North, South East and West of Scotland Cancer Networks

Brain and Central Nervous System Cancers
Scottish Adult Neuro Oncology Network

Audit Report

Brain and Central Nervous System Cancers
Quality Performance Indicators

Report of the 2018 Clinical Audit Data

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Executive Summary

Introduction

The purpose of this report is to present an assessment of the performance of Adult Neuro-Oncology services using clinical audit data relating to patients diagnosed with brain and central nervous system (CNS) cancers across Scotland from 1st January 2018 to 31st December 2018, with twelve months of data were measured against the Brain and CNS Cancer QPIs[1] for the fifth consecutive year.

Background

The Scottish Adult Neuro-Oncology Network (SANON) was established in 2006 and is one of three national cancer networks in Scotland. The aim of the network is to link together health professionals, researchers, patients, their families and carers, social care, voluntary sector representatives and external companies to ensure the delivery of equitable, high quality and clinically effective care for patients in Scotland[7].

Brain and CNS cancers are relatively rare cancers with approximately 425 adult cases diagnosed in Scotland each year between 2013 and 2017[4]. The 2018 audit identified 415 patients diagnosed with a new primary cancer of the brain or CNS in Scotland.

The table below details the four MDTs which manage all cases of brain and CNS cancer in Scotland. There are five specialist centres carrying out neuro-oncology treatment in Scotland and these are considered the centres for specialist treatment, which includes surgery (not in Inverness), chemotherapy and radiotherapy. Patients may receive diagnostic or palliative care in their local hospital where appropriate; however the majority of patients are referred to one of the four MDTs for specialist management.

Neuro-oncology MDT	Constituent Hospital(s)
Aberdeen/Inverness	Aberdeen Royal Infirmary (surgery and oncology) Raigmore Hospital – Inverness (oncology)
Dundee	Ninewells Hospital (surgery and oncology)
Edinburgh	Western General Hospital (surgery and oncology)
Glasgow	Queen Elizabeth University Hospital (surgery) and Beatson West of Scotland Cancer Centre (oncology)

Methodology

The clinical audit data presented in this report was collected by clinical audit staff in each NHS Board in accordance with an agreed dataset and definitions. Data was recorded manually and entered locally into the electronic Cancer Audit Support Environment (eCASE): a secure centralised web-based database. Data relating to patients diagnosed between 1st January 2018 and 31st December 2018 was downloaded from eCASE at 2200 hrs on 8th May 2019. Analysis was performed centrally by the WoSCAN Information Team

Results

Results for each QPI are shown in detail in the main report and illustrate regional/treatment centre performance against each target and overall national results for each performance indicator. Results are presented graphically and the accompanying tabular format also highlights any missing data and its possible effect on any of the measured outcomes.

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 restricted data are denoted with a dash (-). An asterisk (*) is applied to indicate a denominator of zero and to distinguish between this and a 0% performance.

The summary of results over page shows the overall percentage performance for Scotland and individual performance by NHS Region or MDT/neuro-oncology centre.

Summary of QPI Results

Colour Key		Symbol Key	
	Above QPI target	>	Indicates increase on previous year's figure
	Below QPI target	<	Indicates decrease from previous year's figure
		=	Indicates no change from previous year
			Indicates no comparable measure from previous year

Region/Centre	
%	
N	D

N: Numerator **D**: Denominator

Quality Performance Indicator (QPI)	Performance by NHS Board (Reported by Hospital of Diagnosis)								
	QPI target	NCA		SCAN		WoSCAN		Scotland	
QPI 1: Documentation of Performance Status – Proportion of newly diagnosed patients with brain/CNS cancer who have a documented WHO performance status at the time of multidisciplinary team (MDT) discussion.	95%	**90.0% >**		**94.1% >**		**91.7% <**		**92.0% <**	
		108	120	128	136	143	156	379	412
QPI 2: Documentation of MDT meeting - Proportion of patients with Brain/CNS cancer who are discussed at MDT meeting before surgery.	95%	**71.6%**		**83.3%**		**76.5%**		**77.1%**	
		58	81	70	84	88	115	216	280
QPI 4: Neuropathological Diagnosis – Proportion of patients with brain/CNS cancer where the pathology report contains a full set of data items (as defined by the Royal College of Pathologists) including WHO Grade.	90%	**93.3% <**		**100.0% =**		**91.7% >**		**94.8% >**	
		70	75	86	86	99	108	255	269
QPI 5: Pre-treatment MRI - Proportion of patients with Brain/CNS cancer undergoing surgery who have contrast enhance MRI prior to treatment.	90%	**97.7%**		**98.8%**		**98.3%**		**98.3%**	
		84	86	85	86	115	117	284	289
QPI 8: Specialist Neuro-oncology Access – Proportion of patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy) who are managed by a specialist neuro-oncologist.	100%	**100.0% =**		**100.0% =**		**100.0% =**		**100.0% =**	
		60	60	73	73	95	95	228	228

Quality Performance Indicator (QPI)	Performance by NHS Board (Reported by Hospital of Diagnosis)									
	QPI target	NCA		SCAN		WoSCAN		Scotland	
QPI 9: Access to Adjuvant Treatment – Proportion of patients with high grade glioma (WHO Grade III and IV) undergoing surgery who commence their oncological treatment (chemotherapy, radiotherapy or chemoradiotherapy) within 6 weeks of surgery.	95%	**31.0% <**		**89.5% >**		**95.8% >**		**77.8% >**	
		13	42	51	57	69	72	133	171
QPI 10: Radical Radiotherapy Planning Process – Proportion of patients with brain/CNS cancer undergoing radical radiotherapy for whom the radiotherapy planning process includes MRI fusion.	95%	**95.7% >**		**98.4% >**		**96.1% >**		**96.8% >**	
		45	47	63	64	74	77	182	188
QPI 11: Seizure Management – Proportion of patients with brain/CNS cancer presenting with seizures at diagnosis who are seen by a neurologist or a named ESN within four weeks of diagnosis.	95%	**57.1% <**		**50.0% <**		**18.2% <**		**38.9% >**	
		16	28	18	36	8	44	42	108
QPI 12: Key Worker - Proportion of patients with Brain/CNS cancer who have an identified key worker by the first MDT meeting.	95%	**95.3%**		**0.0%**		**18.0%**		**35.3%**	
		82	86	0	92	20	111	102	289
QPI 13: Mortality - Proportion of patients with Brain/CNS cancer who die within 30 days of chemotherapy.	<5%	**12.5%**		**2.4%**		**1.6%**		**3.9%**	
		3	24	1	41	1	64	5	129
QPI 13: Mortality - Proportion of patients with Brain/CNS cancer who die within 30 days of chemoradiotherapy.	<5%	**3.2%**		**0.0%**		**3.2%**		**2.3%**	
		1	31	0	37	2	62	3	130
QPI 13: Mortality - Proportion of patients with Brain/CNS cancer who die within 30 days of radiotherapy.	<5%	**15.0%**		**11.8%**		**0.0%**		**10.0%**	
		3	20	4	34	0	16	7	70

Quality Performance Indicator (QPI)	Performance by Centre (Reported by Hospital of Surgery)										
	QPI target	Aberdeen		Dundee		Edinburgh		Glasgow		Scotland	
QPI 3(i): Molecular Analysis - Proportion of patients with biopsied or resected gliomas who undergo 1p/19q molecular analysis of tumour tissue within 21 days of surgery.	90%	**40.0%**		**-**		**68.4%**		**50.0%**		**55.3%**	
		2	5	-	-	13	19	10	20	26	47
QPI 3(ii): Molecular Analysis - Proportion of patients with biopsied or resected gliomas who undergo MGMT promoter hypermethylation status testing within 21 days of surgery.	90%	**28.3%**		**84.6%**		**100.0%**		**98.9%**		**80.4%**	
		15	53	11	13	55	55	87	88	168	209
QPI 6: Maximal surgical resection - Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who undergo surgical resection where 90% or greater reduction in tumour volume is achieved provided it is considered consistent with safe outcome.	40%	**62.5%**		**-**		**70.4%**		**45.0%**		**58.9%**	
		5	8	-	-	19	27	9	20	33	56
QPI 7: Early Post-Operative Imaging – Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection.	90%	**84.6% >**		**80.0% <**		**97.6% >**		**95.4% >**		**92.3% >**	
		33	39	8	10	40	41	62	65	143	155

Quality Performance Indicator (QPI)	Performance by Centre (Reported by Hospital of Surgery)											
	QPI target	Aberdeen		Dundee		Edinburgh		Glasgow		Scotland		
QPI 13: Mortality - Proportion of patients with Brain/CNS cancer who die within 30 days of surgery.	<5%	**9.8%**		**4.8%**		**2.4%**		**3.2%**		**4.5%**		
		6	61	1	21	2	85	4	125	13	292	

Quality Performance Indicator (QPI)	Performance by NHS Board (Reported by Board of Residence)									
	QPI target	NCA		SCAN		WoSCAN		Scotland		
QPI 14(i): Clinical Trials Access – Proportion of patients with brain/CNS cancer who CONSENT TO PARTICIPATE in a clinical trial.	15%	**3.5% >**		**5.8% <**		**13.9% >**		**8.4%**		
		4	113	8	138	23	166	35	417	
QPI 14(ii): Clinical Trials Access – Proportion of patients with brain/CNS cancer who are ENROLLED in a clinical trial.	NA	**1.8%**		**NA**		**11.5% >**		**NA**		
		2	113	NA	NA	19	166	NA	NA	

Conclusions and Action Required

The Scottish Adult Neuro-Oncology Network (SANON) is encouraged by the continued support and commitment of Network members to deliver a high quality service to brain/CNS cancer patients across the country. The results presented in this report demonstrate that patients with brain/CNS cancer receive a consistent and improving standard of care across all geographical locations. Case ascertainment and data capture is of a high standard enabling robust assessment of performance against QPIs.

The results presented within this report illustrate that some of the QPI targets set have been challenging for NHS Boards to achieve and there remains room for further service improvement, however it is encouraging that the target was consistently met by all Regions for QPIs relating to neuropathological diagnosis, pre treatment MRI, specialist neuro-oncology access, radical radiotherapy planning and 30 day mortality after chemoradiotherapy.

Targets have been particularly challenging for QPIs relating to molecular analysis, seizure management and documentation at MDT. Where targets have not been met NHS Boards have provided detailed comment indicating valid clinical reasons.

SANON will initiate and lead national discussion into QPIs 1 (documentation of performance status) and 6 (maximal surgical resection), in order to ensure that NHS Boards are collecting meaningful data that will drive clinical service improvement.

SANON, MDTs and neuro-oncology centres are asked to develop local Action/Improvement Plans in response to the findings presented in the report. A summary of actions for SANON, MDTs and neuro-oncology centres has been included within the Action Plan templates in the Appendix.

Action required:

QPI 1: Documentation of Performance Status

- Aberdeen/Inverness MDT to submit a query to ISD regarding the definition for performance status.
- SANON to evaluate how performance status data is being collected to help determine whether any definitional change is required.

QPI 2: Multi-disciplinary Team Meeting (MDT)

- Aberdeen/Inverness MDT to discuss patients using CT results only if MRI results are not available.

QPI 3: Molecular Analysis

- Edinburgh pathology department to email Clinicians when cytogenetics results are available.

QPI 6: Maximal Surgical Resection

- SANON to lead discussion on the most appropriate way to capture and measure maximal surgical resection, in order to reach a national consensus, ahead of the formal review scheduled for 2020.

QPI 9: Access to Adjuvant Treatment

- Aberdeen/Inverness MDT to increase the number of radiotherapy and MRI planning slots.

QPI 11: Seizure Management

- CNS in Edinburgh to highlight requirements of QPI to Boards within the Region.

