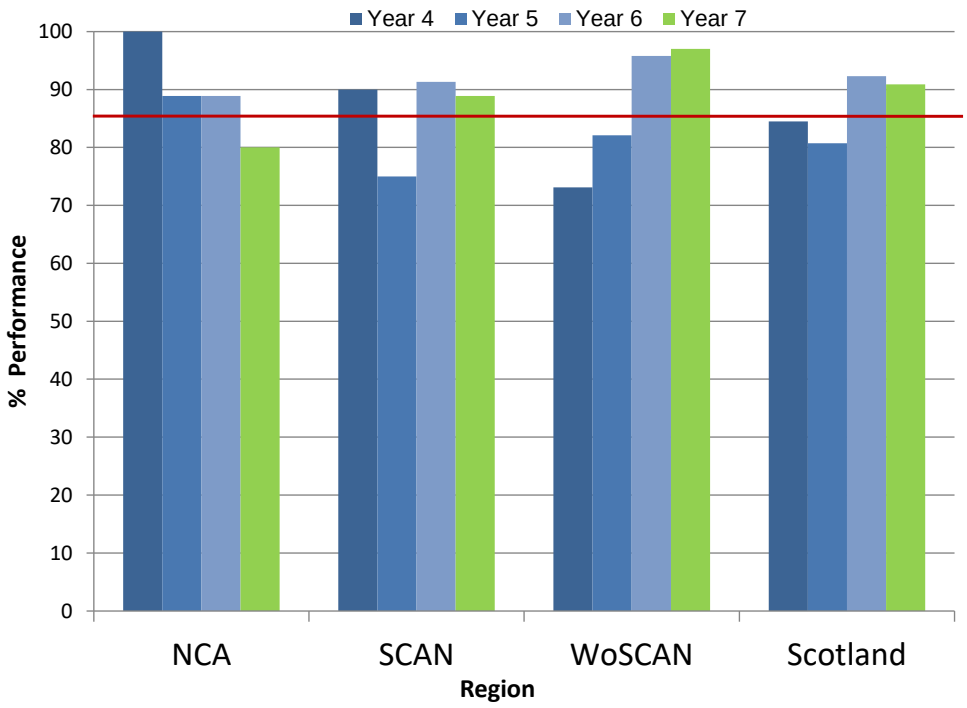
QPI 4 – Surgical Margins

The surgical margin achieved within surgical resection impacts on local recurrence rates and survival of patients[1]. It is important that surgical procedures are planned in advance of surgery, this allows for the necessary treatment planning to take place before the initiation of treatment[1].

The target level for this QPI is set at 85% to account for situations where it is agreed due to anatomical constraints a planned positive surgical margin is acceptable.

QPI Title:	Patients with extremity sarcoma undergoing surgical resection should have their tumour adequately excised.
Numerator:	Number of patients with extremity sarcoma who undergo surgical resection where R0* resection is achieved.
Denominator:	All patients with extremity sarcoma who undergo surgical resection.
Exclusions:	Patients with cutaneous sarcomas.
Target:	85%

Figure 9: Proportion of patients with extremity sarcoma undergoing surgical resection who have their tumour adequately excised.



	Performance (%)	Numerator	Denominator
NCA	80.0%	12	15
SCAN	88.9%	16	18
WoSCAN	97.0%	32	33
Scotland	90.9%	60	66

Performance across Scotland was 90.9% against the 85% QPI target with 60 of 66 patients diagnosed with extremity sarcoma undergoing surgical resection having their tumour adequately excised. SCAN and WoSCAN both exceeded the target with performance of 88.9% and 97.0% respectively.

