North, South East and West of Scotland Cancer Networks

Neuro-Oncology Cancers
Scottish Adult Neuro Oncology Network

Audit Report

Brain and CNS Cancer
Quality Performance Indicators

Report of the 2014 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 during 2014. Results are measured against the Brain and CNS Cancer Quality Performance Indicators[1] (QPIs) which were introduced for patients diagnosed on or after 01 January 2014.

In 2010, the Scottish Cancer Taskforce established the National Cancer Quality Steering Group (NCQSG) to take forward the development of national QPIs for all cancer types to enable national comparative reporting and drive continuous improvement for patients. In collaboration with the three Regional Cancer Networks and Information Services Division (ISD), the first QPIs were published by Healthcare Improvement Scotland (HIS) in January 2012 and implementation for all cancer types was completed in autumn 2014. CEL 06 (2012) mandates all NHS Boards in Scotland to report on QPIs on an annual basis. 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 are measured against the Brain and CNS Cancer QPIs and presented within this audit report. Unlike most other tumour types which have undergone pre-QPI data collection and analysis, this is the first year of such an undertaking for brain and CNS cancers. The first year of data collection and analysis for brain and CNS cancers coincides with the implementation of QPIs. Future reports will compare clinical audit data in successive years to illustrate trend analysis.

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 420 cases diagnosed in Scotland each year[4]. The 2014 audit identified 376 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 1.4% of all cancers diagnosed[5]. It was ranked as the fourteenth most commonly diagnosed cancer in males and the sixteenth most commonly diagnosed cancer in females in Scotland in 2013[5].

The incidence of brain and CNS cancers has decreased by 2.4% in males over the past ten years from 2003 to 2013. However an increase in incidence of 17.9% has been observed in the female population over the same period and overall incidence for both males and females has increased by 5.0% in the past ten years[5].

Although one-year relative survival is seen to be increasing for males and females (+9.9% and +7.8% respectively between 1987 – 1991 and 2007 – 2011)[6], there is little change in five-year survival rates which indicates that although survival is improving, either due to better treatment or earlier diagnosis, the majority of patients are not being cured.

The table below details the five specialist centres carrying out neuro-oncology treatment in Scotland. 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 five centres for specialist management. Neurosurgery is performed at four of the five specialist neuro-oncology centres and is not performed at Raigmore Hospital in Inverness.

Neuro-oncology Centre	Constituent Hospital(s)
Aberdeen	Aberdeen Royal Infirmary (surgery and 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)
Inverness	Raigmore Hospital (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 01 January 2014 and 31 December 2014 was downloaded from eCASE at 2200 hrs on 03 June 2015. SCAN data was collected and analysed locally and the final results were submitted to WoSCAN.

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

This is the first year of data collection for brain and CNS cancers by clinical effectiveness teams across Scotland. A previous internal audit review was carried out by SANON in 2011 in preparation for the introduction of Brain and CNS Cancer QPIs.

Case ascertainment is an estimate of the proportion of expected patients identified through audit and can aid in the assessment of data quality. Overall case ascertainment for Scotland is reasonably high at 89.3% 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 in NOSCAN are lower however at 69.5% and therefore caution should be given to results as percentages might be a less accurate reflection of actual performance in this region.

Overall data capture is very good; however there are areas where improvement is required to enable robust measurement against all QPIs. There were three QPIs which had a high proportion of cases which were not recorded for the numerator; QPIs 1, 6 and 11.

In NOSCAN and WoSCAN there were a proportion of records (22) which had null values and were not included in the denominator for measurement against QPI 5. This reduced the total denominator by 9.4%; however the missing data had minimal effect on the results in this instance (<1%).

Data fields to define the denominator and exclusion criteria had excellent completion rates with only 1 case not recorded for denominator in QPI 11. There were no cases that were not recorded for exclusion criteria.

Despite excellent data capture rates, a number of dataset interpretation and measurability issues were highlighted through this first year of analysis. Each of these is detailed in the main report, and will be addressed through the formal QPI Baseline Review process ahead of Year 2 reporting.

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.

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

Summary of QPI Results

		Target	National	Region		
				NOSCAN	SCAN	WoSCAN
QPI 1:	**Documentation of performance status (PS)** - Proportion of patients with Brain/CNS cancer who have a documented World Health Organisation (WHO) performance status at the time of MDT discussion.	95%	56.8%	23.2%	30.8%	90.1%
QPI 2:	**Multidisciplinary team (MDT) meeting –** Proportion of patients with Brain/CNS cancer who are discussed at MDT meeting before definitive management.	95%	76.8%	73.2%	82.2%	74.1%

		Target	National	Treatment Centre			
				Aberdeen	Dundee	Edinburgh	Glasgow
QPI 3:	**Molecular analysis –** Proportion of patients with biopsied or resected gliomas who undergo relevant molecular analysis of tumour tissue within 21 days of surgery.						
	(i) Patients with gliomas with an oligodendroglial component who have the tumour tested for combined loss of 1p/19q.	90%	73.9%	100%[a]	0.0%[a]	63.6%	90.0%
	(ii) Patients with glioblastomas who have the tumour tested for MGMT promoter methylation status.	90%	74.0%	56.5%	5.6%	85.9%	80.9%

		Target	National	Region		
				NOSCAN	SCAN	WoSCAN
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).	90%	97.8%	95.6%	100%	97.1%
QPI 5:	**Pre-treatment magnetic resonance imaging (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%	91.5%	95.2%	100%	84.0%

[a] Small numbers – percentages should be viewed with caution where the denominator is less than 5.

Summary of QPI Results - continued

				Treatment Centre			
		Target	National	Aberdeen	Dundee	Edinburgh	Glasgow
QPI 6:	**Maximal surgical resection –** Proportion of patients with high-grade malignant glioma who undergo maximal surgical resection (>90%), provided it is considered consistent with safe outcome.	30%	24.1%	50.0%	0.0%	50.0%	1.3%
QPI 7:	**Early post-operative imaging –** Proportion of patients with malignant glioma, WHO grades II, III and IV, who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection.	90%	44.2%	58.3%	30.8%	79.4%	15.6%

				Region		
		Target	National	NOSCAN	SCAN	WoSCAN
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%
QPI 9:	**Access to adjuvant treatment –** Proportion of patients with high-grade glioma (WHO grades III and IV) undergoing surgical resection who commence their oncological treatment (chemotherapy, chemoradiotherapy or radiotherapy) within 6 weeks of surgical resection.	95%	Measurement will be discussed at QPI Baseline Review and results presented in 2015 audit report.			
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%	Measurement and data definitions will be discussed at QPI Baseline Review.			
QPI 11:	**Seizure management –** Proportion of patients with Brain/CNS cancer presenting with seizures at diagnosis that are seen by a neurologist or a nurse with expertise in epilepsy management.	95%	61.3%	73.9%	49.1%	70.7%

Conclusions and Action Required

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.

Results presented in this report demonstrate that work is required to ensure patients with brain and CNS cancers receive an equitable and consistent standard of care across NHS Scotland. It is evident that many of the QPI targets set have been challenging for centres to achieve and some variance and a number of areas for improvement have been highlighted.

This audit report has identified areas where data capture must improve to enable more meaningful analysis of performance against QPIs in the coming years, specifically with regards to tumour reduction volume, date of WHO performance status and whether patients have been seen by an epilepsy specialist. However overall case ascertainment and data capture is commendable for the first year of data collection and analysis, and provides a good foundation from which to measure service improvement in future years.

Areas for service improvement have been identified relating to variation in molecular analysis completion rates, the proportion of patients undergoing maximal surgical resection and early post-operative imaging. These issues were discussed at Baseline Review for Brain and CNS Cancer QPIs and evaluation revealed requirements for improvement in the measurability of some QPIs and highlighted areas for service improvement.

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

Actions required:

QPI 1 – Documentation of performance status

- MDT chairs should ensure processes are in place to check and ensure validity of the performance status documented at the time of MDT.
- NHSGGC to review cases not meeting QPI to establish whether WHO performance status was documented in these cases.

QPI 2 – Multidisciplinary team meeting

- Following agreement at Baseline Review, the dataset should be updated to clarify the definition of ‘definitive treatment’ for brain and CNS cancers to ensure robust measurement against QPI 2.

QPI 3 (ii) – Molecular analysis MGMT promoter methylation status

- All neuro-oncology centres should review pathways to identify where there are delays in molecular analysis reporting and take action to achieve the 21-day target.

QPI 5 – Pre-treatment MRI

- The Glasgow centre should review cases where no pre-operative MRI scan was undertaken and take action to address findings as necessary.

- NHSGGC and NHS Grampian auditors should perform checks prior to analysis and reporting to ensure records are complete and without null values.

