South East Clinical Senate

South East

Clinical

senate

Review of proposals for future stroke services in Sussex

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Foreword

Regional clinical senates exist to provide strategic, independent, clinical advice to commissioners and to health systems, to help them make the best decisions about health care for the populations they are responsible for.

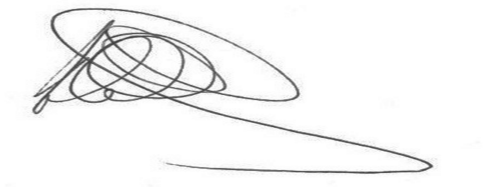
In line with that remit, the South East Clinical Senate (SECS) was formally requested to review and then provide recommendations on both the approach that Sussex commissioners and the stroke clinical reference group have taken to date, and the outline proposals for future stroke services of Western Sussex Hospitals Foundation Trust and Brighton and Sussex University Hospitals NHS Trust.

The SECS convened an expert clinical review group to undertake this work on its behalf. We are very grateful to the members of this group for contributing their experience, expertise, time and independent perspective to produce this report. The SECS Council has reviewed and approved this report.

We hope that this report aids all those involved with improving outcomes for stroke patients in Sussex in getting agreement on the way forward, and then moving to timely implementation.

Professor Anthony Rudd

Chair of the Clinical Senate's Expert Clinical Review Group



Lawrence Goldberg

South East Clinical Senate Chair

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1. Executive Summary

1.1 Summary of the report and recommendations

The South East Clinical Senate was asked by the Sussex commissioners to undertake an independent clinical review of the proposed clinical networks and provider options (from Brighton and Sussex Universities Hospitals NHS Trust [BSUH] and Western Sussex Hospitals NHS Foundation Trust [WSHFT]) for acute stroke service delivery, including early supported discharge, in Sussex. This followed their conclusion that there were significant gaps in their services compared with current requirements, and that the quality of care (as assessed by the national Sentinel Stroke National Audit Programme) could only be significantly improved by service change.

The aim of the clinical senate review was to ensure that current proposals reflect best practice, are sustainable and fit for the future, and have appropriately considered the clinical relationships with adjacent stroke and other clinical services. It was also asked to review the methodology used by the Sussex Stroke Clinical Reference Group (SSCRG) to date and to make any recommendations for improvement. A formal financial analysis of proposals was out of the scope and competence of this review.

A clinical senate expert clinical review group (ECRG) was convened, which reviewed the SSCRG's case for change, the providers' proposals, the evidence base, and available guidelines and service specifications. It has produced a series of recommendations for the commissioners and the providers, to aid in the refinement of their strategic planning and future delivery of high quality stroke services in Sussex. Some of the key conclusions reached were as follows:

- Commissioners should plan and develop the whole stroke pathway in a clinically and financially integrated way, including the South East Coast Ambulance Service, rehabilitation and community services, together with the acute hospital trusts, to ensure coherent, efficient, effective and patient-centred care. Commissioners and providers should also collaborate to a greater degree than at present, and at a senior level, to ensure that respective stroke service developments are joined up, and unintended consequences are avoided. To oversee the delivery and coordination of these aims for stroke services in Sussex, the establishment of a formal, managed Sussex stroke network is recommended.
- Providers themselves should describe more detailed pathways for their proposed stroke services, including for TIAs, stroke mimics, and patients sustaining strokes whilst inpatients in a non-hyper-acute stroke unit hospital.
- Hyper-acute stroke units (HASUs) should care for around 600 confirmed stroke cases per year or more, if not immediately then to have a likelihood of such activity within a defined timescale. Such larger units benefit from faster thrombolysis

pathways, better outcomes, and can deliver a wide range of clinical, recruitment and retention, training, financial and research benefits.

- A detailed service specification should be provided for all providers, based on the South East Strategic Clinical Network's Stroke Service Specification (final version, Oct 2015). Bed modelling should be re-done, based on an agreement on confirmed stroke cases after a further review of catchment areas, travel time (see below), and an agreed methodology across the providers for the analysis of stroke unit activity (confirmed stroke numbers, TIAs and stroke mimic patient numbers, and average length of stay). The national stroke toolkit (publication imminent and the relevant chapters provided in appendices to this report) has guidance on activity modelling which is recommended to the Sussex commissioners and providers.
- Travel times between home and HASUs should be seen in the context of the clinically important overall time between the onset of stroke and the delivery of thrombolysis for suitable patients. A 45 minute travel time standard, aligned with slick assessment and scanning pathways on arrival at the HASU hospital, was considered appropriate, aiming to achieve a call to needle time for the majority of suitable patients within 120 minutes.
- Although the Clinical Senate was asked to review early supported discharge proposals, there were none provided other than a gap analysis undertaken by the Sussex Collaborative in April 2015. Early supported discharge is a key component of the stroke pathway, and can enable shorter length of stay and an increase in discharge rates to the usual place of residence for the patient. Work on the early supported discharge pathway should now be fully integrated with that on the acute stroke units.
- BSUH and WSHFT had produced proposals for co-located HASUs and acute stroke units (ASUs), and have not presented their cases in enough detail for excluding options that provide an ASU in the non-HASU hospital site. It is important that these options are more explicitly considered before public consultation.
- BSUH proposed two options: a combined HASU and an ASU at the Royal Sussex County Hospital (RSCH, Brighton) site, or a combined HASU and an ASU at the Princess Royal Hospital (PRH, Haywards Heath) site. The ECRG agreed that a single HASU for the trust was appropriate, and considered that the RSCH option was far superior. This was based on a combination of the following: activity analysis indicating that the PRH-only unit would be too small; that the longer travel distances would affect a fewer number of future patients and their visiting families; that a RSCH HASU and ASU would have all the required co-located services on site, not least of which is neuroradiology (and the potential for a regional acute thrombectomy service); and a RSCH unit could also provide on-site acute stroke care for patients on the vascular surgery and major trauma centres.

- WSHFT proposed two options: a) a two site HASU and ASU model, at both St Richard's Hospital (SRH, Chichester), and at Worthing Hospital, and b) a Worthing only HASU and ASU. It is unclear at this time what their preferred option is, as it is contingent on a more detailed understanding of the potential of the Queen Alexandra Hospital, Portsmouth unit to take more stroke activity if SRH were to move its acute stroke service to Worthing. Commissioners and providers in both Hampshire and West Sussex should share and coordinate their draft plans and strategies around stroke care as soon as possible to enable realistic, detailed and accurate re-modelling of WSHFT's options.
- Of the two WSHFT options presented, the ECRG strongly recommends the Worthing only HASU and ASU. To continue with two units they would remain of too small a size, not achieve the full patient and financial benefits, and it would be difficult to recruit to the full workforce specification required.
- An adequate survey of patient and public views of stroke services has been undertaken by the Sussex Collaborative. It was felt that for the next phase of planning work it is essential to involve them in the further assessment of public opinion, to help better explain the benefits of service change and the centralisation of the acute services. They should be engaged early by providers in developing their proposals to ensure a fuller understanding of the rationale and impact of proposed service changes for patients, their carers and families.

2. Context of the clinical senate review, and methodology

2.1 Background and context for the clinical senate review

Stroke affects around 110,000 people each year in England, with many more experiencing the warning condition of a transient ischaemic attack (TIA). It is the third highest cause of death in England, and is the single largest cause of severe adult disability (1). Many strokes are considered preventable (particularly by better identification and treatment of high blood pressure and atrial fibrillation, and through other cardiovascular risk reduction measures). For those who sustain a stroke or TIA, there is a large body of evidence that the ready availability and provision of a wide range of multidisciplinary interventions (medical, nursing and therapies), in the context of appropriately constituted specialist stroke units delivering minimum activity rates, reduces mortality and long term disability.

Three kinds of stroke units are described:

a) **Hyper-acute stroke units (HASUs)**, for the first 72 hours of care post-stroke, including assessment for, and the administration of, thrombolysis in suitable patients. Key features (which are described in full detail in the above references) include: continuous physiological monitoring, immediate access to scanning for urgent stroke patients, direct admission from Accident and Emergency (A&E); senior specialist ward rounds seven days a week; acute stroke protocols/guidelines; nurses trained in swallow screening; and nurses trained in stroke assessment and management.

b) **Acute stroke units (ASUs) for subsequent (72 hrs +) acute hospital care**. This includes ongoing specialist care, with seven day therapies services (physiotherapy, occupational therapy, speech and language therapy, dietetics input), and effective multi-disciplinary team (MDT) working.

c) **Combined HASU/ASU units.** Whilst there are no nationally mandated specifications for hospital-based stroke services (unlike many NHS England-commissioned specialised services), the recommended infrastructure was originally laid out in the National Stroke Strategy 2007 (2), which provided a national quality framework to improve services across the stroke pathway. Clinical standards for stroke care and its provision are incorporated in the Sentinel Stroke National Audit Programme (SSNAP), and most recently, NHS England commissioned a stroke services toolkit, 'Stroke Services Configuration Decision Support Guide' (publication imminent). Aligned with the above, the South East (Cardiovascular) Strategic Clinical Network has produced their Stroke Service Specification (SESCNSSS),

which has been used as a key reference document in Sussex as it has developed over the last year. The publication of this document will shortly be published on the SCN's website (http://www.secscn.nhs.uk/our-networks/cardiovascular/).

Within Sussex, commissioners identified in January 2014 that the required quality outcomes, as identified by the national SSNAP audit, were not being achieved. They established a Sussex Stroke Clinical Reference Group (SSCRG), from which a case for change identified a number of key gaps in service, and stated that 'joint working of the CCGs is essential to develop a county wide solution to stroke service delivery', and recommended the following next steps:

- Sussex-wide engagement and a local patient, carer and public engagement plan
- Development of Sussex-wide options with collaborative appraisal to provide system level direction
- Local programmes of work which can be supported by the Sussex Collaborative Development Team to ensure consistency, impacts and understanding on cross-borders.