- Glasgow MDT to examine the data in more detail to fully understand the issue, and explore ways of improving referral rates of patients to specialised staff.

QPI 12: Key Worker to Coordinate Care

- SANON to lead discussion around the most appropriate time frame within the pathway to assign a key worker.

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

Progress against these plans will be monitored by the SANON and any service or clinical issue which the SANON considers not to have been adequately addressed will be escalated to the NHS Board Territorial Lead Cancer Clinician and Regional Lead Cancer Clinician.

Additionally, progress will be reported annually to the Regional Cancer Advisory Group (RCAG) by NHS Board Territorial Lead Cancer Clinicians and NMCN Clinical Leads, and nationally on a three-yearly basis to Healthcare Improvement Scotland as part of the governance processes set out in CEL 06 (2012).

1. Introduction

The purpose of this report is to present an assessment of the performance of Adult Neuro-Oncology services using clinical audit data relating to patients diagnosed with brain and central nervous system (CNS) cancers across Scotland from 1st January 2018 to 31st December 2018. Results are measured against the Brain and CNS Cancer Quality Performance Indicators[1] (QPIs) which were introduced for patients diagnosed on or after 1st January 2014.

The National Cancer Quality Steering Group (NCQSG) completed a programme of work to develop national QPIs for all cancer types to enable national comparative reporting and drive continuous improvement for patients in 2014. In collaboration with the National Managed Clinical Network (NMCN) for Brain and CNS Cancers and Information Services Division (ISD), the Brain and CNS Cancer QPIs[1] were published by Healthcare Improvement Scotland (HIS) in December 2013 and implemented for patients diagnosed on or after 1st January 2014. Data definitions[2] and measurability criteria[3] to accompany the Brain and CNS Cancer QPIs are available from the ISD website.

Twelve months of data were measured against the Brain and CNS Cancer QPIs for the fifth consecutive year. A process of baseline review was undertaken after the reporting of Year 1 data with a formal review process undertaken after Year 3. This is to ensure that QPIs remain appropriate and fit for purpose. QPI data has been presented alongside data for previous years where results have remained comparable after processes of review. Future reports will continue to compare clinical audit data in successive years to further illustrate trends.

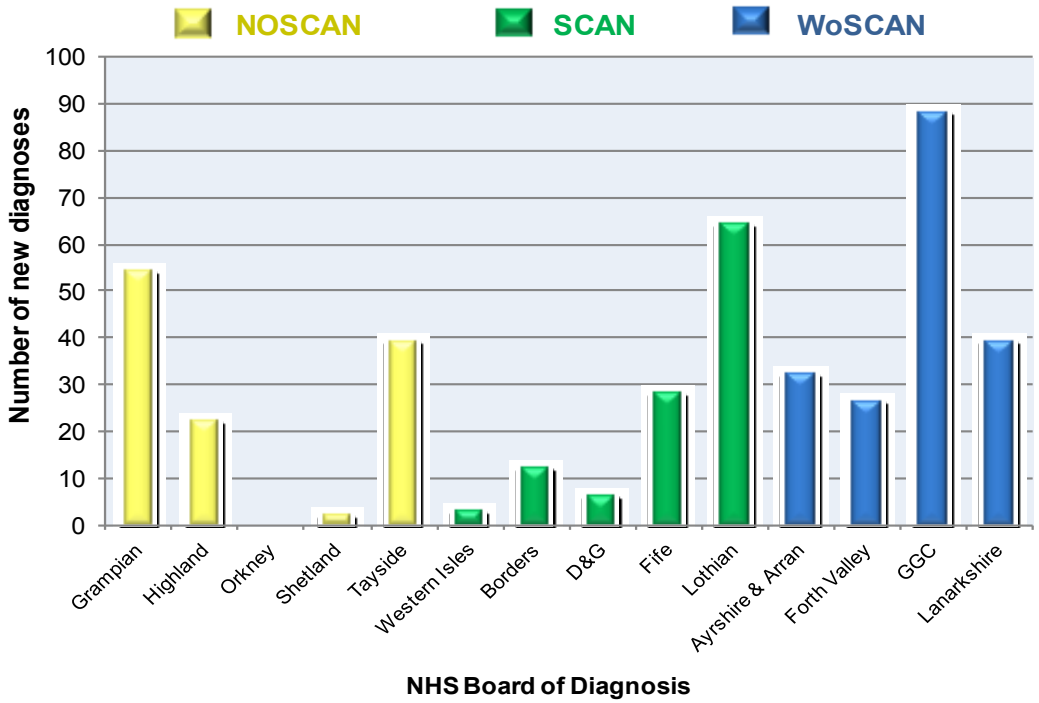
2. Background

The Scottish Adult Neuro-Oncology Network (SANON) was established in 2006 and is one of three national cancer networks in Scotland. The aim of the network is to link together health professionals, researchers, patients, their families and carers, social care, voluntary sector representatives and external companies to ensure the delivery of equitable, high quality and clinically effective care for patients in Scotland[7].

Brain and CNS cancers are relatively rare cancers with approximately 425 adult cases diagnosed in Scotland each year between 2013 and 2017[4]. The 2018 audit identified 415 patients diagnosed with a new primary cancer of the brain or CNS in Scotland.

The distribution of the 415 newly diagnosed cases in 2018 is presented in Figure 1 by location of diagnosis across the fourteen NHS Boards. The West of Scotland Cancer Network (WoSCAN) recorded 44.6% of new diagnoses in 2018 with 185 new cases of brain and CNS cancers captured by audit. This is in line with the adult population distribution in this region as 2017 mid-year population estimates[8] show that 46.1% of the Scottish adult population reside within West of Scotland (WoS) region. It should be noted that 26 of the cases diagnosed in the WoS, specifically NHS Forth Valley, are included in SCAN results throughout the report as these patients are managed through the Edinburgh MDT.

Figure 1: Number of patients diagnosed with brain or CNS cancer across Scotland by NHS Board, 2018.



NCA	Grampian	Highland	Orkney	Shetland	Tayside	W. Isles	Total
Number of cases	54	22	0	2	39	3	120

SCAN	Borders	D&G	Fife	Lothian	Total
Number of cases	12	6	28	64	110

WoSCAN	AA	FV	GGC	Lanarkshire	Total
Number of cases	32	26	88	39	185

‡ Patients diagnosed in Forth Valley are managed through the Edinburgh MDT and are included in SCAN performance for QPI results.

The tumour morphology of cases diagnosed in the audit of 2018 data is detailed below in Table 1, and is classified according to the International Classification for Diseases for Oncology (ICD-O 3). The majority of cases have an astrocytic tumour morphology. Where cases are noted as "Not Applicable", no sample was sent to pathology for testing.

Table 1: Tumour morphology for patients diagnosed with brain or CNS cancer across Scotland by Region of Diagnosis, 2018.

	Hospital of Diagnosis							
	NCA		SCAN		WoSCAN		Scotland	
Tumour Type	n	%	n	%	n	%	n	%
Astrocytic and Oligodendroglial	82	68.3%	64	58.2%	123	66.5%	269	64.8%
Embryonal	0	0.0%	2	1.8%	2	1.1%	4	1.0%
Ependymal	1	0.8%	3	2.7%	4	2.2%	8	1.9%
Meningioma	1	0.8%	0	0.0%	1	0.5%	2	0.5%
Negative Pathology	0	0.0%	0	0.0%	2	1.1%	2	0.5%
Not Applicable	34	28.3%	40	36.4%	52	28.1%	126	30.4%
Not Assessable	1	0.8%	1	0.9%	0	0.0%	2	0.5%
Not Recorded	1	0.8%	0	0.0%	1	0.5%	2	0.5%
Total No of Pts	120		110		185		415	

Table 2 shows a description of the WHO classification of tumour grade. This is a scale to determine the aggressiveness of tumours and to estimate prognosis.

Table 2: Description of the WHO tumour grade classification.

Grade	Description
1	Tumours with low proliferative potential, a frequently discreet nature and a possibility of cure following surgical resection alone.
2	Generally infiltrating tumours low in mitotic activity but with a potential to recur.
3	Histological evidence of malignancy, generally in the form of mitotic activity, clearly expressed infiltrative capabilities and anaplasia.
4	Mitotically active, necrosis prone neoplasms, generally associated with a rapid pre- and post-operative evolution of the disease.

Table 3 illustrates the proportion of cases from the 2018 audit assigned to each tumour grade. The majority of cases are Grade 4 which is associated with poorer outcomes. Cases have been assigned as “Not Applicable” where no sample has been sent to pathology for analysis.

Table 3: Tumour grade for patients diagnosed with brain or CNS cancer across Scotland by Region of Diagnosis, 2018.

	Hospital of Diagnosis							
	NCA		SCAN		WoSCAN		WoS Total	
	n	%	n	%	n	%	n	%
1	2	1.7%	0	0.0%	0	0.0%	2	0.5%
2	6	5.0%	12	10.9%	11	5.9%	29	7.0%
3	3	2.5%	9	8.2%	15	8.1%	27	6.5%
4	74	61.7%	49	44.5%	104	56.2%	227	54.7%
Not Applicable	34	28.3%	40	36.4%	54	29.2%	128	30.8%
Not Recorded	1	0.8%	0	0.0%	1	0.5%	2	0.5%
Total No of Pts	120		110		185		415	

The table below details the four MDTs which manage all cases of brain and CNS cancer in Scotland. There are five specialist centres carrying out neuro-oncology treatment in Scotland and these are considered the centres for specialist treatment, which includes surgery, chemotherapy and radiotherapy. Surgery is not performed in Inverness. Patients may receive diagnostic or palliative care in their local hospital where appropriate; however the majority of patients are referred to one of the four MDTs for specialist management.

Neuro-oncology MDT	Constituent Hospital(s)
Aberdeen/Inverness	Aberdeen Royal Infirmary (surgery and oncology) Raigmore Hospital – Inverness (oncology)
Dundee	Ninewells Hospital (surgery and oncology)
Edinburgh	Western General Hospital (surgery and oncology)
Glasgow	Queen Elizabeth University Hospital (surgery) and Beatson West of Scotland Cancer Centre (oncology)

2.1 Incidence and survival

Brain and CNS cancers are relatively rare cancers with approximately 425 cases diagnosed in Scotland each year between 2013 and 2017[4]. The percentage frequency of brain and CNS cancers (malignant and non-malignant) in Scotland is comparatively low at 1.4% of all cancers diagnosed in 2017. It was ranked as the fourteenth most commonly diagnosed cancer in males and the seventeenth most commonly diagnosed cancer in females in Scotland in 2017[5].

The incidence of brain and CNS cancers has decreased in males by 1.3% in the ten years from 2007-2017, with a decrease in the incidence for females of 4.0%. Overall there has been a decrease in incidence of 2.4%[5]. The mortality of Brain/CNS cancer has increased for males with female mortality essentially static in the ten years from 2007-2017 (males 6.7%, females 0.1%) with an overall increase of 4.1%[5]. Brain and CNS cancers are ranked as the thirteenth most common cause of death from cancer and accounted for 2.4% of all deaths from cancer in 2017[5].