QPI 6 – Maximal surgical resection

- All neuro-oncology centres should review processes for the recording of 'tumour reduction volume' to reduce the proportion of cases that have not-recorded values.
- The Glasgow centre should review cases that were not recorded as having undergone maximal surgical resection and take appropriate action on findings.

QPI 7 – Early post-operative imaging

- Edinburgh centre – Lead neurosurgeon to remind colleagues and trainees that post-operative MRI scans should be performed within 3 days of surgery of patients undergoing a resection and, if required over weekend, to speak to neuro-radiology.
- Aberdeen, Dundee and Glasgow centres should review all cases where post-surgery MRI was not performed, or not completed within the 72-hour interval, to identify areas for service improvement.
- Following agreement at Baseline Review, changes to the dataset and measurability will be proposed for NCQSG approval to measure the proportion of patients with contrast-enhancing tumours who undergo post-operative MRI within 3 days of surgery.

QPI 9 – Access to adjuvant treatment

- Following agreement at Baseline Review, changes to the measurability will be proposed for NCQSG approval to include patients undergoing chemoradiotherapy and biopsy cases.

QPI 10 – Radical radiotherapy planning process

- Following agreement at Baseline Review, changes to the data definitions and measurability will be proposed for NCQSG approval to include patients undergoing radiotherapy over 20 fractions and chemoradiotherapy.

QPI 11 – Seizure management

- All neuro-oncology centres/NHS Boards should review processes and take action to improve data collection with regards to whether patients have been reviewed by an epilepsy specialist.
- All neuro-oncology centres should review cases that did not meet QPI 11 to elicit any reasons why patients presenting with seizures are not seen by an epilepsy specialist.

A template has been provided in the Appendix to enable each NHS Board/neuro-oncology centre 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 MCN Advisory Board and any service or clinical issue which the Advisory Board 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 MCN 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 2014. Regular reporting of activity and performance is a fundamental requirement of the National Managed Clinical Network (NMCN) to assure the quality of care delivered to patients across Scotland. Results are measured against the Brain and CNS Cancer Quality Performance Indicators[1] (QPIs) which were introduced for patients diagnosed on or after 01 January 2014.

In 2010, the Scottish Cancer Taskforce established the National Cancer Quality Steering Group (NCQSG) to take forward the development of national QPIs for all cancer types to enable national comparative reporting and drive continuous improvement for patients. In collaboration with the three Regional Cancer Networks and Information Services Division (ISD), the first QPIs were published by Healthcare Improvement Scotland (HIS) in January 2012 and implementation for all cancer types was completed in autumn 2014. CEL 06 (2012) mandates all NHS Boards in Scotland to report on QPIs on an annual basis. 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 are measured against the Brain and CNS Cancer QPIs and presented within this audit report. Unlike most other tumour types which have undergone pre-QPI data collection and analysis, this is the first year of such an undertaking for brain and CNS cancers. The first year of data collection and analysis for brain and CNS cancers coincides with the implementation of QPIs. Future reports will compare clinical audit data in successive years to illustrate trend analysis.

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, patients, their families and carers, 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 420 cases diagnosed in Scotland each year between 2009 and 2013[4]. The 2014 audit identified 376 patients diagnosed with a new primary cancer of the brain or CNS in Scotland. Brain tumours are undoubtedly the most common tumours accounting for 97.1% of all newly diagnosed cases in Scotland in 2014. The proportion of patients diagnosed with each tumour type by site of origin is illustrated in Figure 1.

Figure 1: Proportion of patients diagnosed with brain or CNS cancer in 2014 by site of origin of tumour.

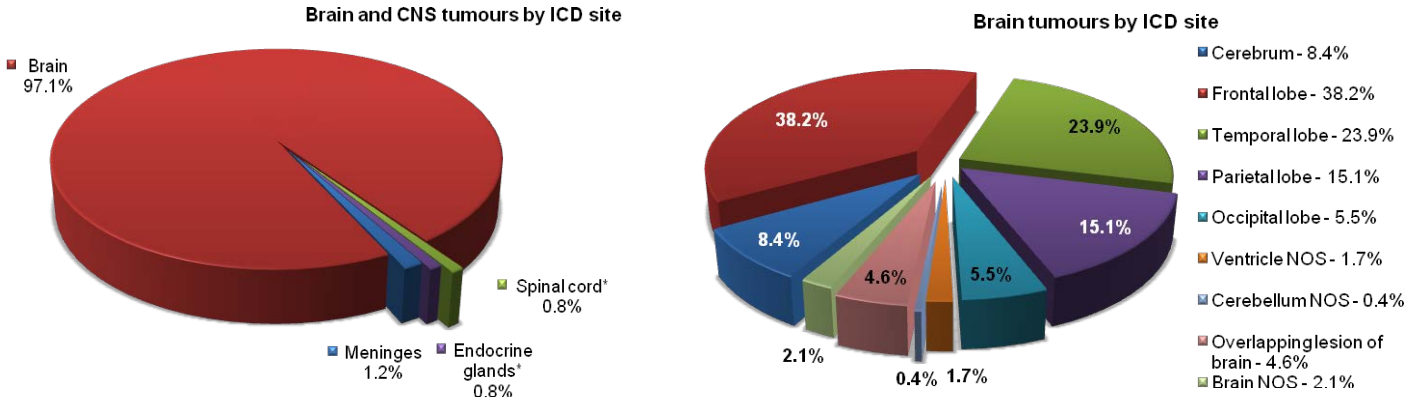
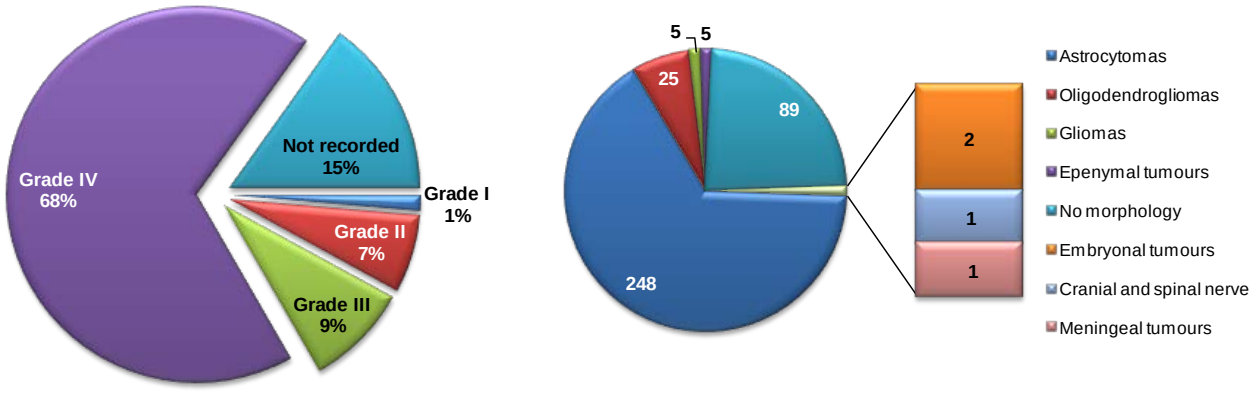


Figure 2: Proportion of patients diagnosed with brain or CNS cancer in 2014 by grade and morphological group.

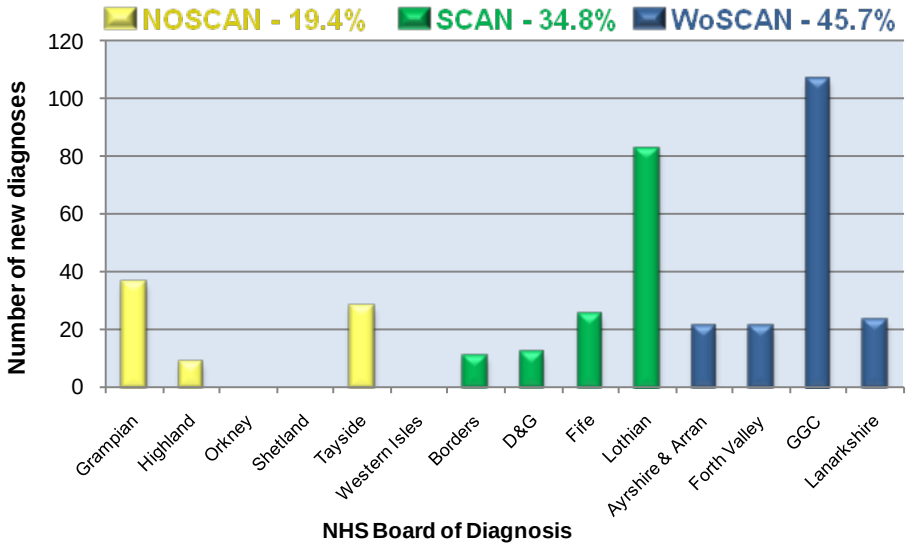


Grade I	5
Grade II	25
Grade III	33
Grade IV	256
Not recorded	57
Total	376

Astrocytomas	248
Oligodendrogliomas	25
Gliomas	5
Ependymal tumours	5
No morphology	89
Embryonal tumours	2
Cranial and spinal nerve	1
Meningeal tumours	1
Total	376

The distribution of the 376 newly diagnosed cases in 2014 is presented in Figure 3 by location of diagnosis across the fourteen NHS Boards. The West of Scotland Cancer Network (WoSCAN) recorded 45.7% of new diagnoses in 2014 with 172 new cases of brain and CNS cancers captured by audit. This reflects the adult population distribution in this region as 2013 mid-year population estimates[8] show that 46.1% of the Scottish adult population reside within West of Scotland (WoS) region. The South East of Scotland Cancer Network (SCAN) diagnosed 131 new cases in 2014 which accounted for 34.8% of all new cases and North of Scotland Cancer Network (NOSCAN) diagnosed 73 cases, 19.4% of all new diagnoses. This is not directly comparable to the population estimates for SCAN and NOSCAN of 27.8% and 26.1% respectively[8], however cross boundary movement could explain some variation where patients are diagnosed outwith their board of residence.