East Sussex stroke services have already been subject to public consultation, with a decision in 2013 to site a single HASU for the East Sussex Healthcare NHS Trust (ESHT) at the Eastbourne District General Hospital site. The other two acute hospital providers in Sussex, Brighton and Sussex University Hospitals NHS Trust (BSUH) and Western Sussex Hospitals Foundation Trust (WSHFT), were asked to develop options for their future stroke services by the SSCRG. At this stage, the South East Clinical Senate (SECS) was asked to provide this review.

2.2 The task given to the South East Clinical Senate

The South East Clinical Senate (SECS) received a formal request from the Sussex commissioners, though their Sussex Collaborative, for an independent clinical review of the current proposals and potential options put forward for future stroke services in Sussex. The requested scope of the Clinical Senate's review is summarised as follows (and provided in full in Appendix A):

- To provide an independent clinical review of the proposed options for stroke service delivery in Sussex, ensuring that they are clinically sound and the interdependencies both of acute services and cross boundaries have been considered.

- To consider the acute pathway and early supported discharge (ESD)[1]. Stroke prevention and rehabilitation services beyond ESD and are out of the scope of this review.
- Highlight any areas of concern that would need to be addressed before final recommendations, possible public consultation and implementation.
- Review the methodology used by the SSCRG to date and to make any recommendations for improvement.

The SSCRG plan to use the advice and any recommendations from the SECS clinical review to ensure that future plans for Sussex stroke patients enable rapid specialist assessment and intervention that reflects clinical best practice and is sustainable and fit for the future, and is compliant with the SESCNSSS, regardless of where patients live within Sussex.

2.3 Methodology

An expert clinical review group (ECRG) was established by the Clinical Senate's Council specifically for the purposes of this review, with professionals from a wide range of professions involved with stroke services, together with a patient and public representation. ECRG members were invited to join on the basis of a combination of experience and expertise and role. A full list of the ECRG membership is found in Appendix B1. Members of the ECRG were required to act impartially, i.e. they do not represent their employing organisation or professional body. A full summary of ECRG members' declarations of interests is found in Appendix B2.

A wide range of materials were provided to the ECRG for their deliberations, including the key Case for Change, and the options papers from the two acute trusts, BSUH and WSHFT. The full range of materials considered by the ECRG is provided in Appendix C. The ECRG met on October 16th 2015 (agenda provided in Appendix D), which included presentations and a question and answer session with the commissioners, and with both BSUH and WSHFT.

This report is based on the materials provided, the presentations made, and the subsequent deliberation of the ECRG. The draft report was submitted to the SSCRG for factual checking on 09/11/15, and was signed off by the Clinical Senate Council 19/11/15.

[1] **Early Supported Discharge** is a service for people after stroke which allows transfer of care from an inpatient environment to a primary care setting to continue rehabilitation, at the same level of intensity and expertise that they would have received in the inpatient setting.

3. Review and recommendations relating to system-wide and commissioner issues

The Clinical Senate was asked to review the methodology used by the Sussex Stroke Clinical Reference Group (SSCRG) to date to make any recommendations for improvement. The ECRG identified a wide range of issues that it advises both the SSCRG and the commissioners it reports to, should consider before their stroke review is progressed.

3.1 The ambition for stroke services in Sussex

The Case for Change states that 'there is a need to improve access and the quality of stroke services provided for Sussex patients', and that 'the CRG …. supports the rationalisation of stroke services on fewer sites, and with the subsequent development/investment in these sites, higher quality stroke services can be provided to the Sussex population'.

The ECRG considers it important to set a more motivating vision and a higher bar for stroke services in Sussex over the coming decade. This would include having high performing stroke networks and pathways across Sussex, delivering excellent patient outcomes, level A SSNAP ratings across all 10 domains and across all future providers, and compliance with the specifications of the South East Strategic Clinical Networks Stroke Services Specification (SESCNSSS) (3).

An understanding of the gap between current and potential patient outcomes that could be realised by transforming the pathways and enhancing the quality of care should be provided to make explicit the positive impact that change could have on future patients.

The commissioners should aim for and foster centres of excellence with pioneering models of integrated stroke services from acute care through to community care and rehabilitation, and which includes education, training and stroke-related research. There is an opportunity for transformative change to maximise the potential of available resources, the workforce and expertise across the pathway.

Commissioners will need to decide what resources they are prepared to commit to fulfilling their ambitions. Providers may not be able to fund the improvements required simply from higher achievement of the best practice tariff, and potential reductions in length of stay. Alternatively, changes may be cost neutral to providers but will have a financial impact on Clinical Commissioning Groups (CCG) (through payment of best practice tariff, or to deliver the improvements required in out of hospital care). Whether additional funding will

be required in the acute sector, the community or both will depend on a review of the whole stroke pathway, and where maximum value and impact can be achieved.

R1. Review and agree a greater ambition for improving stroke care and its services in Sussex in the coming decade, with clear milestones for qualitative and outcome-based improvements.

R2. Consider the total financial resources required to deliver high performing stroke pathways, whether current resources will be sufficient, and whether additional resources will be required to maximise value and impact on patient outcomes.

3.2 Strategic approach

3.2.1 Coordinating pathway development with neighbouring commissioners and providers of stroke care

Sussex currently abuts four other stroke provider networks in the three neighbouring counties (see Appendix E, map of the current stroke networks), all of which are themselves subject to ongoing reviews of stroke services, and have variable potential ability to expand their capacity if required by any proposed changes within Sussex. Patient pathway changes in many parts of Sussex are therefore subject to considerable uncertainty at present, and high level coordination is required between all relevant commissioners and providers in Sussex, Kent, Surrey and Hampshire.

Commissioner and provider strategies to date have made necessary assumptions about the configuration of surrounding stroke units. These include:

- Eastbourne DGH, which was recently agreed as the site for the ESHT HASU/ASU after public consultation, and this decision we understand is not being revisited.
- East Surrey Hospital (based in Redhill) is considered as a confirmed HASU for the future (though there is an ongoing stroke review in Surrey).
- Tunbridge Wells (Pembury) Hospital has a current stroke unit (but again a Kent and Medway review of stroke services in ongoing).

The ECRG heard much less certainty about Queen Alexandra Hospital (QAH) Portsmouth. It has a relatively large stroke unit (around 730 cases per annum), and currently takes patients from western West Sussex when the SRH (Chichester) stroke unit is closed to admissions (currently outside of 9-5 Monday-Friday). It is unclear at present what the potential of QAH is to take on greater activity from the western end of West Sussex, in the event that the stroke unit in WSHFT was centralised at a single site in Worthing and that

the travel times to the Worthing HASU from certain areas in West Sussex were considered excessive.

R3. There should be more formalised and high level coordination and cooperation between the Sussex commissioners, providers and stroke networks and those in Surrey, Kent and Hampshire in developing their stroke strategies, to ensure coordination, avoidance of duplication, and that patient-centred rather than organisation-centred pathways are developed. The commissioners should require, facilitate and oversee all stroke service providers to develop collaboratively their proposals for future stroke services in Sussex. Stakeholders will need to agree where such collaboration is positioned, e.g. within the context of the evolving strategic urgent care networks.

R4. The geographical boundaries that apply to potential future HASUs should be clarified, and aligned with acceptable call to door and call to needle times (see section 3.3.5).

R5. There is an urgent need to understand and agree with Hampshire commissioners and providers what is the requirement for, and the potential of the QAH to receive additional stroke cases from West Sussex, as this could have a significant impact on WSHFT's proposals.

3.2.2 Leadership, decision-making, and a formal Sussex stroke network

The commissioners should now take a more hands on system leadership role, over and beyond their current perceived role of coordinating and informing the discussions between Sussex stakeholders. Review of their programme management of the stroke reconfiguration work is recommended to enable this, and to avoid unnecessary further delay and to enable timely decision-making. Revised programme milestones and an aligned timetable should be re-defined by the commissioners, with all stakeholders committing to an implementation timetable. Clarifying the timeline for decision-making will also have the important impact of minimising the destabilising effects on staff morale and job insecurity with the staffing groups potentially affected by any reconfiguration, and reduces the risk of loss of valuable trained staff to other specialist areas.

We consider that to deliver high quality, integrated stroke services across the county, a formalised Sussex-wide stroke network, fully supported by all the CCGs, acute and community providers and social services, is required. The Sussex stroke network should have a clinical lead (in a part time paid role), supported by a multi-disciplinary membership including an identified stroke lead from South East Coast Ambulance Service NHS Foundation Trust (SECAmb), and have adequate administrative support. This would provide the necessary operational and strategic system leadership, and the coordination

required between the ranges of providers across the stroke pathways. Whilst the South East Cardiovascular Strategic Clinical Network (SECVSCN) has provided invaluable consensus building in developing and agreeing a regional specification and standards, it is an advisory body and cannot undertake the more operational role of a stroke network that we believe Sussex needs. If agreed, commissioners would need to decide where such a network would sit in future governance structures (e.g. within the anticipated strategic urgent care network).

R6. A review of the programme management arrangements of the Sussex stroke services reconfiguration work is advised, to provide a clear and transparent process for decision-making and implementation of changes, and to reduce uncertainty amongst stakeholders.

R7. A formal managed clinical network for the stroke pathways in Sussex should be established, to take the necessary overview and coordinating role of the full range of providers involved.