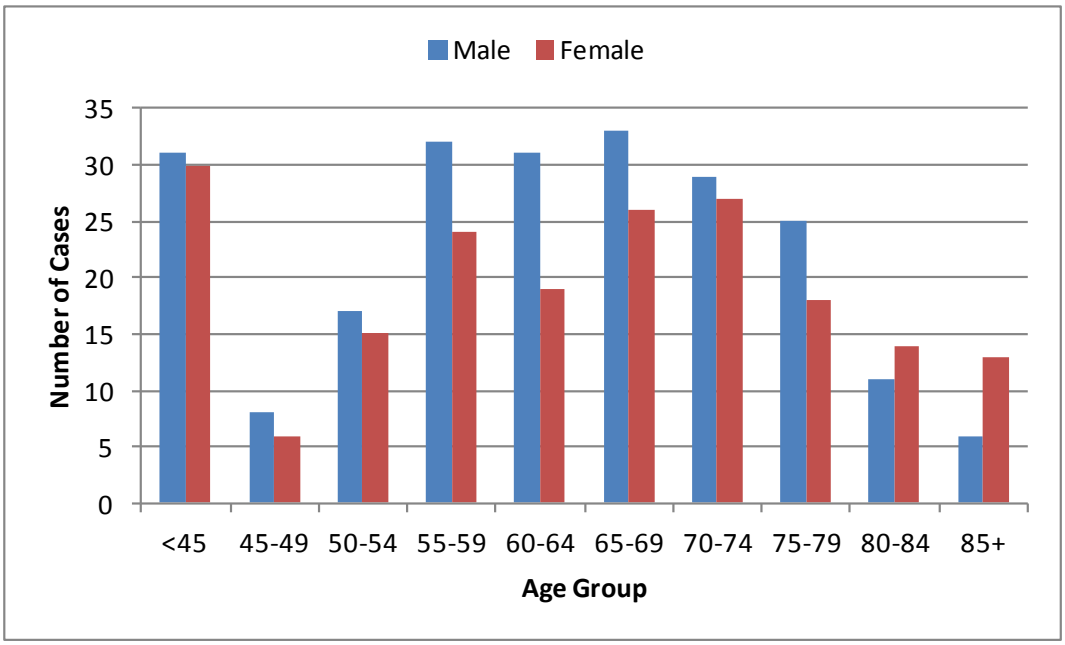
Relative survival at one year is increasing for brain and CNS cancers[6]. Table 1 shows the percentage change in survival rates for patients diagnosed between 1987 and 1991 compared to those diagnosed between 2007 and 2011.

Table 4: Percentage change in relative survival for brain and CNS cancer in Scotland at 1 year and 5 years from 1987-1991 to 2007-2011. Source data: ISD[6]

	Relative survival at 1 year (%)		Relative survival at 5 years (%)	
	2007 – 2011	% change	2007 – 2011	% change
Male	41.2 %	+ 9.8 %	15.1 %	+ 1.0 %
Female	39.5 %	+ 7.7 %	15.8 %	- 0.8 %

This report includes all cases aged 16 and over and the age distribution for males and females diagnosed in 2018 in Scotland is illustrated in Figure 2. The incidence of brain and CNS cancer is higher for males in almost all age groups and approximately 5 males are diagnosed for every 4 female cases.

Figure 2: Number of patients diagnosed with brain and CNS cancers in Scotland in 2018 by age group and sex.



	<45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	Total
Male	31	8	17	32	31	33	29	25	11	6	223
Female	30	6	15	24	19	26	27	18	14	13	192

3. Methodology

The clinical audit data presented in this report was collected by clinical audit staff in each NHS Board in accordance with an agreed dataset and definitions. Data was recorded manually and entered locally into the electronic Cancer Audit Support Environment (eCASE): a secure centralised web-based database. Data relating to patients diagnosed between 1st January 2018 and 31st December 2018 was downloaded from eCASE at 2200 hrs on 8th May 2019. Cancer audit is a dynamic process with patient data continually being revised and updated as more information becomes available. This means that apparently comparable reports for the same time period and cancer site may produce slightly different figures if extracted at different times.

Analysis was performed centrally by the WoSCAN Information Team and the timescales agreed took into account the patient pathway to ensure that a complete treatment record was available for each case. Initial results of the analysis were provided to local NHS 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.

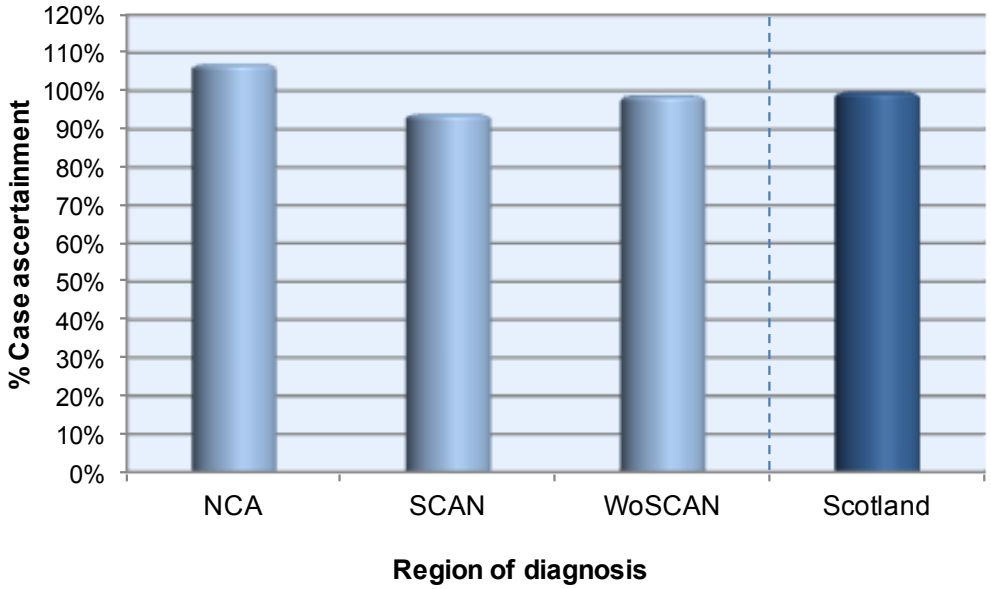
4. Results and Action Required

4.1 Data Quality

Audit data quality can be assessed in the first instance by estimating the proportion of expected patients that have been identified through audit. Case ascertainment is calculated as the number of new cases identified by the audit as a proportion of the number of cases reported by the National Cancer Registry (provided by Information Services Division, National Services Scotland). Cancer Registry figures were extracted from ACaDMe (Acute Cancer Deaths and Mental Health), a system provided by Information Services Division (ISD). Cancer Registry figures are an average of the previous five years' figures to take account of annual fluctuations in incidence within NHS Regions.

Overall case ascertainment for Scotland is 99.8% which indicates excellent data capture and so overall results should be an accurate reflection of performance. Results range from 94.0% in SCAN to 107.1% in NCA. Case ascertainment figures however are provided for guidance and are not an exact measurement as it is not possible to compare directly with the same cohort. Case ascertainment for each NHS Region is illustrated in Figure 3.

Figure 3: Case ascertainment by region for patients diagnosed with brain and CNS cancers in Scotland in 2018.



	NCA	SCAN	WoSCAN	Scotland
Cases from audit	120	110	185	415
ISD Cases (2013-2017 average)	112	117	187	416
% Case ascertainment	107.1%	94.0%	98.9%	99.8%

4.2 Performance against Quality Performance Indicators (QPIs)

Results of the analysis of Brain and CNS Cancer Quality Performance Indicators 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 by region of diagnosis or by location of treatment (neuro-oncology centre) both graphically and in tabular format, with performance also shown as an overall national representation. Years 2-5 data is presented alongside Year 1 data where measurement has remained comparable following the baseline review process. Years 4 and/or 5 data has been presented alongside data for previous years where measurement has remained comparable after formal review.

A number of QPIs were not reported in last year's report due to a large number of measurability changes and the addition of new data items at formal review. These QPIs are reported here for the first time since these changes.

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 restricted data are denoted with a dash (-). An asterisk (*) is applied to indicate a denominator of zero and to distinguish between this and a 0% performance.

Specific national and regional actions have been identified to address issues highlighted through the data analysis.

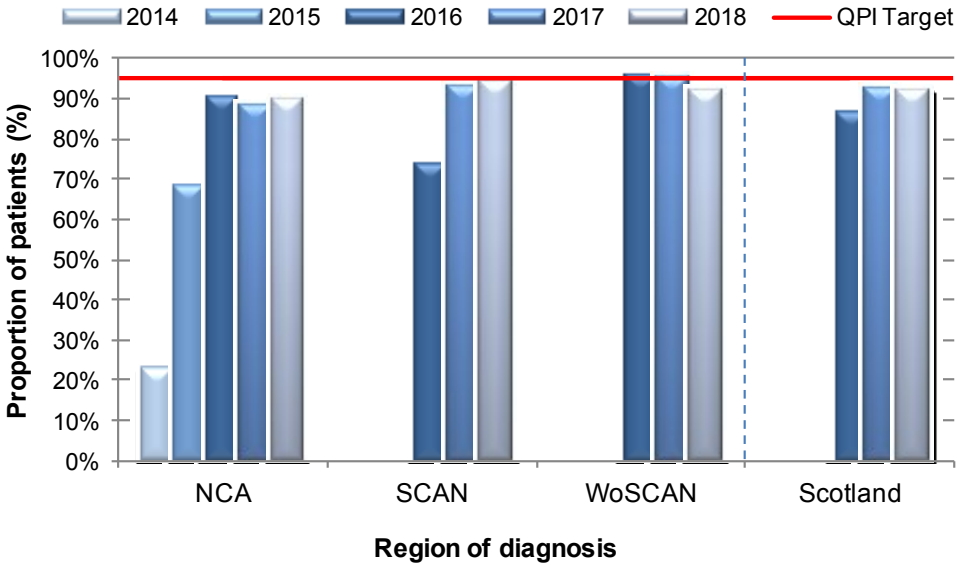
QPI 1: Documentation of Performance Status

Performance status is an important prognostic indicator in patients with brain/CNS cancer. Accurate communication of performance status is vital in guiding complex management decisions, including recruitment into clinical trials[1]. In patients referred from other sites, who have not yet met a member of the neuro-oncology MDT, an estimated performance status should be given based on the available information from the referring site[1].

The tolerance within the 95% target against QPI 1 accounts for situations where there is insufficient information from the referring site to estimate the World Health Organisation (WHO) performance status.

QPI 1:	Patients with newly diagnosed brain/CNS cancer should have a WHO performance status documented at time of diagnosis.
Description:	Proportion of newly diagnosed patients with brain/CNS cancer who have a documented WHO performance status at the time of MDT discussion.
Numerator:	Number of newly diagnosed patients with brain/CNS cancer discussed at MDT meeting with a documented WHO performance status at the time of MDT discussion.
Denominator:	All newly diagnosed patients with brain/CNS cancer discussed at MDT meeting.
Exclusions:	None
Target:	95%

Figure 4: Proportion of newly diagnosed patients with brain/CNS cancer who have a documented WHO performance status at the time of MDT discussion, 2014 to 2017.



QPI 1	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	90.0%	108	120	0	0	0
SCAN	94.1%	128	136	0	0	0
WoSCAN	91.7%	143	156	2	0	0
Scotland	92.0%	379	412	2	0	0

No region met the 95% target. Performance ranged from 90.0% in NCA to 94.1% in SCAN. The overall national performance was 92.0%. Significant improvement has been shown in this QPI since 2014.MDTs have reviewed cases and provided feedback.

Edinburgh MDT stated that a standardised email is being implemented for MDT Coordinators to send out to referrers where performance status has not been documented.

Glasgow MDT commented that referring parties are now well informed to provide performance status. The MDT Chair requests discussion on performance status if it has not been provided.

Aberdeen/Inverness MDT commented that seven cases failed as “pre-treatment” performance status could not be assigned at MDT due the fact that treatment had taken place prior to MDT. This is a definitional issue regarding the recording of performance status. The MDT has indicated that they will submit a query to ISD. The NMCN should evaluate how this data is being collected across the country to help determine if any changes are required around the performance status definition, to ensure consistency in data recording.