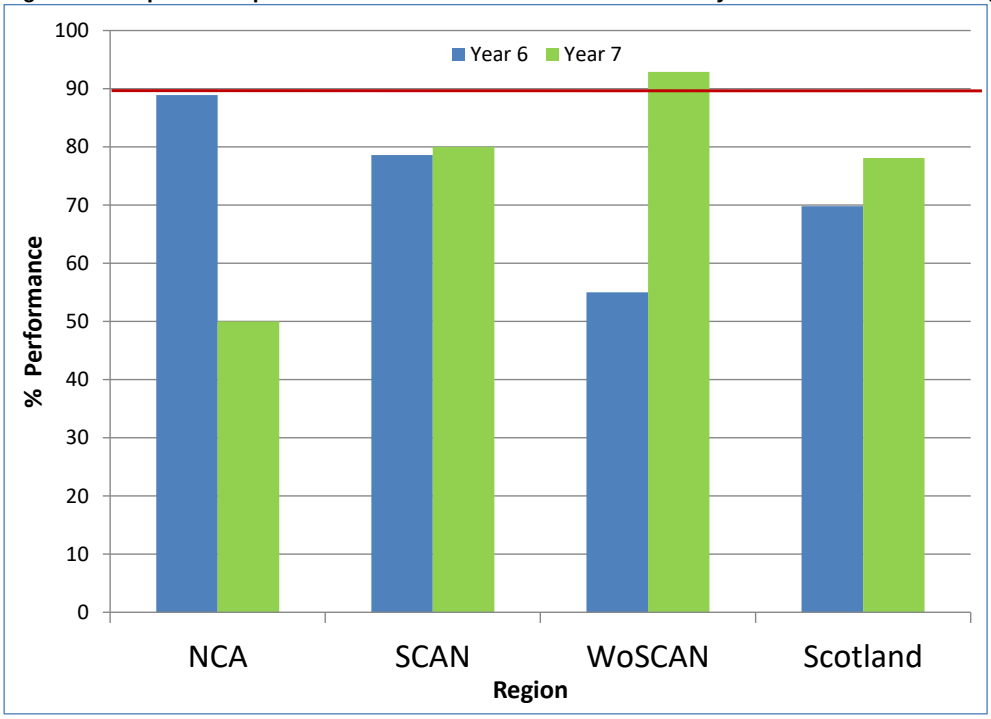
NCA cases not meeting the QPI were reviewed by the relevant treatment centre and detailed clinical feedback was provided at patient level. NCA added that each of these cases was a difficult surgical/pathological assessment.

QPI 5 – Molecular Staging of Gastrointestinal Stromal Tumour

All small bowel GISTs and all intermediate and high risk GISTs, regardless of location, should have mutational analysis. This will provide information on the tumour and will allow for a more detailed prognosis. In addition, mutational analysis can provide important information that will influence the type of treatment to use[1].

QPI Title:	Proportion of patients with GISTs who have mutational analysis within 3 months of diagnosis.
Numerator:	Number of patients with GISTs who have a mutational analysis within 3 months of diagnosis
Denominator:	All patients with GISTs.
Exclusions:	Patients with low risk non metastatic GISTs.
Target:	90%

Figure 10: Proportion of patients with GISTs who have mutational analysis within 3 months of diagnosis.



	Performance (%)	Numerator	Denominator
NCA	50.0%	4	8
SCAN	80.0%	8	10
WoSCAN	92.9%	13	14
Scotland	78.1%	25	32

Performance across Scotland was 78.1% against the 90% QPI target with 25 of 32 patients diagnosed with GISTs having mutational analysis within 3 months of diagnosis. WoSCAN were the only region to achieve the target with performance of 92.9%.

NCA reviewed cases and provided detailed clinical reasons for the cases not meeting the QPI. Reasons included patients who had biopsy only therefore mutational analysis was not carried out and one case where the patient was discussed at MDT and molecular analysis was not to be performed on the specimen as patient died soon after surgery

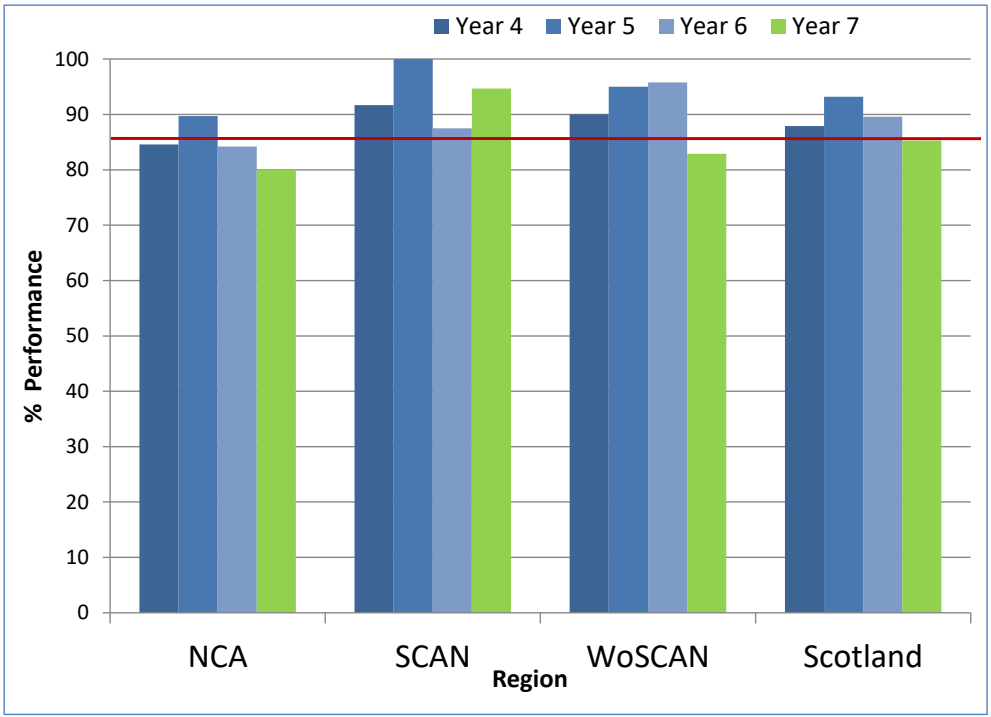
SCAN commented that both patients had biopsy only, therefore mutational analysis was not done. GIST risk was recorded as 'Not applicable' for biopsy. Only low risk GISTs are excluded from this QPI.