3.2.3 Need for an agreed service specification

Stroke care in England is not designated by NHS England as a specialist commissioned service, and consequently does not benefit from a nationally mandated specification. It is therefore vital that all Sussex stakeholders agree what the standards and requirements are for their future services.

The ECRG did not see evidence that BSUH and WSHFT had had clear commissioner guidance and a specification when developing their proposals. Even though various modelling assumptions have been discussed at the SSCRG, there is no evidence of clarity of the task and assumptions that providers were expected to use, and this has resulted in significant differences in the framework of the submissions from each provider. This is evidenced by the recent provisional agreement at the SSCRG to re-define the agreed parameters for modelling activity and necessary capacity.

In the Case for Change, and in BSUH and WSHFT's proposals, there is clear and appropriate reference to the SESCNSSS (3) as a guide to the configuration of services. This document, which follows on from the previous SCN publication of its core standards document (4), incorporates SSNAP requirements, and draft national guidance being produced through the Sandwell and West Birmingham CCG and NHS England, and is an invaluable resource which the ECRG and SECS fully endorse. It has however undergone a number of iterations as it has been developed, and providers have referenced different versions (which may have had implications particularly for their manpower modelling assumptions). The SESCNSSS document is now finalised, and should form the basis for

the required service specification for all providers. Note should be made that this specification applies to community service providers as well as acute hospitals.

R8. The commissioners and the SSCRG should produce a required service specification for providers of future stroke services, to ensure that all providers produce their proposals against clear ambitions, longer term sustainability and stable reference points. The service specification should be aligned with the final agreed version of the South East Strategic Clinical Network's Stroke Service Specification.

R9. There should be an expectation of continuous quality improvement from the providers, with stated timescales by when to plan to achieve the required standards across the stroke pathway. Commissioners should require all providers, including community providers, to submit SSNAP data to monitor standards across the pathway.

3.2.4 Need for whole pathway approach

The remit given to the Clinical Senate review was that of acute inpatient stroke services and early supported discharge, on the basis that a parallel review of community care and rehabilitation was being undertaken. However the ECRG strongly believed that it is unsatisfactory to plan and review acute inpatient services in isolation. Inpatient rehabilitation and community services are key enablers to shorter length of stay and better patient flow and care along the stroke pathway, and therefore the required bed capacity (and resources required) in acute stroke units. It is well recognised that the rehabilitation phase of recovery is a vital component of the pathway to optimise an individual's independence, but this can be limited by inadequate resourcing and coordination. The ECRG was made aware of significant delays in the onward care of patients after hospital, and particularly if they are returning to localities more distant from that of their acute inpatient care. The full stroke pathway is well summarised in the stroke pathway diagram found in Appendix C.

The stroke pathway is one where new models of care, such as a primary acute care system (PACS) or a multispecialty community provider (MCP), or hybrid models, could be co-provided between the acute trusts and community services as a way of delivering more efficient, effective and integrated services.

R10. Commissioners should review the whole stroke pathway, and the improvements and the resources required, in an integrated and synchronous way at this key stage, rather than separately, to ensure effective, efficient and equitable patient-centred pathways are delivered.

R11. Commissioners should consider whether they look to integrated co-commissioning of the whole pathway, together with social services, as part of the new models of care currently being considered and piloted across England.

3.2.5 Role of the South East Coast Ambulance Service (SECAmb)

The paramedic, ambulance and transport services, together with telephone assessment and triage through 999 and NHS 111, are key enablers (and potential constraints) when planning future service configurations and patient pathways. It was not clear to the ECRG that SECAmb as a key provider was sufficiently engaged at a senior level in progressing Sussex stroke planning (even though they are members of the SSCRG). SECAmb's involvement and agreement to proposals are vital to the success of future plans. It was our understanding that there is no designated stroke lead within SECAmb with whom to have the required high level discussions.

It is also important to recognise that there may be an increased financial impact to CCGs from commissioning new ambulance and patient transport flows to support more centralised stroke services. It is important that engagement and review of this impact is carried out across all providers.

R12. That a designated stroke lead role within SECAmb is created, and required by commissioners in their contract specification with SECAmb.

R13. The financial implications of more centralised stroke services on the ambulance service will need to be more fully understood.

3.3 HASU size, and bed modelling criteria

3.3.1 The required size of a HASU

Draft national guidelines (5) are for HASUs to receive at least 600 confirmed stroke cases per annum, based on the wide range of clinical, research, recruitment, training and financial benefits seen in larger units, and for clinical sustainability (6,7). The key limiting factor to this minimum recommended size is the distance and associated travel time for patients in the catchment area of the HASU (which is inevitably greater in more rural and larger counties than that of metropolises - see section 1.3.5), and the proximity to and number of other HASUs.

The ECRG agreed that any individual Sussex HASU should be expecting to undertake this level of activity, or close to it, if not immediately then within a clearly described and justified

time frame, and it should not compromise the required minimum activity levels of adjacent HASUs.

It is essential that when discussing and planning the anticipated activity of proposed HASUs and ASUs, a clear distinction is made in all modelling between confirmed stroke cases, which define the expected activity levels of HASUs, and the additional cases of TIA and stroke mimic patients who are admitted to stroke units, which, along with their respective length of stay (LoS), determine the required bed capacity of the stroke unit.

The refreshed CapGemini analysis (June 2015 report) (8) summarised confirmed stroke unit activity in Sussex and the neighbouring stoke units for 2013/14 [see Appendix G (i & ii)]. This analysis followed an earlier version (Oct 2014) (9) that was challenged by providers, and after further detailed discussions with providers. It is regrettable that there is still disagreement between the WSHFT and the Cap Gemini activity analysis, making pan-Sussex modelling less clear (see the WSHFT proposals review section for more analysis of this issue), and this must be resolved. The draft national stroke toolkit's methodology for modelling activity is recommended in this regard (see Appendix N (i &ii)).

R14. The commissioners must reach agreement with all the providers on the number of confirmed stroke cases undertaken in each unit, using common and agreed definitions for confirmed stroke cases and the year of activity. The methodology described in the national stroke toolkit is recommended.

R15. All future Sussex stroke units should have activity levels at least close to if not more than 600 confirmed stroke cases, and if less, present the expected trajectory of growth in the coming years with a justification.

3.3.2 Bed occupancy rate

CapGemini modelling was based on an 85% bed occupancy rate in stroke units. The ECRG agreed that this was an appropriate rate, as it allows units to cater for peaks in referral activity, and enables good patient flow and achievement of the 4 hours to admission to a stroke unit standard. It also helps units plan for a degree of future growth in activity.

3.3.3 Length of stay on HASU/ASUs, and impact on acute stroke bed requirements

The national mean length of stay (LoS) on a stroke unit for patients with a stroke diagnosis is currently 13.8 days [ref see PO graphs, Appendix I]. LoS in Sussex provider trusts varies, and has resulted in trusts making different assumptions, and a lack of a consistent approach across Sussex. There are a wide range of factors that affect LoS, including the availability of 7 day inpatient multi-disciplinary services, and the ready availability and capacity of rehabilitation and community services (see below). Care must also be taken to

ensure that mean rather than median LoS is used for bed modelling (the median is significantly less than the mean in view of a significant number of long stay patients), and should take account of the fact that TIA and stroke mimic admissions would have significantly shorter LoS on stroke units than stroke patients.

There has been a recent draft agreement at the SSCRG to model required bed capacity on the basis of an average 13 days (3 days on the HASU, and 10 days on the ASU). It is unclear whether this has full sign up if it does not reflect the current reality in the trust.

R16. LoS modelling should be based on that expected with a high performing post-acute hospital pathway, rather than current experience. On that basis an average (mean) LoS figure should be agreed across the acute providers, and based on the current national average, the current proposal for 13 days is supported.

3.3.4 TIA and stroke mimic rates

HASU and ASU inpatient activity includes not just confirmed stroke cases, but also high risk patients with TIAs needing inpatient management, and patients with symptoms mimicking a stroke. In addition for ASUs, there are potentially additional patients being repatriated from a more distant HASU to their local ASU for ongoing stroke care (depending on the agreed local pathways for stroke care). There has been a lack of clarity and agreement within the SSCRG about how to model these additional patients into stroke unit activity.