Actions:

- Aberdeen/Inverness MDT to submit a query to ISD regarding the definition for performance status.
- SANON to evaluate how performance status data is being collected to help determine whether any definitional change is required.

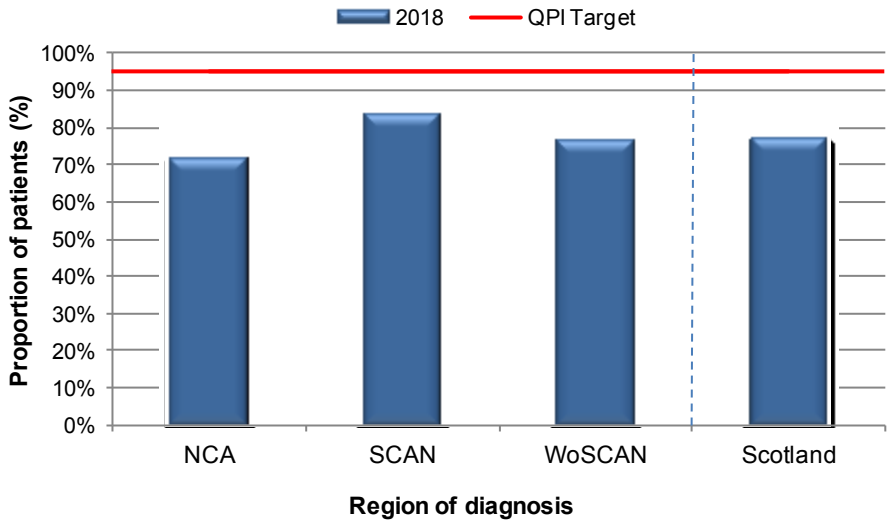
QPI 2: Multi-disciplinary Team Meeting (MDT)

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

Discussion prior to definitive management decisions being made provides reassurance that patients are being managed appropriately. In the majority of cases, patients with brain/CNS cancer will undergo surgery (biopsy or resection) as their initial intervention prior to any treatment. The measurement of this QPI will therefore focus on discussion of patients at this initial point within the clinical pathway.[1]

QPI 2:	Patients with Brain/CNS cancer should be discussed by a multidisciplinary (MDT) team prior to any surgical procedure.
Description:	Proportion of patients with Brain/CNS cancer who are discussed at MDT meeting before surgery.
Numerator:	Number of patients with Brain/CNS cancer discussed at MDT before surgery.
Denominator:	All patients with Brain/CNS cancer undergoing surgery.
Exclusions:	Patients who died before first treatment.
Target:	95%

Figure 5: Proportion of patients with Brain/CNS cancer who are discussed at MDT meeting before surgery, 2018.



QPI 2	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	71.6%	58	81	0	0	0
SCAN	83.3%	70	84	0	0	0
WoSCAN	76.5%	88	115	0	0	0
Scotland	77.1%	216	280	0	0	0

No regions met the 95% target, with performance ranging from 71.6% in NCA to 83.3% in SCAN. The overall national performance was 77.1%.

MDTs have provided feedback on cases not meeting the target. The majority of cases required emergency surgery or early/urgent biopsy and so could not have treatment delayed in order to be discussed at MDT.

The Aberdeen/Inverness MDT identified a small number of cases that were not discussed as MRI results were not available for discussion at the MDT. In future, cases like these will be discussed with CT results alone.

The Glasgow MDT stated that in cases where emergency surgery has been performed, all patients are discussed at MDT after surgery.

Actions:

- Aberdeen/Inverness MDT to discuss patients using CT results only if MRI results are not available.

QPI 3: Molecular Analysis

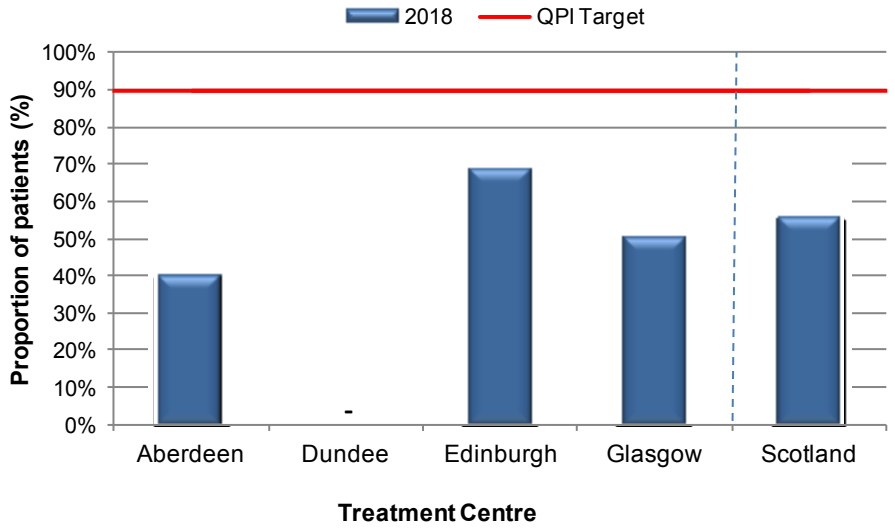
Combined loss of 1p/19q in gliomas is associated with a more favourable response to therapy (chemotherapy or radiotherapy) and is associated with considerably better prognosis when compared to tumours with intact 1p/19q. As such, where indicated, 1p/19q analysis should be carried out to help determine treatment and provide information on predicted tumour response to therapy and prognosis.

Determination of MGMT promoter methylation status predicts response to therapy (chemotherapy or concomitant chemoradiotherapy) in glioblastomas and assists in determination of prognosis. As such, where indicated, MGMT promoter methylation analysis should be carried out to help determine treatment and provide information on predicted tumour response to therapy and prognosis.

A 21 day timeframe is associated with this QPI to ensure that the molecular analysis is undertaken and reported before treatment takes place.

QPI 3(i):	Patients with biopsied or resected gliomas should have molecular analysis performed on the tumour tissue within 21 days of surgery to inform treatment decision making.
Description:	Proportion of patients with biopsied or resected Grade II or III gliomas who have the tumour tested for combined loss of 1p/19q.
Numerator:	Number of patients with a Grade II or III glioma undergoing surgery where tisse sample is tested for 1p/19q within 21 days of surgery.
Denominator:	All patients with a Grade II or III glioma undergoing surgery.
Exclusions:	No exclusions.
Target:	90%

Figure 6: Proportion of patients with biopsied or resected Grade II or III gliomas who have the tumour tested for combined loss of 1p/19q, 2018.



QPI 3(i)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
Aberdeen	40.0%	2	5	0	0	0
Dundee	-	-	-	0	0	0
Edinburgh	68.4%	13	19	0	0	0
Glasgow	50.0%	10	20	0	0	0
Scotland	55.3%	26	47	0	0	0

No centres met the 90% target with performance ranging from 40.0% in Aberdeen to 68.4% in Edinburgh. Performance for Dundee is not shown due to small numbers. The overall national performance was 55.3%.

Boards have reviewed cases not meeting the target and provided feedback. As this is an Edinburgh or Glasgow based service, other centres indicated that there is limited scope for improvement at a local level. Aberdeen reviewed the lab transfer pathway and noted that samples are sent within 24hours of being taken.

The Edinburgh centre commented that pathology are now documenting when cytogenetics results are available which is often earlier than the authorised report. These results will be emailed to Clinicians which should contribute to an improvement in performance against this measure going forward.

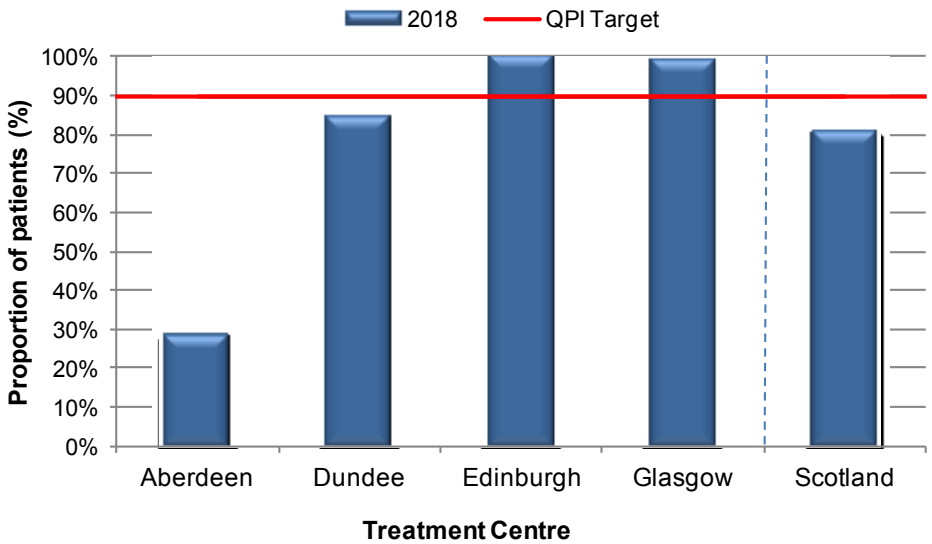
The Glasgow centre has implemented a similar solution and expect the target to be met in 2019.

Action:

- Edinburgh pathology department to email Clinicians directly to notify them when cytogenetics results are available.

QPI 3(ii):	Patients with biopsied or resected gliomas should have molecular analysis performed on the tumour tissue within 21 days of surgery to inform treatment decision making.
Description:	Proportion of patients with biopsied or resected glioblastomas who have the tumour tested for MGMT promoter methylation status.
Numerator:	Number of patients with glioblastomas undergoing surgery where tissue sample is assessed for MGMT promoter hypermethylation status within 21 days of surgery.
Denominator:	All patients with glioblastomas undergoing surgery.
Exclusions:	No exclusions.
Target:	90%

Figure 7: Proportion of patients with biopsied or resected gliomablastomas who have the tumour tested for MGMT promoter methylation status, 2018.



QPI 3(ii)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
Aberdeen	28.3%	15	53	0	0	0
Dundee	84.6%	11	13	0	0	0
Edinburgh	100.0%	55	55	0	0	0
Glasgow	98.9%	87	88	0	0	0
Scotland	80.4%	168	209	0	0	0

The Edinburgh and Glasgow centres met the 90% target with 100.0% and 98.9% respectively. Dundee and Aberdeen were short of the target with 84.6% and 28.3% respectively. The overall national performance was 80.4%.

The Aberdeen centre reviewed cases not meeting the target. In all but 6 cases, results were returned within 30 days of surgery.

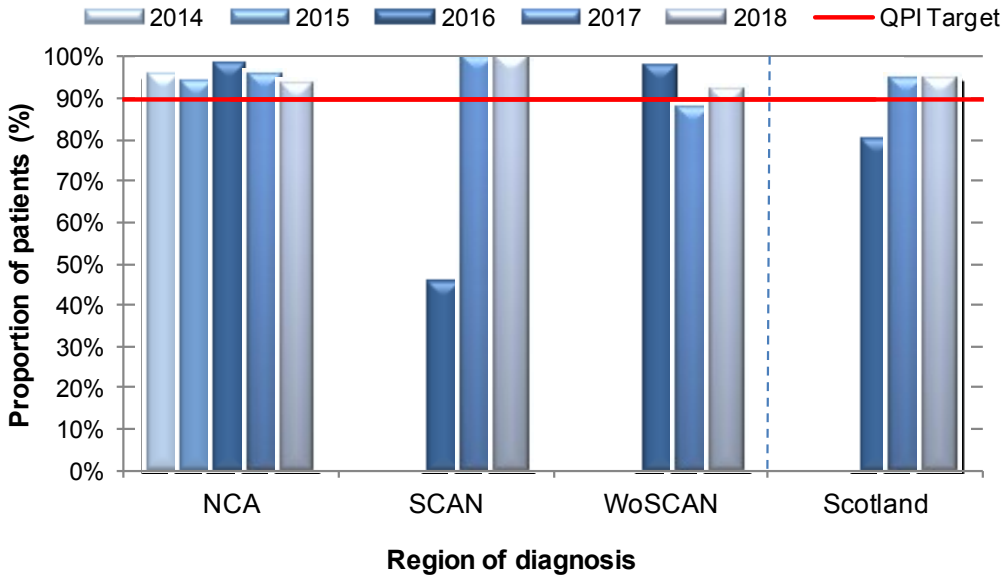
The Edinburgh centre commented that pathology are now documenting when cytogenetics results are available which is often earlier than the authorised report. These results will be emailed to Clinicians which should contribute to an improvement in performance against this measure going forward.