QPI 6 – Limb Sparing Surgery

Studies have shown that surgical treatment for approximately 90-95% of patients involves limb sparing surgery[1]. Rates of amputation have decreased over the years and this treatment approach is typically reserved for patients with locally advanced disease that cannot be managed by limb sparing surgery[1]. Patients who undergo limb sparing surgery have reportedly improved quality of life post treatment, uncompromised survival rates and local tumour control, as well as, an asymptomatic and functional limb[1].

QPI Title:	Patients with extremity sarcoma should have primary limb-sparing surgery.
Numerator:	Number of patients with extremity sarcoma who undergo a primary limb-sparing surgery.
Denominator:	All patients with extremity sarcoma.
Exclusions:	Patients who died before first treatment and patients with cutaneous sarcomas.
Target:	85%

Figure 11: Proportion of patients with extremity sarcoma who undergo a primary limb-sparing surgery.



	Performance (%)	Numerator	Denominator
NCA	80.0%	12	15
SCAN	94.7%	18	19
WoSCAN	82.9%	34	41
Scotland	85.3%	64	75

Overall performance across Scotland was 85.3% against the 85% target. SCAN were the only region to meet the target with performance of 94.7%.

WoSCAN reviewed all cases not meeting the QPI and commented that the cases not meeting the QPI were all appropriate for ablative surgery.

NCA reviewed all cases and provided clinical comments for cases not meeting the QPI. All cases was fully discussed at MDT and none were amenable to limb salvage.

QPI 7 – Primary Flap Reconstruction

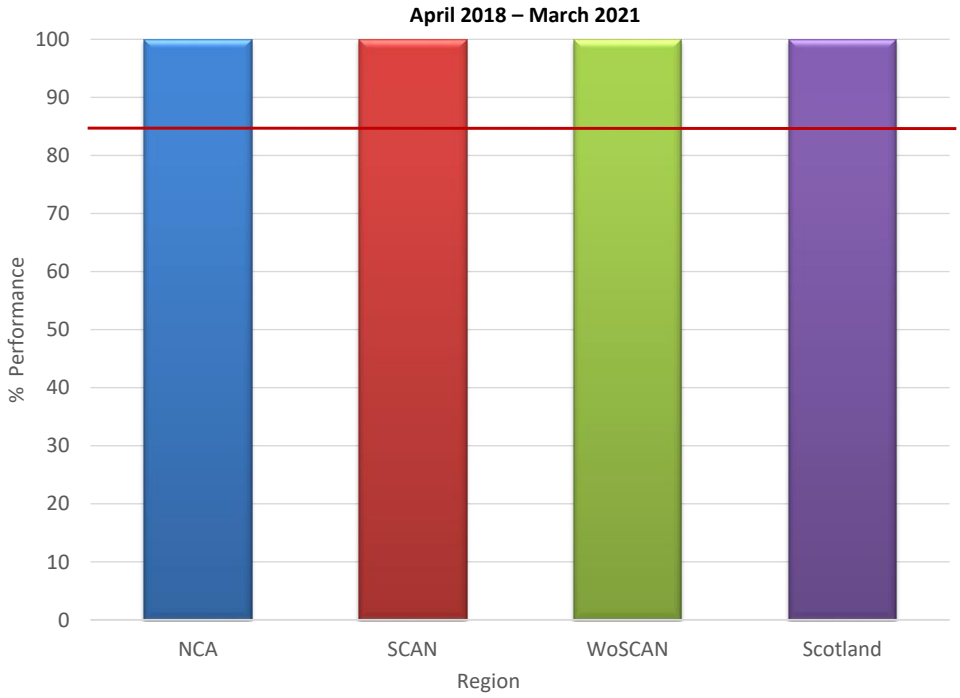
After surgical resection, reconstructive surgery may be needed to cover wounds, preserve function and/or improve the cosmetic outcome[1]. When conducting reconstructive surgery, surgeons should consider the flap success rate as one factor in choosing the best construction for any individual patient[1].