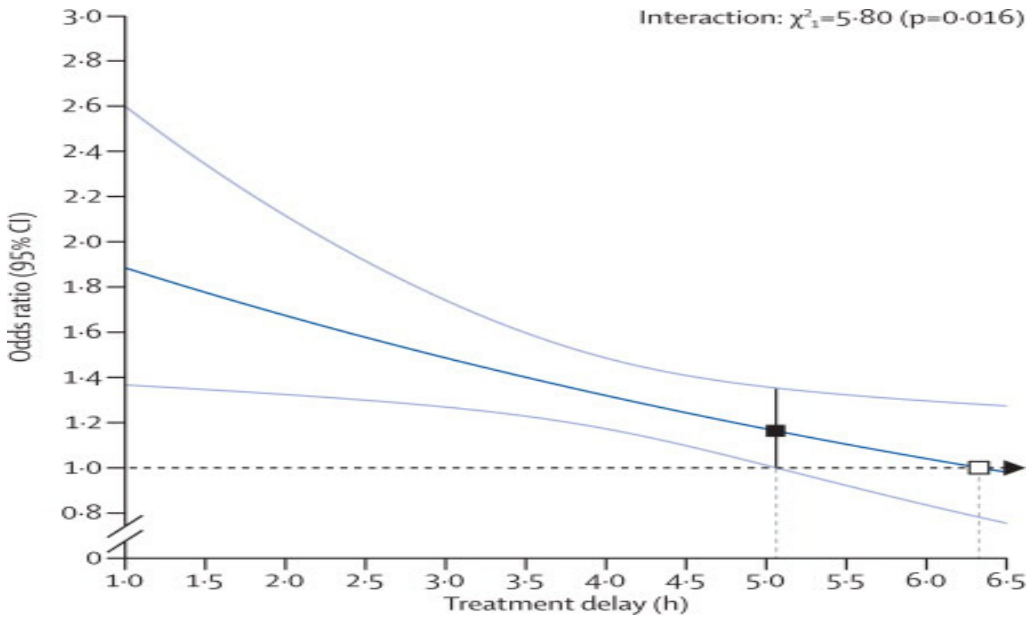
There are no national audit data on TIA and stroke mimic admission rates to stroke units in England to reference. CapGemini had modelled on an 'uplift' over and beyond confirmed stroke cases of 56% (20% additional admissions with TIAs, and 30% of [confirmed stroke + TIA] for stroke mimics), based on a previous agreement by the Sussex Stroke Modelling Group. However BSUH and WSHFT each used different modelling assumptions (see provider section). We understand that the SSCRG has recently provisionally agreed that TIAs and stroke mimics together should be assumed now to be 35% of confirmed stroke cases. The ECRG was concerned that this may be a conservative assumption but did not come to a view on a percentage to recommend, given the wide variability reported by providers across the country (see Appendix H for examples of variable quoted rates and definitions). When evaluating the available evidence on this, caution is required in distinguishing between stroke mimics assessed vs admitted to a stroke unit, and whether TIA cases are included or not. Based on the available evidence however, the ECRG considered that the combined TIA and stroke mimic rate of 35% was acceptable.

R17. It is important to agree the proportion of future HASU admissions due to TIAs or stroke mimic symptoms across the providers. The proposed 35% rate was considered acceptable by the ECRG. Where current providers are in excess of this, they should look at the reasons why, and whether there are ways of avoiding unnecessary or inappropriate admissions to stroke units by a review of their inpatient pathways for stroke mimic patients.

3.3.5 Standards for call to needle time and implications for acceptable travel times.

A key factor in determining an appropriate geographical distribution of HASUs is the time from developing a stroke to receiving thrombolysis (for the 10-20% of stroke patients for whom it is appropriate). Meta-analysis of relevant trials have shown that the best outcomes from thrombolysis are achieved the earlier it is given (10), with loss of significant benefit beyond around 5 hours post-stroke (see figure 1).

Figure 1. Effect of timing of thrombolysis on good stroke outcomes (10)**.**



Currently, rather than having a single performance metric for the time from stroke to thrombolysis, the ambulance service and acute hospital trusts have their own individual time targets and standards for different components of this pathway, including:

- Ambulance call to arrival time: 8 minutes (for a category A Red 2 call)
- Ambulance call to hospital door (i.e. to arrival at the receiving hospital). The current standard is 60 minutes, as stated in the National Institute for Clinical Excellence

(NICE) Quality Standard 2 (11). However this time standard is not cast in stone, as NICE's wording states that 'the goal of one hour set by this statement has been selected to take account of the differences between urban, rural and remote locations. However trusts can set appropriate targets for their local service configurations'.

- Door to needle (administration of thrombolysis). The current target is 60 minutes (to include CT scanning and clinical assessment). However there is now good evidence that that high volume HASUs can reduce their door to needle times significantly (by up to 28 minutes compared to low volume units) (6).

On this basis, the SESCNSSS and the SECS (in their Kent and Medway stroke review) (12) advocated a clinically appropriate composite target of a maximum of 120 minutes from call to needle, allowing for some flexibility in travel times to be compensated for by faster door to needle times. The ECRG concurred with this approach.

It is from this perspective that appropriate travel times for Sussex patients to future HASUs should be considered. CapGemini analysed the percentage of patients who could be conveyed to each hospital site (across the various possible HASU configurations), as <30 minutes, <45 minutes, <60 minutes or 60 minutes and over. They then selected only those scenarios that could convey at least 95% of patients within 45 minutes. The ECRG agrees that 95% of patients conveyed within 45 minutes is an appropriate travel time to model on, accepting that the small number of patients who would fall outside of this time standard would still benefit from the more rapid assessment and treatment a larger HASU could deliver on arrival at hospital, as well as gaining from the wide range of other benefits of a fully designated HASU. For some more distant residences however, it may be appropriate that they are conveyed to an alternative closer HASU, to ensure equity of access to high quality and timely acute stroke care. There is a need to carry out a health impact assessment and Equality Impact Assessment (EqIA) on the preferred option(s) which would give the assurance that this analysis has been carried out robustly.

R18. The appropriate travel time from place of residence to a HASU should take account of the overall aim of administering thrombolysis to appropriate patients within 120 minutes of the call to the ambulance service. Modelling based on 95% of patients being within 45 minutes travel time of the proposed HASUs is consistent with this aim. However there could be some flexibility in this recommended travel time when deciding on the location of stroke units, recognising the potential for faster assessment times in HASUs with high levels of activity.

3.4 Early supported discharge

The clinical senate was asked to review proposals for early supported discharge (ESD) as part of its remit. However no detailed proposals were provided for review, other than a gap analysis undertaken by the Sussex Collaborative (April 2015) of the availability and performance against the earlier service specification in the NHS South East Coast Integrated Stroke Care Pathway Service Specification (2012) (13) .This gap analysis showed that there is significant variability in the availability of ESD across Sussex, and in the quality of the service. Assessment of performance is made harder by the lack of mandatory SSNAP reporting for community services. We were also made aware of the difficulty in accessing ESD and community services from acute stroke units, particularly if patients are not from the local area served by the hospital. It is important to note that not all patients being discharged to the community are suitable for ESD, a factor that becomes more relevant with the elderly when planning the activity of future services.

Adult social care is a critical component of stroke care in the community, and social services across Sussex should be fully integrated into the planning and delivery of stroke services.

Stroke patients, their carers and the public should be involved in the co-design of such services, rather than passive recipients of post-hospital stroke care, and should be considered when drawing up the specifications for these services.

R19. ESD should be available across Sussex for all patients, and access should not be compromised by which stroke unit they are admitted to in relation to their usual place of residence.

R20. Commissioners and providers should refer to the final SESCN Stroke Service Specification (Oct 2015) (3) to guide the quality and specification of these services, and which should be built in to the financial modelling.

R21. ESD planning should be integrated with that of the acute stroke units, inpatient rehabilitation and other community services, as a whole pathway approach to stroke patient care is essential to achieve best outcomes, best value and coherent planning.

R22. Patients, carers and the public should be involved in co-designing community services, and such a requirement if recommended for future provider service specifications.

3.5 Public and patient engagement

The ECRG considered that the Sussex Collaborative had undertaken a meaningful and adequate survey of patient and public views of stroke services, with 400+ responses to the PPE survey, focus group meetings and other strategies. Part of the report concentrated on stroke prevention and life after a stroke, areas evidently of concern to participants but which were not considered as part of this review.

However it was evident in the survey that the public (which included a cross section of patients/carers) were not fully aware of what was being considered by the review, and either collectively or independently both providers should prepare scenarios of what could or would be the benefits and impact of their proposals, and make arrangements to advise what the future is likely to be through open public consultation when that point is reached. The inclusion of lay representatives in framing these provider scenarios is recommended. Future engagement work in the next phase will need to work extra hard to ensure the nature of and benefits of HASUs is fully understood, and that they cannot necessarily be sustainably provided in every hospital.

Some reservations were expressed about the user-friendliness of the on-line survey, considering the number which were started and not completed. Consultation did not ask patients and relatives what was important to them and this is a significant gap.

It was noted that 72% of those surveyed were positive about the prospect of having to travel further if it meant they would receive the best treatment and outcomes. However it is uncertain to what extent those asked fully understood the difference between a HASU and an ASU (as suggested by some contradictory findings from responses). Concerns were expressed about relatives visiting patients having to travel longer distances and the extra time and costs that would entail.

R23. In the next phase of pre-formal public consultation, stroke survivors, carers and public representatives should be fully involved in the design of surveys from the start. This should ensure that responders to surveys fully understand the questions being posed in lay terms, rather than responding to questions primarily constructed and framed by healthcare professionals. They should also be engaged by providers early in developing their proposals, to ensure that the full understanding and impact of proposed service changes for patients, their carers and families is known.

3.6 The recommended co-locations of other clinical services in hospitals with stroke units

Patients admitted to stroke units require a range of clinical services to be on hand in support of the stroke teams, to manage their investigations, treatment and acute co-morbidities. The South East Clinical Senate report 'The clinical co-dependencies of acute hospital services' (14) included a detailed review of the needs of HASUs and ASUs. It also reviewed the needs of other key services, in particular arterial centres (vascular surgery hubs) and major trauma centres, for a co-located HASU (see Appendix J for a summary of the recommended stroke unit co-locations). The only modifications the ECRG recommended to the SECS's conclusions in relation to stroke care was: that speech and language therapy services should be based in the same hospital as a HASU rather than simply providing an in-reach service from an off-site base; and that CT angiography should be available on the same site as the HASU.

R24. The South East Clinical Senate's report 'The clinical co-dependencies of acute hospital services' should be a key and explicit reference in assessing the suitability of proposed hospital sites for future HASUs and ASUs.

4. Review and recommendations relating to providers' proposals and options.

4.1 General points relevant to both providers

4.1.1 The Clinical Senate's remit, and resources for assessing proposals

The Clinical Senate was asked to provide an independent clinical review of the proposed options from BSUH and WSHFT, and to highlight any concerns that would need to be addressed before being taken forward for formal consultation. It was not asked to undertake a formal options appraisal, and no weighted evaluation criteria were provided in order to undertake one. Nor was it tasked with, or equipped, to formally assess the financial modelling undertaken by each trust.