QPI 4: Neuropathological Diagnosis

Accurate and robust standardisation of tumour diagnosis is required for appropriate patient management. Neuropathologists should report to the standards defined by the Royal College of Pathologists in 'Standards and Datasets for Reporting Cancers: Dataset for Tumours of the Central Nervous System, including Pituitary Gland.' [1]

QPI 4:	All pathology reports for brain/CNS cancer should contain full pathology information (including WHO grade) to inform patient management.
Description:	Proportion of patients with brain/CNS cancer where the pathology report contains a full set of data items (as defined by the Royal College of Pathologists).
Numerator:	Number of patients with a histological diagnosis of brain/CNS cancer where histological pathology report contains all data items.
Denominator:	All patients with a histological diagnosis of brain/CNS cancer.
Exclusions:	None.
Target:	90%

Figure 8: Proportion of patients with brain/CNS cancer where the pathology report contains a full set of data items (as defined by the Royal College of Pathologists), 2014 to 2018.



QPI 4	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	93.3%	70	75	0	0	0
SCAN	100.0%	86	86	0	0	0
WoSCAN	91.7%	99	108	0	0	0
Scotland	94.8%	255	269	0	0	0

All regions met the 90% target. Performance ranged from 91.7% in WoSCAN to 100.0% in SCAN. The overall national performance was 94.8%.

It should be noted that the new International Collaboration on Cancer Reporting (ICCR) dataset is being implemented and therefore it will be proposed to change from the Royal College of Pathology dataset to the ICCR dataset at the next formal review of QPIs planned for December 2020.

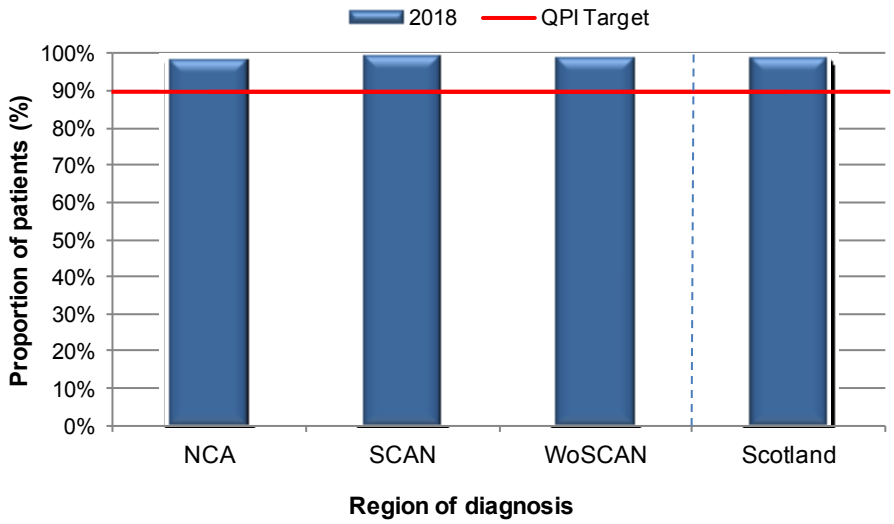
QPI 5: Pre-Treatment Magnetic Resonance Imaging (MRI)

MRI is the established investigation for patients with presumed low grade tumours.

Although contrast enhance Computed Tomography (CT) will often be the initial investigation suggesting the diagnosis of CNS tumour, MRI provides additional information in many cases. Revised response assessment criteria for high grade gliomas suggest that MRI is the preferred modality used to assess response and progression, therefore pre-treatment MRI is essential for this.

QPI 5:	Patients with Brain/CNS cancer should have contrast enhanced Magnetic Resonance Imaging (MRI) prior to treatment.
Description:	Proportion of patients with Brain/CNS cancer undergoing surgery who have contrast enhanced MRI prior to treatment.
Numerator:	Number of patients with Brain/CNS cancer who receive a contrast enhanced MRI prior to treatment.
Denominator:	All patients with Brain/CNS cancer undergoing surgery.
Exclusions:	Patients unable to undergo a contrast enhanced MRI e.g. • pacemaker or other MRI incompatible implanted device • cerebral aneurysm clip • contraindication to intravenous contrast medium Patients who refuse MRI
Target:	90%

Figure 9: Proportion of patients with brain/CNS cancer undergoing surgery who have contrast enhanced MRI prior to treatment, 2018.



QPI 5	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	97.7%	84	86	0	0	0
SCAN	98.8%	85	86	0	0	0
WoSCAN	98.3%	115	117	0	0	0
Scotland	98.3%	284	289	0	0	0

All regions met the 90% target. Performance ranged from 97.7% in NCA to 98.8% in SCAN. The overall national performance was 98.3%.

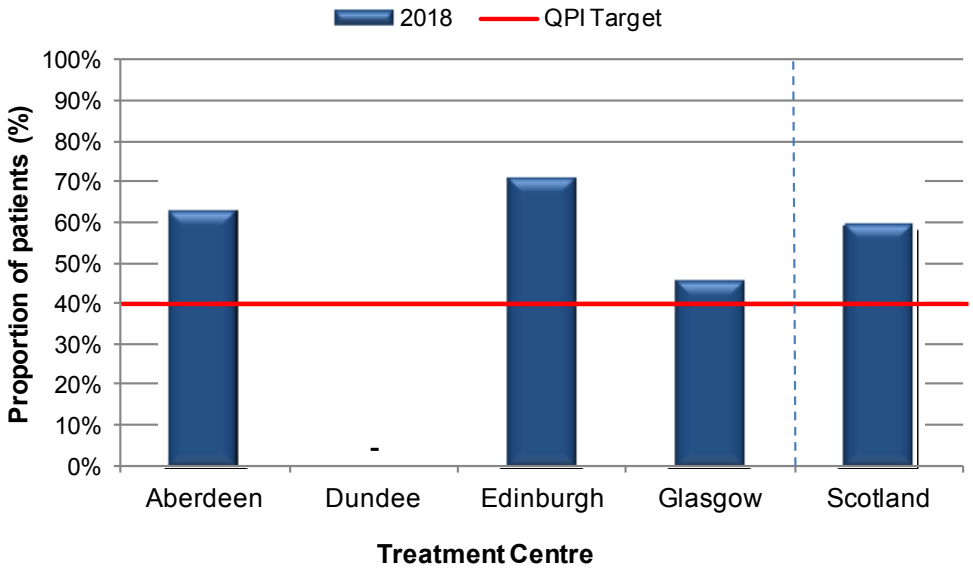
QPI 6: Maximal Surgical Resection

The extent of surgical resection is an independant prognostic factor in Grade III and Grade IV malignant gliomas. Maximal safe surgical resection (≥90%) prolongs time to tumour recurrence and is associated with prolonged survival. Maximum safe surgical resection is recommended by several published guidelines.

Measurement of this QPI will focus on those patients with the intention for maximal safe surgical resection. This will be identified pre-operatively and documented at the MDT.

QPI :	Wherever possible patients should undergo maximal surgical resection of malignant gliomas.
Description:	Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who undergo surgical resection where ≥90% reduction in tumour volume is achieved provided it is considered consistent with safe outcome.
Numerator:	Number of patients with resectable malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection where ≥90% reduction intumour volume is achieved.
Denominator:	All patients with malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection.
Exclusions:	Patients undergoing biopsy only. Patients in who surgeons intent is partial resectuion/debulking surgery.
Target:	40%

Figure 10: Proportion of patients with malignant glioma undergoing surgical resection where ≥90% reduction in tumour volume is achieved, 2018.



QPI 6	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
Aberdeen	62.5%	5	8	0	3	1
Dundee	-	-	-	0	0	0
Edinburgh	70.4%	19	27	0	16	0
Glasgow	45.0%	9	20	11	17	0
Scotland	58.9%	33	56	11	36	1

The Aberdeen, Edinburgh and Glasgow centres met the 40% target. The performance for Dundee is not shown due to small numbers. The overall national performance was 58.9%.

The Edinburgh centre commented that recording of pre-operative intent is being actively encouraged to improve data accuracy.

The Glasgow centre highlighted the limited value of this QPI and commented that intent of surgery cannot always be stated prior to the operation and not all debulking procedures have the intent preoperatively of >90% resection.

A universal agreement should be reached as to how best to proceed with this QPI. The NMCN will initiate lead discussions in this area ahead of the next national formal review in 2020.

Action:

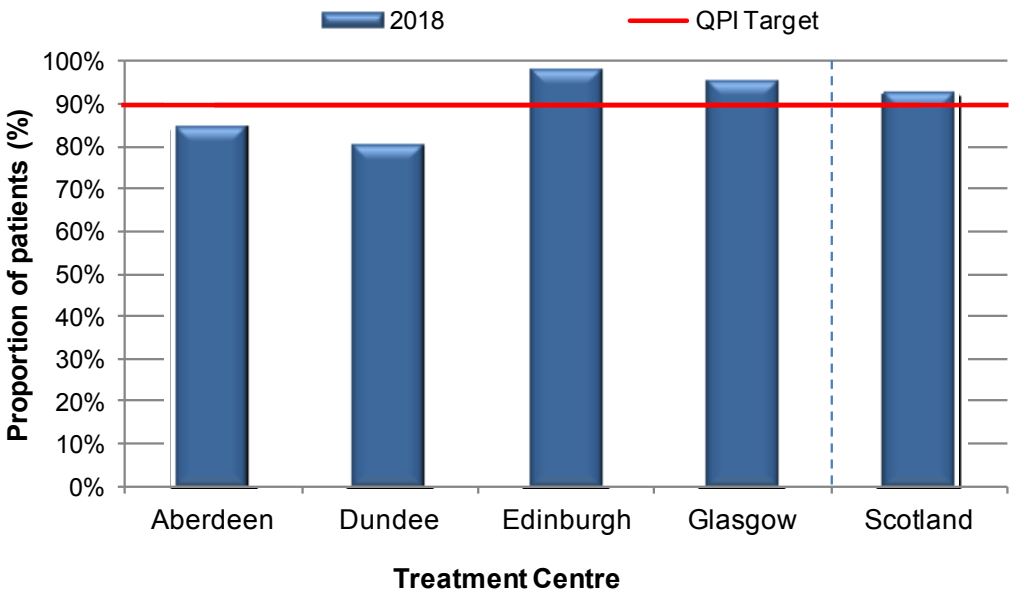
- SANON to lead discussion on the most appropriate way to capture and measure maximal surgical resection, in order to reach a national consensus, ahead of the formal review scheduled for 2020.

QPI 7: Early Post-operative Imaging

Post-operative imaging is important for a number of reasons; it provides a measurement of surgical performance and helps to determine whether and what type of further treatment is required. It also helps to assess prognosis[1]. Imaging should be carried out within 72 hours to enable reliable assessment of the extent of the resection. MRI is the preferred imaging modality for patients with glioma. After this time, changes in the tumour resection bed confound estimation[1].

