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 2016 Clinical Audit Data

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CONTENTS

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 during 2016. 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 third consecutive year. Following reporting of Year 1 data, a process of baseline review was undertaken to ensure QPIs were fit for purpose and truly driving quality improvement in patient care. This review process resulted in measurability changes to some QPIs and therefore Year 1 data is only presented within this report alongside Year 2 and Year 3 data for QPIs where results have remained comparable. Future reports will continue to compare clinical audit data in successive years to further illustrate trends.

Background

The Scottish Adult Neuro-Oncology Network (SANON) was established in 2006 and is one of three national cancer networks in Scotland. Brain and CNS cancers are relatively rare cancers with approximately 425 adult cases diagnosed in Scotland each year[4]. The 2016 audit identified 329 patients diagnosed with a new primary cancer of the brain or CNS in Scotland.

The percentage frequency of brain and CNS cancers in Scotland is comparatively low at 1.3% of all cancers diagnosed[5]. It was ranked as the fifteenth most commonly diagnosed cancer in males and the nineteenth most commonly diagnosed cancer in females in Scotland in 2015[5]. The incidence of brain and CNS cancers has decreased by 0.6% in males over the past ten years from 2005 to 2015. However an increase in incidence of 8.1% has been observed in the female population over the same period and overall incidence for both males and females has increased by 2.8% in the past ten years[5].

Although one-year relative survival is seen to be increasing for both males and females (+9.8% and +7.7% respectively between 1987 – 1991 and 2007 – 2011)[6], there is little change in five-year survival rates for brain and CNS cancers.

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. 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 Centre / MDT	Constituent Hospital(s)
Aberdeen	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. NOSCAN and WoSCAN 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 2016 and 31st December 2016 was downloaded from eCASE at 2200 hrs on 25th May 2017. SCAN data was collected and analysed regionally and the final results were submitted to WoSCAN in August 2017.

Analysis was performed centrally by the WoSCAN Information Team for NOSCAN and WoSCAN Boards 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.

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

Brain/CNS Cancer **Quality Performance Indicator (QPI)**	**Performance by Region of diagnosis (QPIs 1, 2, 4, 5, 8-11)**								
	QPI target	**NOSCAN**		**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%	90.5% >		73.5% <		95.9% >		86.4% >	
		76	84	86	117	117	122	279	323
QPI 2: Multidisciplinary Team Meeting – Proportion of patients with brain/CNS cancer who are discussed at MDT meeting before definitive treatment.	95%	91.6% >		92.3% <		100% >		95.0% >	
		76	83	108	117	119	119	303	319
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%	98.3% >		45.6% <		97.8% <		80.1% <	
		58	59	36	79	91	93	185	231
QPI 5: Pre-treatment MRI – Proportion of patients with brain/CNS cancer undergoing surgical resection and/or radical radiotherapy or chemotherapy, who have an MRI prior to treatment.	90%	97.9% <		97.4% <		84.9% <		91.8% <	
		46	47	38	39	62	73	146	159
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% =		100% =		100% =		100% =	
		51	51	82	82	72	72	205	205
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%	53.8% <		83.9% >		84.2% <		75.8% <	
		14	26	26	31	32	38	72	95

Brain/CNS Cancer **Quality Performance Indicator (QPI)**	**Performance by Region of diagnosis (QPIs 1, 2, 4, 5, 8-11)**									
	QPI target	**NOSCAN**		**SCAN**		**WoSCAN**		**SCOTLAND**	
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%	96.9% >		100% =		95.9% <		97.5% >	
		31	32	41	41	47	49	119	122
QPI 11: Seizure Management – 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.	95%	95.0% >		91.4% <		66.7% >		84.1% >	
		19	20	32	35	18	27	69	82

Brain/CNS Cancer **Quality Performance Indicator (QPI)**		**Performance by Hospital of surgery (QPIs 3, 6 and 7)**									
		QPI target	**Aberdeen**		**Dundee**		**Edinburgh**		**Glasgow**		**SCOTLAND**	
QPI 3 (i): Molecular Analysis – Patients with gliomas with an oligodendroglial component who have the tumour tested for combined loss of 1p/19q within 21 days of surgery.		90%	20.0% >		-		100% >		75.0% <		70.8% >	
			1	5	-	-	9	9	6	8	17	24
QPI 3 (ii): Molecular Analysis – Patients with glioblastomas who have the tumour tested for MGMT promoter methylation status within 21 days of surgery.		90%	63.3% >		92.9% <		94.9% <		61.5% <		76.2% >	
			19	30	13	14	56	59	40	65	128	168
QPI 6: Maximal Surgical Resection – Proportion of patients with malignant glioma (with enhancing component on pre-operative imaging) who undergo maximal surgical resection (>90% resection of the measurable enhancing component), provided it is considered consistent with safe outcome.	(i) resection	30%	35.0% <		44.4% >		56.4% >		30.1% >		43.3% >	
			7	20	4	9	22	39	9	29	42	97
	(ii) biopsy and resection	30%	35.0%		36.4% <		56.4% >		26.5%		40.4% >	
			7	20	4	11	22	39	9	34	42	104
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%	65.0% >		88.9% >		85.7% <		68.3% >		75.9% >	
			13	20	8	9	36	42	28	41	85	112

A dash (-) denotes restricted data where the denominator is less than 5.

Conclusions and Action Required

The development of national QPIs for brain and CNS cancers has helped to 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.

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 good standard enabling robust assessment of performance against QPIs. However SANON will compare 2014 and 2015 cohorts to further improve cases ascertainment.

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 targets relating to specialist neuro-oncology access, radical radiotherapy planning and maximal surgical resection were consistently met by all regions in 2015.

Where targets have not been met NHS Boards have provided detailed comment indicating valid clinical reasons or in some cases patient choice or co-morbidities have influenced patient management.

SANON, MDTs and neuro-oncology centres are asked to develop local Action/Improvement Plans in response to the findings presented in the report.

Actions required:

Case Ascertainment

- SANON to obtain Scottish Cancer Registry cohorts for 2014 and 2015 and work with NHS Boards to compare with QPI cohorts to further improve case ascertainment.

QPI 1: Documentation of Performance Status

- SCAN and NoSCAN to ensure that performance status is captured for all patients at initial discussion, to inform decision making at MDT.

QPI 2: Multidisciplinary Team Meeting

- Aberdeen centre to raise awareness with regards to ensuring all cases including those where no intervention is being considered are discussed at MDT.

QPI 3: Molecular Analysis (ii)

- SANON to liaise with the Regional Molecular Pathology Departments to improve turnaround times for molecular testing.

QPI 4: Neuropathological Diagnosis

- SCAN should investigate the reduction in performance from the previous years and ensure processes are in place to capture all data items on the pathology report.

QPI 9: Access to Adjuvant Treatment

- Glasgow centre to review cases diagnosed outwith NHSGGC and provide feedback on the outcome of the review.

A template has been provided in the Appendix to enable SANON and each MDT to produce an Action Plan to address the areas highlighted above.

