NHS England

Stereotactic Radiosurgery and Radiotherapy Services – needs assessment and service review

NHS England INFORMATION READER BOX		
Directorate		
Medical	Commissioning Operations	Patients and Information
Nursing	Trans. & Corp. Ops.	Commissioning Strategy
Finance		

Publications Gateway Reference:	**02469**
Document Purpose	Consultations
Document Name	Stereotactic Radiosurgery and Radiotherapy Services - Needs Assessment and Service Review
Author	NHS England, Medical Directorate (Specialised Commissioning)
Publication Date	03 November 2014
Target Audience	Foundation Trust CEs , Medical Directors, Directors of Nursing, NHS England Regional Directors, NHS England Area Directors, NHS Trust CEs
Additional Circulation List	Interested Patient Groups/Associations, MPs, Royal Colleges, NHS England Clinical Reference Groups
Description	This is one of two documents that is being issued as part of a public consultation
Cross Reference	Consultation Guide - 02468
Superseded Docs (if applicable)	
Action Required	The needs assessment and service revierw should be read in conjuction with the consultation guide
Timing / Deadlines (if applicable)	**The consultation runs from 3 November 2014 to 26 January 2015**
Contact Details for further information	David Stockdale Regional Programme of Care Manager - Trauma (North) 3 Piccadilly Place Manchester M1 3BN 0113 825 5158

Document Status

This is a controlled document. Whilst this document may be printed, the electronic version posted on the intranet is the controlled copy. Any printed copies of this document are not controlled. As a controlled document, this document should not be saved onto local or network drives but should always be accessed from the intranet

Stereotactic Radiosurgery and Radiotherapy Services

Needs Assessment and Service Review

First published: 3 November 2014

Prepared by: Medical Directorate (Specialised Commissioning)

Classification: Official

Contents

Foreword

NHS England took on responsibility for commissioning Stereotactic Radiosurgery and Stereotactic Radiotherapy Services (SRS/SRT) in April 2013.

The organisation inherited a number of different commissioning arrangements, which meant that patients were experiencing variable access to services, depending on where in the country they lived.

As the single national commissioner of SRS/SRT services, NHS England has the opportunity – for the first time ever – to develop a truly national service, which means equitable access to high quality services for all patients requiring these forms of specialised care.

This report sets out the findings of a comprehensive needs assessment and service review carried out by NHS England, to look at the provision of SRS/SRT services across England, as well as a number of other issues relating to these services.

It outlines whether changes in the commissioning of SRS/SRT services are required to improve service provision and patient experience, and, particularly, whether there is a need to commission additional activity, and new market entrants to provide that capacity and activity.

It sets out a number of options for change, each of which is focused on obtaining the best possible choice for patients, and on ensuring that innovative radiotherapies such as SRS/SRT remain at the heart of the NHS in England.

One of the key strengths of this exercise was the bringing together of both the surgical and oncology communities, driven by a single sense of purpose, which, it is hoped, will set a precedent for future collaborative work in this area, in improving services for patients. This report provides a framework for that future consolidation of effort.

This is a detailed report, and rightly so. I would encourage all who read it to pay due consideration to the options for change, in particular the prospect of seven-day working, which has the potential to ensure that patients have easier access to vital services, whenever, and wherever, they need them.

We look forward to hearing the views of as many of you as possible during the next 12 weeks and I would like to take this opportunity to encourage you all to help us shape the future of these services, and ensure that patients get the very best care and treatment which they deserve.

Mr Sean Duffy
National Clinical Director for Cancer

Executive summary

1. NHS England became responsible for the direct commissioning of Stereotactic Radiosurgery/Stereotactic Radiotherapy (SRS/SRT) services from 1 April 2013.

2. NHS England carried out a needs assessment and service review which highlighted two potential future levels of annual activity for England, both significantly higher than the circa 2,500 SRS/SRT treatments recorded in 2013/14. Scenario A totals 5,239 treatments and is based on the needs assessment within agreed NHS England commissioning policies. Scenario B totals 8,847 treatments, based on the levels experienced in countries with similar economies.

3. SRS/SRT activity is growing incrementally and may increase by as much as 50% over the next four years. It is likely that the activity levels of either Scenario A or B would take several years to be realised. The table below demonstrates how the additional activity might be phased in over a period of time. However, the pace of clinical change is uncertain.

	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Base Case	2,500	2,812	3,125	3,437	3,750			
Scenario A	2,500	2,812	3,900	5,000	5,239			
Scenario B	2,500	3,000	3,900	5,000	6,000	7,000	8,000	8,847

4. The machine requirement for England varies, depending on the ratio of Gamma Knife® to linear accelerators; the overall level of commissioned activity; the machine daily throughput; and whether the service is delivered within a five or seven-day working week. The options concerning the device requirement for England reflect these variables. NHS England has put forward option 2 as the preferred option.

5. The 2013/14 activity for England could be met by three Gamma Knife® machines, working seven days a week, at 85% capacity.

6. Currently, there are 12 contracted services and a further 13 aspiring market entrants.

7. Due to a lack of strategic placement of capacity, 45% of the population cannot access SRS/SRT services within a one-hour drive time. Even if all contracted and aspirant providers were available, 31% of the population would be unable to access services within a one-hour drive time.

8. The current arrangements have led to duplicated and excess capacity in some areas of the country, and have left much of the rest of the country with

poorer access. The review concludes that a strategic approach to the level and location of capacity would achieve improved access and outcomes for patients, compared to the current legacy arrangements. The review recommends a procurement which would allow NHS England to select the most capable providers of services from amongst existing and aspirant healthcare providers, to provide equitable and fair access to services for patients, reflecting patient need.

9. This report sets out the findings of a needs assessment and service review exercise carried out by NHS England, looking at the provision of SRS/SRT services across England.

10. It outlines whether changes in the commissioning of SRS/SRT services are required to improve service provision and patient experience, and, particularly, whether there is a need to commission additional activity, and new entrants to provide that capacity and activity.

Background

11. NHS England became responsible for the commissioning of Stereotactic Radiosurgery and Stereotactic Radiotherapy (SRS/SRT) services in April 2013. As the direct commissioner of these services, NHS England commissions care pathways for patients who require SRS and SRT for intracranial conditions.

12. In treating intracranial conditions, SRS/SRT uses a large number of precisely directed beams of radiation to treat cancerous and benign tumours, vascular lesions and functional abnormalities in the brain. The precise nature of this technique means that there is less risk of causing damage to any healthy tissue surrounding the target area for treatment.

13. As the single, national commissioner of these prescribed specialised services, NHS England aims to ensure that patients requiring SRS/SRT have access to high quality, consistent and equitable services across England.

14. In support of this aim, prior to April 2013, the then NHS Commissioning Board developed, consulted on, and then published, a series of national clinical commissioning policies for intracranial SRS and SRT treatment. View the commissioning policies.

15. SRS and SRT are an established part of the innovative radiotherapy portfolio and, therefore, NHS England established a project to review, at a national level, the current commissioning arrangements for these services. This project would include a needs assessment for those defined indications now routinely commissioned by NHS England, and a broader review of intracranial SRS and SRT services, following established commissioning and procurement principles.

16. As a national commissioner we are in the position, for the first time, to examine the national need for SRS/SRT in accordance with our commissioning policies and establish the capacity requirements in a coordinated way, so that we can secure equitable geographical access for patients requiring these services.

Needs assessment and service review

17. NHS England wished to evaluate whether increased capacity for SRS/SRT was required, based upon the need for these services, in line with our published commissioning policies for intracranial conditions. This approach would ensure that any changes in levels of service provision, through either commissioning increased or decreased capacity, would be undertaken in a coordinated way. This would promote equitable access for patients, enabling a fair and level playing field for new market entrants, and acting in line with NHS England's policy on patient choice.

18. The aim was also to adopt an approach that was in keeping with the service and quality standards required for SRS/SRT services and was fully supported, funded and contracted by commissioners to ensure the improved quality and outcomes for patients requiring SRS/SRT services.

19. In addition, NHS England wanted to ensure that, in the approach taken, any risks for providers and commissioners were minimised, by ensuring that any recommendations for the future configuration and commissioning of SRS/SRT were in line with the strategic intentions for these services, and with those outlined in the recent publication 'Everyone Counts: Planning for Patients 2014-15 – 2018-19'.

1.1 Objectives

20. The objectives of the needs assessment and service review were to:

- establish a time-limited steering group, and weekly reporting mechanism, to monitor delivery of the project;
- establish a needs assessment informed by the recently agreed policies for intracranial SRS and SRT;
- undertaken a service review of the current provision of SRS/SRT, reviewing the care pathway; current and potential provider landscape; outcome measures, and synopsis of the type and range of delivery platforms for SRS/SRT;
- establish a baseline of current contracted activity and current provider capacity;
- outline the current and future national need for SRS/SRT interventions, taking into account NHS England's clinical commissioning policies and international trends in clinical practice;

- determine the required capacity; location of that capacity, and type of capacity required;
- consider if the different machines capable of delivering SRS/SRT had comparable clinical outcomes and costs;
- establish the geographical access parameters appropriate for this service;
- assess how appropriate the current level, and location, of available commissioned capacity was, given the current and projected demand for these services;
- consider with Clinical Reference Groups (CRGs) and Royal Colleges, clinical consensus on minimum volumes per unit;
- determine whether the current configuration of services requires change, and proactive management, to more effectively meet the needs of patients; and
- recommend a preferred procurement method to secure future SRS/SRT services, should a change in commissioned activity and provision be required.

1.2 Definition and use of SRS and SRT

21. The basic principle of SRS and SRT is the elimination of a functional disorder, or destruction of abnormal tissue, by the administration of a strong, and highly focused, dose of radiation. The procedure allows radiation to be limited to the target area, and thus helps spare the surrounding tissue as much as possible.

22. In SRS, treatment is delivered as a single dose. In SRT, it is delivered as a hypofractionated treatment, of not more than five fractions.

23. This service review applies to both of these approaches to treating intracranial conditions. Commissioning arrangements for fractionated treatments, or larger tumour volumes, utilising a larger number of fractions, are beyond the remit of this review.

24. A multi-disciplinary team comprising at least one neurosurgeon; oncologist; neuro-radiologist, and physicist, should be involved in SRS/SRT case selection. Treatment planning and delivery is carried out by a neurosurgeon or oncologist with input from a neuro-radiologist and physicist, as well as radiographers.