Figure 3: Number of patients diagnosed with brain or CNS cancer across Scotland by NHS Board in 2014.



Grampian	Highland	Orkney	Shetland	Tayside	W. Isles	Borders	D&G	Fife	Lothian	AA	FV	GGC	Lan
36	9	0	0	28	0	11	12	25	83	21	21	107	23

The table below details the five specialist centres carrying out neuro-oncology treatment in Scotland. 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 five centres for specialist management. Neurosurgery is performed at four of the five specialist neuro-oncology centres and is not performed at Raigmore Hospital in Inverness.

Neuro-oncology Centre	Constituent Hospital(s)
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Inverness	Raigmore Hospital (oncology)

2.1 Incidence and survival

Brain and CNS cancers are relatively rare cancers with approximately 420 cases diagnosed in Scotland each year between 2009 and 2013[4]. The percentage frequency of brain and CNS cancers in Scotland is comparatively low at 1.4% of all cancers diagnosed. It was ranked as the fourteenth most commonly diagnosed cancer in males and the sixteenth most commonly diagnosed cancer in females in Scotland in 2013[5].

The incidence of brain and CNS cancers has decreased by 2.4% in males over the past ten years from 2003 to 2013. However an increase in incidence of 17.9% has been observed in the female population over the same period and overall incidence for both males and females has increased by 5.0% in the past ten years[5]. Although the mortality rate from brain and CNS cancers has seen a moderate decrease in males of 0.7%, a 2.0% rise in female mortality has resulted in a marginal overall increase in mortality of 0.4%. Brain and CNS cancers are ranked as the twelfth most common cause of death from cancer and accounted for 2.5% of all deaths from cancer in 2013[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 %

Although one-year relative survival is seen to be increasing, there is little change in five-year survival rates which indicates that although survival is improving, either due to better treatment or earlier diagnosis, the majority of patients are not being cured.

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]. In 2014, 88.0% of adult cases were diagnosed in people aged 40 and over. This report

includes all cases aged 16 and over and the age distribution for males and females diagnosed in 2014 in Scotland is illustrated in Figure 4. The incidence of brain and CNS cancer is higher for males in almost all age groups and approximately 3 males are diagnosed for every 2 female cases.

Figure 4: Number of patients diagnosed with brain and CNS cancers in Scotland in 2014 by age group and sex.

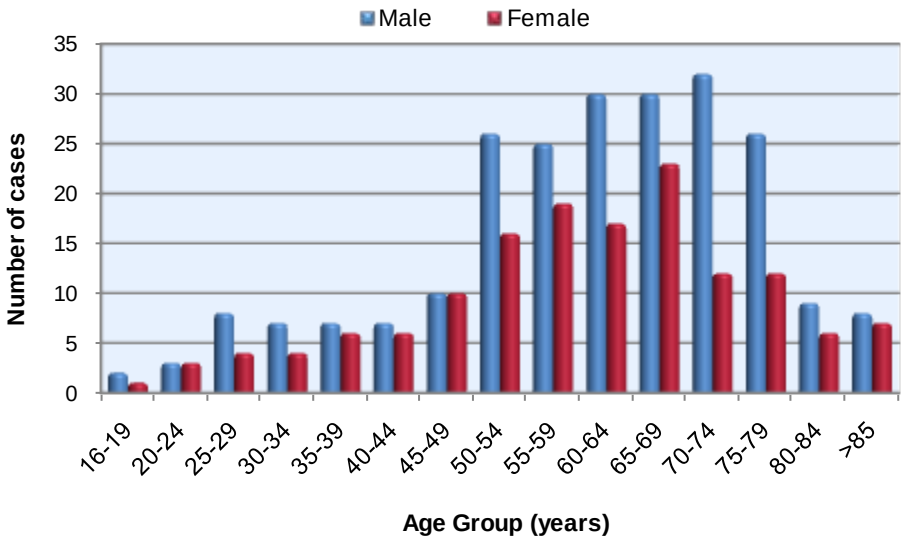


Table 2: Age distribution of patients diagnosed with brain and CNS cancers by region and sex, 2014.

	NOSCAN		SCAN		WoSCAN	
Age	Male	Female	Male	Female	Male	Female
Median	64	62	65	63	61	59
Mean	61.3	57.3	69.0	55.0	59.9	57.2
Minimum	26	18	21	22	16	22
Maximum	83	91	98	98	89	85
Total no. of cases	**44**	**29**	**79**	**52**	**107**	**65**

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 01 January 2014 and 31 December 2014 was downloaded from eCASE at 2200 hrs on 03 June 2015. SCAN data was collected and analysed locally and the final results were submitted to WoSCAN. 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

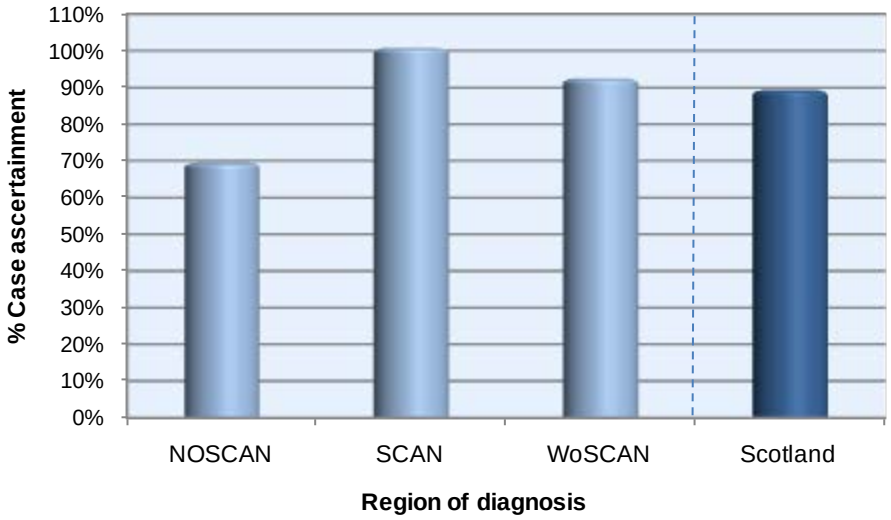
4.1 Data Quality

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 89.3% 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 in NOSCAN are lower however at 69.5% and therefore caution should be given to results as percentages might be a less accurate reflection of actual performance in this region.

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 5 and varies from 69.5% to 100.8%.

Figure 5: Case ascertainment by region for patients diagnosed with brain and CNS cancers in Scotland in 2014.



	NOSCAN	SCAN	WoSCAN	Scotland
Cases from audit	73	131	172	376
ISD Cases (2009-2013 average)	105	130	186	421
% Case ascertainment	69.5%	100.8%	92.5%	89.3%

Overall data capture is very good however there are areas where improvement is required to enable robust measurement against all QPIs. There were three QPIs which had a high proportion of cases which were not recorded for the numerator;

QPI 1 – Documentation of Performance Status – 30.4% of NOSCAN cases did not have date of WHO performance status (WHODATE) recorded and therefore could not be measured.

QPI 6 – Maximal Surgical Resection – Overall there were 41.5% of cases across Scotland that did not have tumour reduction volume recorded (REDUCT) and therefore outcomes could not be measured for these patients.

QPI 11 – Seizure Management – Across Scotland there were 22.7% of cases where it was not recorded whether the patient had been seen by an epilepsy specialist (EPILNESN).

In NOSCAN and WoSCAN there were a proportion of records (22) which had null values and were not included in the denominator for measurement against QPI 5. This reduced the denominator by 13.5% in these regions; however the missing data had minimal effect on the results in this instance (<1%).