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 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 during 2016. 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 third consecutive year. Following reporting of Year 1 data, a process of baseline review was undertaken to ensure QPIs were fit for purpose and truly driving quality improvement in patient care. This review process resulted in measurability changes to some QPIs and therefore Year 1 data is only presented within this audit report alongside Year 2 and Year 3 data for QPIs where results have remained comparable. Future reports will continue to compare clinical audit data in successive years to further illustrate trends.

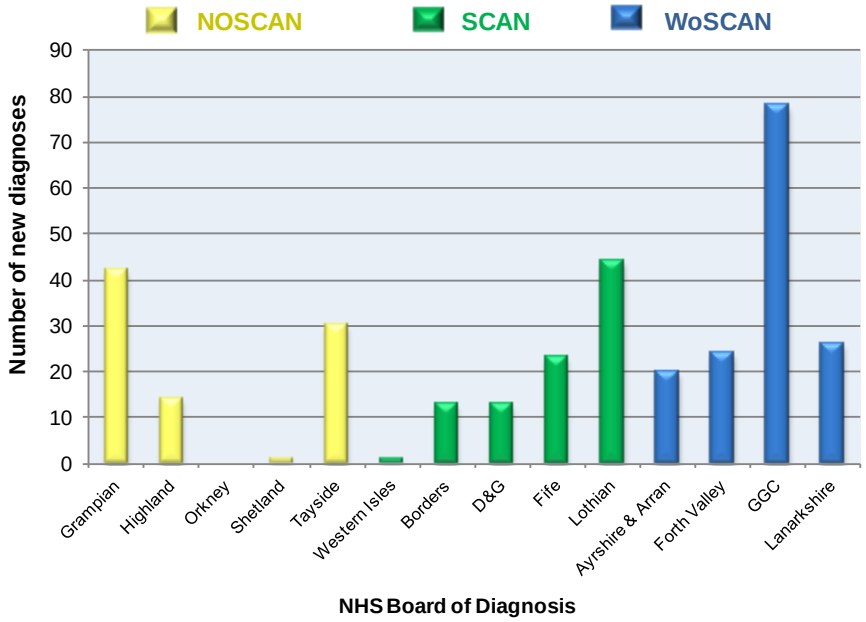
2. Background

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 2011 and 2015[4]. The 2016 audit identified 329 patients diagnosed with a new primary cancer of the brain or CNS in Scotland.

The distribution of the 329 newly diagnosed cases in 2016 is presented in Figure 1 by location of diagnosis across the fourteen NHS Boards. The West of Scotland Cancer Network (WoSCAN) recorded 45% of new diagnoses in 2016 with 148 new cases of brain and CNS cancers captured by audit. This is in line with the adult population distribution in this region as 2015 mid-year population estimates[8] show that 46.4% of the Scottish adult population reside within West of Scotland (WoS) region. It should be noted that 24 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, 2016.



NOSCAN	Grampian	Highland	Orkney	Shetland	Tayside	W. Isles	NOSCAN
Number of cases	42	14	0	1	30	1	88

SCAN	Borders	D&G	Fife	Lothian	SCAN
Number of cases	13	13	23	44	93

WoSCAN	AA	FV‡	GGC‡	Lanarkshire	WoSCAN
Number of cases	20	23	79	26	148

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

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. 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 Centre / MDT	Constituent Hospital(s)
Aberdeen	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 2011 and 2015[4]. The percentage frequency of brain and CNS cancers in Scotland is comparatively low at 1.3% of all cancers diagnosed. It was ranked as the fifteenth most commonly diagnosed cancer in males and the nineteenth most commonly diagnosed cancer in females in Scotland in 2015[4].

The incidence of brain and CNS cancers has decreased by 0.6% in males over the past ten years from 2005 to 2015. An increase in incidence of 8.1% has been observed in the female population over the same period and overall incidence for both males and females has increased by 2.8%[5]. Although the mortality rate from brain and CNS cancers has seen a moderate increase in males of 1.1%, a 10.3% rise in female mortality has resulted in an overall increase in mortality of 4.5%. Brain and CNS cancers are ranked as the fourteenth most common cause of death from cancer and accounted for 2.5% of all deaths from cancer in 2016[5].

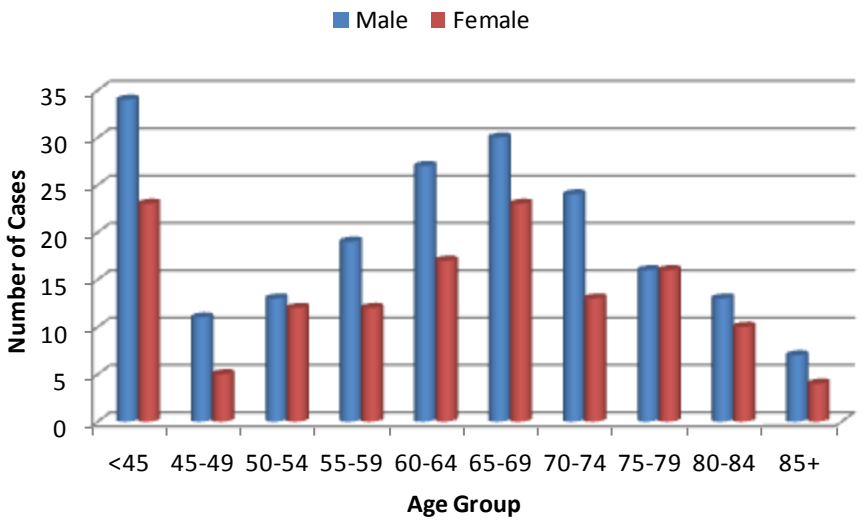
Relative survival at one year is increasing for brain and CNS cancers[6]. Table 1 shows the percentage change in survival rates for patients diagnosed between 1987 and 1991 compared to those diagnosed between 2007 and 2011.

Table 1: Percentage change in relative age-standardised 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 %

The incidence of brain and CNS cancers has an unusual age distribution compared to other cancer types. The incidence is relatively high in children, decreasing in the teens and then rising again after age 40[9]. This report includes all cases aged 16 and over and the age distribution for males and females diagnosed in 2016 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 2016 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	34	11	13	19	27	30	24	16	13	7	194
Female	23	5	12	12	17	23	13	16	10	4	135

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. NOSCAN and WoSCAN 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 2016 and 31st December 2016 was downloaded from eCASE at 2200 hrs on 24th May 2017. SCAN data was collected and analysed regionally and the final results were submitted to WoSCAN in August 2017. 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 for NOSCAN and WoSCAN Boards 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.