25. Patients of all ages may benefit from SRS/SRT. The treatment is usually carried out with the patient awake, and therefore compliant with treatment. Young children and non-compliant adults can be treated using sedation or general anaesthesia.

26. SRS and SRT can be provided using one of several technologies/platforms. This service review covers SRS/SRT delivered by Gamma Knife ®, Cyberknife ®, or any other modified linear accelerator-based technology. A list of platforms, and their commercial names, are included in table 1 below:

Table 1: Summary of SRS/SRT delivery platforms

Platforms	Commercial Name
Modified Linear Accelerator	LINAC
	X Knife®
	Novalis®
	Cyberknife®
Gammaknife®	Gamma Knife®
Tomotherapy®	Tomotherapy®

Please note, the Tomotherapy machines do not deliver SRS and do not routinely delivery SRT. It is included in this table as it was indicated as a machine used by a commissioned provider.

1.3 Conditions treated by SRS/SRT

27. SRS/SRT is used to treat both malignant and benign tumours in the brain, as well as an increasing range of neurological functional disorders. NHS England has developed a range of clinical commissioning policies, outlining its routine commissioning position on a range of SRS/SRT treatments.

28. NHS England supports the routine funding of SRS/SRT for the following conditions:

- Ocular melanoma and pituitary adenoma
- Meningioma
- Glomus tumours
- Cavernous venous malformations
- Vestibular Schwannomas and other cranial nerve tumours
- Trigeminal Neuralgia
- Cerebral arteriovenous malformations
- Cerebral metastasis

1.4 Care pathway

29. Each patient considered for SRS/SRT treatment will follow a specific care pathway. This pathway will vary, depending on the indication being treated (see figure 1). All patients with intracranial conditions, and their treatment plans, are first considered in a condition, or site-specific, multi-disciplinary team (MDT) meeting, for example, a breast, lung or neurosciences MDT,

before being discussed at a SRS/SRT multi-disciplinary meeting (MDM), held in a patient's local oncology centre.

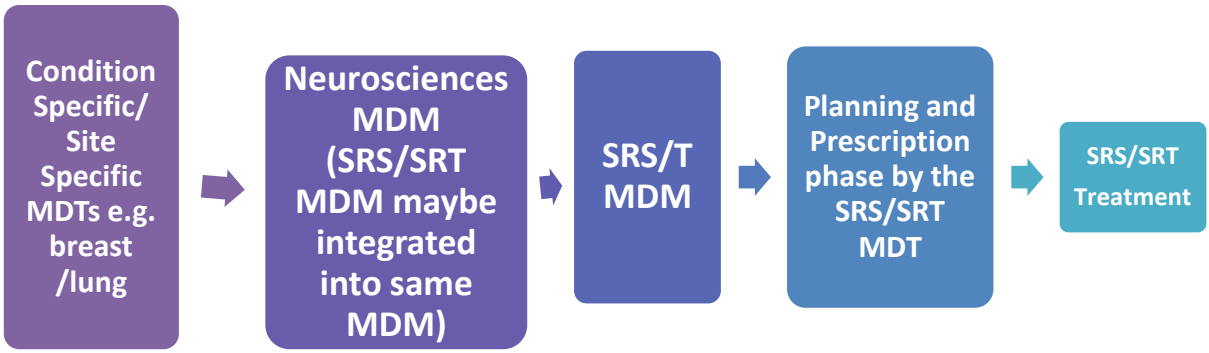


Figure 1: SRS/SRT MDM care pathway

30. For these patients, there must be clear, documented pathways for each condition treated, which show:

    - the process for ensuring that each patient is reviewed by an appropriate MDT which makes the decision about the most appropriate treatment;
    - the process for determining where the patient is treated;
    - the point within each care pathway where the role of SRS/SRT provider starts and finishes: and
    - the process for ensuring that the pathway is seamless and has no avoidable delays.

31. For patients with brain metastases, the decision to refer to a Neurosciences Brain and Central Nervous System (CNS) MDT will be made by their disease-specialist MDT. This team will consider the role of aggressive management of brain metastases with SRS/SRT, or surgery, within the patient's overall oncological management. In cases where patients are being referred for indications others than brain metastases, the decision to offer SRS/SRT is made by the appropriate sub-specialist MDT e.g. the base of the skull MDT or the neurovascular MDT.

32. Patients that have either a neurosciences functional condition, or intracranial tumour, are then referred to a tertiary centre, to a neurosciences MDT. The neurosciences MDT will consider whether conservative management, surgery, or SRS/SRT is the optimum treatment option for the patient at that stage of their condition, whether that be for functional conditions or for benign and malignant tumours.

33. The aim of MDT assessments is:

    - to ensure that all forms of treatment are considered, and to advise of the next steps in a patient's treatment plan, which may include

SRS/SRT; surgery; chemotherapy; conservative management or palliative care;
- to ensure that SRS/SRT, if recommended, is the correct choice for the individual patient at the current stage of their condition;
- to facilitate referral to the SRS/SRT MDT, to ensure that SRS/SRT can be delivered safely.

34. If SRS/SRT is considered the optimum treatment for the patient at that stage of their condition, and they fall within the clinical eligibility criteria of the relevant NHS England national commissioning policy, then their case is considered by the SRS/SRT MDT. The role of this MDT is to decide whether it is appropriate for the patient to receive SRS/SRT, and, if so, to enter the planning and prescription stage of treatment planning and delivery.

35. Following discussion at the SRS/SRT MDT, patients accepted for this form of treatment will be seen by a clinician who is a core member of that MDT. This clinician should discuss with the patient their condition; treatment options, and the rationale for SRS/SRT treatment, before planning and supervising that treatment.

36. If patients are considered to be unsuitable for SRS/SRT treatment by the SRS/SRT MDT on clinical grounds, that decision will be conveyed to the patient by the referring MDT, with the support of the SRS/SRT MDT. Where no further investigations are required, patient assessment will be completed within 14 days of the first discussion at the SRS/SRT MDT, unless decided otherwise between the patient, the SRS/SRT MDT and the referring specialist MDT. The patient will be provided with a full management plan within 14 days of their assessment.

37. All patients should be provided with detailed condition-specific information, and links to relevant website addresses during informal counselling. Patients should have access to a specialist nurse or key worker throughout the referral and treatment process. A patient's diagnosis and management plan should be communicated to the referring consultant/MDT and to the patient's GP within five days of the definitive management plan being established.

1.4.1 Discharge

38. Follow-up protocols and recommendations will be sent to referring physicians with whom shared care is arranged. This applies particularly to patients for whom transport may present difficulties.

39. Patients will be discharged back to the referring consultant/MDT following treatment, with the exception of those patients with the conditions detailed below:

- *Arteriovenous malformations* - Patients who have demonstrated obliteration on magnetic resonance imaging (MRI), and formal angiography, may be discharged from further follow-up.

- *Vestibular Schwannoma (acoustic neuroma)* – Patients with Vestibular Schwannoma will have follow-up at one, two, three and five years, which will include MRI, audiology and facial nerve assessment.

1.5 Delivery platforms for SRS/SRT

1.5.1 Overview of SRS/SRT machines

40. Three main technological applications are used to deliver SRS/SRT:

1. The Gamma Knife ® - this has been in use for five decades and utilises Cobalt 60 as a radiation source. This is guided via collimators, a piece of equipment which narrows beams of radiation, to provide a conformal treatment.
2. Modified linear accelerator-based SRS/SRT is the term used to describe SRS/SRT delivered by a linear accelerator (LINAC), using a tungsten multi-leaf collimator or fixed conical collimators, to shape the radiosurgery/radiotherapy beam to the unique anatomy of the lesion. The LINAC beam is usually delivered by a series of arcs. The multi-leaf collimator aperture adapts its shape as the modified LINAC moves through an arc. Novalis ® and X—knife ® are examples of modified LINAC-based systems.
3. CyberKnife ® is an adapted form of modified LINAC-delivered SRS/SRT, using a robotically mounted modified LINAC that enables pencil beam delivery of radiation to the target from multiple nodal points in the 3D space surrounding the patient.

41. All three delivery systems have developed a body of supportive literature verifying clinical efficacy.

42. At present, Gamma Knife ® treatment is confined to the brain and upper cervical spine region. Use of a frame, which is used to hold the patient's head in a fixed position for the duration of treatment, leads to utility being mainly as a single treatment SRS therapy. Modified LINACs and CyberKnife ® can operate, with similar accuracy, without the need for a frame, enabling SRT to be used on other parts of the body. In addition, mask localised or frameless techniques, enable treatment to be fractionated. In some cases three fractions of treatment have been used; in other cases 30 fractions have been employed. Fractionated SRT (more than five fractions) and extracranial radiosurgical techniques are beyond the remit of this needs assessment and service review.

43. The distinguishing features of each delivery platform are summarised in table 2. Please note that this table simply sets out general distinguishing features. The evidence for the clinical effectiveness of the technology suggests that there are no significant differences between the machines. The needs assessment and service review determined, therefore, that, when considering capacity requirements for this treatment, the three types of machine should be considered as a single, collective capacity requirement, rather than three separate requirements

	LINAC	Gamma Knife ®	CyberKnife ®
Description	Modified LINAC	Gamma radiation using Co-60 radiation through attached frame	LINAC mounted on a robotic arm
SRS	Yes	Yes	Yes
SRT	Yes	Yes (but not routinely undertaken in clinical practice)	Yes
Sites treated	Intracranial and extracranial	Intracranial and upper cervical	Intracranial and extracranial
Immobilisation	Frame/frameless	Frame	Frame/frameless
On board imaging	Yes	No	Yes
Throughput	2.5 per day for modified LINAC 2.5 per day for dedicated machine (Novalis ®)	3.5 per day	2.5 per day

Table 2: Summary of key delivery platforms for SRS/SRT

1.6 Summary of evidence base for SRS/SRT-treated clinical indications

44. There is evidence to support the use of SRS/SRT for a wide range of cranial indications including arteriovenous malformations, acoustic neuroma, meningioma, pituitary adenoma, ocular melanoma, trigeminal neuralgia, and selected sub-groups of patients with cerebral metastases. A policy is in development for other rare intracranial tumours.