The providers' proposals were assessed by a) their submitted plans (a 'stroke service reconfiguration and improvement plan options appraisal' from BSUH, and a 'strategic outline case' from WSHFT, and b) their individual presentations to the ECRG, and associated questions and answers at the meeting. The ECRG's conclusions were also informed by the range of supporting materials as listed in Appendix C

Many of the recommendations (from section 3 of this report) are relevant to the acute trusts as well as the commissioners, and should be referred to in additional to the specific points and recommendations made in this section for the individual trusts.

There are some general provider-related themes that apply to both and are detailed here, before the review of the individual trusts' proposals.

4.1.2 Improving high level coordination between acute stroke providers (both in and adjacent to Sussex)

(Refer also to section 3.2.1 and Recommendation 3).

The Sussex acute providers are represented on the SSCRG, which appears to be the forum where cross-provider issues and impacts are discussed. It is not clear if there are any formal links between the providers in coordinating their planning for future stroke care models outside of this group, and at an executive level. This is particularly important given the ongoing stroke reviews in Kent and Surrey, and the uncertainties about additional capacity if required at the QAH Portsmouth unit.

For BSUH, this coordination is particularly important with WSHFT, ESHT and SASH. For the northern end of Mid-Sussex, Horsham and Crawley, the impact of changes in activity should PRH lose their stroke unit should be closely coordinated with SASH, whilst if RSCH

lost its stroke unit, there would be a major impact on Worthing and Eastbourne HASU activity. For WSHFT, close coordination with QAH Portsmouth in particular is critical for planning the future patient pathways for stroke patients in the western end of West Sussex.

Neither provider clearly articulated plans for networking and provided insufficient detail and analysis concerning the potential impact of their proposals on adjacent networks. There was also little evidence of communication and consultation with providers outside Sussex.

4.1.3 Integration of provider planning with ESD, rehabilitation and community services

In the absence of detailed work within Sussex on the full stroke pathway (particularly relating to inpatient rehabilitation, early supported discharge and future community services, all of which are key enablers for high performing, efficient acute stroke units), provider planning is compromised at present. Length of stay and bed numbers (and the financial implications) would all be significantly impacted by improvements in these onward care services across Sussex. Nonetheless, providers' plans should be more explicitly linked to post-hospital care.

R25. The acute trusts should provide a more detailed description of their post-acute care patient pathways, taking account of the range of community providers and facilities currently available in the localities patients may be discharged to.

4.1.4 Workforce considerations

Both providers need to be clear about plans on how they will recruit, retain and move their workforce where necessary. If they go for the one HASU/ASU option, who and how many staff need to move and would move? Providers need to undertake realistic assessments of how many staff would actually move to a new location. Based on experience, less than 50% of staff may move to a new service if in a different geographic location, especially if there are travel challenges (such as road congestion, poor public transport links and the availability of on-site parking). This would particularly impact on therapies and nursing staff. Both providers will need to manage staff expectation and involve them early in their plans to allay anxieties and reduce stress as well as encourage co-operation and reduce resistance.

One way to retain specialist skills within the stroke care pathway, particularly with regard to therapies staff, is to enhance local ESD services and offer employment in these services as an alternative to changing to other specialty care.

R26. Providers should undertake realistic assessments of the staff implications of their proposals, in particular their assumptions about recruitment, retention and readiness to work in a different location, and plan measures to address these challenges.

R27. Staff should be kept informed of and engaged in the proposed changes to how stroke care is delivered, and the rationale for those changes.

4.1.5 Potential integration of stroke and neurology services around acute stroke care

There are significant manpower constraints and challenges in both stroke medicine and neurology, yet an overlap in professional competency in caring for stroke patients. There may be advantage in the two medical specialties reviewing the potential for some integration of their workforces for the delivery of stroke care, particularly for on call rotas.

R28. Providers and their clinicians are encouraged to consider the potential for joint rotas and collaborative working between the neurology and stroke physician workforce.

4.1.6 Financial and activity modelling

Members of the ECRG expressed concern that the financial modelling used by providers was based on CapGemini activity analysis, and that analysis of trust and CapGemini data has highlighted discrepancies. Trusts and commissioners should refer to the guidance on activity modelling in the draft national toolkit (see Appendix N (i&ii)).

BSUH used programme budgeting to support the financial modelling. Programme budgeting has significant assumptions and apportionment underpinning the numbers and there is likely to be significant 'unallocated' expenditure (which cannot be mapped to a programme category) apportioned across areas.

Stroke activity can only be identified within certain Healthcare Resource Groups (HRG) and ICD10 (clinical diagnosis codes) combinations and should be used to calculate future activity and cost. In order to understand the cost of delivering stroke activity, CCGs need to obtain information on the cost base of each provider involved in the reconfiguration. This should capture cost information for pay, non-pay, income and overheads for each stage of the pathway, through a standardised template.

It is recommended that the financial analysis should consider using other benchmarks to validate submitted provider returns. By multiplying the provider submitted reference cost (for stroke/TIA HRGs) by the activity in provider returns. A total cost of the service can be estimated. CCGs should compare this to the total cost of the stroke service in the provider

returns. Any significant mismatch should be investigated. Referenced costs are nationally published and can be found online: https://www.gov.uk/government/collections/nhs-reference-costs.

There is evidence from the Birmingham, Solihull and Black Country Review that a 25-28% efficiency can be achieved through HASUs (0-3 days) of activity of 900 or more compared to smaller units (see slide in Appendix K)

It is recommended that both providers would need to re-model the finances in light of a refreshed activity model. A system wide approach to the financial model, led by the commissioners, should be taken, and the guidance in the finance chapter from the draft national toolkit is recommended for this purpose (see Appendix N (i&ii)). The main features of this approach are:

- Estimate the current cost of care – preferably through a combination of service Level agreement monitoring (SLAM) and best practice monitoring data.
- Estimate the cost of 100% PBR + best practice tariff. This is the overall stroke income available to providers.
- Agree a method of identifying stoke mimics and identify the current spend.
- Estimate the cost of the new provision including:
- Working with the providers to estimate a reasonable cost of providing the new service
- Challenge, Validation and bench marking to sense check the outputs
- Capacity challenges and additional capital costs of additional throughput
- The impact of losing Stroke and mimic income (if HASU closure)
- Overall impact of mimics (capacity, pathway and cost)
- Work with the local ambulance and patient transport service to identify the 'vortex effect' and cost of repatriations.

R29. Further work on the activity and financial modelling of future HASU and ASU options is required, using the methodology described in the draft national toolkit (see Appendix N (i&ii)).

4.2 Framework for reviewing the providers' proposals

In order to assess systematically BSUH and WSHFT proposals, the ECRG used a framework that took account of the range of issues it considered were essential to address and were within the Clinical Senate's remit, whilst acknowledging that the trusts have not to date been provided with a common specification and clear guidance in developing their proposals.

The framework assessed the proposals against the following criteria:

1. The level of ambition for future stroke services
2. A clear description of all relevant patient pathways (including stroke mimics, late presenters and patients sustaining strokes in a non-HASU site)
3. Clear and appropriate modelling of current and future confirmed stroke cases in the proposed HASU(s)
4. Bed modelling
5. Feasibility of delivering the required bed base
6. Rationale for excluding any re-configuration options
7. Clear and appropriate pathways for patients with TIAs
8. Alignment with recommended clinical services co-locations
9. Evidence of a detailed and appropriate assessment of travel times in relation to the call to needle time standard of within 120 minutes
10. The multi-disciplinary workforce planning is appropriate to meet the required standards, and is realistic
11. Patient and relative access to HASU and ASU hospital site
12. Evidence of satisfactory engagement and involvement of patients and the public
13. That the proposals are considered affordable within planned budgets
14. Summary of ECRG view of individual options

4.3 Brighton and Sussex University Hospitals' proposals

4.3.1 Level of ambition for future stroke services

BSUH recognise that the 'do nothing' option is not appropriate, and that services need to improve to meet the requirements of the SESCNSSS, and to improve performance against SSNAP. There was no data however on current patient outcomes, and clear goals and timescales for their improvement, which would be the underlying purpose of change. The ECRG would have liked to have seen more strategic ambition articulated, such as developing further as a centre for high quality education, training and research, and providing system leadership.

4.3.2 A clear description of all relevant patient pathways (including stroke mimics, late presenters and patients sustaining strokes in a non-HASU site)

The BSUH options appraisal document does provide outline pathways for patients with mild, moderate and severe stroke, and for stroke mimics. In addition to this, it would be useful to describe the full patient pathway for patients coming from the different parts of the proposed catchment area, to make it clear where patients are likely to receive their care at the different stages of the pathway, depending on where the HASU is sited (though recognising that this requires more clarity about the HASU configuration in neighbouring trusts, and therefore the respective 'catchment areas'). This is particularly important for stroke patients living more distant from the HASU, and for stroke mimic patients needing ongoing inpatient care, as there is a risk with centralising HASUs that patients end up in hospital with a condition that could be managed as effectively at a closer hospital to their usual place of residence.

There should be more detailed work on the onward care pathways (post-stroke inpatient or outpatient rehabilitation, and community care). In particular there needs to be confidence that the Sussex Rehabilitation Centre (a BSUH facility), a vital part of the patient pathway for the 20% of all current BSUH stroke patients, will have sufficient capacity for stroke patients (as opposed to that required by patients with other inpatient rehab needs (e.g. following major trauma and neurotrauma) to meet future demand.