QPI 7:	Patients with malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection should be subject to early post-operative imaging.
Description:	Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection.
Numerator:	Number of patients with malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection receiving MRI within 3 days (72 hours) of surgical resection.
Denominator:	All patients with malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection.
Exclusions:	• Patients who are unable to undergo an MRI scan. • Patients who refuse an MRI scan. • Patients undergoing biopsy only.
Target:	90%

Figure 11: Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection, 2018.



QPI 7	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
Aberdeen	84.6%	33	39	0	0	1
Dundee	80.0%	8	10	0	0	0
Edinburgh	97.6%	40	41	0	0	0
Glasgow	95.4%	62	65	0	0	0
Scotland	92.3%	143	155	0	0	1

The Edinburgh and Glasgow centres met the 90% target with performances of 97.6% and 95.4% respectively. Aberdeen and Dundee were short of the target with 84.6% and 80.0%. The overall national performance was above the target at 92.3%. Continual improvement has been shown over the years measured.

The Dundee Centre commented that one patient had post operative MRI in Aberdeen which added to the delay.

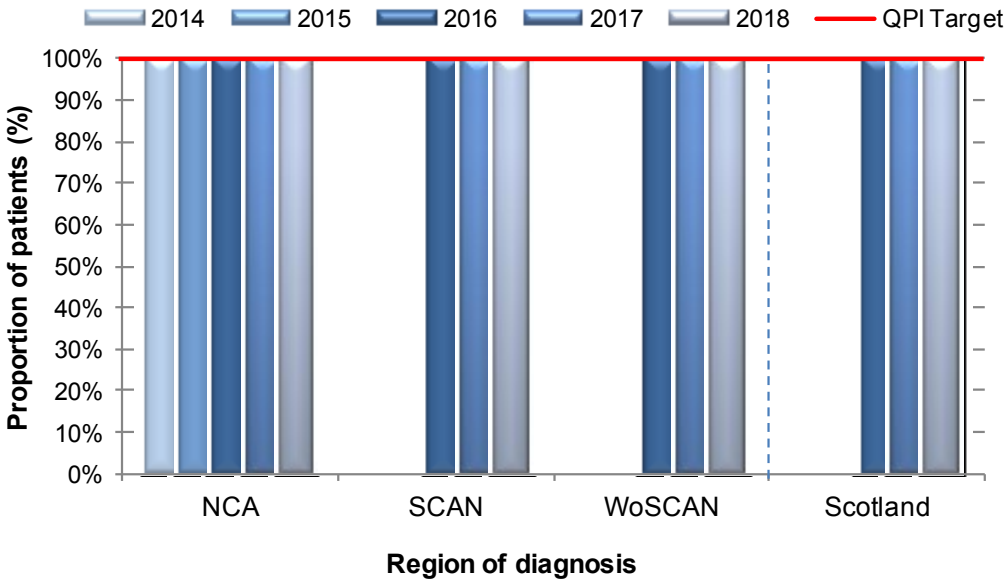
The Aberdeen Centre noted significant improvement when compared to previous years, and highlighted that spinal cord emergency cases are prioritised over stable post operative cranial patients for weekend MRI slots. Additional inpatient slots cannot be made available without impacting on other conditions.

QPI 8: Specialist Neuro-oncology Access

Non-surgical management of patients with brain and CNS tumours is increasingly complex. Radiotherapy and systemic therapy are evolving rapidly, particularly with regard to the emergence of new radiological technologies and novel prognostic and predictive molecular markers[1]. Psychosocial aspects of care are also complex. All patients should therefore be under the care of a clinical oncologist with a special interest in tumours of the brain and CNS[1].

QPI 8:	Patients with brain/CNS cancer undergoing oncological treatment should be managed by a site specialist neuro-oncologist.
Description:	Proportion of patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy) who are managed by a specialist neuro-oncologist.
Numerator:	Number of patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy) who are managed by a specialist neuro-oncologist.
Denominator:	All patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy).
Exclusions:	None.
Target:	100%

Figure 12: Proportion of patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy) who are managed by a specialist neuro-oncologist, 2014 to 2017.



QPI 8	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	100.0%	60	60	0	0	0
SCAN	100.0%	73	73	0	0	1
WoSCAN	100.0%	95	95	0	0	1
Scotland	100.0%	228	228	0	0	2

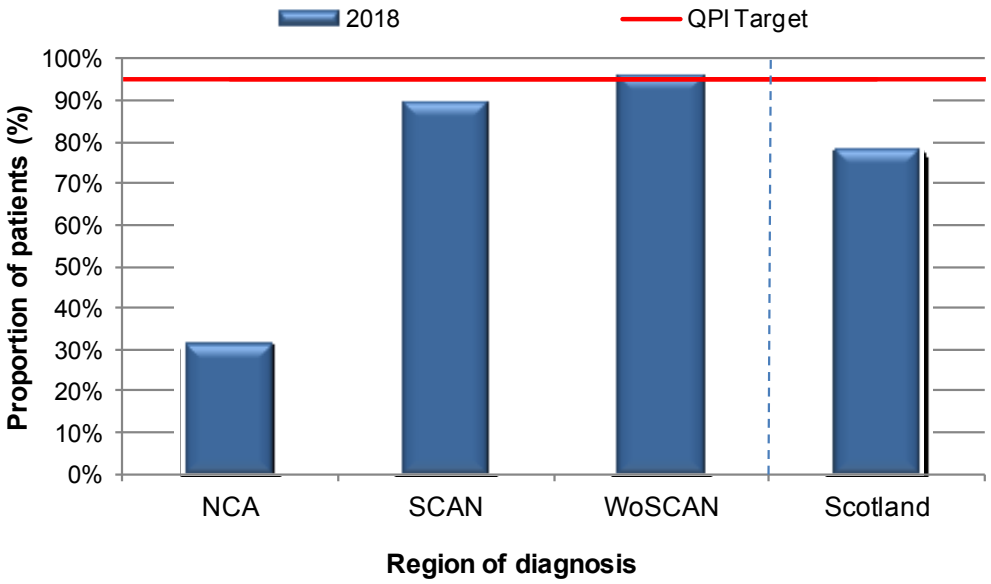
All regions met the 100.0% target. All regional and national performances have been 100% in each year of audit. NMCN will be proposing this QPI is retired at the 2nd formal review (planned for December 2020) as this is now standard practice in all centres.

QPI 9: Access to Adjuvant Treatment

Evidence demonstrates a negative impact on patient outcome if adjuvant treatment is delayed. It has been reported that by delaying oncological treatment, the risk of death increased by 8.9% for each week from the date of first surgery[1]. In addition, evidence shows that patients commencing radiotherapy within 6 weeks of the date of surgery had improved overall survival. Hence a maximum interval of 6 weeks between surgery and first day of radiotherapy is recommended[1].

QPI 9:	The maximum time between surgical resection and oncological treatment for patients with high grade glioma (WHO Grades III and IV) should be 6 weeks.
Description:	Proportion of patients with high grade glioma (WHO Grade III and IV) undergoing surgical resection who commence their oncological treatment (chemotherapy, radiotherapy or chemoradiotherapy) within 6 weeks of surgical resection.
Numerator:	Number of patients with high grade glioma (WHO Grades III and IV) who undergo oncological treatment (chemotherapy, radiotherapy or chemoradiotherapy) who commence oncological treatment within 6 weeks of surgery.
Denominator:	All patients with high grade glioma (WHO Grades III and IV) who undergo oncological treatment (chemotherapy, radiotherapy or chemoradiotherapy).
Exclusions:	None
Target:	95%

Figure 13: Proportion of patients with high grade glioma (WHO Grade III and IV) undergoing surgical resection who commence their oncological treatment within 6 weeks of surgery, 2018.



QPI 9	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	31.0%	13	42	0	0	1
SCAN	89.5%	51	57	0	0	1
WoSCAN	95.8%	69	72	0	0	0
Scotland	77.8%	133	171	0	0	2

WoSCAN met the 95% target with a performance of 95.8%. NCA and SCAN were short of the target with performance of 31.0% and 89.5% respectively. The overall national performance was 77.8%.

MDTs have reviewed cases not meeting the target and provided feedback.

The Edinburgh MDT commented that reasons for failure included patient fitness for treatment and complex pathology requiring further investigation. A small number of cases were delayed over public holiday periods.

Performance has continued to decline in the NCA region. The Aberdeen/Inverness MDT commented that all patients commenced oncological treatment within 3 weeks of the target; 5 cases commenced therapy within 5 days of the target. A limited number of radiotherapy planning slots and difficulty in arranging transport was also highlighted as causing delay. Efforts are being made to increase the number of radiotherapy and MRI planning slots. The MDT suggested that improvement in pathology reporting times would aid QPI performance. The Dundee MDT reflected this view and commented that if pathology results could be obtained within 21 days then this would allow oncologists to see patients sooner and lead to improvements in QPI performance.

Actions:

- Aberdeen/Inverness MDT to increase the number of radiotherapy and MRI planning slots.

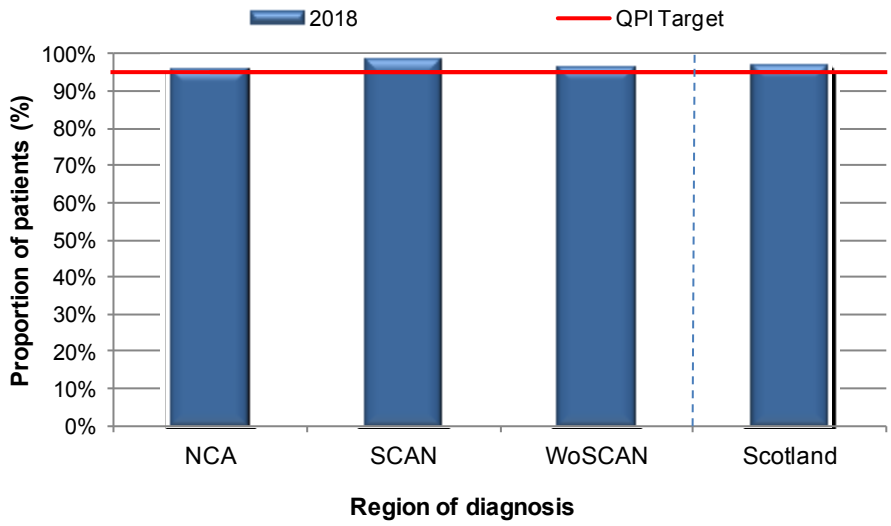
QPI 10: Radical Radiotherapy Planning Process

Determining the Gross Target Volume is a critical process in the radiotherapy planning of patients with primary brain/CNS cancer. Radiotherapy planning CT scans provide very limited information on the extent of the primary tumour and attempts to utilise anatomical MRI information by 'side-by-side' visual assessment are usually inaccurate[1].

MRI fusion enables the superior anatomical and physiological information provided by MRI to be accurately combined with planning CT data sets in order to optimise gross tumour volume (GTV) delineation. MRI fusion has been shown to reduce inter-observer variation in target delineation of high grade gliomas and a number of studies have shown that target volumes determined by CT alone frequently underestimate tumour extent[1].

QPI 10:	The radical radiotherapy planning process for patients with brain/CNS cancer should include MRI fusion.
Description:	Proportion of patients with brain/CNS cancer undergoing radical radiotherapy for whom the radiotherapy planning process includes MRI fusion.
Numerator:	Number of patients with brain/CNS cancer undergoing radical radiotherapy for whom radiotherapy planning includes MRI fusion.
Denominator:	All patients with brain/CNS cancer undergoing radical radiotherapy.
Exclusions:	• Patients who are unable to undergo an MRI scan. • Patients who refuse an MRI scan.
Target:	95%

Figure 14: Proportion of patients with brain/CNS cancer undergoing radical radiotherapy for whom the radiotherapy planning process includes MRI fusion, 2018.