For the purpose of reporting this QPI a successful primary flap has been defined as a patient who does not need to return to theatre for unplanned surgery. The target level for this QPI is 85%; this is to account for situations where re-exploration of flaps is undertaken due to vascular insufficiency.

QPI Title:	Patients with extremity sarcoma should have successful primary flap reconstruction following surgical resection.
Numerator:	Number of patients with extremity sarcoma who undergo successful* primary flap reconstruction.
Denominator:	All patients with extremity sarcoma who undergo primary flap reconstruction.
Exclusions:	Patients with cutaneous sarcomas.
Target:	85%

*Successful has been defined as patients who do not need to return to theatre for unplanned surgical debridement of a sufficient volume of the flap reconstruction such that secondary reconstruction is required.

Figure 12: Proportion of patients with extremity sarcoma who undergo successful* primary flap reconstruction.



	Performance (%)	Numerator	Denominator
NCA	100%	13	13
SCAN	100%	5	5
WoSCAN	100%	61	61
Scotland	100%	79	79

Due to the small numbers meeting the denominator criteria in each year of analysis individual year results cannot be presented therefore Figure 12 shows aggregated three year results.

Overall Scotland 3 year aggregated performance was 100% with all patients with extremity sarcoma undergoing a successful primary flap reconstruction.

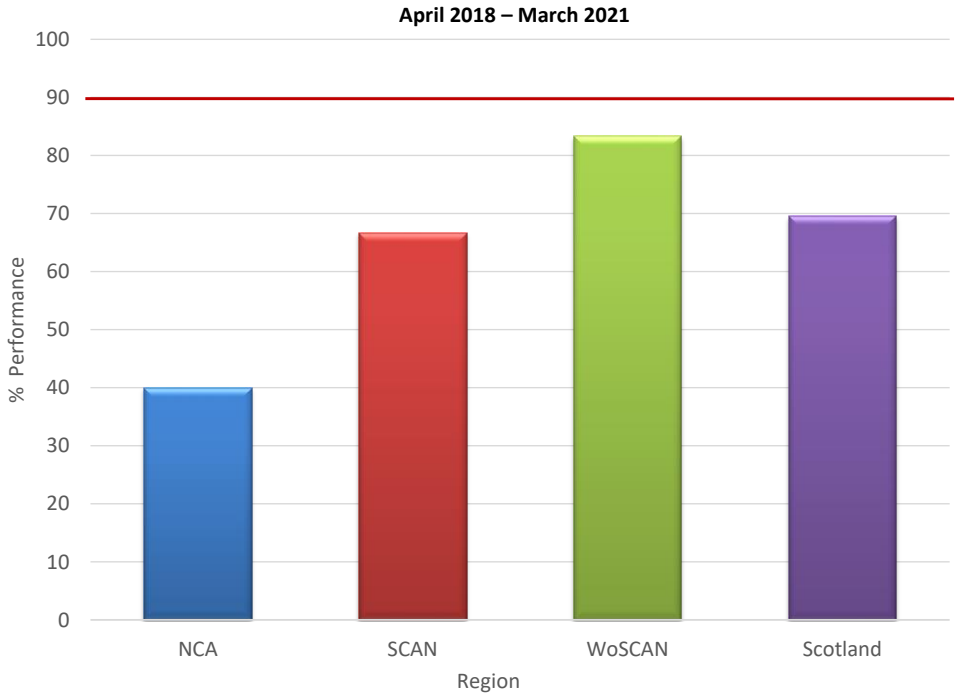
QPI 8 – Post-Operative Radiotherapy

Post-operative radiotherapy is advocated for those with a deep tumour (any size, grade 2 or 3), who have had an R0 or R1 excision. Evidence suggests that post-operative radiotherapy should start within 3 months of surgery[1]. The target level for this indicator is set at 90% to account for situations where co-morbidities, severe post-operative complications or frailty can mean the patient is not suitable for post-operative radiotherapy.

QPI Title:	Patients with extremity sarcoma should receive radiotherapy within 3 months of surgery.
Numerator:	All patients aged 16 and over, with extremity sarcoma who commenced post-operative radiotherapy within 3 months of surgery.
Denominator:	All patients aged 16 and over, with extremity sarcoma who undergo post-operative radiotherapy.
Exclusions:	Patients with cutaneous sarcomas. Patients with osteosarcomas. Patients with Ewing's sarcoma. Patients with chondrosarcomas.
Target:	90%

* Deep can be defined as: deep to fascia, this is determined radiologically.