45. The full evidence base for SRS and SRT can be found in each individual clinical commissioning policy.

46. In summary, there is a good evidence base that supports the clinical effectiveness, cost effectiveness, and safety and improvement in patient outcomes, for SRS/SRT for intracranial conditions. However, there is no cost effectiveness evidence comparing SRS/SRT with alternative treatments. Similarly, there is no evidence comparing the clinical and cost effectiveness of the different types of machinery that can deliver SRS/SRT.

1.7 Methodology

1.7.1 Needs assessment

47. The first stage of the analysis was to undertake a needs assessment that considered the need for SRS/SRT across England, as indicated by the incidence rates of each of the individual SRS/SRT clinical commissioning policies.

48. The needs assessment tool was developed to consider each of the policy areas routinely funded by NHS England, and the incidence figures detailed in those policies, to give an assumption of the number of cases each year. Additionally, an assessment was made concerning whether those assumptions were still correct, what capacity is required to treat those cases (in fractions/sessions), and any demographic and population-based growth assumptions that should be factored into the analysis.

49. A further section was included for the relatively small volumes of activity that would be included within policies currently in development.

50. The needs assessment templates were completed initially by a small sub-group of the Intracranial SRS Clinical Reference Group (CRG), and subsequently presented to, and discussed by, the focus group for further validation.

51. The SRS/SRT Focus Group consisted of representatives of the SRS CRG, four associated CRGs, and NHS England staff. The associated CRGs were Adult Neurosurgery, Radiotherapy, Neurosciences, and Central Nervous System Tumours. The group met twice, chaired by the National Clinical Director for Cancer. The focus group agreed the overall figures for both scenario A and B, which are described below.

52. Two needs assessment tools were developed to estimate the projected need for SRS/SRT. The first, ***Scenario A,*** examined the England demand based on current estimated need, but which factored in that presently, England had not yet made the full switch to SRS/SRT for cerebral metastases, glomus tumours and trigeminal neuralgia.

53. The second tool, ***Scenario B***, estimated the projected demand based on the incidence rates included in the NHS England policies, and taking into account England reaching the access levels in line with those internationally for cerebral metastases and trigeminal neuralgia (the anticipated step-change).

54. The Focus Group analysed Scenario B information and concluded that the overall level of treatment was correct, but within the total, the number of cerebral metastases needed to be increased, and the trigeminal neuralgia number reduced.

1.7.2 Analysis of current service provision

55. The service review looked at the current commissioned service provision in terms of an overview of the care pathway; treatment modalities, and current commissioned providers.

56. All current contracted providers of intracranial SRS and SRT services were asked to complete a template in order to establish a baseline and current capacity position. Providers were asked to return data relating to intracranial activity and capacity only.

57. The documents were circulated to area teams, via Heads of Specialised Commissioning, for area teams to disseminate to their contracted providers. Providers were given two weeks to complete and return their submission. Where providers required clarification or further support to complete the template, there was an opportunity to contact a member of the project team to discuss those issues further.

1.7.3 Data limitations

58. The review also sought to examine the growth in SRS/SRT activity. It should be noted that analysis of growth within this project will need to be treated with caution, as the project was limited by its ability to access previous Hospital Episode Statistics (HES) and Secondary Uses Services (SUS) data. Furthermore, due to the variability in coding, and not all previous activity having been submitted through SUS, it was viewed as a data source that could not be relied upon; nor would it allow us to draw firm conclusions from that data source for the purposes of this review.

59. Given that in 2012/13, some activity was commissioned on an ad hoc basis from the current non-contracted providers through Primary Care Trusts, as individual funding requests (IFRs), we also contacted all established providers (contracted and non-contracted) who had installed devices to ask them to make a data return relating to any activity they had undertaken in 2012/13. This activity was used to support the data submissions from contracted providers in relation to 2012/13 activity.

1.7.4 Capacity

60. In order to establish estimated capacity, two methods were implemented:

- **Operational capacity** - the provider reported utilisation rate to the 2012/13 actual and 2013/14 planned activity, and extrapolated this to obtain a level of capacity (activity) should an optimum level of 85% utilisation be undertaken.

- **Machine capacity (five and seven-day service)** – this method is based solely on the estimated machine capacity to undertake treatment. It is based on the assumption that each device is capable of treating a set number of patients in a given eight-hour working day. The following level of activity was applied to each device:

Modified linear accelerator:	2.5 patients per day
Dedicated linear accelerator (e.g. Novalis ®):	2.5 patients per day
Gamma Knife ®:	3.5 patients per day
CyberKnife ®:	2.5 patients per day

61. These figures were then used to calculate the potential device requirement for England for both a five, and a seven-day service. In the five-day scenario, LINACS used also for fractionated therapy were assumed to be utilised two days a week for SRS/SRT. In the seven-day scenario, SRS/SRT use was raised to four days a week.

1.7.5 Pricing review

62. A pricing review was developed to understand the different prices currently paid by commissioners across England. Additionally, analysis was undertaken to determine if SRS/SRT was a cheaper or more expensive treatment option, compared with neurosurgery.

1.7.6 Data collection and analysis

63. Once all provider submissions were received, the data from the templates was aggregated and analysed. The data was cleaned and, in instances where data was inconsistent or absent, contact was made with the provider to correct this information where available. An example of this was in the calculation for activity. In this case, all day cases were assumed to be activity where treatment for SRS/SRT was undertaken. In instances where providers would have described this activity as ‘elective’ or ‘outpatient’, they were grouped, for the purposes of this project, as ‘day case’. In this exercise, descriptive analysis was used. Key changes to the submitted data, such as the one described, were reflected back to the provider, for confirmation.

64. The senior project team developed a data analysis framework and key analysis questions, prior to running a full data analysis.

65. Table 3 lists all current providers contracted by NHS England. In 2013/14 NHS England was commissioning with 12 providers for SRS/SRT.

2013-14 Contracted NHS England providers of SRS/SRT

- Cambridge University Hospitals NHS Foundation Trust (Addenbrookes Hospital)
- Bupa Cromwell, London
- Plymouth Hospitals NHS Trust (Derriford Hospital)
- Hillingdon Hospitals NHS Foundation Trust (Mount Vernon Hospital)
- Nova Healthcare/Leeds Teaching Hospitals NHS Trust
- Sheffield Teaching Hospitals NHS Foundation Trust
- Lancashire Teaching Hospitals NHS Foundation Trust (Royal Preston Hospital)
- Salford Royal NHS Foundation Trust/Christie Hospital NHS Foundation
- Barts Health NHS Trust (St Bartholomew's)
- Thornbury Gamma Knife ® Centre, Sheffield
- University Hospital Birmingham NHS Foundation Trust

Table 3: NHS England current contracted providers

1.7.7 Market assessment

66. A market assessment was undertaken to understand the existing and potential SRS/SRT provider market. This work involved mapping the providers with the capabilities of undertaking this type of treatment. The output intended was a map showing all of the delivery devices for SRS and SRT that are operational in England. Industry companies were contacted, notified of the project, and asked to provide details for their installed devices to populate the map for current and potential providers.

67. The data returned was used to produce a provider map with geographical isochrones to identify any geographical gaps in the service, and identify potential new providers. Each of the mapping isochrones sought to illustrate public access travel times of 15 minutes, 30 minutes and one hour. This was assuming a drive time in a car or taxi.

Findings and results

Needs assessment

1.7.8 NHS England policy data

68. The needs assessment, as set out in table 4, demonstrates a national need projection for SRS/SRT incorporating incidence rates based on Scenarios A and B. Incidence rates were adjusted following discussions at the first

meeting of the focus group. Please note that policies for other intracranial tumours and epilepsy, pain and Parkinson's disease are in production.

SRS Policy Area	Scenario A Demand	Scenario B Demand
Cerebral Metastases	1,052	2,834
Meningioma	1,875	2,691
Acoustic Neuroma	583	957
Arteriovenous Malformations	600	730
Ocular Melanoma and Pituitary Adenoma	400	574
Trigeminal Neuralgia	320	330
Cavernomas	159	243
Glomus Tumours	50	144
Epilepsy, Pain, Parkinson's Disease	100	200
Other intracranial tumours	100	144
TOTAL	5,239	8,847

Table 4: Scenario A and B needs assessment

69. The needs assessment has two positions: Scenario A baseline projection on the above adjustment, and Scenario B, a higher need projection that incorporates the step-change point and high incidence rates which England aspires to, to meet the access rates of those seen internationally, within the next five years.

70. At a national level, Scenario A suggests a projected activity of 5,239 treatments per year of SRS and SRT, with 90% of treatment delivered by SRS and 10% by SRT. This gives an average of 98 treatments per million population. For Scenario B, the overall projected activity for SRS/SRT annually would increase to 8,847 treatments. This gives an average of 165 treatments per million population.

Capacity and activity

1.7.9 Activity by device

71. There were 16 machines reported as in use, and currently commissioned by NHS England from the 12 providers detailed in table 3. The modified LINAC was the most commonly commissioned machine, followed by Gamma Knife ®.

1.7.10 Activity: national

72. At a national level, the activity commissioned in 2012/13 was 2,132 SRS/SRT treatments and 2,563 treatments in 2013/14.

	Total Activity 12/13	Total Activity 13/14	Growth (%)
Total	**2132**	**2563**	**20%**

Table 5: Growth for England (financial years 2012/13 and 2013/14)

73. In order to ensure that all activity had been captured, providers who were not commissioned by NHS England to undertake this work, but who had the machines installed to deliver, were asked to provide information on any NHS activity undertaken in 2012/13. Results found that these providers had undertaken additional activity of 186 treatments.

74. The majority of the activity undertaken was SRS. Similarly, in a number of cases where providers were delivering SRT, these numbers were either relatively small, or were not separately planned for. In these cases, there was no planned activity; providers reported managing these patients as part of their overall operational plan on an 'as needed' basis; and highlighted that they had flexibility within the services currently to do this.

1.7.11 Growth

75. At a national level, the percentage increase of SRS/SRT treatments in England from 2012/13 to 2013/14 was 20%.

76. At a regional level, the Midlands and East showed a doubling of activity between these years related directly to the expansion in provision within that region. This was followed by the South region, with growth of 38%. The region with the least overall growth in activity was the North (13%).

1.7.12 Utilisation

77. The average utilisation rates by delivery platform were 47% for Gamma Knife ®; 80% for CyberKnife ®, and 46% for modified LINACs. These calculations were made using a five-day working week. In a seven-day working week, these utilisation rates would drop to 34%; 57% and 33% respectively.