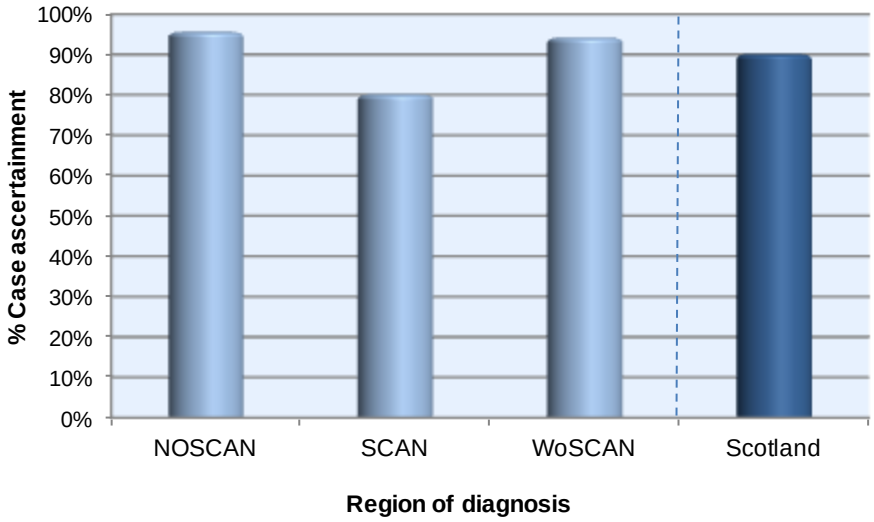
4. Results and Action Required

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 reasonably high at 90.1% which indicates that the capture of new cases of brain and CNS cancers through audit is good and overall results should be an accurate reflection of performance. 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 and varies from 80.2% in SCAN to 95.7% in NOSCAN.

Figure 3: Case ascertainment by region for patients diagnosed with brain and CNS cancers in Scotland in 2015.



	NOSCAN	SCAN	WoSCAN	Scotland
Cases from audit	88	93	148	329
ISD Cases (2011-2015 average)	92	116	157	365
% Case ascertainment	95.7%	80.2%	94.3%	90.1%

Although data capture throughout Scotland is good, further work is required to explore the apparent differences in case ascertainment and potential reasons for this. It was therefore agreed that SANON would request cancer registry data for 2014 and 2015 cohorts and compare with the QPI cohorts to ensure that all patients diagnosed with brain/CNS cancer are captured in audit.

Action required:

- SANON to obtain Scottish Cancer Registry cohorts for 2014 and 2015 and work with NHS Boards to compare with QPI cohorts to further improve case ascertainment.

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. Year 2 and Year 3 data is presented alongside Year 1 data where measurement has remained comparable following the baseline review process.

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.

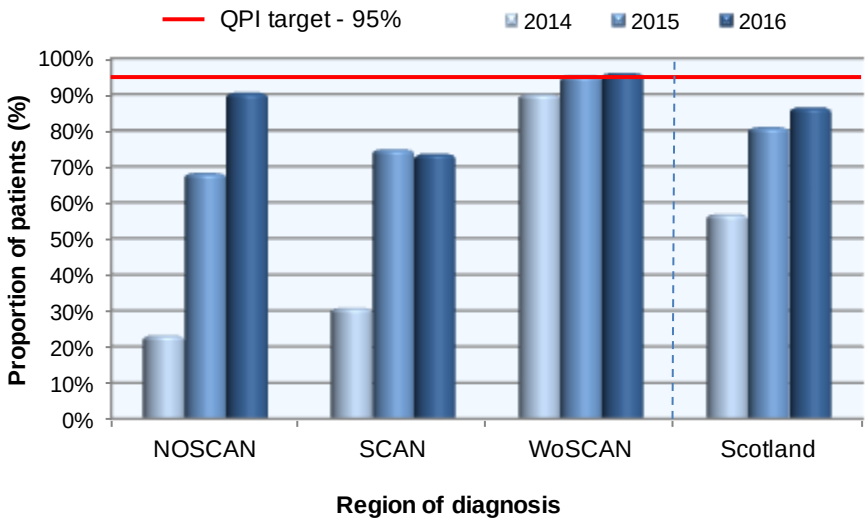
QPI 1: Documentation of Performance Status

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 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 2016.



QPI 1	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	90.5%	73.5%	95.9%	86.4%
Numerator	76	86	117	273
Denominator	84	117	122	323
Not recorded numerator	1	0	1	2
Not recorded numerator (%)	1.2%	0.0%	0.8%	0.6%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

Across Scotland 86.4% of newly diagnosed patients with brain/CNS cancer had a documented WHO performance status at the time of MDT discussion. Improvement in documentation of performance status at MDT has continued with results increasing from 56.8% in 2014 to 86.4% in 2016. WoSCAN met the 95% target for the second consecutive year.

NoSCAN achieved 90.5% which is just below the 95% QPI target however considerable improvement was noted on the previous years' results. The Aberdeen centre commented that the case notes of patients not meeting have been reviewed retrospectively. In virtually all cases the clinical status of the patient was known by the referring clinician but unfortunately was not documented formally in the MDT proforma. There has been a significant improvement since last year from 56% to 85% PS being recorded. Despite making PS a mandatory field in their proforma, NOSCAN recognise that further work is required to raise awareness of the importance of recording this.

In SCAN 31 cases did not have WHO performance status documented at time of MDT discussion resulting in a performance of 73.5%. SCAN has commented that all cases have undergone retrospective review and that 4 cases did not have PS recorded as they were for best supportive care and did not have any further treatment. A further 27 cases did not have PS recorded at time of MDM but it was recorded prior to surgery/oncological treatment.

Action:

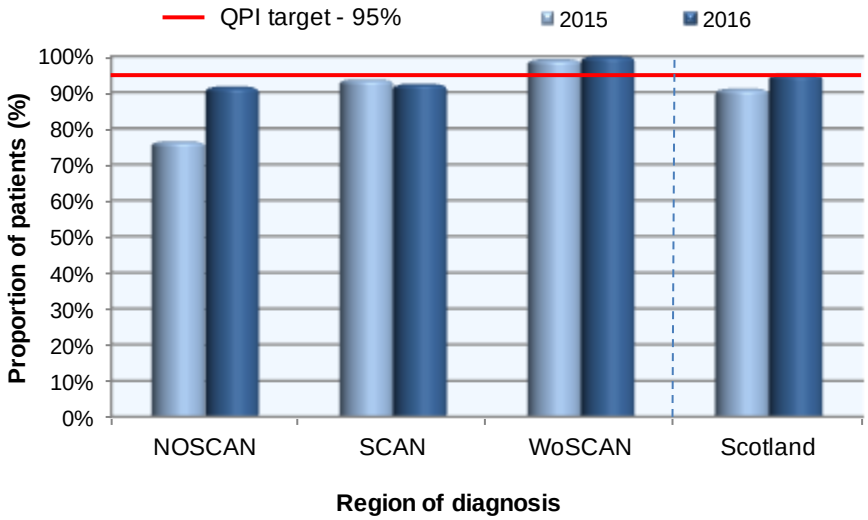
- SCAN and NoSCAN to ensure that performance status is captured for all patients at initial discussion, to inform decision making at MDT.

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 patients' overall satisfaction with their care[1]. Discussion prior to definitive management decisions being made provides reassurance that patients are being managed appropriately.

QPI 2:	Patients with brain/CNS cancer should be discussed by a multidisciplinary team prior to definitive management.
Description:	Proportion of patients with brain/CNS cancer who are discussed at MDT meeting before definitive treatment.
Numerator:	Number of patients with brain/CNS cancer discussed at the MDT before definitive management.
Denominator:	All patients with brain/CNS cancer.
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 definitive treatment, 2015 and 2016.