Figure 13: Proportion of patients aged 16 and over, with extremity sarcoma who commenced post-operative radiotherapy within 3 months of surgery.



	Performance (%)	Numerator	Denominator
NCA	23.1%	3	13
SCAN	70.0%	7	10
WoSCAN	73.1%	19	26
Scotland	59.2%	29	49

Due to the small numbers meeting the denominator criteria in each year of analysis individual year results cannot be presented therefore Figure 13 shows aggregated three year results.

Overall Scotland 3 year performance against this QPI for was 59.2% with no region meeting the QPI target.

NCA achieved 40% in Year 7 and commented that all cases were reviewed. Reasons provided for not meeting the QPI included cases where the patient had radiotherapy in another health board and cases where treatment was delayed due to issues with wound healing.

SCAN achieved 83.3% in Year 7 and commented that one case was delayed due to post-operative healing issues.

In Year 7 WoSCAN achieved 100% with 7 out of 7 cases with extremity sarcoma commencing post-operative radiotherapy within 3 months of surgery.

QPI 9 – Multi-agent Chemotherapy for Osteosarcoma or Ewing's sarcoma

Only a very small number of patients were included within the measurement of this QPI across Scotland and therefore individual regional results cannot be presented at this time. At a national level, data shows that 2 of 4 patients with osteosarcoma under the age of 40 underwent multi-agent chemotherapy resulting in a performance of 50% against the 90% target.

Results for Ewing's sarcoma show that 100% (2 out of 2) of patients under the age of 50 underwent multi-agent chemotherapy.

QPI 10 – Adjuvant Oncological Treatment for Gastrointestinal Stromal Tumour

Adjuvant imatinib therapy given for a period of three years compared to one year, significantly improved the recurrence free survival in adult patients at significant risk of relapse following resection of GIST[1].

QPI Title:	Patients with high risk GIST should commence post-operative imatinib within 3 months of surgery.
Numerator:	Number of patients aged 16 and over with high risk GIST who undergo surgery that receive post-operative imatinib.
Denominator:	All patients aged 16 and over with high risk GIST who undergo surgery.
Exclusions:	Patients enrolled in a clinical trial.
Target:	90%

Only a very small number of patients were included within the measurement of this QPI across Scotland and therefore individual regional results cannot be presented at this time. At a national level, data shows that 13 of 15 patients aged 16 and over with high risk GIST who underwent surgery received post-operative imatinib, resulting in a performance of 86.7% against the 90% target. Year 7 performance is also below the previous year's result of 100%.

The second part of the QPI looks at those patients who received post-operative imatinib and commenced this within 3 months of surgery. Overall in Scotland 100% (13 out of 13) of patients commenced imatinib within 3 months of surgery.

QPI 11 – 30 Day Mortality

Treatment related mortality is a marker of the quality and safety of the whole service provided by the MDT[1]. Treatment should only be undertaken in individuals that may benefit from that treatment, that is, treatments should not be undertaken in futile situations. This QPI is intended to ensure treatment is given appropriately, and the outcome reported on and reviewed[1].

The QPI is split into 2 separate sections; the first measures the proportion of patients who die within 30 days of treatment with curative intent and the second those patients who die within 30 days of palliative treatment. The target level is less than 10% for curative treatments and less than 15% for palliative treatments.

With regards to mortality following SACT, a decision has been taken nationally to move to a new generic QPI (30-day mortality for SACT) applicable across all tumour types. This new QPI will use CEPAS (Chemotherapy ePrescribing and Administration System) data to measure SACT mortality to ensure that the QPI focuses on the prevalent population rather than the incident population. The measurability for this QPI is still under development to ensure consistency across the country and it is anticipated that performance against this measure will be reported in the next audit cycle. In the meantime all deaths within 30 days of SACT will continue to be reviewed at a NHS Board level.

QPI Title:	30 day mortality following curative treatment for sarcoma.
Numerator:	Number of patients with sarcoma who undergo surgical resection or oncological treatment with curative intent who die within 30 days of treatment.
Denominator:	All patients with sarcoma who undergo surgical resection or oncological treatment with curative intent.
Exclusions:	No exclusions.
Target:	<10%

Table 2: Proportion of patients with sarcoma who undergo surgical resection or oncological treatment with curative intent who die within 30 days of treatment.