Data fields to define the denominator and exclusion criteria had excellent completion rates with only 1 case not recorded for denominator in QPI 11.

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

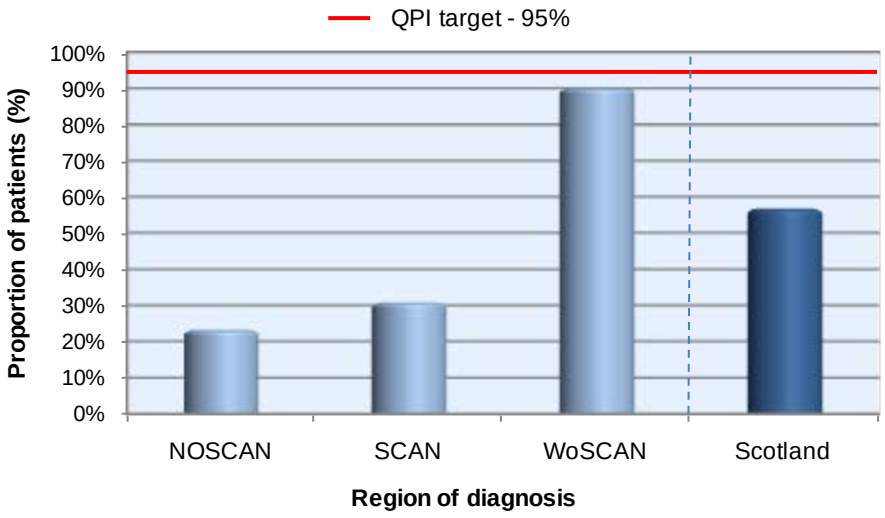
QPI 1: Documentation of Performance Status

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 6: Proportion of newly diagnosed patients with brain/CNS cancer who have a documented WHO performance status at the time of MDT discussion.



QPI 1	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	23.2%	30.8%	90.1%	56.8%
Numerator	16	40	154	210
Denominator	69	130	171	370
Not recorded numerator	21	0	0	21
Not recorded numerator (%)	30.4%	0.0%	0.0%	5.7%
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 for QPI 1 was 56.8% which does not meet the 95% QPI target. Results for QPI 1 varied between the three regions with performance of 23.2% in NOSCAN, 30.8% in SCAN and 90.1% in WoSCAN.

NOSCAN had 21 cases (30.4%) where the date of WHO performance status documentation was not recorded and therefore it could not be calculated if these cases were recorded at the time of MDT meeting. NHS Tayside has commented that the new MDT proforma will now stipulate date of performance status assessment to allow for future measurement against QPI 1. NHS Grampian acknowledged a shortfall in the number of patients who had their performance status recorded and has stated that this will be addressed going forward.

SCAN commented that of the 90 patients that did not meet the QPI criteria, 64 of these patients had their performance status recorded after initial MDT meeting, either at their oncology appointment or a subsequent MDT meeting. There were 26 patients that did not have a performance status recorded (20.0%). SCAN has stated that MDT members have agreed to estimate patient performance status going forward however the usefulness of this is questioned. It was proposed that an alternative measurement be discussed at QPI Baseline Review where performance status could be recorded prior to definitive treatment rather than at MDT.

WoSCAN performance was within 5 percentage points of the target, indicating that the 95% target is achievable, however the validity of the QPI was also questioned by WoS MDT due to the accuracy of the performance status data. It was agreed however that MDT meeting is the appropriate time to record each patients' performance status and the MDT chair should be responsible for checking the validity of the performance status recorded and updating as required.

Action required:

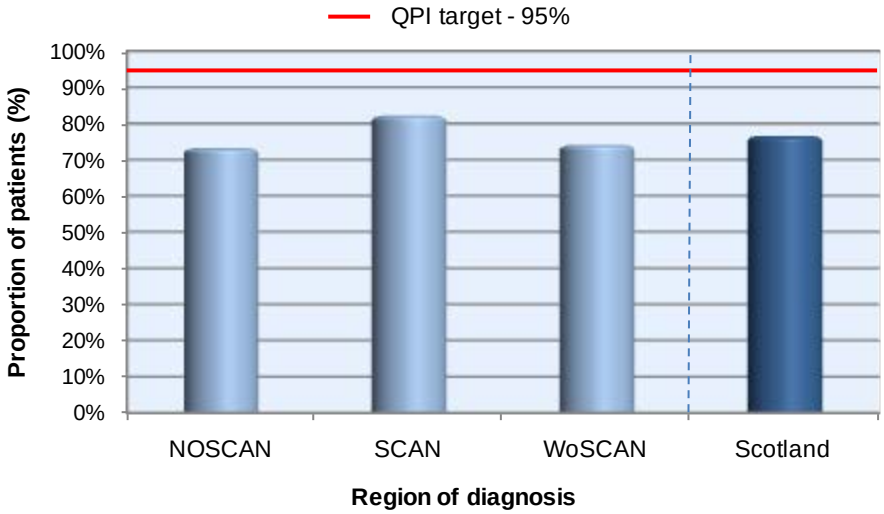
- MDT chairs should ensure processes are in place to check and ensure validity of the performance status documented at the time of MDT.
- NHSGGC to review cases not meeting QPI to establish whether WHO performance status was documented in these cases.

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 7: Proportion of patients with brain/CNS cancer who are discussed at MDT meeting before definitive treatment.



QPI 2	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	73.2%	82.2%	74.1%	76.8%
Numerator	52	106	126	284
Denominator	71	129	170	370
Not recorded numerator	2	0	0	2
Not recorded numerator (%)	2.8%	0.0%	0.0%	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

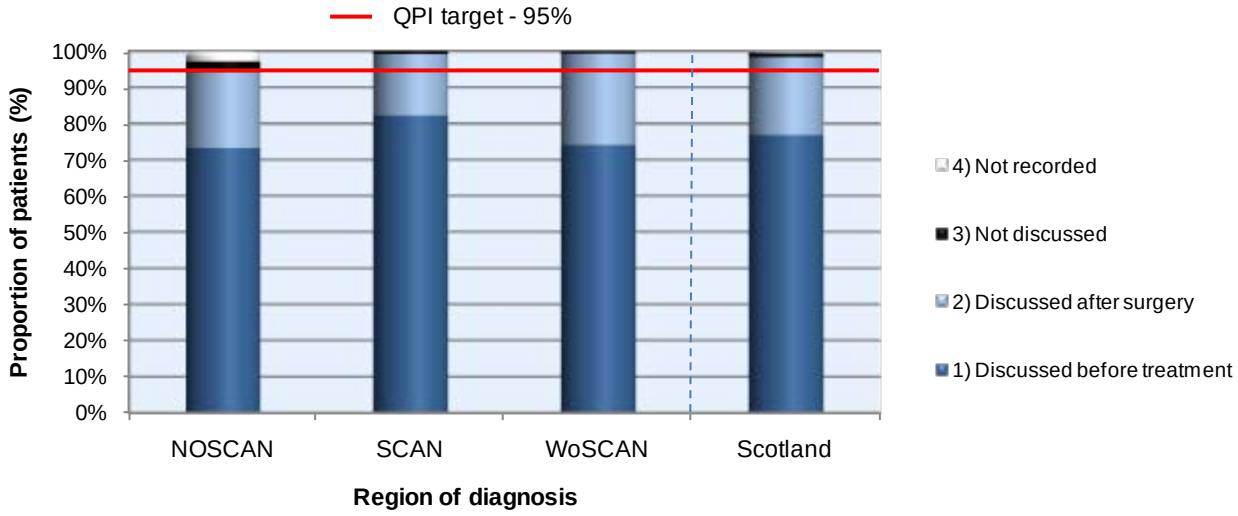
Performance across Scotland was 76.6% against the 95% QPI target. None of the three regions met the target with percentage performance of 73.2%, 73.4% and 82.2% for NOSCAN, WoSCAN and SCAN respectively.

All regional comments which were fed back in relation to QPI 2 shared the premise that surgery is carried out as a matter of urgency for a proportion of patients diagnosed with brain and CNS cancer and it is appropriate that these cases are discussed following surgical treatment. It was also stated that surgery is not considered the definitive treatment in brain and CNS cancers, unlike with other cancer types, and it was recommended that data definitions should be amended to reflect this.

Further analysis has revealed that of the 81 cases that did not meet the criteria for QPI 2, only 4 cases were not discussed at MDT (1.1%) and the remaining 77 cases were discussed after 'definitive' treatment (which was recorded as surgery). The median number of days for those patients having MDT discussion after surgery in NOSCAN and WoSCAN was 8 days (range: 1 day to 30 days), indicating that the majority of patients were discussed at the next scheduled MDT meeting. Figure 8 illustrates the proportion of patients that were; 1) discussed prior to 'definitive' treatment (met QPI), 2) discussed after surgery, 3) not discussed and 4) not recorded.