QPI 2	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	91.6%	92.3%	100.0%	95.0%
Numerator	76	108	119	303
Denominator	83	117	119	319
Not recorded numerator	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

Performance across Scotland was 95.0% which meets the 95% target. Improvement from the previous years' performance is also noted. Only WoSCAN met the target with 100% of patients with brain/CNS cancer being discussed at the MDT prior to definitive treatment.

In NoSCAN 7 cases were not discussed at MDT prior to treatment resulting in a performance of 91.6% against the 95% target. This however is an improvement of 15.2 percentage points on the

previous years' results. The Dundee centre had 2 cases not meeting the QPI criteria and commented that these cases had been reviewed and the reason for cases not being discussed prior to treatment was that the patients required emergency surgery. Aberdeen reviewed the four cases not meeting the target and detailed clinical commentary was provided. Aberdeen added that all cases of suspected brain tumour should be discussed at MDT for audit purposes even if no intervention is being considered. This will be communicated to other colleagues.

SCAN reviewed all cases not meeting the QPI and reported that in the majority of cases patients required emergency surgery and were all discussed at MDT post surgery as per local agreement.

Action:

- Aberdeen centre to raise awareness with regards to ensuring all cases including those where no intervention is being considered are discussed at MDT.

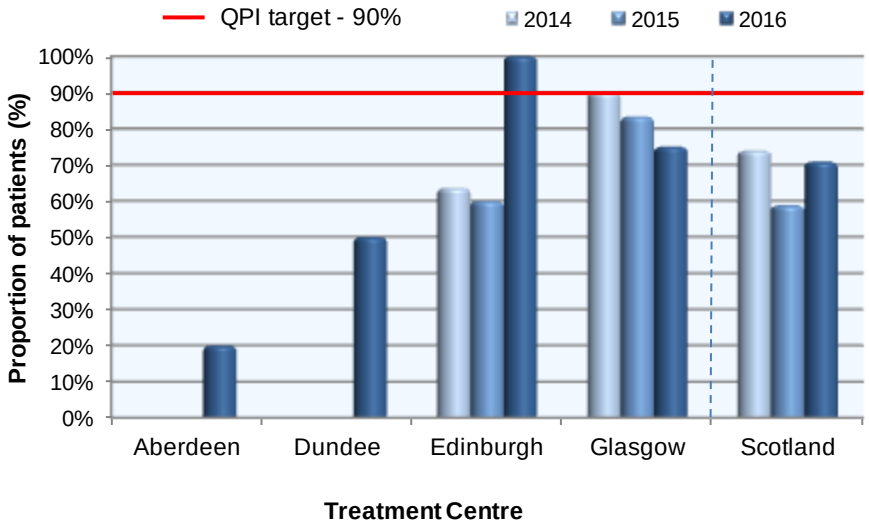
QPI 3: Molecular Analysis

(i) Combined loss of 1p/19q in gliomas with an oligodendroglial component

Combined loss of 1p/19q in gliomas with an oligodendroglial component is associated with a more favourable response to therapy 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 predicated tumour response to therapy and prognosis[1].

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:	Patients with gliomas with an oligodendroglial component who have the tumour tested for combined loss of 1p/19q
Numerator:	Number of patients with glioma with an oligodendroglial component undergoing surgery where tissue sample is tested for 1p/19q within 21 days of surgery.
Denominator:	All patients with glioma with an oligodendroglial component undergoing surgery.
Exclusions:	None
Target:	90%

Figure 6: Proportion of patients with gliomas with an oligodendroglial component who have the tumour tested for combined loss of 1p/19q within 21 days of surgery, 2014 to 2016.



QPI 3 (i)	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	20.0%	-	100.0%	75.0%	70.8%
Numerator	1	-	9	6	17
Denominator	5	-	9	8	24
Not recorded numerator	0	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0	0

A dash (-) denotes restricted data where the denominator is less than 5.

Performance across Scotland was 70.8% against the 90% target for QPI 3 (i) and represents an increase in performance from the previous year. Although testing is being performed an overall increase in the number of days for the reports to become available has affected performance. Only

the Edinburgh centre met the target achieving 100%. Numbers were very low in Aberdeen however with only 1 patient meeting the denominator criteria. Dundee centre numbers have been restricted due to low numbers. Percentages should therefore be viewed with caution.

The Glasgow centre commented that the issues have been raised with neuropathology however prioritisation in molecular testing in the West is now managed by the Regional Molecular Pathology Department. Nevertheless measures have been taken to try and ensure a more rapid turnaround, including looking at possibility to outsource the testing if the 21 day target could not be achieved.

The Tayside centre commented that it is too small a sample size to be statistically significant. They added that they are discussing whether to process tissue in Edinburgh with neuropathology there or if there is a way to improve access to their batch testing.

The Aberdeen centre stated that Histopathology services are provided by NHS Lothian. Of the 3 patients that missed this QPI, 2 were available on 24th day so narrowly missed target.

Following discussion at the formal review meeting reference to oligodendroglial component is to be removed from the denominator criteria.

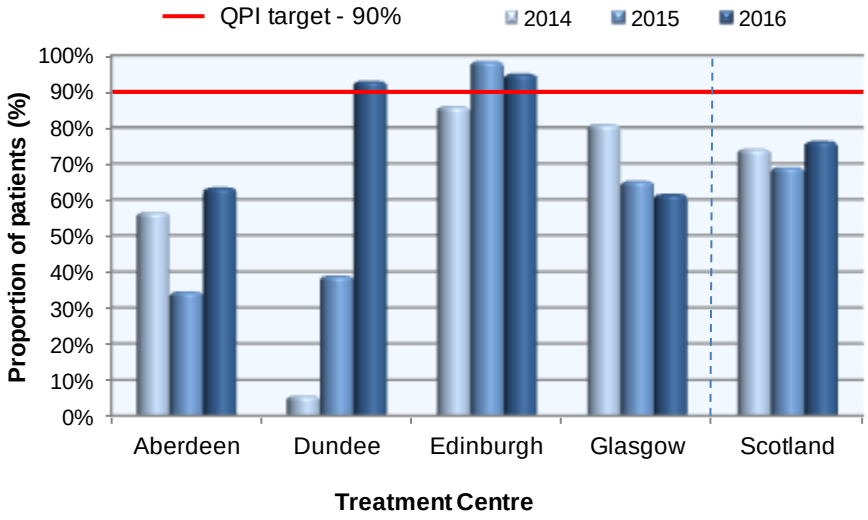
QPI 3: Molecular Analysis

(ii) MGMT promoter methylation status in glioblastomas

Determination of O6-methylguanine-DNA methyltransferase (MGMT) promoter methylation status predicts response to therapy (chemotherapy or concomitant chemoradiotherapy) in glioblastomas and assists in determination of prognosis[1]. 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.