Gaps in ESD services and community stroke rehabilitation, particularly in East Sussex, are identified both from the Sussex Collaborative summary (April 2015), and from regular clinical experience, and are highlighted in the options appraisal. These are serious constraints to patient flow, and should be addressed by a system-wide approach, in collaboration with commissioners and community providers.

The pathway for patients developing a stroke whilst an inpatient for another condition, should be described, at least for the more common clinical scenarios (e.g. during surgical care, post-ICU or renal dialysis patients), and the pathway for patients arriving at the non-

HASU/ASU hospital with stroke symptoms (either acute or as late presenters) should be outlined.

The full implications of all pathway changes must be agreed with SECAmb.

R30. Patient-centred pathways for the range of presentations, and to account for the different patient locations, should be provided in more detail, so that the full implications of changes are more clearly understood. Pathway changes with implications for the ambulance service should be agreed with SECAmb

4.3.3 Clear and appropriate modelling of current and future confirmed stroke cases in the proposed HASU(s)

BSUH have used the CapGemini activity analysis (for the year 2013/14) and their scenario modelling for confirmed stroke cases (see Appendix D summary diagram from CapGemini). This shows that they treated 632 cases between the two current units of RSCH (416 or 66%) and PRH (216 or 34%).

The modelling of future BSUH stroke activity assumes HASUs at Eastbourne, Tunbridge Wells and Redhill (Surrey and Sussex Healthcare NHS Trust (SaSH)), which is considered appropriate based on the current understanding of neighbouring stroke networks (though both Kent and Surrey are currently also undergoing stroke services reviews). Although BSUH have provided models that include the absence of a HASU in Worthing, it is clear from the strategic outline case from WSHFT that they intend to have a HASU at Worthing, and comments here on BSUH's analysis will only refer to that which assumes a Worthing HASU.

a) RSCH HASU option

Based on the 2013/14 activity and assumptions, a RSCH HASU would have between 539 and 632 cases per annum. The uncertainty relates to which HASU some patients currently served by the PRH stroke unit would be conveyed to, other than to that at RSCH (predominantly this would be to the SaSH HASU). CapGemini modelling assumes only 57% of current PRH activity would continue to be provided at BSUH at a single RSCH unit (giving the 539 total). BSUH cite the recent example where the PRH unit was closed to admissions for a two month period, with no loss of activity to other stroke units. The ECRG considered that when a new permanent HASU landscape takes shape across Kent, Surrey and Sussex, referral pathways to other HASUs may consolidate, so to assume that all current PRH activity would flow to RSCH (giving the 632 annual total) in the long term is tenuous. The long term likelihood is somewhere between these two figures.

Two other factors may increase activity at a RSCH HASU: an increase in stroke incidence in the coming years (if considered likely by public health modelling), and the mainstreaming of neuroradiological thrombectomy (clot removal) for acute stroke (likely given the results from recent large scale studies). RSCH now has the regional neuroradiology (and neurosurgery) service on site, and reports intending to develop a future 24/7 service for the region. This development would increase the number of acute stroke cases being referred and admitted to the RSCH HASU from other HASUs in Sussex (or potentially even wider). It is too early to quantify the amount of such potential activity, and in the absence of an agreed future regional pathway for this intervention (which is subject to national discussions at present).

R31. Taking account of their activity modelling and likely future developments, the ECRG was of the view that a future RSCH-only HASU would undertake sufficient acute stroke activity.

b) PRH HASU option

The PRH stroke unit is currently small (216 cases per annum). Modelling shows that a future PRH-only HASU for BSUH would take between 323 cases and 632 cases per annum, depending on where current RSCH activity would be undertaken. Given the proportion of BSUH's population that lives near the coast rather than inland, and given the proximity of the Eastbourne and Worthing units to the RSCH and its catchment population, a large proportion of current RSCH activity would not feed to PRH if a single site HASU was established there. CapGemini modelling showed that if PRH was chosen as the HASU, 74% (309) of RSCH cases would go to Worthing or Eastbourne, leaving the PRH unit taking only 323 cases per annum.

There is uncertainty as to whether the neighbouring units could cope with the additional activity and bed requirements of this option. It should be noted that WSHFT have not modelled options that assume a PRH HASU with no RSCH HASU.

The ECRG concurs with BSUH's analysis that total activity is likely to be nearer the lower end of the quoted range (323-632), even allowing for some future demographic growth. In addition, it is hard to see how there would be any additional admissions resulting from future potential referrals for acute thrombectomy with the neuroradiology service based on a different site.

R32. On the basis of likely activity levels, the ECRG considered that a PRH HASU would be of insufficient size to secure the clinical and efficiency gains of a centralised BSUH unit.

4.3.4 Bed modelling

Reference should be made to the general review of bed modelling criteria in section 4.3 where the general principles and assumptions are critiqued in detail.

BSUH bed modelling was based on CapGemini 2013/14 activity figures, and they made the following assumptions:

a) **A bed occupancy rate of 85%.** The ECRG concurred that this was an appropriate level to plan on, catering for peaks in activity, need for direct access within 4 hours of admission, and future growth in activity.

b) **An average length of stay (LoS) in the combined HASU/ASU (either site) of 12 days.** BSUH has had an impressively low length of stay by national comparison until recently (9.2 days in Q1 of 2014/15 vs 13.9 nationally), but this seems to have deteriorated in recent quarters to 13.8 days in Q1 of 2015/16 (see Appendix I). The ECRG heard that LoS could be significantly lower with improvements in ESD and community services in their catchment areas, though the consequence of taking patients from more distant areas to a centralised HASU risks longer LoS which needs to be mitigated by well-functioning onward care pathways. The SSCRG has recently agreed however that re-modelling should be done on the basis of a LoS of 13.0 days.

c) **A combined uplift in stroke unit activity relating to high risk TIAs and stroke mimic admissions of 20% over and above confirmed stroke admissions.** This compares with a CapGemini assumption of 56% for combined TIAs (20%) and stroke mimics (36%). BSUH state in their options appraisal that 20% was 'as agreed by the Sussex Stroke Collaborative'. BSUH activity analysis for 2014/15 (Appendix A of their options appraisal) suggests a TIA rate of 15.5% of confirmed strokes, and a 'stroke mimic/other stroke consultant activity' rate of 35% (i.e. combined 50.5% uplift on confirmed stroke numbers). At the most recent SSCRG meeting in October, a combined uplift of 35% for TIAs and stroke was agreed (which the ECRG considered conservative but acceptable. Ways of limiting stroke mimic admissions to or stay on the HASU/ASU should be considered, including a review of their in-hospital patient pathway and the alternative acute or general medical care options.

R33. The re-modelling of the required bed numbers, taking in to account the updated bed modelling criteria and re-analysis of likely activity levels, will increase the required size of the proposed HASU (for either of the BSUH options), and the feasibility and cost of a unit of such an increased size will need to be re-evaluated. Reference should be made to the draft national stroke toolkit for assessing stroke unit activity, and the modelling approach agreed with the commissioners.

4.3.5 Feasibility of delivering the required bed base

Changing to a single HASU/ASU will require an increased bed base on either site, based on agreed activity levels and the re-modelling discussed above (including stroke mimics, an increased number of which would come to a centralized unit, and may receive part or all of their care on a non-stroke ward). For either option, the trust should provide assurance that the required beds would be delivered and prioritised for stroke patients, having considered how the bed base would be freed up by necessary changes for other services. This assurance has not been provided to date by the trust.

Some de-pressuring on beds in the centralised HASU/ASU could be achieved by developing repatriation pathways for longer stay stroke patients and stroke mimic patients who could be cared for by a more local hospital to them, including the alternative BSUH hospital site (in addition to more efficient discharge arrangements contingent on improvements in ESD and community services). As above, the in-hospital stroke mimic pathway should also be reviewed. Conversely however as BSUH describe, there are other patients who may repatriate to the BSUH HASU/ASU from other units, but until the full Sussex stroke provider configuration is clearer, it is hard to anticipate these numbers accurately.

R34. BSUH should make clear their commitment to providing the required specialist bed base for their proposed future single site HASU, to provide re-assurance that the proposals are deliverable.

4.3.6 Rationale for excluding any re-configuration options

Of the five options described in their options appraisal, none include a HASU on one site but with an ASU on the other. There is no rationale or evidence given for this omission, other than the statement that 'the options assume that all stroke admissions are conveyed and admitted directly to a comprehensive stroke unit that provides a service compliant with the standards of a HASU and ASU'.

R35. Before going to staff and public consultation, BSUH should include a more detailed explanation of why they have discounted a 1 HASU/ASU + 1 ASU model, ensuring that staff, patients, Overview and Scrutiny Committee(OSC), Healthwatch and Health and Wellbeing Boards (HWB) understand the need for the proposed fully centralised model.

4.3.7 Clear and appropriate pathways for patients with TIAs

The urgent assessment and treatment of patients with TIAs is a key aspect of acute stroke care, and relies on effective pathway design, including prompt access to a range of diagnostic tests and to vascular surgery, and on occasion requiring admission.

R36. The pathway for the investigation and management of TIA patients is only cursorily described, and more detail should be provided for both BSUH options.

4.3.8 Alignment with recommended clinical services co-locations

BSUH have used the SECS report on acute co-dependencies (14) to benchmark their two hospital sites for concordance with the recommended clinical co-locations of services with HASUs and ASUs (see summary table in Appendix J).