78. While both the CyberKnife ® and Gamma Knife ® are dedicated SRS/SRT machines, the modified LINACs are not. There is flexibility with the providers delivering this service using the modified LINAC machine, in that they have

the ability to take on an increased workload for intracranial conditions should the need arise.

1.7.13 Capacity

79. Overall capacity at a national, regional and area team level was calculated, using three different assumptions:

- The operational capacity (based on operational utilisation rates submitted by providers);
- The machine capacity, based on both a five-day service;
- The machine capacity based on a seven-day service.

80. The potential machine capacity was based on 3.5 cases per day on a Gamma Knife ®; 2.5 per day on a CyberKnife ®, and 2.5 cases per day on a modified LINAC.

Market assessment

1.7.14 Current and projected provider landscape

81. A market assessment was undertaken as part of this review in order to ascertain a full picture of all providers capable of delivering this service, which includes those providers who are not currently commissioned by NHS England to undertake this work.

82. In order to complete this, appropriate industry companies were contacted and a request was made for them to provide information on providers who had machines installed, capable of undertaking SRS or SRT. A list of all providers can be found at table 6.

Hospital
Cambridge University Hospitals NHS Trust (Addenbrookes Hospital)
Imperial College Healthcare NHS Trust (Charing Cross Hospital)
Oxford University Hospitals NHS Trust (Churchill Hospital)
Salford Royal NHS Foundation Trust/Christie Hospital NHS Foundation Trust
The Walton Centre NHS Foundation Trust/Clatterbridge Centre for Oncology NHS Foundation Trust (Liverpool)
BUPA Cromwell Hospital, London
Plymouth Hospitals NHS Trust (Derriford Hospital)
Newcastle-upon-Tyne Hospitals NHS Foundation Trust (Freeman Hospital)
Guy's & St Thomas' NHS Foundation Trust
Harley Street Clinic, London
Harley Street at UCH
South Tees Hospitals NHS Foundation Trust (James Cook Hospital)
Hillingdon Hospitals NHS Foundation Trust (Mount Vernon Hospital)
Nottingham University Hospitals NHS Trust
University Hospital Birmingham NHS Foundation Trust (Queen Elizabeth Hospital)
University College London Hospitals NHS Foundation Trust (National Hospital for Neurology and Neurosurgery)
Sheffield Teaching Hospitals NHS Foundation Trust (Royal Hallamshire Hospital)
Lancashire Teaching Hospitals NHS Foundation Trust (Royal Preston Hospital)
Barts Health NHS Trust
Leeds Teaching Hospitals NHS Trust (St James University Hospital)
The London Clinic
The Royal Marsden NHS Foundation Trust
BMI Thornbury Hospital, Sheffield
University Hospitals Bristol NHS Foundation Trust

Table 6: List of all providers with machines capable of undertaking SRS/SRT

83. In addition to the 12 contracted providers, an additional 13 providers with machines capable of undertaking SRS/SRT were identified. (Please note: St Bartholomew's is both a commissioned and non-commissioned provider). This data was then used to produce maps indicating the location of the commissioned and non-commissioned providers. The maps also indicate the type of device found at the identified provider.

Geographical access

84. Map 1 (Appendix A) shows that there is not equally geographically distributed capacity.

85. Additionally, a provider map with geographical access isochrones was produced. Each of the mapping isochrones illustrates public access travel times of 15 minutes, 30 minutes, one hour, and greater than one hour. (Appendices B, C, D, E, F and G)

86. At a national level, 9% of the population is within 15 minutes' access of a current SRS/SRT centre. 29% is within 30 minutes, and 55% is within a one hour travel time.

87. For all providers, both commissioned and non-commissioned, the following populations falls in the 'below' travel times:

    - 12% of the population is within 15 minutes
    - 36% of the population is within 30 minutes
    - 69% of the population is within one hour.

88. Of commissioned providers, the London providers had the greatest populations within 15 minutes, which is to be expected, given the population density of London.

89. Unlike standard radiotherapy, 90% of patients undergoing SRS/SRT will have a single treatment. A short travel time, while beneficial, should be balanced with considerations of ensuring cost effectiveness of services, and the need to have sufficient, sustainable clinical expertise within a centre.

Potential providers of SRS/SRT

90. Maps 2 and 3 (Appendices H and I) show the providers highlighted by industry as having machines that can undertake SRS/SRT work, but are not NHS England-commissioned providers of these services. There is a very high concentration of these providers in London. Outside of London these providers do not overlap with commissioned providers.

Review of minimum volumes

91. Unlike some of the other specialised services commissioned by NHS England, the SRS/SRT service does not currently specify a minimum volume of activity per centre. With the absence of nationally reported outcome measures and indices, by which further consensus could be drawn to make recommendations about minimum volumes, making a recommendation was not possible to deliver within the parameters of this service review. At this current time, and until the data is collected nationally, we are unable to make

any conclusions about the impact that certain volume levels or delivery devices may have compared to others, in terms of clinical outcomes.

92. What is apparent, however, is that to provide an efficient throughput, to deliver a five-day and seven-day service, machines used exclusively for SRS/SRT should operate at an 85% utilisation rate. Part-time SRS/SRT machines should operate at 85% capacity overall, including a combination of SRS/SRT and standard radiotherapy.

93. In the review of co-dependencies for SRS/SRT, there were no specialties that were required to be co-located on site with the SRS/SRT services, although it concluded that neurosurgery should be located in the same town or city as the SRS/SRT provider. This would enable the efficient running of MDTs, and the planning and delivery of services.

94. SRS/SRT services provide complex and specialised care, requiring a level of infrastructure that does not lend itself to be provided across a greater number of providers, hence its categorisation as a specialised service. The cost of delivering the service in order for that provider to remain financially sustainable, and have the necessary throughput to provide an efficient, economically sustainable service, requires the concentration of provision in tertiary centres, with a maximum number of devices commissioned.

Conclusions

General conclusions

95. The overarching conclusions of the review are that:

- there is an unmet need, as projected by the national clinical commissioning policies. The contracted commissioning plan with current providers is only at an activity level of 42% of the total activity commissioning level required to meet the needs of patients requiring SRS/SRT for intracranial conditions;

- many of the providers with machines that can only be used for SRS/SRT are significantly under-utilised, so the cost per case is significantly higher than if these services were fully utilised;

- supplier capacity constraints are not the cause of the unmet need;

- even if the current number of machines commissioned were more efficiently utilised, at a rate of 85%, and delivered as a five-day service, there would still be surplus capacity to national activity requirements (Scenario A), and the provision would remain inequitably geographically distributed.

96. A decision is required as to the best option to meet the need requirements for SRS/SRT. Options include commissioning a provision of dedicated machines, or commissioners could consider an option that ensures best alignment to

utilisation through commissioning provision that includes both dedicated and non-dedicated machines (taking into account the fact that modified LINACs are also utilised for radiotherapy activity, and that that provision should not be destabilised).

97. The machine requirement for Scenario A is outlined below in Table 7. Both five and seven-day working has been modelled. The machine requirement for Scenario B is outlined in Table 8. Both five and seven-day working has been modelled.

Population of England - ONS Census 2011	53,012,456			
Caseload **5239**	Gamma Knife 5 Day Week	Gamma Knife 7 Day Week	Linacc 2 Day Week	Linacc 4 Day Week
Annual Throughput per machine	625	875	210	420
% of England Caseload per machine	11.9	16.7	4.0	8.0
Catchment Population	6,324,257	8,853,960	2,124,951	4,249,901
Options for caseload of 5239	8		1	
Number of Machines Required	7		4	
	6		7	
	5		10	
	4		13	
	3		16	
	2		19	
	1		22	
	0		25	
		6		0
		5		2
		4		4
		3		6
		2		8
		1		10
		0		12

Table 7: Estimated number of devices/providers based on Scenario A, annual caseload of 5,239

Caseload **8847**	Gamma Knife 5 Day Week	Gamma Knife 7 Day Week	Linacc 2 Day Week	Linacc 4 Day Week
Annual Throughput per machine	625	875	210	420
% of England Caseload per machine	7.1	9.9	2.4	4.7
Catchment Population	3,745,087	5,243,122	1,258,349	2,516,698
Options for caseload of 8847	15		0	
Number of Machines Required	14		3	
	13		6	
	12		9	
	11		12	
	10		15	
	9		18	
	8		21	
	7		24	
		10		1
		9		3
		8		5
		7		8
		6		10
		5		12
		4		14
		3		16
		2		18
		1		20
		0		22

Table 8: Estimated number of devices/providers based on Scenario B, annual caseload of 8,847.

98. On an economic basis, therefore, to meet the national activity requirement of Scenario A, no more than eight machines, used exclusively for SRS/SRT, would be needed to deliver the required throughput at an 85% utilisation rate capacity, and across a five-day a week service.

99. This reduces to six machines if the service is operational seven days a week. The activity levels suggested in Scenario B could be met by the maximum of 10 machines if the service was instead delivered as a seven-day service.

100. Modelling has also been undertaken to consider the machine requirement using machines used exclusively for SRS/SRT, plus machines used for SRS/SRT and fractionated radiotherapy. In Scenario A, the range moves from eight machines used exclusively for SRS/SRT to 25 machines all used for SRS/SRT and fractionated radiotherapy. Within the range are many possible variations e.g. six exclusive machines plus seven non-exclusive machines or three exclusive machines plus 16 non-exclusive machines.

101. When applying the need estimated for Scenario A for a seven-day service, there is a range of six exclusive machines to 12 non-exclusive machines. There could be four exclusive machines plus four non-exclusive machines or two exclusive machines plus eight non-exclusive machines.

102. The activity levels suggested in Scenario B for a five-day a week service would require 15 exclusive machines. Alternatively, eight exclusive machines plus 21 non-exclusive machines could be used. 42 part-time machines would be needed, although this is an unrealistic option.

103. When applying the need estimated for Scenario B, for a seven-day service, the range is from 10 exclusive machines to 22 non-exclusive machines. There could be seven exclusive machines plus eight non-exclusive machines, or four exclusive machines plus 14 non-exclusive machines.

104. The conclusions from the needs assessment and service review provide four options for implementation.

Options for the future commissioning of SRS/SRT services

105. The Project Team, consisting of a small number of NHS England staff and clinicians from the Stereotactic Radiosurgery Clinical Reference Group, identified two key variables to address:

- the level of treatment needed for the residents of England, as predicted in Scenarios A and B; and
- whether the service should operate for five or seven days a week.