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:	Patients with 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:	None
Target:	90%

Figure 7: Proportion of patients with glioblastomas who have the tumour tested for MGMT promoter methylation status within 21 days of surgery, 2014 to 2016.



QPI 3 (ii)	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	63.3%	92.9%	94.9%	61.5%	76.2%
Numerator	19	13	56	40	128
Denominator	30	14	59	65	168
Not recorded numerator	1	0	0	4	5
Not recorded numerator (%)	3.3%	0.0%	0.0%	6.2%	3.0%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0	0

Performance across Scotland was 76.2% against the 90% target for QPI 3 (ii) with 128 of 168 cases meeting the QPI criteria. This is an increase of 7.2 percentage points on 2015 performance and 2.2 percentage points above the 2014 result. Performance varied across the centres with performance of 61.5% in Glasgow to 94.9% in Edinburgh. Two of the four centres, Dundee and Edinburgh exceeded the QPI target achieving 92.9% and 94.9% respectively. The Edinburgh centre has exceeded the target for two consecutive years.

Aberdeen demonstrated improvement on the previous years' results however only achieved 63.3% which is below the 90% target. Aberdeen commented that histopathology services are provided by NHS Lothian and that systems of processing and sending samples have been streamlined at Aberdeen. Further resources may be required in the pathology department in Edinburgh.

Dundee also noted a considerable improvement on the previous results and commented that improved performance was due to better transport of samples to Edinburgh pathology.

Glasgow achieved 61.5% and showed a reduction in performance since 2014. Comments received from the Glasgow centre stated that the issues have been raised with neuropathology however samples are now managed and prioritised by the Regional Molecular Pathology Department. Nevertheless measures have been taken to try and ensure a more rapid turnaround, including looking at possibility to outsource the testing if the 21 day target could not be achieved.

Action:

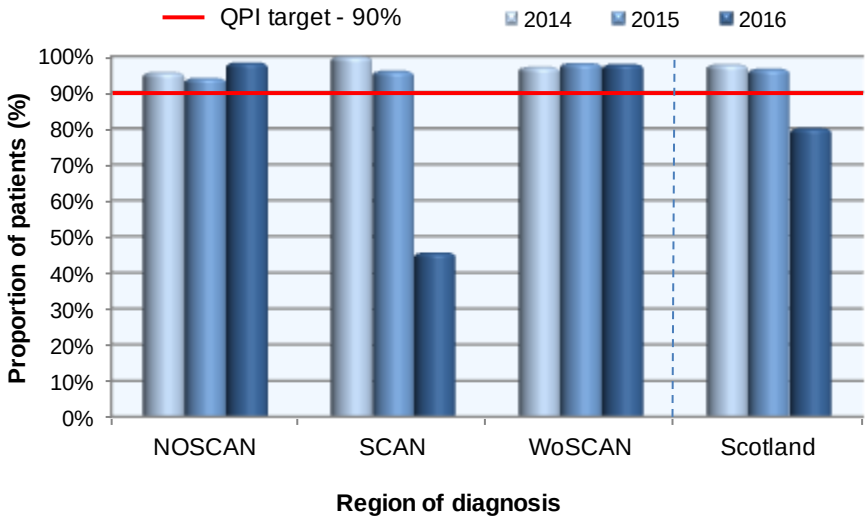
- SANON to liaise with the Regional Molecular Pathology Departments to improve turnaround times for molecular testing.

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 2016.



QPI 4	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	98.3%	45.6%	97.8%	80.1%
Numerator	58	36	91	185
Denominator	59	79	93	231
Not recorded numerator	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

Overall performance across Scotland is 80.1% for QPI 4 which does not meet the 90% QPI target. NoSCAN and WoSCAN met the QPI target for the third consecutive year with performance of 98.3% and 97.8% respectively. SCAN achieved 45.6% and showed a considerable reduction in performance against previous years' results.

SCAN commented that they found many neuropathology reports had limited information relating to the neurosurgical procedure i.e. biopsy or debulking procedure. This will be addressed in the RCPath document revision as this is not a function of the neuropathology report rather of the operation notes.

Following formal review it was decided that type of procedure and tumour subtype will be removed as a requirement for complete pathology reporting.

Action Required:

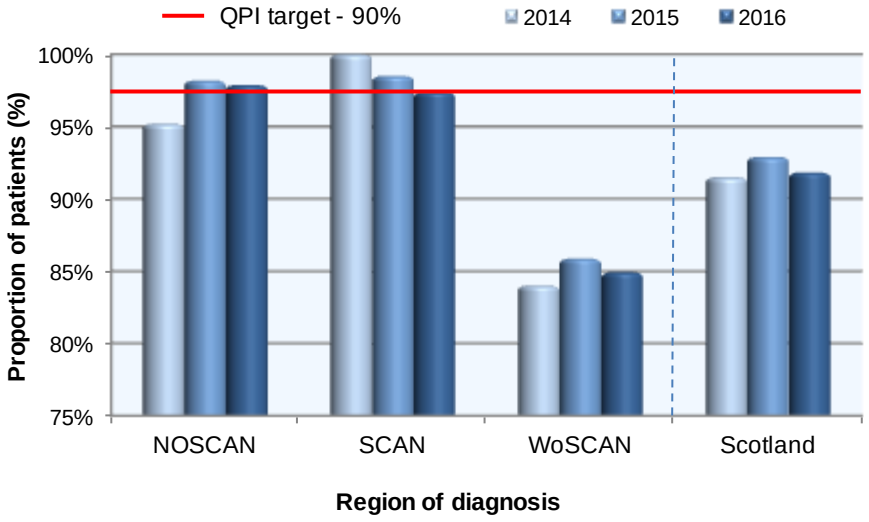
- SCAN should investigate the reduction in performance from the previous years and ensure processes are in place to capture all data items on the pathology report.

QPI 5: Pre-treatment Magnetic Resonance Imaging

Magnetic Resonance Imaging (MRI) is the established investigation for patients with presumed low grade tumours. Although contrast-enhanced 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[1].

QPI 5:	Patients with brain/CNS cancer should have MRI imaging prior to treatment.
Description:	Proportion of patients with brain/CNS cancer undergoing surgical resection and/or radical radiotherapy or chemotherapy, who have an MRI prior to treatment.
Numerator:	Number of patients with brain/CNS cancer undergoing resection of tumour, radical radiotherapy or chemotherapy, who receive an MRI prior to treatment.
Denominator:	All patients with brain/CNS cancer undergoing resection of tumour, radical radiotherapy or chemotherapy.
Exclusions:	• Patients who are unable to undergo an MRI scan. • Patients who refuse MRI scan.
Target:	90%

Figure 9: Proportion of patients with brain/CNS cancer undergoing surgical resection and/or radical radiotherapy or chemotherapy, who have an MRI prior to treatment, 2014 to 2016.



QPI 5	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	97.9%	97.4%	84.9%	91.8%
Numerator	46	38	62	146
Denominator	47	39	73	159
Not recorded numerator	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

Two of the three regions exceeded the 90% QPI target with performance of 97.9% and 97.4% in NOSCAN and SCAN respectively. The overall performance for Scotland was 91.8% which meets the QPI target. In WoSCAN, 11 cases did not have a pre-treatment MRI scan, resulting in a performance of 84.9%.