The RSCH HASU option aligns with all the recommended co-locations listed, whilst the PRH HASU option complies with far fewer. In addition, both arterial centres (vascular surgery hubs) and major trauma centres, are recommended to have HASUs on the same site, for which only the RSCH option complies. The ECRG also considered that renal unit hubs (that provide inpatient dialysis) should co-locate with a HASU. It is noted that RSCH is the renal unit hub for Sussex, and that no inpatient renal services are based at PRH

BSUH has also recently moved its interventional neuroradiology and acute neurosurgical service from PRH to RSCH, and BSUH plans for this service to evolve into a regional centre for stroke thrombectomy.

R37. Taking account of all these factors, the ECRG considered that on co-location criteria, the RSCH option was by far the more appropriate siting of the BSUH HASU.

4.3.9 Evidence of a detailed and appropriate assessment of travel times in relation to the call to needle time standard of within 120 minutes

(Refer to section 1.3.5 for detailed discussion of call to needle time modelling).

BSUH used the CapGemini modelling of travel times for both the RSCH and PRH HASU options. In the relevant scenarios (48B, 58B, 52B, 59B), 100% of patients would be conveyed (travel time from leaving the patient's residence to arriving at hospital) to the HASU within 45 minutes, which would mean that the vast majority of patients would have a call to door time of within the current national standard of 60 minutes. This meets with the ECRG's conclusion that even if a small proportion of patients had a longer travel time (beyond 45 minutes), as long as the maximum call to needle time of 120 minutes is achieved for most patients such a travel time is appropriate.

If BSUH plan to continue to serve a similar catchment area to the current one but with just one HASU, and continue with their current levels of stroke activity, then this will clearly involve longer travel times for some patients. To what extent such longer travel times can be mitigated by shorter door to needle times should be explicitly stated and modelled, so that the potential for a wider catchment area can be fully understood, and seen alongside other HASU proposals from neighbouring trusts in deciding the most appropriate HASU.

R38. The call to needle pathway should be explicitly mapped, and the way that longer travel times can be mitigated by faster assessment and decision-making on arrival at the HASU hospital should be clearly described, so as to provide re-assurance that call to needle times will be clinically appropriate.

4.3.10 The multi-disciplinary workforce planning is appropriate to meet the required standards, and is realistic.

A coherent plan for medical staff was included in the proposal, but clarity about the requirements for additional stroke consultant whole time equivalents (WTEs) (quoted as 2.15 for both options), as opposed to the number required to run a rota of at least 1 in 6, is required. With the centralisation of stroke services on one site, the trust should consider how best to integrate the current two site stroke physician workforce and ensure good and effective working relationships across the two sites are sustained.

For the nursing workforce, using the recommended WTEs from the SESCNSSS, there does not appear to be a significant increase in the total number required for either proposal (and fewer may even be required overall depending on the final agreed size of the centralized single unit). However the need to improve the skills mix was articulated in the presentation to the ECRG, and this needs to be better described in their proposals as only total nursing numbers required are provided. The Trust should also consider ensuring there are sufficient band 6 level nurses in the establishment, ideally to provide 24 hour cover with contingency for leave. The likelihood of recruiting or promoting staff in these roles should also be considered. Clinical experience would indicate that centralization can enhance the view of stroke care as a desirable specialty in nursing and the Trust should consider raising the profile of stroke nursing in the lead up to any service changes.

The planned number of occupational therapists (OT) and speech and language therapists (SALT) appears to have been over-quoted in the options appraisal paper, in relation to the recommendations in the SESCNSSS. For OT it refers to requiring 0.98 WTE rather than 0.68 WTE per 5 HASU beds, and for SALT, the staffing refers to the WTE required per 5 HASU and ASU beds, rather than the recommended per 10 HASU and ASU beds. It is not clear if this is a transcription error or a modelling error, and this should be corrected.

The ECRG considered that the recruitment plans for therapies staff would be challenging, particularly given the shortages of OT and SALT staff in the region (and nationally). It also cannot be assumed that the middle grade nursing and therapies staff in particular will move to the other trust site, with the associated travel to work times, rather than moving to work in alternative wards and services that are more local. No plans were provided regarding workforce development, which will be critical in delivering a sustainable workforce model.

R39. Additional detail is required on the WTE and skill mix changes required for both the medical and nursing workforce, and the number of therapists required should be re-checked against the SESCNSSS recommendations.

R40. Further work is recommended on the therapist workforce to ensure that the WTE specification requirements can be delivered, and if so how. This should take account of the reality of current staff re-locating their workplace, and of workforce development and other initiatives that will maximise recruitment and retention.

4.3.11 Patient and relative access to the HASU/ASU hospital site

The RSCH is well known for being a challenging site for parking and access, though is served reasonably by the town's bus routes. The PRH site is generally considered far easier for parking. This factor is likely to have a considerable impact on the acceptability of proposals to the public.

R41. BSUH should be transparent about the access challenges of the two sites, particularly at the RSCH, and consider what measures can be proposed to make access more acceptable to the carers and relatives of admitted stroke patients.

4.3.12 Evidence of satisfactory engagement and involvement of patients and the public

BSUH make no mention of any engagement work of their own with patients, carers or the public (PPE) in the evolution of their proposals. In discussion with the ECRG, they referred to the engagement work and report undertaken by the Sussex Collaborative.

R42. The ECRG would expect significant PPE in the next stage when making the case for the agreed single site, which should involve patients, carers, family and the public in co-designing the engagement work. Early involvement will help to develop robust processes and lay the foundations for meaningful co-design.

4.3.13 That the proposals are considered affordable within planned budgets

Refer to section 2.1.6 for recommendations on financial modelling.

BSUH's income and expenditure analysis shows that for both options, whatever the level of activity expected, further investment would be required, over and beyond current expenditure, and even taking account of maximizing best practice tariff income. This is mainly due to required increases in the multidisciplinary workforce, and potential reductions in overall trust stroke activity, and therefore income (depending on the option and revisions to the activity modelling). However the impact of improvements in ESD, rehabilitation and community services is unknown, but if delivered would reduce the expenditure requirements of the acute inpatient service. Refer to section 2.1.6 for recommendations on financial modelling.

4.3.14 Summary conclusion of BSUH options:

R43. The ECRG agreed with BSUH should integrate their stroke services on a single site. It strongly favours the RSCH HASU option over the PRH HASU. It would have sufficient activity, affect the travel times of fewer patients, and be fully aligned with other key co-dependent clinical services. The PRH HASU option would result in too small a unit, and it is on the wrong site for a wide range of clinical services that would support a HASU, or that require support from a HASU. It would also put an additional large burden of additional activity on Worthing and Eastbourne stroke units that it is uncertain they could manage.

4.4 Western Sussex Hospitals' proposals

The Strategic Outline Case (SOC) submitted by WSHFT in advance to the ECRG strongly favoured a single option (a 2 HASU/ASU model at both Worthing and Chichester). The presentation made to the ECRG however presented the 1 HASU/ASU at Worthing option as equally valid for consideration. This was explained on the basis that they understood that QAH Portsmouth was now expressing a desire and ability to take on more activity. This has made it more challenging for the ECRG's review, as there is significant uncertainty about the assumptions that have been made.

4.4.1 The level of ambition for future stroke services

The SOC describes the need and intention to improve the standard of stroke services and quality of care provided by the trust, to review models of care, and to work with the Sussex-wide stroke review in developing a county wide service model. It does not describe current patient outcomes, or goals for their improvement, which is the underlying purpose of change.

It refers in places to meeting the clinical standards detailed in the National Stroke Strategy 2007, but in the options development refers appropriately to matching the service specification described in the SESCNSSS (version v2.0 – note current and likely final version is now v4.0).

WSHFT presented evidence that their SSNAP performance had improved on both sites in recent quarters, with Worthing now at level B, and SRH at level C. Service change is now recognised as required to raise the level of stroke care to higher levels for West Sussex patients, and across all domains within the responsibility of the trust, including the therapies services.

The ECRG considered that more strategic ambition should be articulated, including system leadership, and further developing as a centre for high quality education, training and research in relation to stroke.

4.4.2 A clear description of all relevant patient pathways (including stroke mimics, late presenters and patients sustaining strokes in a non-HASU hospital)

There were no mapped patient-centred pathways in the WSHFT submission and presentation to review, and these are strongly recommended so that all understand how patients in WSHFT's catchment area could expect to move along the pathway, from initial symptoms, through to acute care, and onward to rehabilitation and community services.

Such pathways should include those for patients (particularly TIA patients) needing vascular surgical assessment, and stroke patients requiring neuroradiological or neurosurgical management.

In addition to this, it would be useful to describe the full patient pathway for patients coming from the different parts of the proposed catchment area, to make it clear where patients are likely to receive their care at the different stages of the pathway, depending on where the HASU is sited (though recognising that this requires more clarity about the HASU configuration in neighbouring trusts). This is particularly important for stroke patients living more distant from the HASU, and for stroke mimic patients needing ongoing inpatient care, as there is a risk with centralised HASUs that patients end up in hospital with a condition that could be managed as effectively at a closer hospital to their residence.

There will need to be more detailed work on the pathways for onward care (inpatient or outpatient rehabilitation, and community care), in collaboration with community providers. Gaps in ESD services and community stroke rehabilitation were identified in the Sussex Collaborative summary (April 2015) and are serious constraints to patient flow.

The following patient pathways should be outlined:

a) Patients developing a stroke whilst an inpatient for another primary condition, at least for the more common scenarios.

b) Patients arriving at the non-HASU/ASU site with stroke symptoms (either acute or as late presenters).

c) Stroke mimic patients once a stroke has been ruled out, including any repatriation to a hospital closer to home.

The full implications of all pathway changes must be agreed with SECAmb.

R44. Patient-centred pathways for the range of presentations, and to account for the different patient locations, should be provided in more detail, so that the full implications of changes are more clearly understood. Pathway changes should be agreed with SECAmb.