106. Scenario A was based on the level of need identified in the suite of NHS England Clinical Commissioning Policies, using this information to identify where SRS/SRT might be required. The predicted growth in this scenario represented a doubling of treatment compared to the current level.

107. Scenario B was based on an expected growth demand based on the treatment rates of some other European countries. The predicted growth demand in this scenario equated to more than trebling the current level of treatment.

108. A review of the elements of growth anticipated under Scenarios A and B, and exploring the variables of five and seven-day working weeks, produced four options for change

109. The following options 1 and 3 are based on a five-day working week. The “part-time” machines are assumed to be operating two days a week for SRS/T and the remaining time for radiotherapy. In options 2 and 4, for the seven-day working week, the “part-time” machines are assumed to be operating four days a week for SRS/T.

Option 1: Under this option NHS England would plan to commission activity at the levels suggested in **Scenario A** as this is the most likely current scenario for the need requirements for SRS/T across a **five-day service**.

Option 1 has a planning assumption of between 8 and 25 machines, depending on the mix of dedicated and part time machines.

Option 2: Under this option NHS England would plan to commission activity at the levels suggested in **Scenario A** as this is the most likely current scenario for the need requirements for SRS/T across a **seven-day service**.

Option 2 has a planning assumption of between six and 12 machines, depending on the mix of dedicated and part time machines.

Option 3: Under this option NHS England would plan to commission activity at the levels suggested in **Scenario B** which would align capacity to levels that increase access rates **five-day service**.

Option 3 has a planning assumption of between 14 and 45 machines, depending on the mix of dedicated and part time machines.

Option 4: Under this option NHS England would plan to commission activity at the levels suggested in **Scenario B** which would align capacity to levels that increase access rates to those seen internationally and implement an active plan to achieve this across a **seven-day service**.

Option 4 has a planning assumption of between 10 and 22 machines, depending on the mix of dedicated and part time machines

Option Appraisal and Preferred Option

110. The relative merit of each option was outlined by the Project Team and is as follows:

Option 1 (Scenario A, five-day working)

(i) The projected activity is in line with the volumes specified in existing NHS England clinical commissioning policies. There is less risk of overcapacity given uncertainty of growth rates to international levels.

(ii) A five-day service may be easier for centres to staff than a seven-day service.

(iii) This is in line with the current culture of many trusts of providing most elective treatment on week days.

(iv) There may be a wider range of interested providers as some providers might withdraw from the procurement process under other options because of an inability to support seven-day working.

(v) The machine delivering SRS/T will be idle 2/7ths of the week (29%), leading to a higher cost per case than is possible within seven-day working. A higher cost per case means less funding is available for other NHS services, and less likelihood of extending the range of conditions the treatment can be used for in future, due to reduced cost-effectiveness.

(vi) In five-day working, more centres are needed to meet the capacity requirements in comparison to the number of centres needed for seven-day working. This leads to greater geographical accessibility, but at higher cost.

(vii) Five-day working is not in line with the national strategic direction of moving towards seven- day provision of services.

(viii) This option is able to achieve activity levels that are higher than Scenario A.

Option 2 (Scenario A, seven-day working)

(i) The activity is in line with the volumes specified in existing NHS England clinical commissioning policies. This option has the lowest risk of overcapacity given the uncertainty of growth rates to match international levels, or if the uptake is closer to the base case incremental growth levels.

(ii) A seven-day service may be harder for centres to staff than a five-day service. However, once established it will more able to be a sustainable centre of excellence.

(iii) Some providers might withdraw from the procurement process because of an inability to support seven-day working.

(iv) There is no idle capacity at weekends leading to a lower cost per case than five-day working.

(v) This option is aligned to the national strategic direction of moving towards seven-day service provision.

(vi) This option requires fewer centres to meet patient need, and would therefore lead to less geographical accessibility than options which require more centres, although inequity in geographical accessibility is addressed under all options.

(vii) This option is less able to respond to activity levels that are higher than Scenario A

Option 3 (Scenario B, five-day working)

(i) This option can deliver activity which exceeds the volumes specified in existing NHS England clinical commissioning policies, so the costs and benefits of any changes in indications would be subject to future prioritisation against other health needs. Providers would bear the risk that future decisions did not find further extensions to access cost-effective, compared to other healthcare priorities or affordable, under future funding constraints.

(ii) This option is based on activity which matches levels achieved in equivalent countries. However, many of these countries spend a higher percentage of GDP on healthcare than the UK, and have different thresholds for determining whether care is cost-effective, so it is not certain that the NHS in England would adopt similar policies.

(iii) There is a risk of unused capacity if the substantial increase in commissioned activity is not realised.

(iv) This option has the highest risk of overcapacity, which would adversely affect value for money and provider sustainability.

(v) Establishing a large number of centres to deliver this option may dissipate too thinly the specialised skills and experience required to deliver SRS/SRT.

(vi) Having a larger number of centres means that geographical accessibility is maximised.

(vii) Five-day working suits the current culture of many trusts of providing most elective treatment on week days

(viii) There may be a wider range of interested providers as some providers might withdraw from the procurement process under other options because of an inability to support seven-day working arrangements.

(ix) The machine delivering SRS/T will be idle 2/7ths of the week (29%), leading to a higher cost per case than is possible within seven-day working

(x) Five-day working is not in line with the national strategic direction of moving towards seven-day service provision.

Option 4 (Scenario B, seven-day working)

(xi) This option can deliver activity which exceeds the volumes specified in existing NHS England clinical commissioning policies, so the costs and benefits of any changes in indications would be subject to future prioritisation against other health needs. Providers would bear the risk that future decisions did not find further extensions to access cost-effective, compared to other healthcare priorities or affordable, under future funding constraints.

(i) This option is based on activity levels which match those achieved in equivalent countries. However, many of these countries spend a higher percentage of GDP on healthcare than the UK, and have different thresholds for determining whether care is cost-effective, so it is not certain that the NHS in England would adopt similar policies.

(ii) There is a risk of unused capacity if the substantial increase in commissioned activity is not realised.

(iii) A seven-day service may be harder for centres to staff than a five- day service. However, once established it will more able to be a sustainable centre of excellence.

(iv) Some providers might withdraw from the procurement process because of an inability to support seven-day working.

(v) This option means that there will be no idle capacity at weekends leading to a lower cost per case than five-day working.

(vi) This option is aligned to the national strategic direction of moving towards seven-day services provision.

(vii) This option would deliver less geographical accessibility than five-day working, although the additional activity predicted as part of the growth modelling for Scenario B means that there would be more machines than Option 2 and roughly the same as Option 1.

111. The four options were considered by NHS England's Specialised Commissioning Oversight Group (SCOG). The project team recommended that SCOG consider Option 2 as a preferred option. SCOG endorsed the recommendation.

Detailed conclusions

1.7.15 Needs assessment

112. NHS England is committed to ensuring that patients have access to consistent, high quality, effective and efficient services that represent value for money, and are sustainable in the long-term, through concentration in fewer specialised centres ('Everyone Counts: Planning for Patients 2014/15 – 2018/19). The review, therefore, considered how we could improve the sustainability, efficiency and utilisation of SRS/SRT services and whether, by doing so, we could improve the utilisation rates sufficiently to contain the needs of patients in both Scenario A and Scenario B.

113. An increase in commissioned SRS/SRT activity of 2,676 would be required to meet the activity level requirements of Scenario A, and an

increase of 6,284 to meet the activity requirements of Scenario B. Commissioning at this increased activity level would contribute to the ambition of increasing the number of patients who have access to SRS/SRT for all planned treatments for those same conditions.

114. The review has found, however, that England still has some way to go to deliver access rates seen internationally for SRS/SRT (Scenario B). It is recognised that to achieve the full step-change in access rates suggested by the policy, it will take some time for referrals and clinical practice to shift to that of European colleagues (particularly for cerebral metastases). Commissioners and providers need to develop a plan that considers how the shift in referral and treatment options can move towards these access levels, ensuring that patients receive the optimum treatment outcomes and contribution to our ambition to increase the percentage of SRS/SRT delivery of all planned treatments.

1.7.16 Service provision review

115. NHS England currently contracts SRS/SRT services from 12 contracted providers. The market analysis has indicated that there are an additional 13 potential providers (potential new market entrants) with machines capable of undertaking SRS/SRT.

116. There is an inequitable geographical distribution of provision shown from the maps of current provision; variation across regions in travel time, and populations served by current providers.

117. There is no evidence available that has reported, or drawn conclusions, on what minimum volumes of cases there should be per SRS/SRT unit in order to deliver improved clinical outcomes for patients receiving SRS/SRT treatment. It is concluded, however, that in order to deliver a service that is efficient, sustainable and which has utilisation rates in line with most acute services, there is a natural number of commissioned devices required to achieve this.

1.7.17 Pricing review

118. There is a wide variation in the price currently paid by commissioners for SRS/SRT activity by delivery platform, despite no evidence existing that demonstrates that one device delivers improved patient outcomes over another.

119. There is variation in the price paid by commissioners for SRS/SRT activity, by provider, for the same machine.

120. The second meeting of the focus group agreed that most of the additional SRS/SRT treatments, to attain the levels of Scenarios A and B, would be a substitution for conventional surgery. The exception would be for

a sub-set of cerebral metastatic patients who were unable to receive surgery. For these patients, the SRS/SRT treatment represents a cost pressure.

121. One provider was able to supply details of the cost of treating a patient surgically compared to treatment with SRS/SRT. For meningioma, acoustic neuroma and cerebral metastasis, the cost of SRS/SRT is less than surgical treatment. These three conditions receive the most SRS/SRT treatment currently and the most within Scenario A and Scenario B.

122. Cavernoma, trigeminal neuralgia, arteriovernous malformation and pituitary tumour are cheaper using surgery than SRS/SRT.

Securing services

123. The scale of change required to increase commissioned activity levels and access rates to those suggested by the incidence rates of the national clinical commissioning policies for SRS/SRT, specifying a five or seven-day service delivery requirement, and concentrating volumes to ensure a 85% utilisation rate, represent material changes to the current commissioned service.

124. Those changes are so significant, that the extension of some, or all, of the current provider contracts would be in breach of the procurement legislation and regulations, and so an open and fair procurement of SRS/SRT services would be required. Furthermore, there are now additional providers in the market who may wish to be considered through this open process, who did not have the opportunity to be so when these services were first commissioned.