The Glasgow centre commented on the 7 cases for which details were available and all but one were data entry errors. Had these cases been correctly entered then the target would have been achieved. The 4 cases diagnosed out with the Glasgow centre will be reviewed.

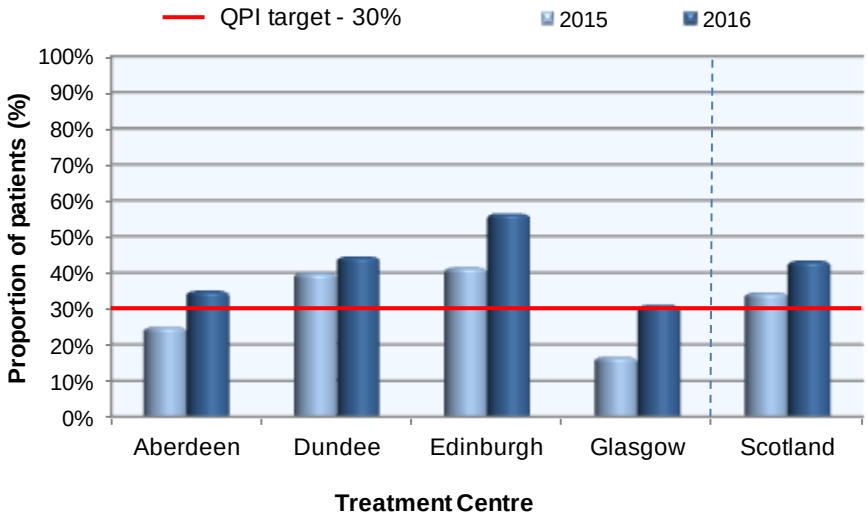
Following discussion at formal review it was decided to split QPI 5 into two parts one focusing on pre surgical MRI and the other pre-oncological (post surgery) MRI.

QPI 6: Maximal Surgical Resection

The extent of surgical resection is an independent 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[1]. Maximum safe surgical resection is recommended by several published guidelines. Published evidence shows that 70 – 90 % of patients judged eligible for maximal safe surgical resection (>90%) actually receive this (depending on surgical technique used). It is less clear what proportion of patients has the potential for maximal safe surgical resection. This is possibly only 30 – 50 %[1].

QPI 6 (i):	Wherever possible patients should undergo maximal surgical resection of malignant gliomas.
Description:	Proportion of patients with resectable malignant glioma (with enhancing component on pre-operative imaging) who undergo maximal surgical resection (>90% resection of the measurable enhancing component), 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 in tumour volume is achieved.
Denominator:	All patients with malignant glioma (with enhancing component on pre-operative imaging) undergoing surgical resection.
Exclusions:	Patients undergoing biopsy only.
Target:	30%

Figure 10: Proportion of patients with resectable malignant glioma who undergo maximal surgical resection where >90% reduction in tumour volume is achieved in 2015 and 2016.



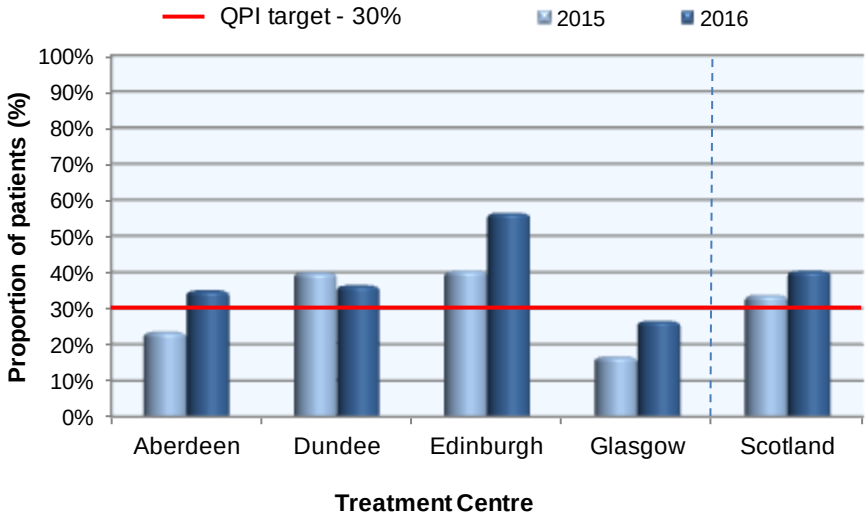
QPI 6 (i)	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	35.0%	44.4%	56.4%	31.0%	43.3%
Numerator	7	4	22	9	42
Denominator	20	9	39	29	97
Not recorded numerator	1	1	0	17	19
Not recorded numerator (%)	5.0%	11.1%	0.0%	58.6%	19.6%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	1	0	0	0	1

Overall performance across Scotland is 43.3% for QPI 6 (i) which exceeds the 30% QPI target by 13.3 percentage points. All four neuro-oncology centres met the QPI target and all showed improved performance on 2015 results. It should be noted that the Glasgow centre had a high number (58.6%) of not recorded for numerator cases.

The measurement criteria for QPI 6 is currently under review and will be amended as part of the formal review process to ensure a more robust quality indicator around maximal surgical resection.

QPI 6 (ii) includes the same measures as part (i) however it also includes patients undergoing biopsy only in the denominator.

Figure 11: Number of patients with resectable malignant glioma (with enhancing component on pre-operative imaging) undergoing surgery (biopsy and resection) where >90% reduction in tumour volume is achieved.



QPI 6 (ii)	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	35.0%	36.4%	56.4%	26.5%	40.4%
Numerator	7	4	22	9	42
Denominator	20	11	39	34	104
Not recorded numerator	1	2	0	18	21
Not recorded numerator (%)	5.0%	18.2%	0.0%	52.9%	20.2%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	1	0	0	0	1

Overall performance across Scotland is 40.4% for QPI 6(ii) which meets the 30% QPI target. Three of the four surgical neuro-oncology centres, Aberdeen, Dundee and Edinburgh, exceeded the QPI target for the second consecutive year achieving 35%, 36.4% and 56.4% respectively. The Glasgow centre did not meet the QPI target achieving 26.5%. 52.9% of cases in Glasgow were also noted as not recorded.

The Glasgow centre has commented that they will continue to encourage surgeons to request pre-operative MRI at MDT. Subspecialisation in the neurosurgeons is seen as a major improvement and likely to improve this.