	QPI Target	NCA	SCAN	WoSCAN	Scotland
Surgery	<10 %	0.0% (0/33)	0.0% (0/10)	1.8% (2/113)	1.3% (2/156)
Radical Radiotherapy	<10 %	0.0% (0/2)	0.0% (0/4)	0.0% (0/1)	0.0% (0/7)
Neo-Adjuvant Radiotherapy	<10%	0.0% (0/1)	0.0% (0/1)	0.0% (0/11)	0.0% (0/13)
Adjuvant Radiotherapy	<10%	0.0% (0/9)	0.0% (0/13)	0.0% (0/14)	0.0% (0/36)
Chemoradiotherapy	<10%	0.0% (0/1)	n/a	n/a	0.0% (0/1)
Biological Therapy	<10%	0.0% (0/1)	0.0% (0/6)	0.0% (0/16)	0.0% (0/23)

In SCAN there is a large number of patients noted as not recorded for denominator for surgical mortality. This is due to intent of surgery not being recorded (32 patients). This is the reason for the small number of patients included in this QPI in SCAN.

QPI Title:	30 day mortality following palliative treatment for sarcoma.
Numerator:	Number of patients with sarcoma who undergo palliative treatment who die within 30 days of treatment.
Denominator:	All patients with sarcoma who undergo palliative treatment.
Exclusions:	No exclusions.
Target:	<15%

Table 3: Proportion of patients with sarcoma who undergo palliative radiotherapy or palliative chemotherapy who die within 30 days of treatment.

	QPI Target	NCA	SCAN	WoSCAN	Scotland
Palliative Radiotherapy	<15 %	0.0% (0/4)	20.0% (1/5)	13.3% (2/15)	12.5%% (3/24)

Cases not meeting the QPI have been reviewed by treating centres, and it is acknowledged that palliative radiotherapy or chemotherapy is often administered to control symptoms and manage pain.

QPI 12 - Clinical Trials

Clinical trials are necessary to demonstrate the efficacy of new therapies and other interventions. Evidence suggests improved patient outcomes from participation in clinical trials[1].Clinicians are therefore encouraged to enter patients into well-designed trials and to collect longer-term follow-up data. High accrual activity into clinical trials is used as a goal of an exemplary clinical research site[1].

The clinical trials QPI is measured utilising Scottish Cancer Research Network (SCRN) data and ISD incidence data, as this is the methodology currently utilised by the Chief Scientist Office (CSO) and the National Cancer Research Institute (NCRI). The principal benefit of this approach is that this data is already collected utilising a robust mechanism[1]. The QPI looks at *all* patients with sarcoma entered into a trial in the calendar year 1st January to 31st December 2020, and not just those patients who had an initial diagnosis in that same period.

QPI Title:	All patients should be considered for participation in available clinical trials/research studies, wherever eligible.
Numerator:	Number of patients with sarcoma who are consented for a clinical trial / research study.
Denominator:	All patients with sarcoma.
Exclusions:	No exclusions.
Target:	15%

The target is to consent a minimum of 15% of patients with sarcoma for a clinical trial/research study.

Table 5: Proportion of patients consented for clinical trials for Sarcoma by NHS Board of residence.

Sarcoma	Consented (QPI target 15%)		
	N	D	%
NCA	5	92	5.4%
SCAN	3	99	3.0%
WoSCAN	13	162	8.0%
Scotland	21	353	5.9%

Performance against this QPI was affected by the COVID-19 pandemic in 2020. Trial recruitment was suspended due to the COVID-19 pandemic and all trial activity was stopped in March 2020.

Overall for patients in Scotland, 5.9% patients were consented for clinical trials for sarcoma. It is important to note that the denominator used in the measurement of this QPI is the 5 year average of ISD incidence data for sarcoma in Scotland (2011 -2015). No regions met the 15% target for patients consented for clinical trials.

The Scottish Sarcoma Network (SSN) published its research strategy in August 2019 which details a way forward with clinical trials and access in Scotland. Presently, not every trial can be opened in all centres but where possible, patients are referred to the treatment centre with the most appropriate trial. The approval of medicines by the Scottish Medicines Consortium (SMC) is increasing for sarcoma but some manufacturers do not submit their medicine for approval by the SMC therefore the sarcoma team submit individual patient treatment requests as appropriate. Also, individual cases are often complex and there can be insufficient time in clinics to fully embrace inclusion to a clinical trial.

5. Next Steps

The NMCN will actively take forward regional actions identified and NHS Boards are asked to develop local Action/Improvement Plans in response to the findings presented in the report. A summary of actions for each NHS Board has been included within the Action Plan templates in Appendix 3.