125. There will be a need, therefore, once a decision has been made about the future commissioning of SRS/SRT services in England, to procure the required number of devices to deliver the required level of service, as part of phase two of this project.

126. The number of commissioned devices will range from six to 29 nationally, dependent on which of the four options is approved for implementation. The possibility of 42 part-time machines is unrealistic, given that this number greatly exceeds the number of neurosurgery centres.

127. In the procurement and contracting of these services, NHS England will procure from the most capable providers. This would not prevent the centre sub-contracting the SRS/SRT service, since this would align with our commissioning intentions of moving to a prime contracting model. The strength of our relationships with other providers, delivering elements of the care pathway, will be important.

128. There should be a national approach to the development and implementation of the procurement project.

129. The procurement project will form stage two of this project, and will be subject to a separate work stream led by NHS England's procurement team, working in conjunction with the Operations Directorate.

Recommendations

130. **A:** NHS England will look to work with partners, and the Health and Social Care Information Centre (HSIC), to develop a national SRS/SRT registry. NHS England will discuss with industry how they can support this registry, and how the information can be used to inform research studies, governance and future innovation. In the future, NHS England will be able to gather outcome measure information and benchmarking that may enable us to consider whether we would only commission particular platforms based on their evidence base, outcomes achieved and value for money.

131. **B:** It is recommended that NHS England have regard to achieving the benefits of higher utilisation and outlining ceiling prices based on good rates of utilisation from which procurement looks to achieve a discount.

132. **C:** NHS England will review its Intracranial Stereotactic Radiosurgery and Stereotactic Radiotherapy service specification in light of the findings of this review; clarify the SRS/SRT MDT standards, and add that the reporting of clinical outcome measures to a national registry is mandatory for all commissioned providers. The specification will be an integral element of the procurement process.

133. **D:** NHS England will establish a work stream that evaluates what level of improved outcomes could be achieved.

134. **E:** The costs and benefits of raising access levels to Scenario B should be considered by NHS England's Clinical Priorities Advisory Group (CPAG).

135. **F:** NHS England will publicly consult for 12 weeks with stakeholders on any preferred option for implementation, following any decision made by the Specialised Commissioning Oversight Group (SCOG).

136. **G:** NHS England will begin a dialogue with providers through a provider work shop to consider the options for the procurement of the preferred option for implementation.

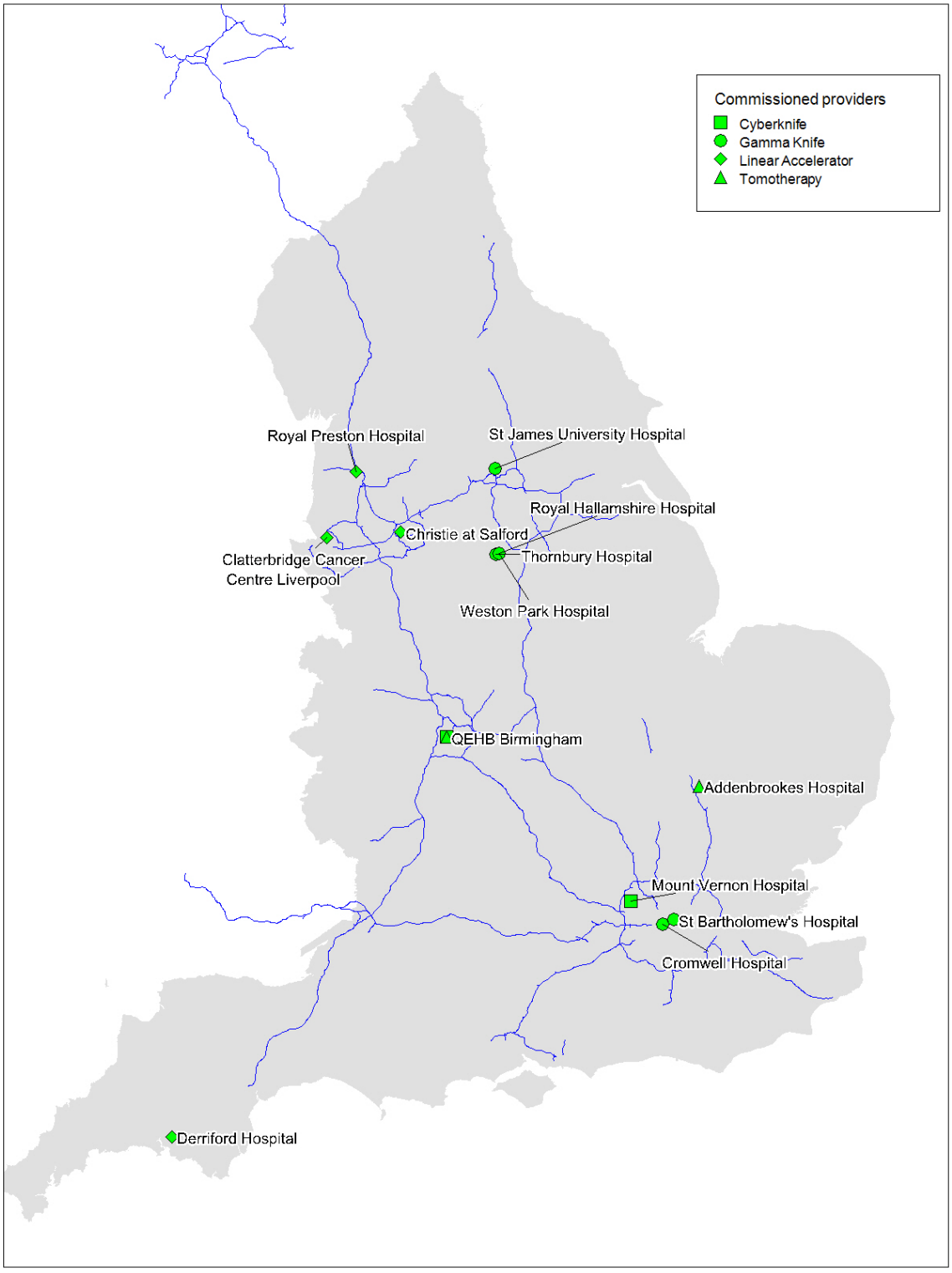
Glossary

Benign tumour	A non-cancerous growth that lacks the ability to invade neighbouring tissue or to spread to other parts of the body, but, when in the brain, can cause serious harm.
Cavernous venous malformations	Clusters of abnormal blood vessels found mainly in the brain or spinal cord.
Cerebral arteriovenous malformations	Networks of coiled feeding arteries and draining veins that are not properly connected by capillaries.
Cerebral metastasis	Tumours in the brain that result from the spread of cancer cells from a primary site outside of the brain.
Clinical Reference Groups (CRG)	A group, consisting of clinicians, commissioners and patient/carer members, that provides clinical advice to NHS England for a specific prescribed specialised service.
Co-dependencies	Other services in a hospital which are needed to assist the provision of a specialised service.
Conservative management	Treatment designed to avoid radical medical therapeutic measures or operative procedures.
Elective	Pre-arranged; booked in patient treatment.
Extracranial	Outside of the cranium (skull)
Glomus tumour	Rare, benign tumours that can develop in several locations of the body, including areas in and around the ear.
Hypofractionated treatment	A situation where the radiation dose is delivered over a course of treatment which is less frequent than standard radiotherapy, but more frequent than stereotactic radiosurgery.
Incidence rates	The number of new cases for a population in a given time period.
Innovative radiotherapy	The ability to deliver radiation that is more targeted at a patient's cancer, and causes less damage to the surrounding healthy tissue.
Intracranial	Within the cranium (skull)
Isochrones	A line on a map connecting points of equal travel time.
Lesion	An abnormality in the tissue usually caused by disease or trauma.
NHS Commissioning Board	The predecessor organisation to NHS

	England
Malignant tumour	A cancerous growth involving abnormal cell growth with the potential to invade or spread to other parts of the body.
Meningioma	A tumour of the meninges, which are the protective membranes around the brain and spinal cord.
MDM	A multi-disciplinary meeting involving members of the MDT.
MDT	A multi-disciplinary team involving the key staff delivering the service e.g. neurosurgeon, oncologist, radiologist, physicist.
Ocular melanoma	A tumour in or around the eye that develops in pigment cells.
Operational utilisation rates	The percentage of a given time where the SRS/SRT machinery is in use.
Pituitary adenoma	A tumour that occurs in the pituitary gland.
Prescribed specialised services	Services provided in relatively few hospitals to catchment populations of more than one million people.
Procurement	The process of supporting the delivery of high quality patient care while ensuring value for money is achieved.
Platform	In this context, the different types of machine capable of delivering SRS/SRT.
Trigeminal neuralgia	Sudden, one-sided facial pain, caused by a blood vessel pressing on the trigeminal nerve.
Vestibular Schwannoma	A tumour affecting the eighth cranial nerve, which is responsible for transmitting sound and balance information from the inner ear to the brain (also known as acoustic neuroma)