Within the multidisciplinary guidelines for The Edinburgh Centre for Neuro-oncology (ECNO) it is agreed that, in order to reduce delays, patients with a high grade glioma or metastases who need urgent surgery can proceed without waiting for the next MDT meeting. However, all biopsy-only patients and those where 5-ALA or Gliadel are being considered, must be discussed at the MDT meeting prior to surgery. ECNO has commented that for the 22 cases discussed after MDT, there was 100% compliance with local policy.

Figure 8: Proportion of patients with brain/CNS cancer who are 1) discussed at MDT meeting before definitive treatment, 2) discussed after surgery, 3) not discussed and 4) not recorded.



Measurement of this QPI was discussed at QPI Baseline Review and recommendations will be made to clarify the definition of 'definitive' treatment as it was agreed that this should not be recorded as the date of surgery.

Action required:

- Following agreement at Baseline Review, the dataset should be updated to clarify the definition of 'definitive treatment' for brain and CNS cancers to ensure robust measurement against QPI 2.

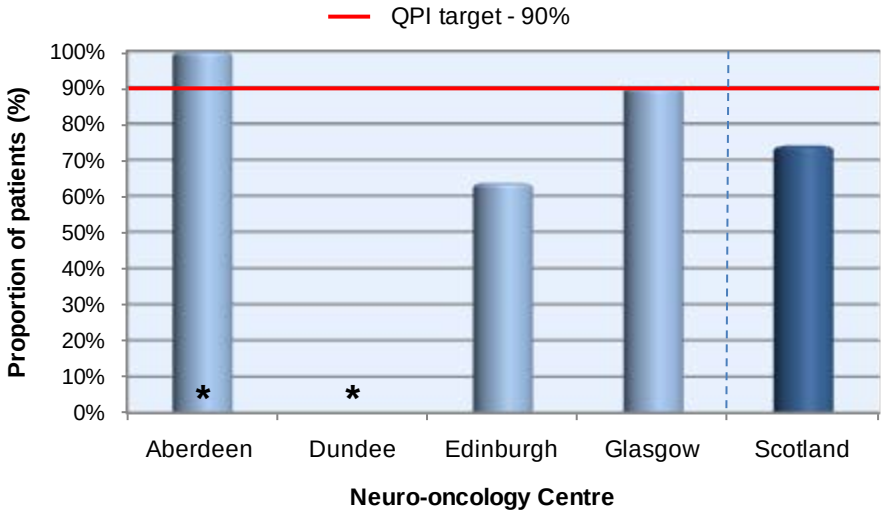
QPI 3: Molecular Analysis

(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 9: 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.



QPI 3 (i)	Aberdeen*	Dundee*	Edinburgh	Glasgow	Scotland
Performance (%)	100%	0.0%	63.6%	90.0%	73.9%
Numerator	1	0	7	9	17
Denominator	1	1	11	10	23
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

*Small numbers – Percentages should be viewed with caution where the denominator is less than 5.

Performance across Scotland was 73.9% against the 90% target for QPI 3 (i). The Glasgow and Aberdeen neuro-oncology centres met the QPI target with performance of 90.0% and 100% respectively. Numbers were very low in Aberdeen however with only 1 patient meeting the denominator criteria. Percentages should therefore be viewed with caution and analysis may have to look at combined results over three to five years to provide meaningful results.

Edinburgh and Dundee centres did not meet the QPI target with performance of 63.6% and 0.0% respectively. Again, numbers are very low in Dundee with only 1 patient meeting the denominator criteria and accurate analysis will rely on more data becoming available. Although 1p/19q molecular analysis was carried out in this case, it was outwith the 21-day time frame therefore did not meet the QPI criteria.

There were four cases in Edinburgh that did not meet the QPI criteria. Edinburgh has commented that all four patients had their molecular testing for 1p/19q successfully performed but this was completed more than 21 days after surgery/biopsy as these samples had to be retested using fluorescence in situ hybridisation (FISH). Two of the patients who did not meet this QPI had “biopsy only” as their surgical intervention. The size of biopsy was discussed at ECNO steering committee and it was felt that as much tissue as was felt safe was taken. Currently only lesions with oligodendroglial appearance are tested but the oncologists often need this in other cases, particularly to see if suitable for trials. Neuropathology will now automatically test all grade 2 and grade 3 tumours.

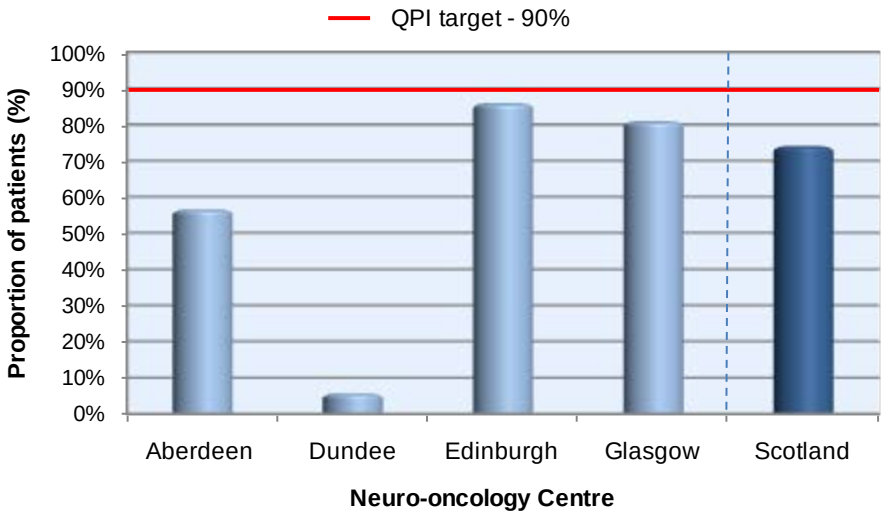
QPI 3: Molecular Analysis

(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 10: Proportion of patients with glioblastomas who have the tumour tested for MGMT promoter methylation status within 21 days of surgery.



QPI 3 (ii)	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	56.5%	5.6%	85.9%	80.9%	74.0%
Numerator	13	1	73	72	159
Denominator	23	18	85	89	215
Not recorded numerator	0	0	0	1	1
Not recorded numerator (%)	0.0%	0.0%	0.0%	1.1%	0.5%
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

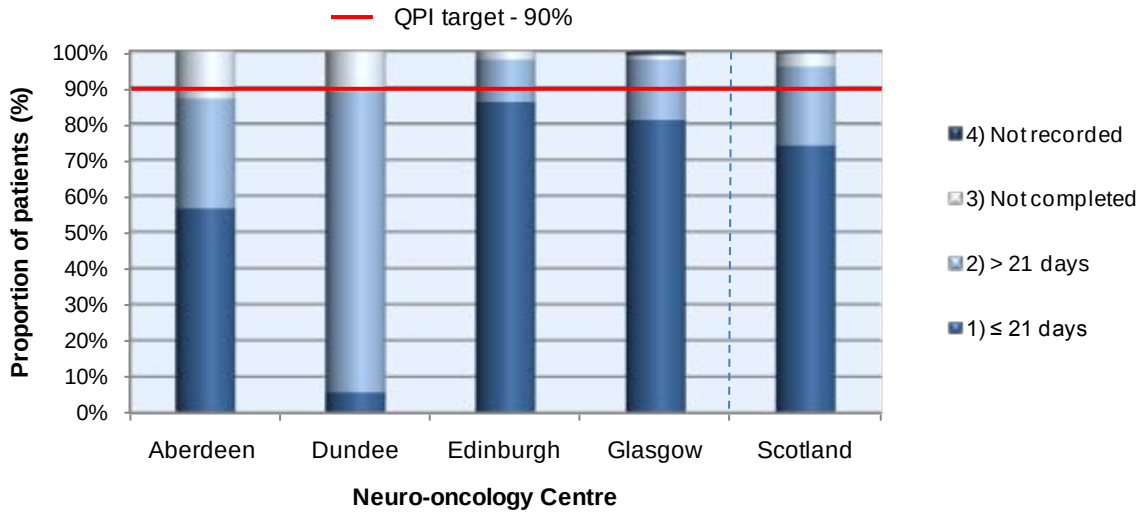
Performance across Scotland was 74.0% against the 90% target for QPI 3 (ii). None of the four neuro-oncology centres met the 90% target.

Edinburgh had the highest performance at 85.9% with 73 of 85 cases having MGMT analysed within the 21-day time period. The Edinburgh centre has stated that, of the 12 cases that did not meet the QPI criteria, 10 had molecular testing for MGMT successfully performed but this was completed more than 21 days following surgery, usually because it had to be repeated due to technical failure. Two samples had insufficient tissue for analysis therefore the methylation status was unable to be given. Further analysis by SCAN showed that, by quarter 4 of 2014, performance had improved to 91.7% and ECNO anticipate this improvement to be maintained throughout 2015.