QPI 10	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	95.7%	45	47	0	0	0
SCAN	98.4%	63	64	1	1	1
WoSCAN	96.1%	74	77	1	1	1
Scotland	96.8%	182	188	2	2	2

All Regions achieved the 95% target. Performance ranged from 95.7% in NCA to 98.4% in SCAN. The overall national performance was 96.8%.

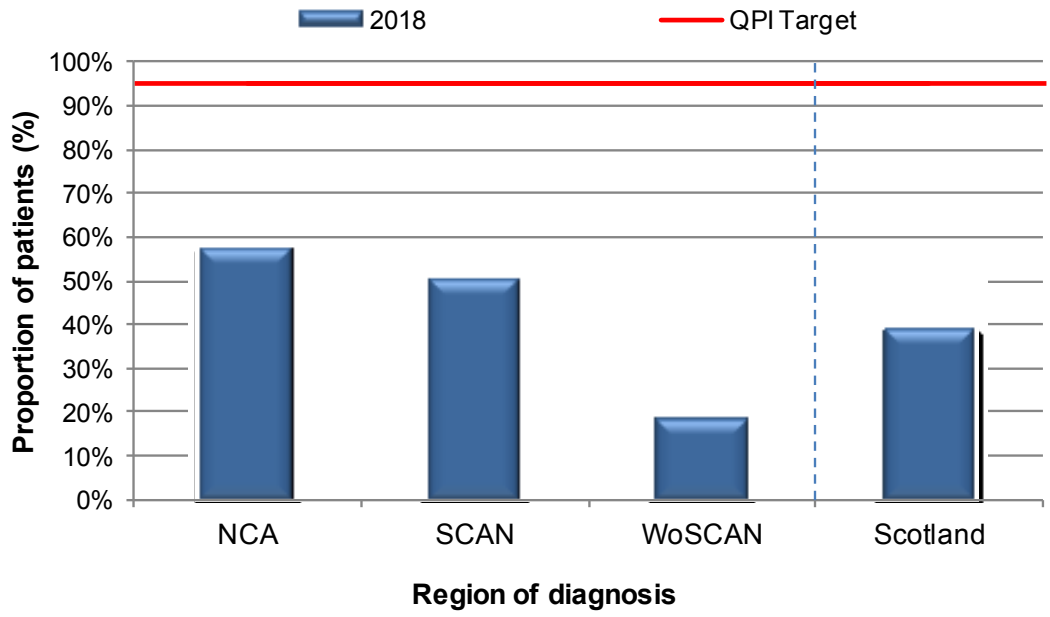
The Glasgow MDT commented that three cases included data errors due to local data recording. Two cases did have MRI fusion while one patient should not be included in the audit as their tumour morphology had been miscoded. As two of these cases are from NHS Western Isles, the amended result would affect both NCA and WoSCAN. Amended performances would be NCA 47/47 (100.0%) and WoSCAN 75/77 (97.4%).

QPI 11: Seizure Management

The diagnosis of epilepsy is more accurate when made by a medical practitioner who specialises in epilepsy, resulting in better patient outcomes. Access to a nurse with expertise in epilepsy management enhances quality of life for patients and gives a more patient-centred approach to care[1].

QPI 11:	Patients with brain/CNS cancer presenting with seizures at diagnosis should be seen by a neurologist and/or a nurse with expertise in epilepsy management.
Description:	Proportion of patients with brain/CNS cancer presenting with seizures at diagnosis who are seen by a neurologist or a nurse with expertise in epilepsy management.
Numerator:	Number of patients presenting with seizures at diagnosis seen by a neurologist or a nurse with expertise in epilepsy management.
Denominator:	All brain/CNS cancer patients presenting with seizures at diagnosis.
Exclusions:	None.
Target:	95%

Figure 15: Proportion of patients with brain/CNS cancer presenting with seizures at diagnosis who are seen by a neurologist or a nurse with expertise in epilepsy management.



QPI 11	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	57.1%	16	28	0	0	0
SCAN	50.0%	18	36	1	0	1
WoSCAN	18.2%	8	44	4	0	0
Scotland	38.9%	42	108	5	0	1

No Region met the 95% target. Performance ranged from 18.2% in WoSCAN to 57.1% in NCA. The overall national performance was 38.9%. All MDTs have found the tightening to the 4 week timeframe challenging.

The Edinburgh MDT commented that the CNS in Edinburgh will liaise with all Boards within the Region to ensure the requirement of the QPI is known and understood.

The Glasgow MDT commented that there is perceived improvement in this area with a dedicated neurologist for cases presenting with seizures in place. It was suggested that there may be an issue of data capture in this area. Efforts will be made within the Region to improve referral of appropriate cases to specialists with expertise in epilepsy management.

The Aberdeen/Inverness MDT highlighted a small number of cases who were not seen as they were being managed in ICU (Intensive Care Unit) as a precaution for their seizure symptoms. Two cases had symptoms that were deemed not to be due to seizure activity and therefore were not referred by neurosurgeons.

Actions:

- CNS in the Edinburgh Centre to highlight requirements of QPI to Boards within the Region.
- Glasgow MDT to examine the data in more detail to fully understand the issue, and explore ways of improving referral rates of patients to specialised staff.

QPI 12: Key Worker

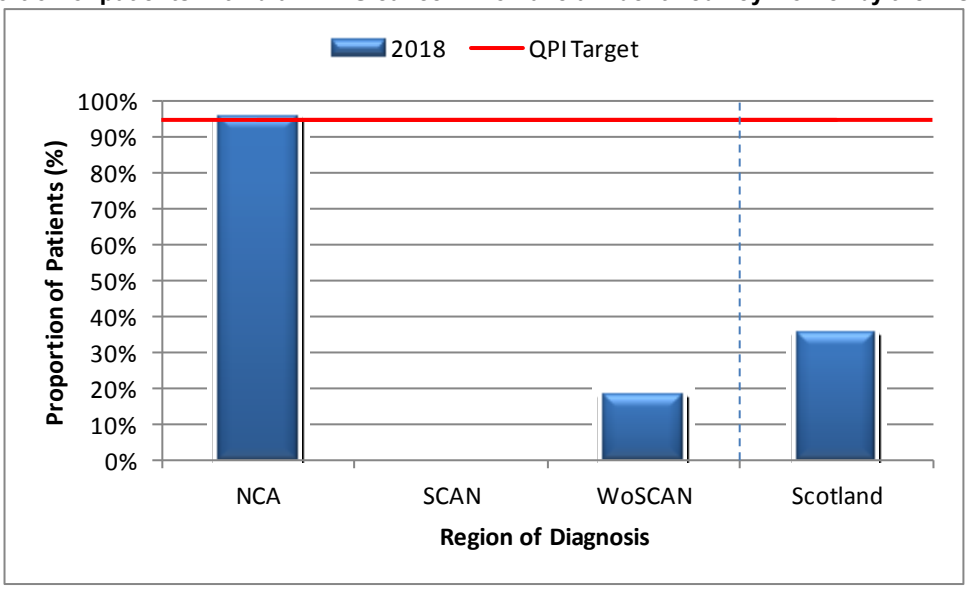
It is recommended that all patients with CNS tumours should have an identified key worker. Having a clearly identified key worker is important to ensure that care is adequately coordinated for patients with CNS tumours.

While the patient is being managed under the care of the neuroscience or oncology/radiotherapy centre the key worker is likely to be the Clinical Nurse Specialist (CNS).

Supportive care patients have been excluded from this QPI as they are managed separately through a palliative care route.

QPI :	Patients with brain/CNS cancer should have an identified key worker to coordinate care across the patient pathway.
Description:	Proportion of patients with brain/CNS cancer who have an identified key worker by the first MDT meeting.
Numerator:	Number of patients with brain/CNS cancer who have an identified key worker by the first MDT meeting.
Denominator:	All patients with brain/CNS cancer.
Exclusions:	Patients undergoing supportive care.
Target:	95%

Figure 16: Proportion of patients with brain/CNS cancer who have an identified key worker by the first MDT meeting.



QPI 12	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	95.3%	82	86	4	0	0
SCAN	0.0%	0	92	0	0	0
WoSCAN	18.0%	20	111	89	0	0
Scotland	35.3%	102	289	93	0	0

NCA was the only Region to meet the 95% target with a performance of 95.3%. SCAN and WoSCAN were significantly short of the target with 0.0% and 18.0% respectively. It should be noted that 89

cases in WoSCAN were missing data as to whether a key worker had been assigned. The overall national performance was 35.3%.

Both the Edinburgh and Glasgow MDTs raised concern over the timing of assignment of a key worker. It is felt that MDT is not the most appropriate time to do this as the diagnosis and management plan are still being established. A more appropriate time would then be after histological diagnosis when a clear management plan has been developed for the patient.

Action:

- SANON to lead discussion around the most appropriate time frame within the pathway to assign a key worker.

QPI 13: 30 Day Mortality after Treatment for Brain/CNS Cancer

Treatment related mortality is a marker of the quality and safety of the whole service provided by the MDT. Outcomes of treatment, including treatment related morbidity and mortality should be regularly assessed.

Treatment should only be undertaken in individuals that may benefit from that treatment. This QPI is intended to ensure that treatment is given appropriately, and the outcome reported on and reviewed.

QPI :	30 day mortality following treatment for brain/CNS cancer.
Description:	Proportion of patients with brain/CNS cancer who die within 30 days of treatment (surgery, radiotherapy and chemotherapy) for brain/CNS cancer.
Numerator:	Number of patients with brain/CNS cancer who undergo treatment that die within 30 days of treatment.
Denominator:	All patients with brain/CNS cancer who undergo treatment. (i) Surgery (ii) Chemotherapy (iii) Chemoradiotherapy (iv) Radiotherapy
Exclusions:	No exclusions
Target:	<5%

Table 5: Proportion of patients with brain/CNS cancer who die within 30 days of surgery.

QPI 13 Surgery (i)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
Aberdeen	9.8%	6	61	0	0	0
Dundee	4.8%	1	21	0	0	0
Edinburgh	2.4%	2	85	1	0	0
Glasgow	3.2%	4	125	0	0	0
Scotland	4.5%	13	292	1	0	0

Aberdeen exceeded the <5% target with 9.8%. All other centres were within the target. The overall national performance was 4.5%.

Table 6: Proportion of patients with brain/CNS cancer who die within 30 days of chemotherapy.

QPI 13 Chemotherapy (ii)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	12.5%	3	24	0	0	0
SCAN	2.4%	1	41	20	0	1
WoSCAN	1.6%	1	64	11	0	1
Scotland	3.9%	5	129	36	0	2

NCA exceeded the <5% target with a performance of 12.5%. The overall national performance was 3.9%.

Table 7: Proportion of patients with brain/CNS cancer who die within 30 days of chemoradiotherapy.

QPI 13 Chemoradiotherapy (iii)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	3.2%	1	31	0	0	0
SCAN	0.0%	0	37	0	0	1
WoSCAN	3.2%	2	62	2	0	0
Scotland	2.3%	3	130	2	0	1

All Regions were within the <5% target, with performance ranging from 0.0% in SCAN to 3.2% in both NCA and WoSCAN.

Table 8: Proportion of patients with brain/CNS cancer who die within 30 days of radiotherapy.

QPI 13 Radiotherapy (iv)	Performance (%)	Numerator	Denominator	Not Recorded Numerator	Not Recorded Exclusions	Not Recorded Denominator
NCA	15.0%	3	20	0	0	0
SCAN	11.8%	4	34	0	0	1
WoSCAN	0.0%	0	16	2	0	1
Scotland	10.0%	7	70	2	0	2

NCA and SCAN exceeded the <5% target with 15.0% and 11.8% respectively. The WoSCAN performance was 0.0%. The overall national performance was 10.0%.