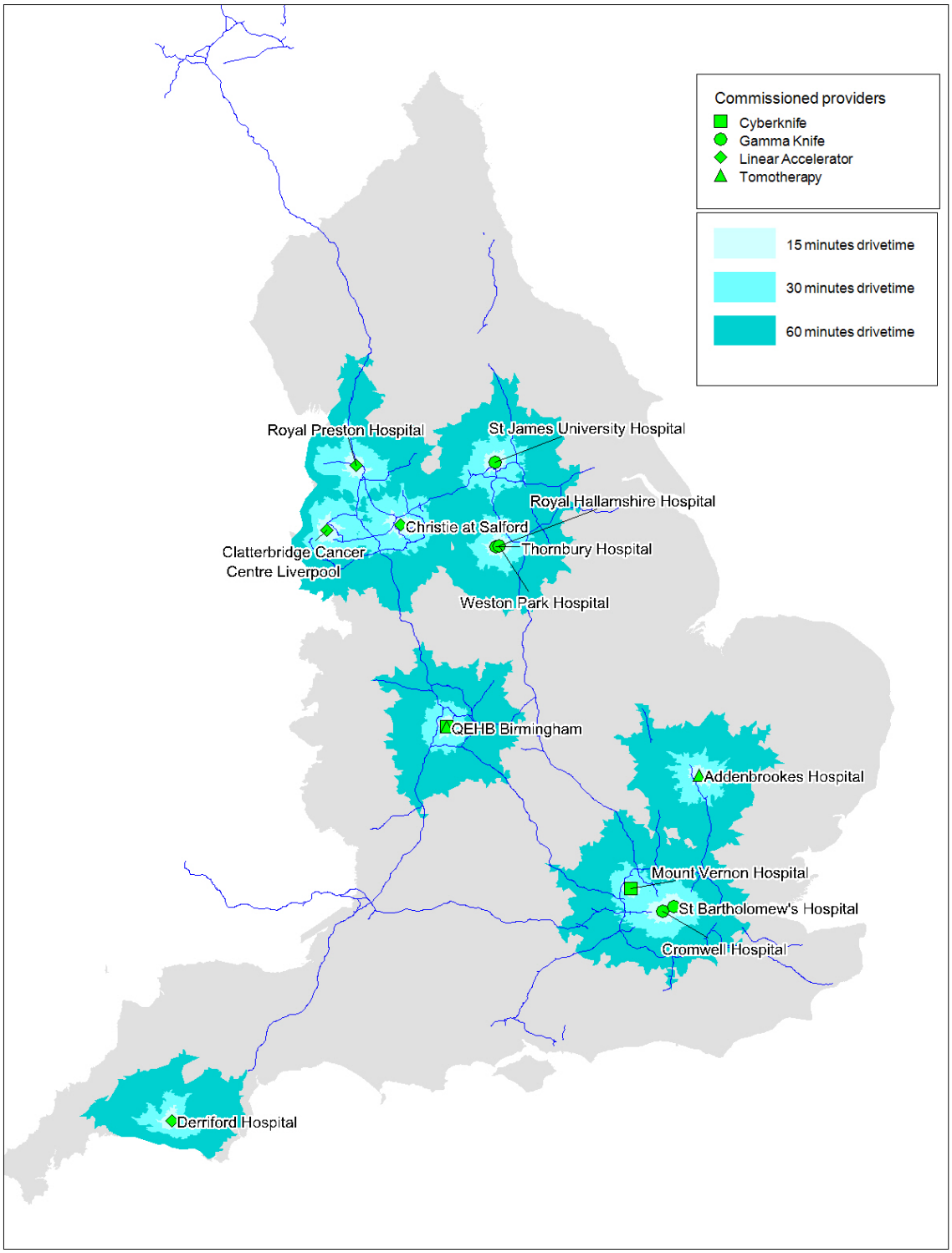
Appendix A

Current NHS England-commissioned providers



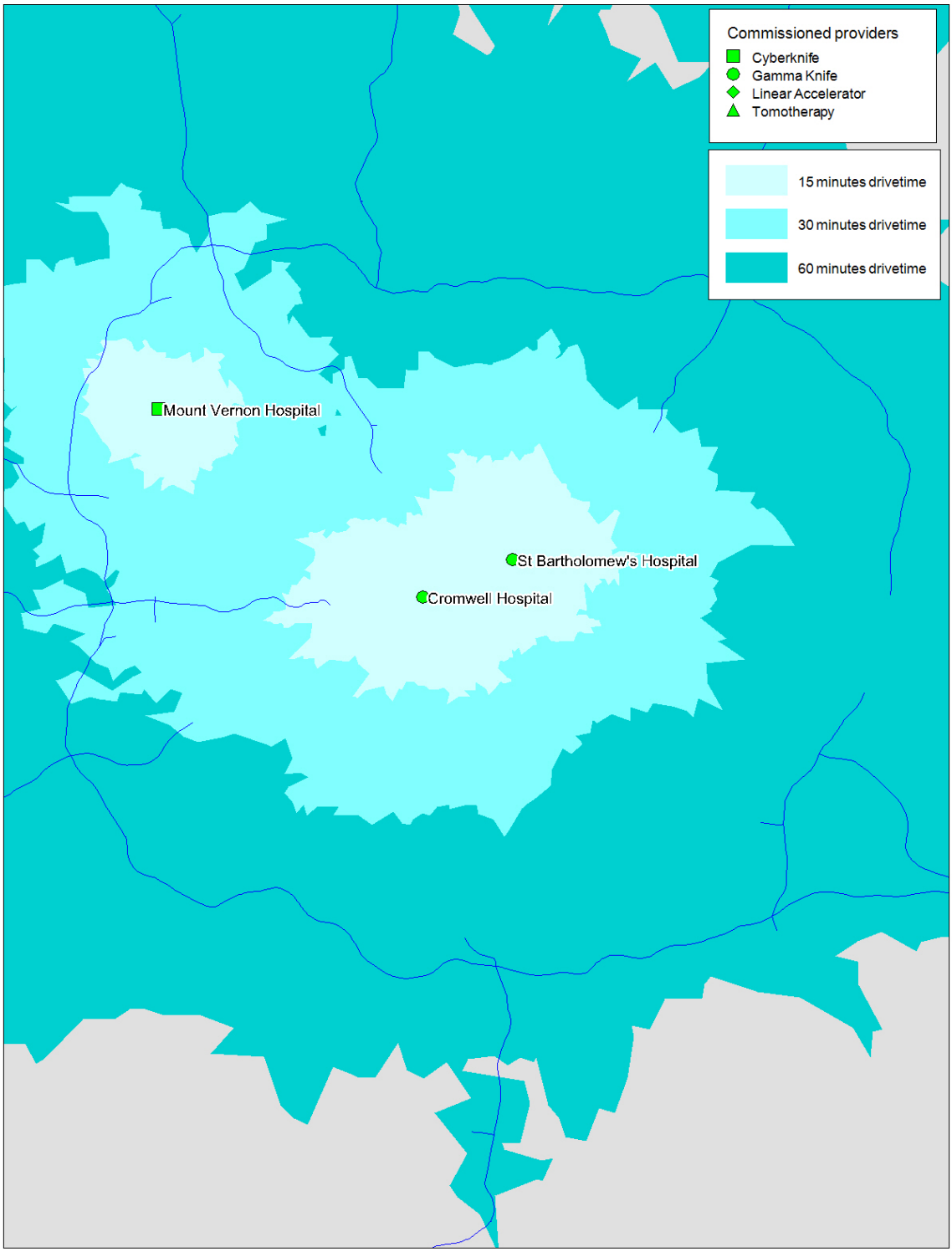
Appendix B

Current commissioned providers with drive time isochrones



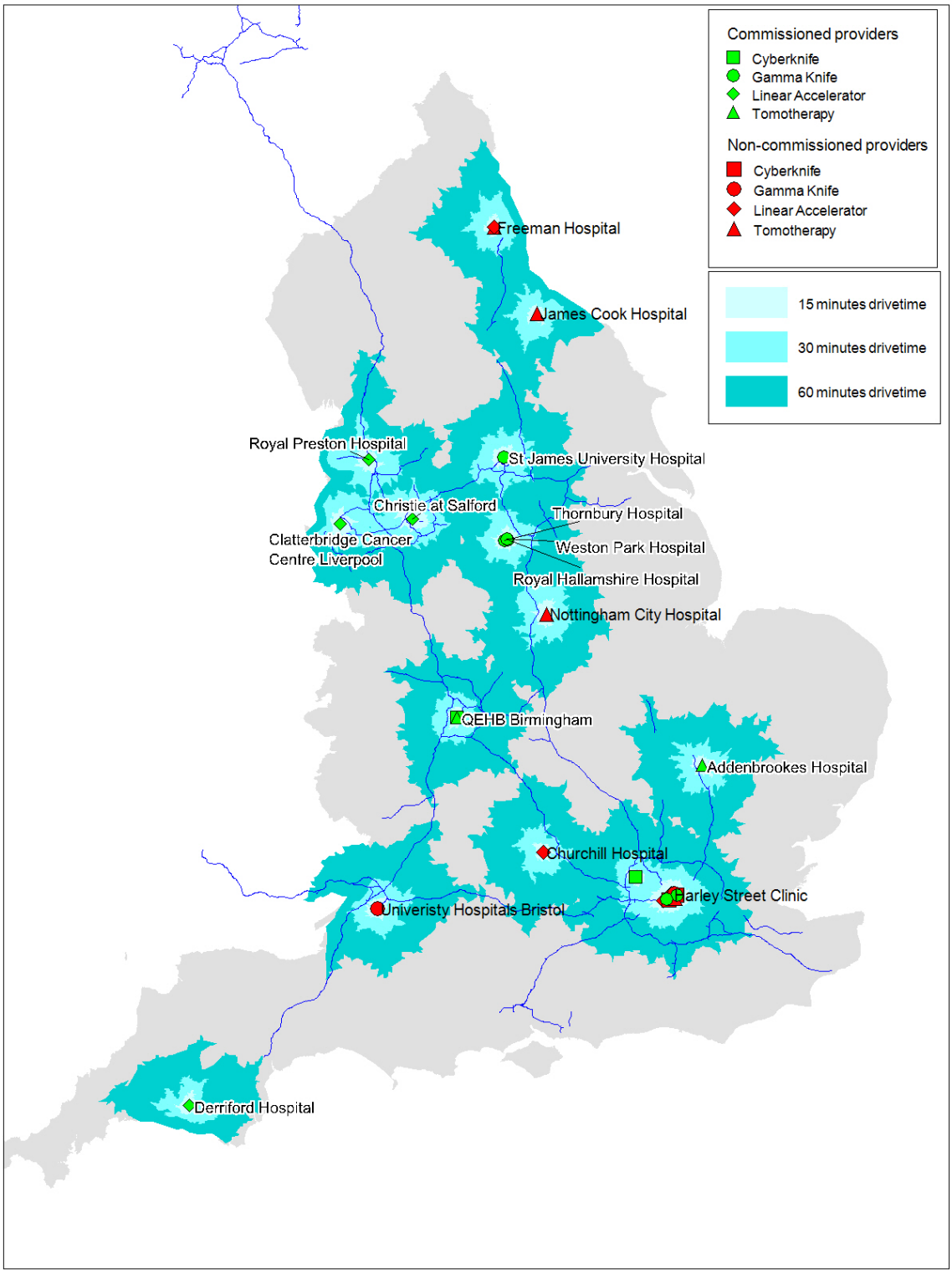
Appendix C

Current providers with drive time isochrones – London area



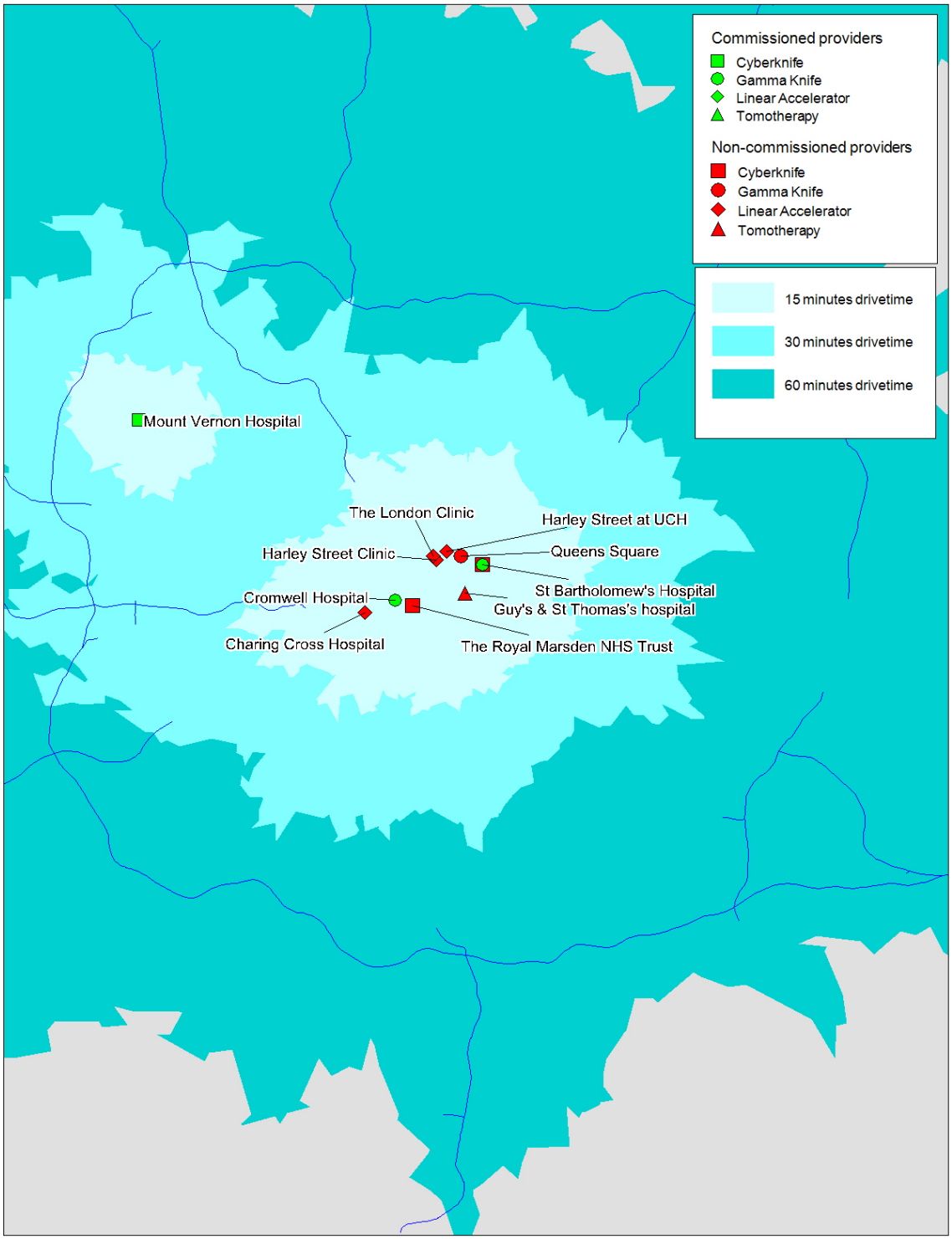
Appendix D

All providers (both currently commissioned and those non-commissioned) with drive time isochrones



Appendix E

All providers (both currently commissioned and those non-commissioned) with drive time isochrones for London



Appendix F

Population living within drive time isochrones

	Currently commissioned	% of England population	Commissioned & non commissioned	% of England population
Population within 15 mins of any provider site	4,681,087	9%	6,282,313	12%
Population within 30 mins of any provider site	15,441,965	29%	19,028,409	36%
Population within 60 mins of any provider site	29,202,470	55%	36,900,759	69%

At a national level, 9 % of the population is within 15 minutes access of a current SRS/SRT centre; 29% is within 30 minutes, and 55% are one hour from a centre.

Appendix G

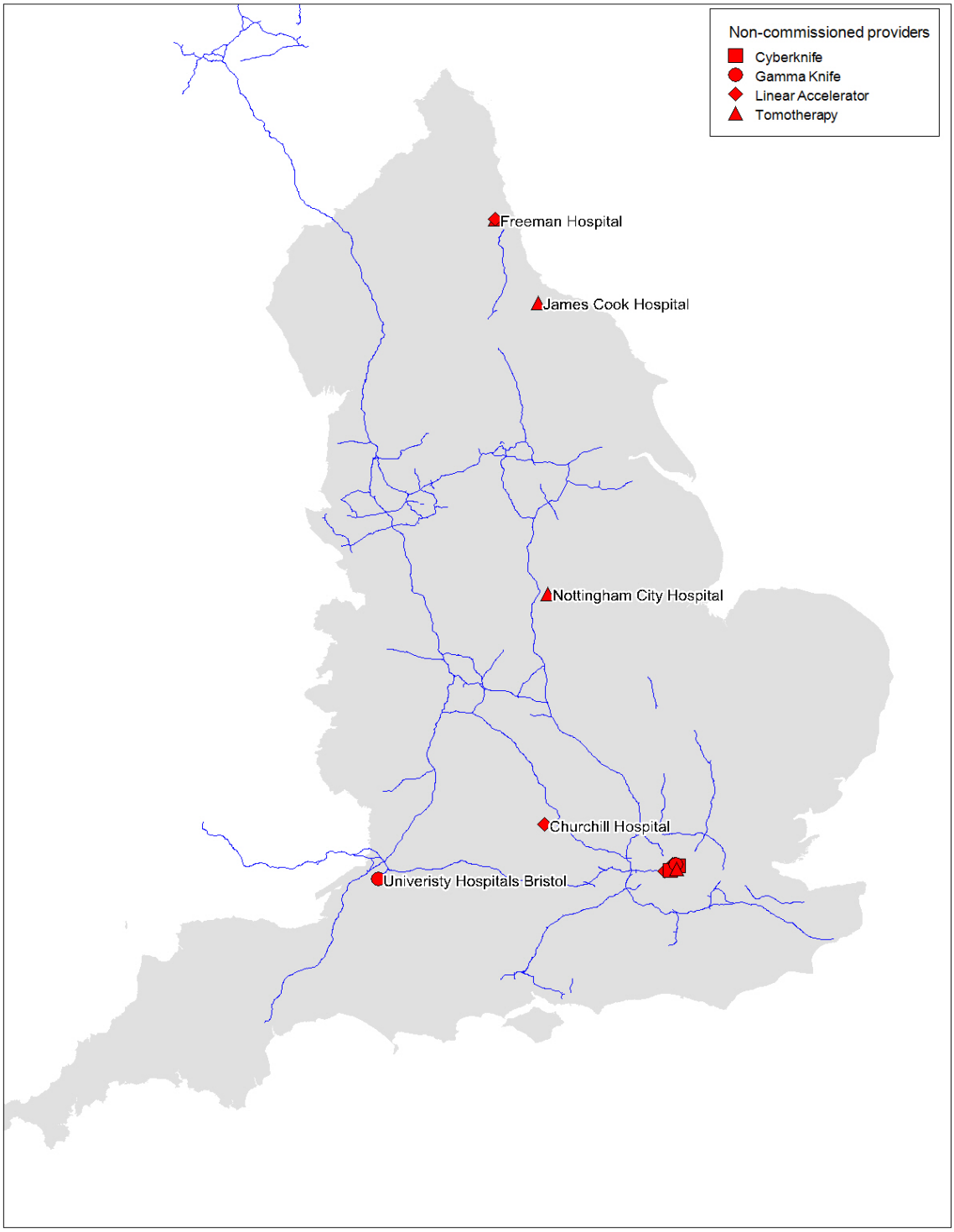
Population living within drive time isochrones of each provider (commissioned and non-commissioned)

Hospital	Population within 15 min drive time	Population within 30 min drive time	Population within 60 min drive time
Addenbrookes Hospital	115,070	212,467	1,036,440
Charing Cross Hospital	999,711	4,811,539	11,119,042
Christie at Salford	473,202	2,445,257	6,556,156