The Glasgow centre had a performance of 80.9% with 72 of 89 cases having MGMT analysed within the 21-day time period. Of the 17 cases that did not meet the QPI criteria, 15 had MGMT analysed outwith the 21-day time period (median = 26 days), 1 case did not have MGMT analysis completed and 1 case was not recorded. Figure 11 shows the proportion of patients who had MGMT analysed; 1) within 21 days (met QPI) 2) outwith 21 days 3) not completed and 4) not recorded. The median number of days for MGMT analysis for cases that did not meet the QPI criteria in Aberdeen and Dundee was 28 days and 36 days respectively.

Across Scotland, 95.8% of patients with glioblastomas had their tumour tested for MGMT promoter methylation status however 21.9% of cases did not meet the QPI criteria due to analysis being reported outwith the 21-day time frame, thus performance is lower at 74.0%.

Figure 11: Proportion of patients with glioblastomas who have the tumour tested for MGMT promoter methylation status 1) ≤ 21 days of surgery 2) > 21 days 3) not completed 4) not recorded.



Action required:

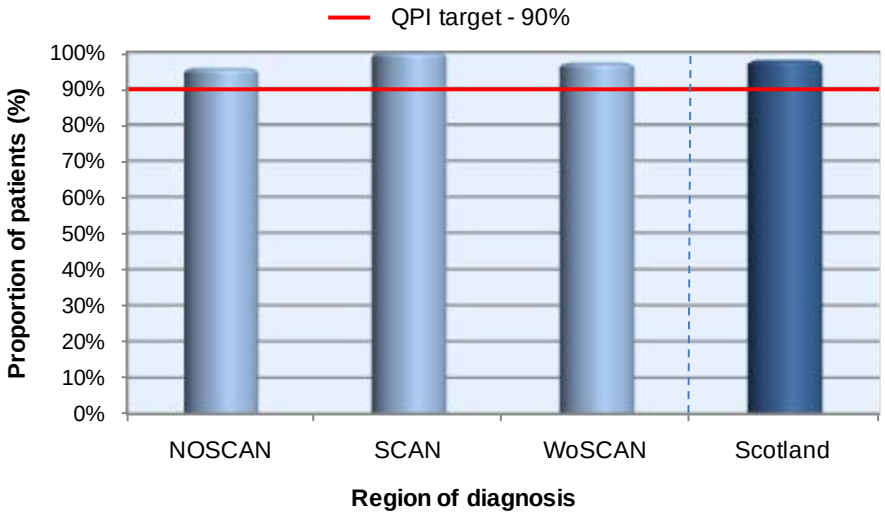
- All neuro-oncology centres should review pathways to identify where there are delays in molecular analysis reporting and take action to achieve the 21-day target.

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 12: 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).



QPI 4	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	95.6%	100%	97.1%	97.8%
Numerator	43	96	132	271
Denominator	45	96	136	277
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

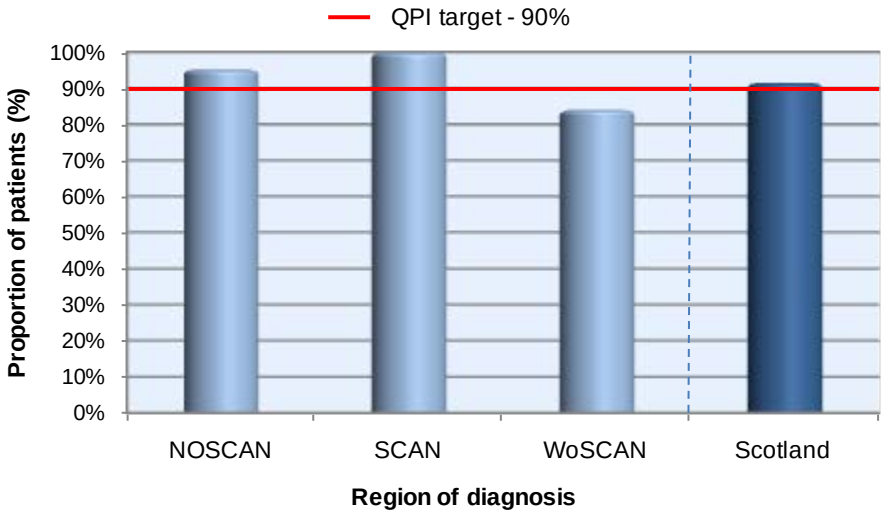
Overall performance across Scotland is 97.8% for QPI 4 which exceeds the 90% QPI target by 7.8 percentage points. All three regions met the target with performance of 95.6%, 97.1% and 100% in NOSCAN, WoSCAN and SCAN respectively.

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



QPI 5	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	95.2%	100%	84.0%	91.5%
Numerator	40	71	84	195
Denominator	42	71	100	213
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 95.2% and 100% in NOSCAN and SCAN respectively. The overall performance for Scotland was 91.5% which also exceeded the QPI target. In WoSCAN, 16 cases did not have a pre-treatment MRI scan, resulting in a performance of 84.0%. No specific comments were submitted by the Glasgow centre with regards to those cases that did not have pre-treatment MRI.

Further analysis of NOSCAN and WoSCAN data shows that 22 cases were not included in the denominator for QPI 5 due to null values (NOSCAN – 3 cases, WoSCAN – 19 cases). In this instance, the missing values affected results by less than 1 percentage point in both NOSCAN and WoSCAN.

Action required:

- The Glasgow centre should review cases where no pre-operative MRI scan was undertaken and take action to address findings as necessary.
- NHSGGC and NHS Grampian auditors should perform checks prior to analysis and reporting to ensure records are complete and without null values.

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:	Wherever possible patients should undergo maximal surgical resection of high grade (WHO Grade III and IV) malignant gliomas.
Description:	Proportion of patients with high grade malignant glioma who undergo maximal surgical resection (>90%), provided it is considered consistent with safe outcome.
Numerator:	Number of patients with resectable high grade (WHO Grades III and IV) malignant glioma undergoing surgical resection where >90% reduction in tumour volume is achieved.
Denominator:	All patients with high grade malignant glioma (WHO Grades III and IV) undergoing surgical resection.
Exclusions:	Patients undergoing biopsy only.
Target:	30%

Overall performance across Scotland is 24.6% for QPI 6 which is 5.4 percentage points below the 30% QPI target. Two of the four surgical neuro-oncology centres, Aberdeen and Edinburgh, exceeded the QPI target both achieving maximal surgical resection for 50.0% of patients with high grade malignant glioma.

The Glasgow neuro-oncology centre did not meet the QPI target with 1.3% of patients with high grade glioma recorded as having undergone maximal surgical resection. Glasgow had 45 cases where reduction in tumour volume was not recorded; 30 of these cases did undergo post-surgical MRI however only 8 cases were within the recommended 3 days following surgery and 13 of the 45 cases did not have a post-surgical MRI. Of the additional 30 patients that did not meet the QPI, 29 did not undergo post-surgical MRI and one case had tumour volume reduction between 50 and 89%. The Glasgow centre did not provide specific comments on cases for QPI 6.

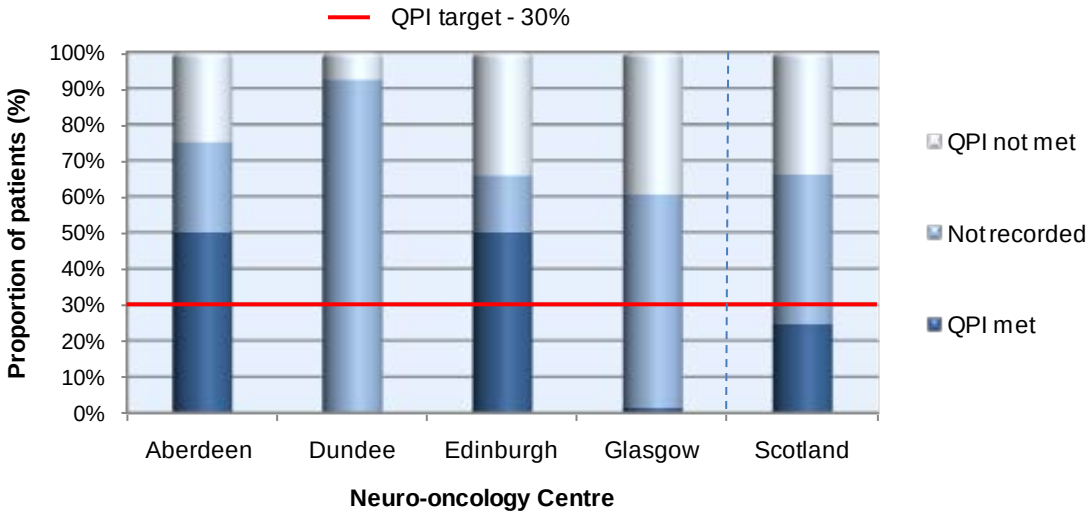
The Dundee centre also had a high proportion of cases where tumour reduction volume was not recorded at 92.3% of cases (12 of 13 cases). Of the 12 cases not recorded, 3 had post-surgical MRI within 3 days of surgery, 4 had a post-surgical MRI more than 3 days post surgery and 5 cases did not have a post-surgical MRI. The Dundee centre has commented that reduction in tumour volume was not previously recorded at the post-surgical MDT. This has now been added to the MDT form and will be recorded hereon in.