MDTs have reviewed all cases of mortality for all treatment modalities. In most cases death was due to rapid disease progression. Other causes of death included community acquired pneumonia, intracerebral haemorrhage and out of hospital cardiac arrest post discharge. On reviewing cases, no cases of mortality were deemed to be preventable and no specific improvement actions were identified.

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 using CEPAS data in the next audit cycle. In the meantime all deaths within 30 days of SACT will continue to be reviewed at a treatment centre level.

QPI 14: Clinical Trials Access

Clinical trials are necessary to demonstrate the efficacy of new therapies and other interventions. Evidence suggests improved patient outcomes when hospitals are actively recruiting patients into clinical trials[1].

Clinicians are therefore encouraged to enter patients into well designed trials and to collect longer term follow up data.

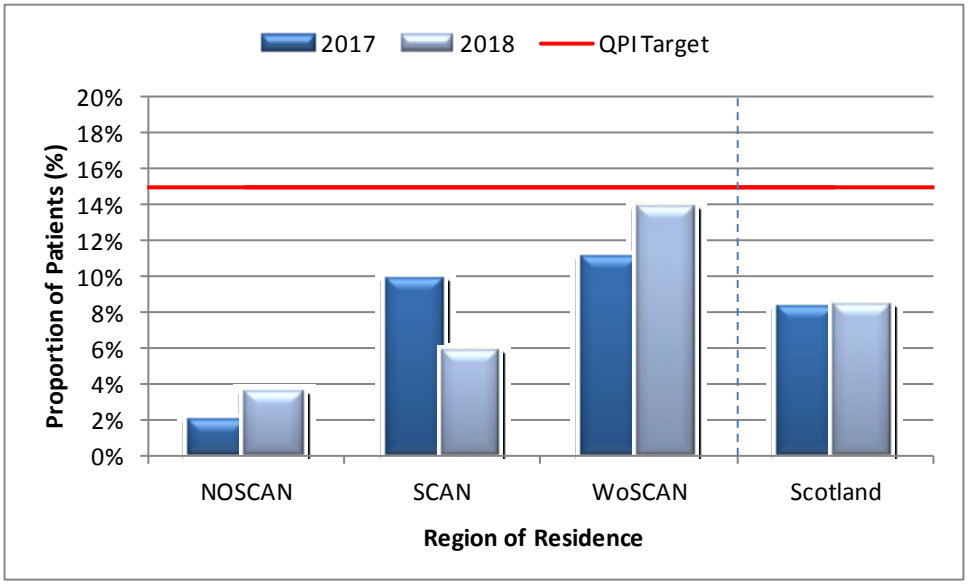
High accrual activity into clinical trials is used as a goal of an exemplary clinical research site.

The measurement of this QPI focuses on those patients who have consented in order to reflect the intent to join a clinical trial and demonstrate the commitment to recruit patients. Often patients can be prevented from enrolling within a trial due to stratification of studies and precise inclusion criteria identified during the screening process.

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].

QPI 13:	All patients should be considered for participation in available clinical trials/research studies, wherever eligible.
Description:	Proportion of patients diagnosed with brain/CNS cancer who are consented for a clinical trial/research study.
Numerator:	Number of patients diagnosed with brain/CNS cancer consented for a clinical/research study.
Denominator:	All patients with Brain/CNS cancer.
Exclusions:	No exclusions
Target:	15%

Figure 17: Proportion of patients consented for clinical trials for brain/CNS cancer by NHS Board of residence, 2017 and 2018.



	Consented Target 15%			Recruited		
	N	D	%	N	D	%
NCA	4	113	3.5%	2	113	1.8%
SCAN	8	138	5.8%	NA	NA	NA
WoSCAN	23	166	13.9%	19	166	11.5%
Scotland	**35**	**417**	**8.4%**	**NA**	**NA**	**NA**

N: Number of patients consented/enrolled in trials.

D: Cancer registry data (5-year average)

%: Percentage of patients enrolled in clinical trials.

No regions met the 15% target for patients consented for clinical trials. Performance ranged from 3.5% in NCA to 13.9% in WoSCAN. The overall national performance was 8.4%.

Table 9: List of clinical trials with number of patients consented for each trial in 2018.

Project Title	Consented 2018
AZD1390 given with radiation therapy in patients with brain cancers	2
BEACON-Neuroblastoma Trial: Bevacizumab, Temozolomide ± Irinotecan	1
BRITER	1
BT-LIFE	12
CamBMT1	1
CheckMate 548: CHECKpoint pathway and nivoluMAb clinical Trial Evaluation 548	3
Diffusion imaging in gliomas	3
Intellance 1 - A Phase IIb/III study of ABT414 for newly diagnosed glioblastoma	1
PARADIGM	6
PARADIGM-2	3
ROAM	2
Total	***35***

All Regions are striving to increase trial activity at their trial centres. Feedback from the trials unit at the Beatson West of Scotland Cancer Centre (BWoSCC) stated that the majority of trials are phase I therefore recruitment numbers are generally low, but efforts have been made to increase the breadth of the trial portfolio.

For example, the BT-LIFE study is a randomised trial testing three different behavioural interventions for glioma patients with fatigue, which has recruited extremely well and has benefited from the appointment of a part-time research fellow whose salary is funded by the research grant. This study illustrates how high recruitment figures can be when properly funded research support staff are in place. The centre is optimistic that recruitment will increase as phase I trials progress to phase II. Efforts will be made to continue participation in behavioural, supportive care and biomarker studies which are of critical importance in this population of patients.

5. Conclusions

The development of national QPIs for brain and CNS cancers will help 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 will facilitate regular monitoring and reporting of data to ensure equitable care across the country.

The Scottish Adult Neuro-Oncology Network (SANON) is encouraged by the continued support and commitment of Network members to deliver a high quality service to brain/CNS cancer patients across the country. The results presented in this report demonstrate that patients with brain/CNS cancer receive a consistent and improving standard of care across all geographical locations. Case ascertainment and data capture is of a high standard enabling robust assessment of performance against QPIs.

The results presented within this report illustrate that some of the QPI targets set have been challenging for NHS Boards to achieve and there remains room for further service improvement, however it is encouraging that the target was consistently met by all Regions for QPIs relating to neuropathological diagnosis, pre treatment MRI, specialist neuro-oncology access, radical radiotherapy planning and 30 day mortality after chemoradiotherapy.

Targets have been particularly challenging for QPIs relating to molecular analysis, seizure management and documentation at MDT. Where targets have not been met NHS Boards have provided detailed comment indicating valid clinical reasons.

SANON should lead national discussion into QPIs 1 and 6, in order to ensure that they are collecting meaningful data that will drive clinical service improvement.

SANON, MDTs and neuro-oncology centres are asked to develop local Action/Improvement Plans in response to the findings presented in the report. A summary of actions for SANON, MDTs and neuro-oncology centres has been included within the Action Plan templates in the Appendix.

Actions required:

QPI 1: Documentation of Performance Status

- Aberdeen/Inverness MDT to submit a query to ISD regarding the definition for performance status.
- SANON to evaluate how performance status data is being collected to help determine whether any definitional change is required.

QPI 2: Multi-disciplinary Team Meeting (MDT)

- Aberdeen/Inverness MDT to discuss patients using CT results only if MRI results are not available.

QPI 3: Molecular Analysis

- Edinburgh pathology department to email Clinicians when cytogenetics results are available.

QPI 6: Maximal Surgical Resection

- SANON to lead discussion on the most appropriate way to capture and measure maximal surgical resection, in order to reach a national consensus, ahead of the formal review scheduled for 2020.

QPI 9: Access to Adjuvant Treatment

- Aberdeen/Inverness MDT to increase the number of radiotherapy and MRI planning slots.

QPI 11: Seizure Management

- CNS in Edinburgh to highlight requirements of QPI to Boards within the Region.
- Glasgow MDT to examine the data in more detail to fully understand the issue, and explore ways of improving referral rates of patients to specialised staff.

QPI 12: Identified Key Worker to Coordinate Care

- SANON to lead discussion around the most appropriate time frame within the pathway to assign a key worker.

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

Progress against these plans will be monitored by the SANON and any service or clinical issue which the SANON considers not to have been adequately addressed will be escalated to the NHS Board Territorial Lead Cancer Clinician and Regional Lead Cancer Clinician.

Additionally, progress will be reported annually to the Regional Cancer Advisory Group (RCAG) by NHS Board Territorial Lead Cancer Clinicians and NMCN Clinical Leads, and nationally on a three-yearly basis to Healthcare Improvement Scotland as part of the governance processes set out in CEL 06 (2012).

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 brain and CNS cancers for their contribution to the clinical audit process.

Abbreviations

AA	NHS Ayrshire & Arran
ACaDMe	Acute Cancer Deaths and Mental Health
BWoSCC	Beatson West of Scotland Cancer Centre
CEL	Chief Executive Letter
CNS	Central Nervous System
CT	Computed Tomography
D&G	NHS Dumfries & Galloway
eCASE	Electronic Cancer Audit Support Environment
FV	NHS Forth Valley
GGC	NHS Greater Glasgow and Clyde
GTV	Gross Tumour Volume
HIS	Healthcare Improvement Scotland
ISD	Information Services Division
KPS	Karnofsky Performance Status
MCN	Managed Clinical Network
MDT	Multidisciplinary Team
MGMT	O6-methylguanine-DNA methyltransferase
MRI	Magnetic Resonance Imaging
NCQSG	National Cancer Quality Steering Group
NMCN	National Managed Clinical Network
NOSCAN	North of Scotland Cancer Network
QPI(s)	Quality Performance Indicator(s)
RCAG	Regional Cancer Advisory Group
SANON	Scottish Adult Neuro-Oncology Network
SCAN	South East of Scotland Cancer Network
VMAT	Volumetric Modulated Arc Therapy
WHO	World Health Organisation
WoS	West of Scotland
WoSCAN	West of Scotland Cancer Network

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Appendix: NHS Board Action Plans

A summary of actions has been provided within the Audit Report. Neuro-oncology centres should populate the template with relevant actions and completed Action Plans should be returned to WoSCAN within two months of publication of this report.

Action / Improvement Plan

Area:	Aberdeen/Inverness MDT
Action Plan Lead:	
Date:	

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

QPI No.	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see Key)
			Start	End			
1	Submit a query to ISD regarding the definition for performance status	*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.*
2	Discuss patients using CT results only if MRI results are not available						
9	Increase the number of radiotherapy and MRI planning slots						

Action / Improvement Plan

Area:	Edinburgh MDT
Action Plan Lead:	
Date:	

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

QPI No.	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see Key)
			Start	End			
3	Pathology department to email Clinicians when cytogenetics results are available	*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*.
11	Highlight requirements of QPI to Boards within the Region						

Action / Improvement Plan

Area:	Glasgow MDT
Action Plan Lead:	
Date:	

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

QPI No.	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see Key)
			Start	End			
11	Examine the data in more detail to fully understand the issue, and explore ways of improving referral rates of patients to specialised staff.	*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*.

Action / Improvement Plan

Area:	SANON
Action Plan Lead:	
Date:	

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

QPI No.	Action Required	Health Board Action Taken	Timescales		Lead	Progress/Action Status	Status (see Key)
			Start	End			
1	Evaluate how performance status data is being collected to help determine whether any definitional change is required	*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*.
6	Lead discussion on the most appropriate way to capture and measure maximal surgical resection, in order to reach a national consensus, ahead of the formal review scheduled for 2020						
12	Lead discussion around the most appropriate time frame within the pathway to assign a key worker						