Acknowledgement

This report has been prepared using clinical audit data provided by each of the fourteen NHS Boards in Scotland. We would like to thank colleagues in the clinical effectiveness departments throughout Scotland for gathering, submitting and verifying these data. We would also like to thank the clinicians, nurses and others involved in the management of patients with sarcoma for their contribution to the clinical audit process.

Abbreviations

ARI	Aberdeen Royal Infirmary
ACaDMe	Acute Cancer Deaths and Mental Health
BWoSCC	Beatson West of Scotland Cancer Centre
CEPAS	Chemotherapy ePrescribing and Administration System
CMG	Clinical Management Guideline
CSO	Chief Scientist Office
CT	Computed Tomography
eCASE	Electronic Cancer Audit Support Environment
GGH	Gartnavel General Hospital
GIST	Gastrointestinal Stromal Tumour
GJNH	Golden Jubilee National Hospital
GRI	Glasgow Royal Infirmary
HIS	Healthcare Improvement Scotland
ISD	Information Services Division
MDT / MDM	Multidisciplinary Team / Multidisciplinary Meeting
NCA	North Cancer Alliance
NCQSG	National Cancer Quality Steering Group
NCRI	National Cancer Research Institute
NHSGGC	NHS Greater Glasgow and Clyde
NMCN	National Managed Clinical Network
NWH	Ninewells Hospital

QEUH	Queen Elizabeth University Hospital
QPI (s)	Quality Performance Indicator (s)
RACH	Royal Aberdeen Children's Hospital
RCAG	Regional Cancer Advisory Group
RHC	Royal Hospital for Children
RHSC	Royal Hospital for Sick Children
RIE	Royal Infirmary of Edinburgh
SACT	Systemic Anti-Cancer Therapy
SCAN	South East Scotland Cancer Network
SCRN	Scottish Cancer Research Network
SSN	Scottish Sarcoma Network
TNM	Classification of Malignant Tumours (Tumour Node Metastasis)
WGH	Western General Hospital
WHO	World Health Organisation
WoS	West of Scotland
WoSCAN	West of Scotland Cancer Network

References

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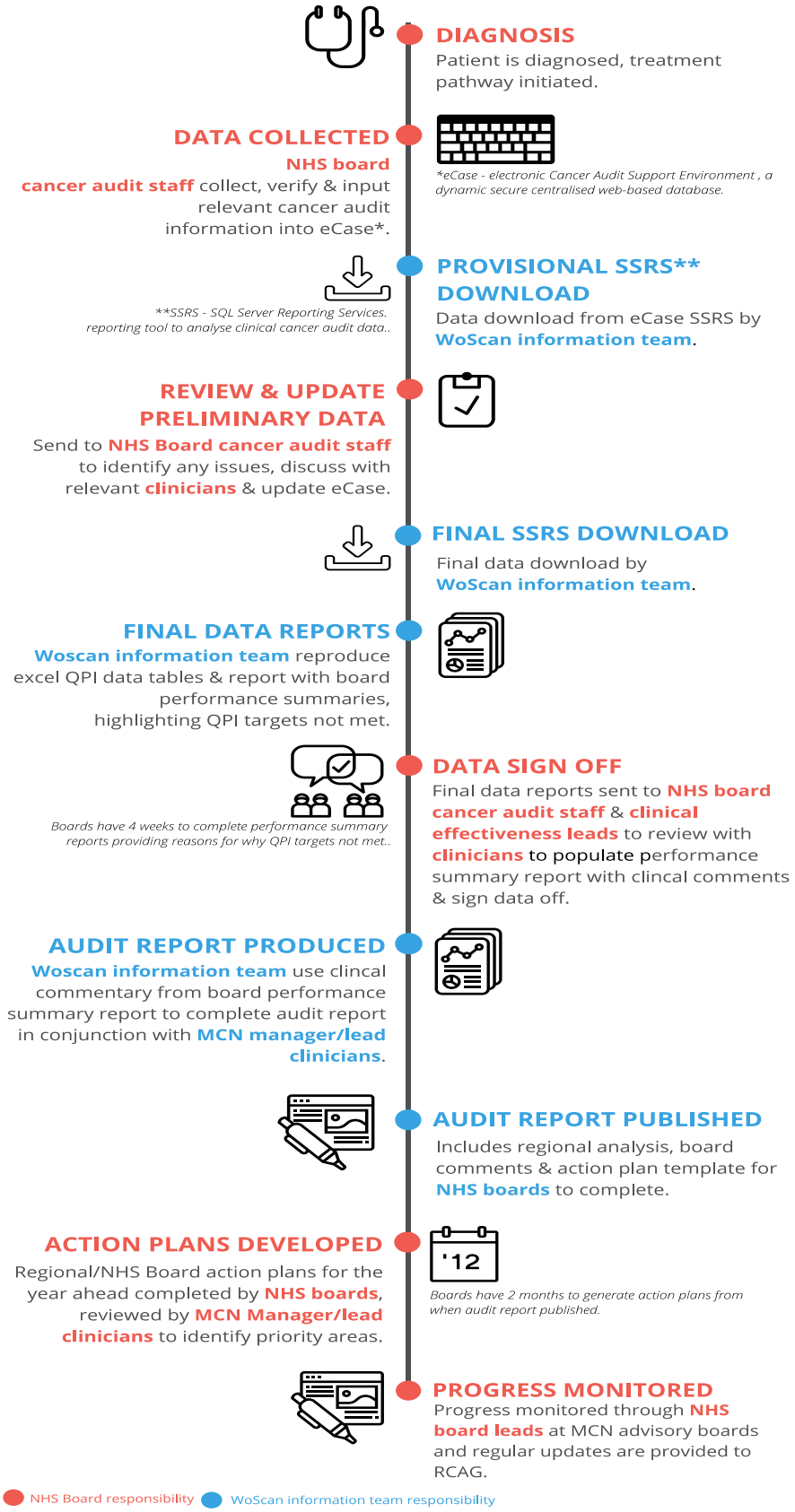
Appendix 1: Meta Data