Action required:

- All neuro-oncology centres should review processes for the recording of ‘tumour reduction volume’ to reduce the proportion of cases that have not-recorded values.

- The Glasgow centre should review cases that were not recorded as having undergone maximal surgical resection and take appropriate action on findings.

Figure 14: Proportion of patients with high grade malignant glioma who undergo maximal surgical resection where >90% reduction in tumour volume is achieved.



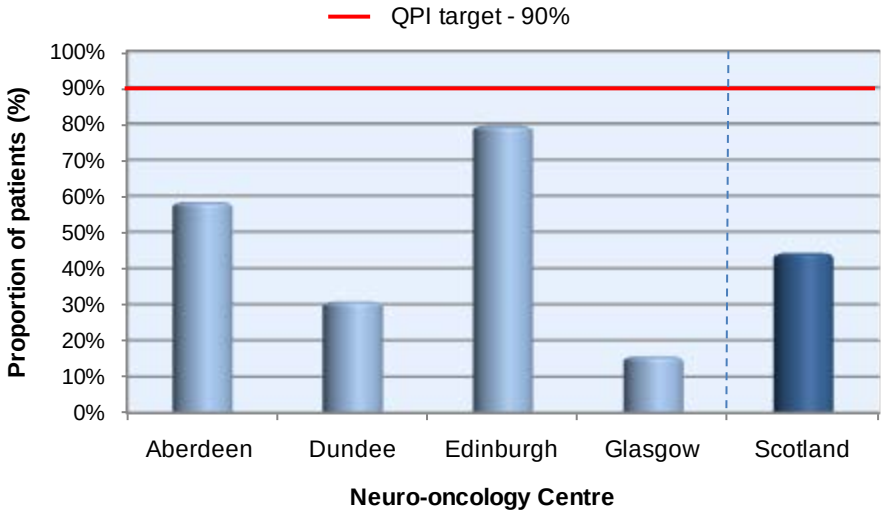
QPI 6	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	50.0%	0.0%	50.0%	1.3%	24.6%
Numerator	6	0	35	1	42
Denominator	12	13	70	76	171
Not recorded numerator	3	12	11	45	71
Not recorded numerator (%)	25.0%	92.3%	15.7%	59.2%	41.5%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0	0

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 (WHO Grades II, III and IV) undergoing surgical resection should be subject to early post-operative imaging.
Description:	Proportion of patients with malignant glioma, WHO Grades II, III and IV, who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection.
Numerator:	Number of patients with malignant glioma, WHO Grade II, III and IV, undergoing surgical resection receiving MRI within 3 days (72 hours) of surgical resection.
Denominator:	All patients with malignant glioma, WHO Grades II, III and IV, 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 15: Proportion of patients with malignant glioma, WHO Grades II, III and IV, who receive early post-operative imaging with MRI within 3 days (72 hours) of surgical resection.



QPI 7	Aberdeen	Dundee	Edinburgh	Glasgow	Scotland
Performance (%)	58.3%	30.8%	79.4%	15.6%	44.2%
Numerator	7	4	50	12	73
Denominator	12	13	63	77	165
Not recorded numerator	0	0	2	0	2
Not recorded numerator (%)	0.0%	0.0%	3.2%	0.0%	1.2%
Not recorded exclusions	0	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	0	0	0	0	0

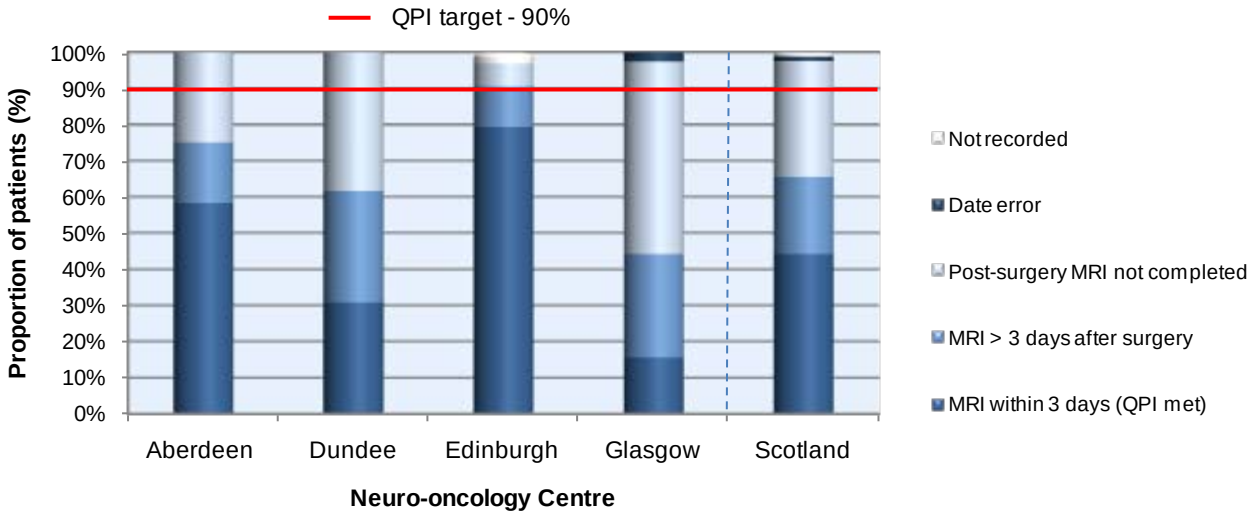
Overall results for Scotland show that 44.2% of patients with malignant glioma underwent post-surgical MRI within the specified time (3 days). None of the four surgical centres met the 90% QPI target with the Edinburgh centre achieving the highest performance of 79.4%.

The Edinburgh centre provided comments that 11 patients did not meet this QPI; 7 patients had their MRI performed more than three days after surgery, 3 patients had no post-op MRI and 1 patient had a post-op CT instead of an MRI. Individual cases were reviewed and it was found that several patients were clinically unstable during the 72-hour window and therefore could not have an MRI completed in this time. However, another issue identified was access to MRI scanning at weekends. The Edinburgh centre also questioned the validity of including low grade gliomas as the post-op MRI can be difficult to interpret. This was discussed at Baseline Review and it was agreed that the most valid factor in determining the requirement for post-op MRI was whether a tumour was contrast enhancing.

The Aberdeen and Dundee centres also raised the concern that MRI scanning was not a 7-day-a-week service and this would therefore make the QPI difficult to achieve for cases where the surgery was carried out towards the end of the week. An audit into individual cases had not yet been completed therefore no specific comments were received on those cases not meeting the QPI. The Glasgow centre did not provide any specific comments.

Further analysis of NOSCAN and WoSCAN data has revealed that there were 5 cases where the day of surgery (Thursday or Friday) may have impacted on the ability to meet the 3-day specification. As this equates to only 6.3% of the cases not meeting the QPI, centres should investigate alternative explanation as to why QPI 7 is not being achieved. Figure 16 provides further detail and illustrates the proportion of patients who did have a post-op MRI however outwith the 3-day period.

Figure 16: Proportion of patients with malignant glioma, WHO Grades II, III and IV, who receive early post-operative imaging with MRI; 1) within 3 days (72 hours) of surgical resection 2) more than 3 days after surgery 3) MRI not completed 4) date error 5) not recorded.