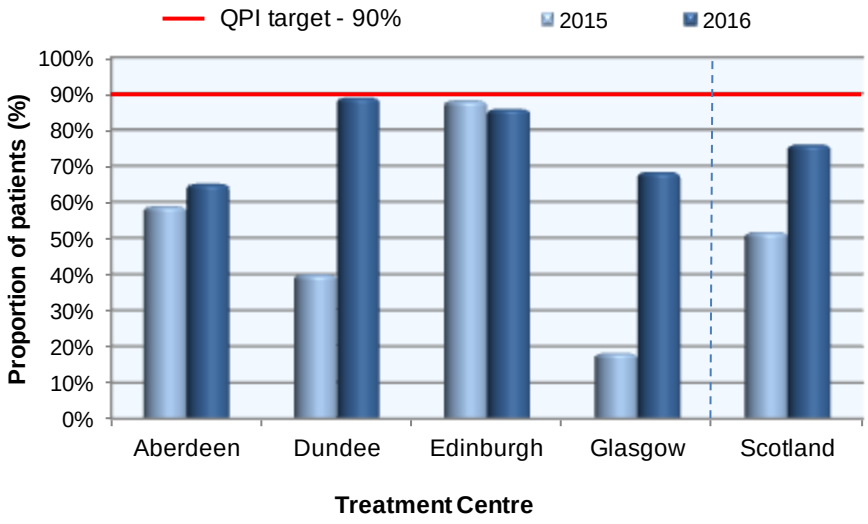
During formal review it was agreed that QPI 6(ii) should be archived.

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 12: 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, 2015 and 2016.



QPI 7	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	65.0%	88.9%	85.7%	68.3%	75.9%
Numerator	13	8	36	28	85
Denominator	20	9	42	41	112
Not recorded numerator	0	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	1	0	0	0	1

Overall results for Scotland show that 75.9% of patients with malignant glioma underwent post-surgical MRI within the specified time (3 days). None of the four surgical centres met the 90% QPI target with the Dundee centre achieving the highest performance of 88.9%.

The Dundee centre commented that this is a considerable improvement on the previous years' results and reflects more MRI scanning being carried out on a Friday. Only one patient did not achieve this target and this was due to the patient being unfit for scanning.

The Aberdeen Centre reviewed all cases where imaging was not obtained within 72 hours. In the majority of cases the imaging was obtained within 96 hours due to demands on the MRI department. Post operative MRI is now routinely recorded on our post operative notes so there are no delays in requests. Unfortunately global hospital pressures on MRI are increasing. Radiology resources may need to be increased to allow for this imaging.

The Edinburgh centre provided comments that 6 patients did not meet this QPI; 3 patients did not receive their MRI performed within 3 days due to unscheduled MRI downtime due to technical difficulties and 3 patients were considered not fit for MRI following surgery.

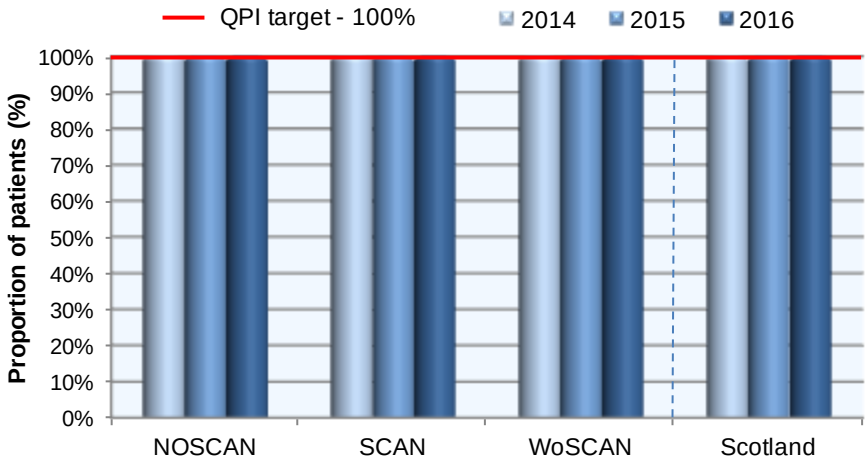
The Glasgow centre achieved 68.3% against the 90% target and commented that they will continue to encourage surgeons to request pre-operative MRI at MDT. Subspecialisation in the neurosurgeons is seen as a major improvement and likely to improve this.

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 13: Proportion of patients with brain/CNS cancer undergoing oncological treatment (chemotherapy or radiotherapy) who are managed by a specialist neuro-oncologist, 2014 to 2016.



QPI 8	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	100.0%	100.0%	100.0%	100.0%
Numerator	51	82	72	205
Denominator	51	82	72	205
Not recorded numerator	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

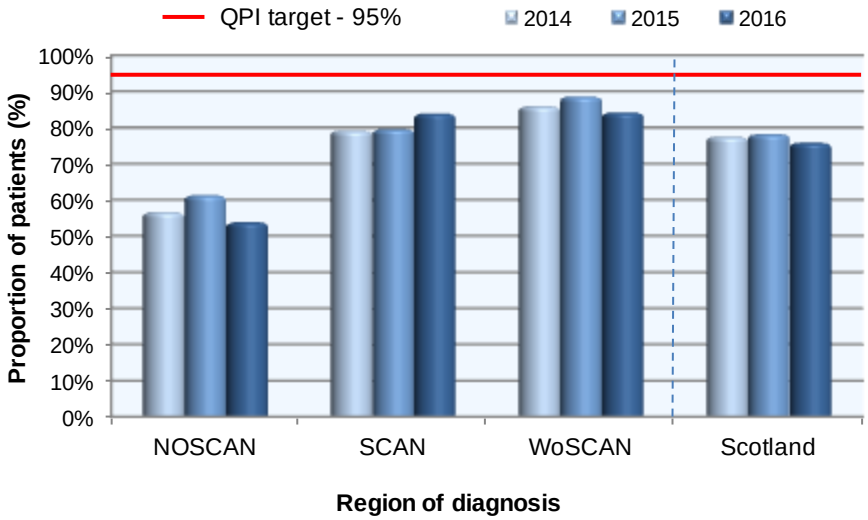
All three regions met the 100% target for the third consecutive year.

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 14: 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, 2014 to 2016.



QPI 9	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	53.8%	83.9%	84.2%	75.8%
Numerator	14	26	32	72
Denominator	26	31	38	95
Not recorded numerator	0	0	0	0
Not recorded numerator (%)	0.0%	0.0%	0.0%	0.0%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0

None of the three regions met the 95% target for QPI 9. Across Scotland 72 of 95 (75.8%) patients with high grade glioma undergoing adjuvant oncological treatment received their treatment within 6 weeks of surgery.

All centres carried out a review of cases not meeting the QPI. Detailed clinical commentary was provided and in the main reasons for patients' not commencing oncological treatment within six weeks of surgical resection were related to patient choice, patient fitness or wound infection.

Additionally the Dundee centre noted that ongoing neuro-oncology resource issues had impacted upon treatment timescales.

The Aberdeen centre noted improvement from 64% in Year 1 to 78% in Year 3 and attributed this to a change in oncology clinical scheduling to allow more planning time and access to CT planning scans.

The Glasgow centre stated that each case that did not meet the QPI has been reviewed (4 out of 6 in Glasgow). In all cases treatment was deferred for valid clinical reasons, mainly wound infection issues. The 2 cases diagnosed outwith Glasgow will be reviewed.

Action required:

- Glasgow centre to review cases diagnosed outwith NHSGGC and provide feedback on the outcome of the review.