Churchill Hospital	118,228	249,061	1,206,907
Clatterbridge Cancer Centre Liverpool	383,850	1,341,670	4,609,900
Cromwell Hospital	1,373,650	5,335,725	11,418,202
Derriford Hospital	165,582	311,415	584,661
Freeman Hospital	231,882	922,107	1,787,713
Guy's & St Thomas's hospital	1,455,924	5,226,261	10,903,391
Harley Street Clinic	1,592,658	5,332,739	11,144,569
Harley Street at UCH	1,710,759	5,401,001	11,146,443
James Cook Hospital	156,503	431,366	1,243,952
Mount Vernon Hospital	97,727	838,467	8,093,839
Nottingham City Hospital	336,033	884,842	2,997,378
QEHB Birmingham	345,983	1,614,448	4,190,830
Queens Square	1,498,708	5,226,077	10,970,209
Royal Hallamshire Hospital	321,623	758,864	2,935,840
Royal Preston Hospital	142,383	657,822	4,438,485
St Bartholomew's Hospital	1,546,211	5,158,911	11,002,746
St James University Hospital	328,176	1,186,685	4,108,334
The Royal Marsden NHS Trust	1,514,725	5,471,503	11,476,284
The London Clinic	1,720,606	5,451,675	11,222,585
Thornbury Hospital	220,784	629,585	2,354,446
University Hospitals Bristol	337,609	739,057	2,077,551
Weston Park Hospital	330,843	761,886	2,949,826

Of commissioned providers, the London providers had the greatest populations within 15 minutes, which is expected given the population density of London, whilst Mount Vernon Hospital had the least.

Appendix H

Potential providers with machines installed to deliver SRS/SRT services (currently non-NHS England commissioned)



Appendix I

Potential providers with machines installed to deliver SRS/SRT services – London area (currently non-NHS England commissioned)