Report Title	Cancer Audit Report: Sarcoma Quality Performance Indicators
Time Period	Patients diagnosed between 01 April 2020 and 31 March 2021
Data Source	Electronic Cancer Audit Support Environment (eCASE). A secure centralised web-based database which holds cancer audit information in Scotland.
Data extraction date	2200 hrs on 04 November 2021
Methodology	Analysis was performed centrally by the WoSCAN Information Team. The timescales agreed took into account the patient pathway to ensure that a complete treatment record was available for the majority of patients. Initial results were provided to Boards to check for inaccuracies, inconsistencies or obvious gaps and a subsequent download taken upon which final analysis was carried out. The final data analysis was disseminated for NHS Board verification in line with the regional audit governance process to ensure that the data was an accurate representation of service in each area. Please see info graphic in appendix 2 for a more detailed look at the reporting process.
Data Quality	Audit data completeness can be assessed by estimating the proportion of expected patients that have been identified through audit compared to the number reported by the National Cancer Registry (provided by PHS, Public Heath Scotland); this is known as case ascertainment. Figures should only be used as a guide as it is not possible to compare the same exact cohort from each data source. Note that a 5 year average is taken for cancer registry cases to take account of annual fluctuations in incidence within NHS Boards.

Appendix 2: Cancer Audit Timeline



Appendix 3: NHS Board Action Plans

Completed Action Plans should be returned to WoSCAN within two months of publication of this report.

Action / Improvement Plan

Region:	NCA
Action Plan Lead:	
Date:	

KEY (Status)	
1	Action fully implemented
2	Action agreed but not yet implemented
3	No action taken (please state reason)

No	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see key)
			Start	End			
	Action	*Detail specific actions that will be taken by the NHS Board.*	*Insert date*	*Insert date*	*Insert name of responsible lead for each specific action.*	*Provide detail of action in progress, change in practices, problems encountered or reasons why no action taken.*	*Insert No. from key above*
1.	***QPI3 – Clinical Staging*** All centres to ensure recording of TNM for all sarcomas.						

Action / Improvement Plan

Region:	SCAN
Action Plan Lead:	
Date:	

KEY (Status)	
1	Action fully implemented
2	Action agreed but not yet implemented
3	No action taken (please state reason)

No	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see key)
			Start	End			
	Action	*Detail specific actions that will be taken by the NHS Board.*	*Insert date*	*Insert date*	*Insert name of responsible lead for each specific action.*	*Provide detail of action in progress, change in practices, problems encountered or reasons why no action taken.*	*Insert No. from key above*
1.	***QPI3 – Clinical Staging*** All centres to ensure recording of TNM for all sarcomas.						

Action / Improvement Plan

Region:	WoSCAN
Action Plan Lead:	
Date:	

KEY (Status)	
1	Action fully implemented
2	Action agreed but not yet implemented
3	No action taken (please state reason)

No	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see key)
			Start	End			
	Action	*Detail specific actions that will be taken by the NHS Board.*	*Insert date*	*Insert date*	*Insert name of responsible lead for each specific action.*	*Provide detail of action in progress, change in practices, problems encountered or reasons why no action taken.*	*Insert No. from key above*
1.	***QPI3 – Clinical Staging*** All centres to ensure recording of TNM for all sarcomas.						