Action required:

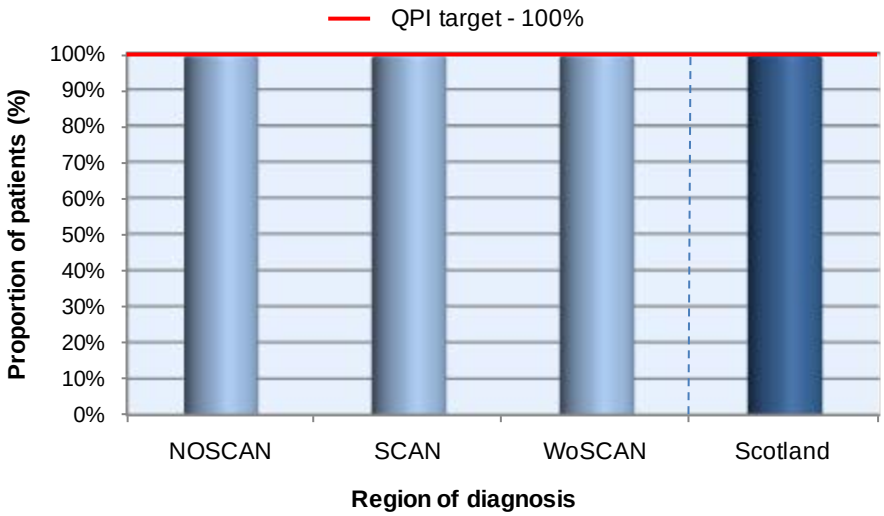
- Edinburgh centre – Lead neurosurgeon to remind colleagues and trainees that post-operative MRI scans should be performed within 3 days of surgery of patients undergoing a resection, and if required over weekend to speak to neuro-radiology.
- Aberdeen, Dundee and Glasgow centres should review all cases where post-surgery MRI was not performed, or not completed within the 72-hour interval, to identify areas for service improvement.
- Following agreement at Baseline Review, changes to the dataset and measurability will be proposed for NCQSG approval to measure the proportion of patients with contrast-enhancing tumours who undergo post-operative MRI within 3 days of surgery.

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



QPI 8	NOSCAN	SCAN	WoSCAN	Scotland
Performance (%)	100%	100%	100%	100%
Numerator	44	80	88	212
Denominator	44	80	88	212
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 QPI 8; thus performance across Scotland was also 100%.

SCAN has commented that they would have expected QPI 8 to have been met in all cases as guidelines mandate supervision of all radiotherapy and chemotherapy by a specialist oncologist. The Edinburgh centre has proposed that this QPI could be revised to measure those patients who have support from a clinical nurse specialist or palliative care nurse and this could be considered after Year 3 analysis when QPIs will undergo formal review. All centres should strive to maintain excellent performance against QPI 8 in the interim.

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 or radiotherapy) within 6 weeks of surgical resection.

The results for QPI 9 are not included within 2014 audit report due to difficulties encountered with the measurement of this QPI. Initial measurement selected the number of patients undergoing adjuvant treatment and measured the time between surgery and commencement of oncological treatment. This however, did not include patients undergoing adjuvant chemoradiotherapy and therefore excluded a large proportion of relevant patients from the denominator. Changes to the measurability prior to analysis also did not identify the correct cohort of patients as appropriate exclusions had not been taken into consideration.

QPI 9 was discussed at Baseline Review to assess the most appropriate measurement criteria. It was agreed that the original measurability should be amended to include patients having adjuvant chemoradiotherapy and to also add biopsy procedures to the numerator. Year 1 and Year 2 results will be reported in next year's audit report, as there are no dataset changes that would preclude this.

Action required:

- Following agreement at Baseline Review, changes to the measurability will be proposed for NCQSG approval to include patients undergoing chemoradiotherapy and biopsy cases.

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%

Performance against QPI 10 will not be reported in Year 1 as the dataset did not allow for the correct cohort of patients to be identified for the denominator (i.e. unclear definition of radical radiotherapy). Performance across Scotland was good at 92.4%, however only a small proportion of the relevant patients were included and therefore results are not representative of the service as a whole.

The Edinburgh centre performed a separate analysis of 2014 data by looking at the fractions of radiotherapy received and defined 'radical' radiotherapy as patients receiving 20 fractions or more, and those receiving concurrent chemotherapy. This increased the denominator from 7 to 54 patients and performance was 100% in both cases. Measurement of this QPI was discussed at Baseline Review and it was agreed that data definitions should contain an explanatory note describing radical

radiotherapy as that over 20 fractions. It was also agreed that patients undergoing chemoradiotherapy should also be included in the denominator. Data will be presented in Year 2.

Action required:

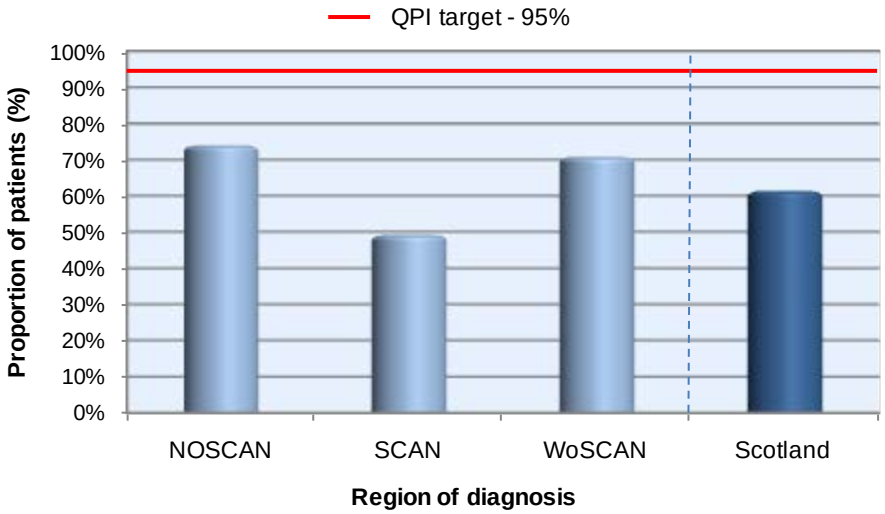
- Following agreement at Baseline Review, changes to the data definitions and measurability will be proposed for NCQSG approval to include patients undergoing radiotherapy over 20 fractions and chemoradiotherapy.

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 18: 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 (%)	73.9%	49.1%	70.7%	61.3%
Numerator	17	27	29	73
Denominator	23	55	41	119
Not recorded numerator	3	14	10	27
Not recorded numerator (%)	13.0%	25.5%	24.4%	22.7%
Not recorded exclusions	0	0	0	0
Not recorded exclusions (%)	0.0%	0.0%	0.0%	0.0%
Not recorded denominator	1	0	0	1

Overall performance across Scotland for QPI 11 was 61.3% against the 95% target. None of the three regions met the target for QPI 11 with performance of 49.1%, 70.7% and 73.9% for SCAN, WoSCAN and NOSCAN respectively.

NHS Boards have commented that the information has been difficult to collect as it is not recorded on the regional MDT outcomes. This is reflected in the results as 22.7% of cases were not recorded for the numerator.

Action required:

- All neuro-oncology centres/NHS Boards should review processes and take action to improve data collection with regards to whether patients have been reviewed by an epilepsy specialist.
- All neuro-oncology centres should review cases that did not meet QPI 11 to elicit any reasons why patients presenting with seizures are not seen by an epilepsy specialist.

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.

Results presented in this report demonstrate that work is required to ensure patients with brain and CNS cancers receive an equitable and consistent standard of care across NHS Scotland. It is evident that many of the QPI targets set have been challenging for centres to achieve and some variance and a number of areas for improvement have been highlighted.

This audit report has identified areas where data capture must improve to enable more meaningful analysis of performance against QPIs in the coming years, specifically with regards to tumour reduction volume, date of WHO performance status and whether patients have been seen by an epilepsy specialist. However overall case ascertainment and data capture is commendable for the first year of data collection and analysis, and provides a good foundation from which to measure service improvement in future years.

Areas for service improvement have been identified relating to variation in molecular analysis completion rates, the proportion of patients undergoing maximal surgical resection and early post-operative imaging. These issues were discussed at Baseline Review for Brain and CNS Cancer QPIs to evaluate whether difficulties in achieving the QPI targets relate to measurability rather than service issues. Baseline Review discussion also addressed the measurement issues identified for QPIs 9 and 10 which were not reported in Year 1, and proposed changes await NCQSG ratification.

The NMCN will actively take forward national actions identified and NHS Boards/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 each NHS Board/neuro-oncology centre has been included within the Action Plan templates in the Appendix.

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 MCN Advisory Board and any service or clinical issue which the Advisory Board 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 MCN 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
CNS	Central Nervous System
CT	Computed Tomography
D&G	NHS Dumfries & Galloway
eCASE	Electronic Cancer Audit Support Environment
ECNO	The Edinburgh Centre for Neuro-Oncology
FISH	Fluorescence in-situ hybridisation
FV	NHS Forth Valley
GGC	NHS Greater Glasgow and Clyde
GTV	Gross Tumour Volume
HIS	Healthcare Improvement Scotland
ISD	Information Services Division
Lan	NHS Lanarkshire
MCN	Managed Clinical Network
MDT	Multidisciplinary Team
MGMT	O6-methylguanine-DNA methyltransferase
MRI	Magnetic Resonance Imaging
NCQSG	National Cancer Quality Steering Group
NHSGGC	NHS Greater Glasgow and Clyde
NMCN	National Managed Clinical Network
NOSCAN	North of Scotland Cancer Network
PS	Performance Status
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
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:	
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*.