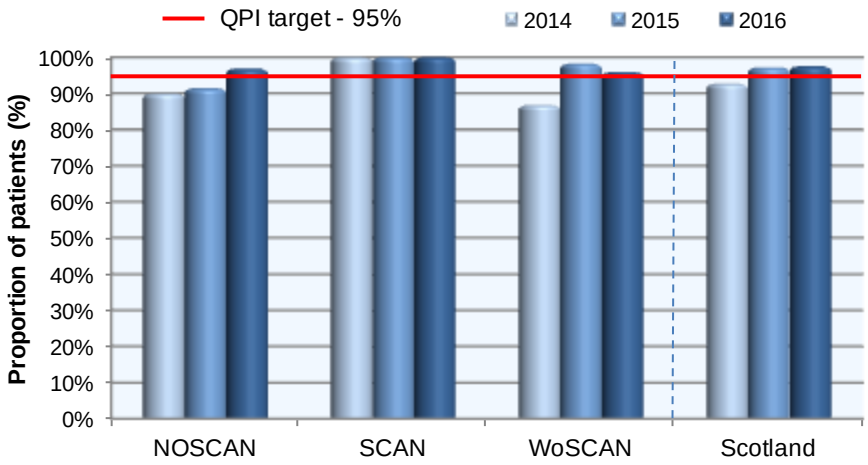
QPI 10: Radical Radiotherapy Planning Process

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 15: Proportion of patients with brain/CNS cancer undergoing radical radiotherapy for whom the radiotherapy planning process includes MRI fusion, 2014 to 2016.



QPI 10	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	96.9%	100.0%	95.9%	97.5%
Numerator	31	41	47	119
Denominator	32	41	49	122
Not recorded numerator	1	0	1	2
Not recorded numerator (%)	3.1%	0.0%	2.0%	1.6%
Not recorded exclusions	1	0	0	1
Not recorded exclusions (%)	3.1%	0.0%	0.0%	0.8%
Not recorded denominator	0	0	0	0

Across Scotland 97.5% of patients with brain/CNS cancer undergoing radical radiotherapy had MRI fusion included as part of the planning process, meeting the 95% QPI target.

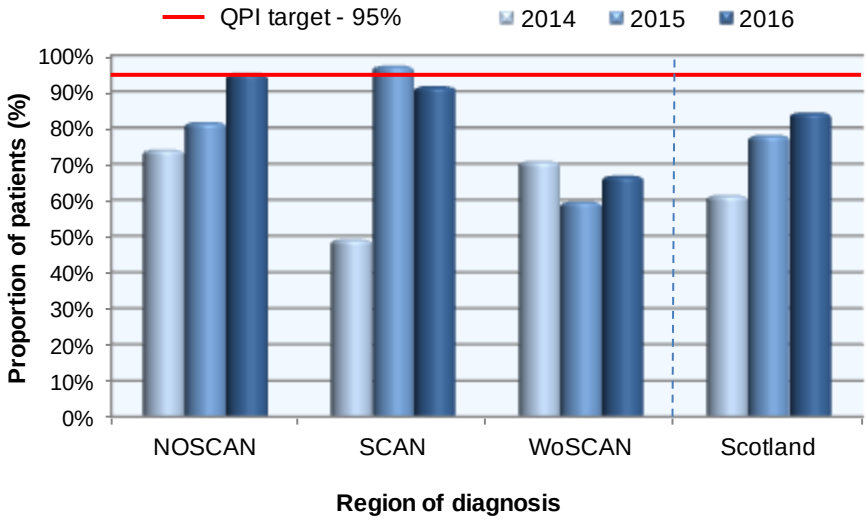
All three regions achieved the QPI target with performance of 96.9%, 100% and 95.9% in NoSCAN, SCAN and WoSCAN respectively. SCAN has achieved 100% over three consecutive years.

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 16: 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	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	95.0%	91.4%	66.7%	84.1%
Numerator	19	32	18	69
Denominator	20	35	27	82
Not recorded numerator	0	0	2	2
Not recorded numerator (%)	0.0%	0.0%	7.4%	2.4%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	3	0	0	3

Overall performance across Scotland for QPI 11 was 84.1% against the 95% target. Performance across the three regions was varied ranging from 66.7% in WoSCAN to 95% in NOSCAN.

The Aberdeen and Edinburgh centres reviewed cases not meeting the QPI and detailed clinical reasons relating to patient fitness were cited. Additionally the Aberdeen centre noted significant improvement since last year.

The Glasgow centre commented that a Consultant neurologist with specific interest in seizures in brain tumours had recently been appointed and it was anticipated that performance against this indicator would improve in subsequent years.

Following discussion at formal review it was proposed that QPI 11 should be updated to include an appropriate timescale for being seen by the neurologist / nurse with expertise in epilepsy management.

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 targets relating to specialist neuro-oncology access, radical radiotherapy planning and maximal surgical resection were consistently met by all regions in 2016.

Where targets have not been met NHS Boards have provided detailed comment indicating valid clinical reasons or in some cases patient choice or co-morbidities have influenced patient management.

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:

Case Ascertainment

- SANON to obtain Scottish Cancer Registry cohorts for 2014 and 2015 and work with NHS Boards to compare with QPI cohorts to further improve case ascertainment.

QPI 1: Documentation of Performance Status

- SCAN and NoSCAN to ensure that performance status is captured for all patients at initial discussion, to inform decision making at MDT.

QPI 2: Multidisciplinary Team Meeting

- Aberdeen centre to raise awareness with regards to ensuring all cases including those where no intervention is being considered are discussed at MDT.

QPI 3: Molecular Analysis (ii)

- SANON to liaise with the Regional Molecular Pathology Departments to improve turnaround times for molecular testing.

QPI 4: Neuropathological Diagnosis

- SCAN should investigate the reduction in performance from the previous years and ensure processes are in place to capture all data items on the pathology report.

QPI 9: Access to Adjuvant Treatment

- Glasgow centre to review cases diagnosed outwith NHSGGC and provide feedback on the outcome of the review.

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
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
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 and 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 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			
	Ensure actions mirror those detailed in Audit Report.	*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.	Aberdeen to ensure that performance status is captured for all patients at initial discussion, to inform decision making at MDT.						
2.	Aberdeen centre to raise awareness with regards to ensuring all cases including those where no intervention is being considered are discussed at MDT.						

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			
	Ensure actions mirror those detailed in Audit Report.	*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.	SCAN to ensure that performance status is captured for all patients at initial discussion, to inform decision making at MDT.						
4.	SCAN should investigate the reduction in performance from the previous years and ensure processes are in place to capture all data items on the pathology report.						

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			
	Ensure actions mirror those detailed in Audit Report.	*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*.
9.	Glasgow centre to review cases diagnosed outwith NHSGGC and provide feedback on the outcome of the review.						

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			
	Ensure actions mirror those detailed in Audit Report.	*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*.
	SANON to obtain Scottish Cancer Registry cohorts for 2014 and 2015 and work with NHS Boards to compare with QPI cohorts to further improve case ascertainment.						
3.	SANON to liaise with the Regional Molecular Pathology Departments to improve turnaround times for molecular testing.						