4.4.3 Clear and appropriate modelling of current and future confirmed stroke cases in the proposed HASU(s)

There are discrepancies between the CapGemini activity analysis, and that produced by WSHFT. CapGemini produced activity figures for confirmed stroke cases across Sussex in 2013/14. It is the ECRG's understanding that the initial analysis (CapGemini report Oct 2014) was challenged by WSHFT, particularly in relation to postcode methodology, walk-ins vs ambulance conveyance, and SRH activity. Subsequently there were several meetings between CapGemini and WSHFT representatives to resolve the data issues. The final CapGemini report (June 2015) (8) was thought to have resolved the perceived

errors, and the SSCRG 'agreed the data as the most accurate to date and would be more helpful as an aid to the development of options' (15).

CapGemini (June 2014) (9) reported 504 confirmed stroke cases for Worthing and 348 for SRH (2013/14). The WSHFT submitted SOC reports 521 for Worthing and 389 for SRH in the do nothing option, and 560 for Worthing and 401 for SRH in the two site model (a difference of 109 cases for the combined units compared with CapGemini). It was not explained in the material submitted or presented why there is this persistent difference in stroke numbers, which it is important to resolve given the importance of HASU activity on its viability and in modelling in other adjacent stroke networks. Subsequent communication from WSHFT states that the trust did their own analysis of their 2014/15 data from PAS for their current modelling, included patients transferred from QAH Portsmouth to SRH (though it is not clear if these were HASU-type patients or post-72 hour ASU-type patients) and included the Hampshire patients treated at SRH (though it appears that CapGemini included these also).

Regardless of this, the 2 HASU option would result in the SRH HASU still being of a relatively small size, and well short of the recommended minimum recommended activity of 600 cases per annum. It would also limit the activity at the Worthing unit to less than 600 cases per annum.

It should be noted that WSHFT did not model their future HASU activity in a scenario where in BSUH, PRH became the HASU and RSCH did not. In the event that this BSUH scenario applies, clearly radically different activity, capacity and financial modelling would be required. However, this SECS review concluded that the RSCH site was the most appropriate single site HASU/ASU for BSUH, and if this is agreed, such additional modelling would be unnecessary.

What is not clear at present is the capacity of QAH Portsmouth to take additional patients in the event of SRH losing its HASU. In the SOC it was assumed (with no justification given other than that QAH 'is extremely busy and on occasions has to divert patients back to the SRH service') that they could not, which effectively almost ruled out the Worthing HASU only option. The veracity of this assumption is not at all certain to our understanding, and at their ECRG presentation, WSHFT said that they were re-considering this assumption after feedback from QAH. It is therefore essential that Sussex commissioners and WSHFT liaise urgently and formally with QAH and the Hampshire commissioners to develop a shared understanding of future plans and capacity of QAH.

R45. WSHFT must agree with the commissioners how confirmed stroke activity is being counted, and be consistent with the approach in other trusts, to avoid ongoing differences in approach to modelling.

R46. The ECRG was of the view that the activity that would flow to SRH in the two site option was well short of that recommended for a HASU to maximise the benefits of centralised specialist care, on which basis the single HASU at Worthing is favoured.

4.4.4 Bed modelling

Reference should be made to the general review of bed modelling criteria in section 4.3 where the general principles and assumptions are critiqued in detail.

Detail of how WSHFT bed modelling was undertaken was not provided, but they used the following assumptions:

a) Bed occupancy rate of 90%. This is different to that used by BSUH, and the SSCRG (Oct 2015) has now agreed that providers should use the 85% rate, as it caters more appropriately for peaks in activity, need for direct access within 4 hours of admission, and future growth in activity.

a) An average length of stay (across both sites) of 13.8 days. This compares with a national average LoS of 13.9 days *[see appendix F, data from the NHS Quality Observatory* The SSCRG (Oct 2015) has now asked that providers use an average LoS of 13.0 days (3 days on HASU, 10 days on ASU).

b) Stroke mimic rates in the WSHFT SOC were set 'using an assumption of 25% on top of already identified stroke and TIA spells'. However in their detailed models (appendix B to their SOC), the total of stroke mimics + TIAs appears to calculate out at 62% of confirmed strokes. Meanwhile, the SSCRG (Oct 2015) has now provisionally agreed that providers assume that TIAs and stroke mimics combined should be 35% of confirmed stroke cases.

R47. WSHFT will need to re-model their required HASU/ASU bed base, taking in to account the updated bed modelling criteria, and provide more clarity and consistency in their modelling and assumptions in future analyses. They need to agree a TIA and stroke mimic rate with commissioners that is consistent with that of other providers, and the 35% combined rate is consistent with their previous stated modelling and is considered a suitable rate by the ECRG. Reference should be made to the draft national stroke toolkit for assessing stroke unit activity, and the modelling approach agreed with the commissioners.

4.4.5 Feasibility of delivering the required bed base

WSHFT have ruled out the SRH only HASU option, as they have concluded that it is not logistically feasible to expand the stroke ward, and the costs would be excessive.

For a Worthing only HASU/ASU, the increase in beds required would be from 28 to 32. However they rightly acknowledge the impact that effective ESD would have in minimising the additional bed requirement to just one bed. The SOC states that Worthing has the space to accommodate such extra beds with minor alterations, and at minor cost.

There is no description of the bed requirements for the 2 HASU model, so it is assumed no additional beds would be required.

4.4.6 Rationale for excluding any re-configuration options

None of the WSHFT options included a HASU on one site and an ASU on the other, and no explanation was given for this omission.

R48. Before going to staff and public consultation, WSHFT should include a detailed description of why they have discounted a 1 HASU/ASU + 1 ASU model, ensuring that staff, patients, OSC, Healthwatch and HWBs understand the need for the proposed fully centralised model.

4.4.7 Clear and appropriate pathways for patients with TIAs

There was no TIA management pathway provided. The urgent assessment and treatment of patients with TIAs is a key aspect of acute stroke care, and relies on effective pathway design, including prompt access to a range of diagnostic tests and to vascular surgery, and on occasion requiring admission.

R49. The pathway for the investigation and management of TIA patients is only cursorily described, and more detail should be provided for both WSHFT options.

4.4.8 Alignment with recommended clinical services co-locations

The SOC aimed to show in a table that the co-dependency requirements could be met for each option. However there was no specific mention of the South East Clinical Senate's co-dependency report and the detailed recommendations within (see table in appendix J).

R50. WSHFT should review the required co-locations as described in the SECS's report on the clinical co-dependencies of acute hospital services. It should also describe in particular how it would access acute vascular, neuroradiological and neurosurgical services, as these are not readily available within the trust.

4.4.9 Evidence of a detailed and appropriate assessment of travel times in relation to the call to needle time standard of within 120 minutes

(Refer to section 4.3.5 for detailed discussion of call to needle time modelling).

The SOC analysed WSHFT's options based on a 30 minute 'response' or 'pick up' time. The ECRG presumes that this refers to the travel or 'conveyance' time for the ambulance (the terminology used by CapGemini). It is not clear from the information provided if the anticipated numbers of cases for the Worthing only option is based on 30 minutes rather than 45 minutes travel time. If 30 minutes, the 45 minute isochrones would result in significant increases in stroke activity in the Worthing unit.
The ECRG considers that it is acceptable to model on 95% achieving conveyancing times of 45 minutes, as this will enable the 120 minute call to needle time for the vast majority of patients, enhanced by the anticipated shortening of door to needle times that can be achieved in high activity units.

The Worthing only HASU/ASU option would clearly involve longer travel times for some patients. To what extent such longer travel times can be mitigated by shorter door to needle times should be explicitly stated and modelled, so that the potential for a wider catchment area can be fully understood.

R51. WSHFT should model on 95% of patients conveyed within 45 minutes to the proposed HASU(s), not 30 minutes. The call to needle pathway should be explicitly mapped, and the way that longer travel times can be mitigated by faster assessment and decision-making on arrival at the HASU hospital should be clearly described, so as to provide re-assurance that call to needle times will be clinically appropriate.

4.4.10 The multi-disciplinary workforce planning is appropriate to meet the required standards, and is realistic.

WSHFT show their manpower requirements for the various options in their SOC (pg. 34, and their appendix B).

For medical staff, the two site model requires an additional 5 WTE medical staff (including an extra stroke fellow on each site). There are currently shortages in the South East in specialist stroke consultants and trainees, with currently vacant posts, and recruitment will prove a major challenge.

For nursing, six additional nurse practitioners and 0.5 WTE ward nurses are required in the two site option. There was insufficient detail in the proposals in terms of skills mix, and on what the ECRG was presented with the numbers were considered to be underestimates of what would be required against that specified in the SESCNSSS. Should a single site option be recommended, the Trust will need to realistically consider the volume of nursing

staff that may transfer from one site to another. This may have a significant impact on the recruitment required and therefore the run up time needed. The ECRG would recommend increasing the number of Band 6 nurses with higher skills and nurse specialists to ensure 24/7 cover to achieve quality outcome for patients.

For the therapies, SSNAP performance is poor in speech and language (both sites) and physiotherapy (SRH) whilst OT is currently satisfactory on both sites. The two site model refers to the need for an additional 4 WTE therapies staff, but there is no breakdown of different therapies, and direct reference to the requirement and current gap compared with the regional SEC SCN specification. There is therefore insufficient detail to comment on this further. It should be noted that recruitment to physiotherapy, OT and SALT posts are all difficult.

For clinical psychology, 1.2 WTE clinical psychologists are recommended for every 40 stroke beds. There was no mention of this requirement in the manpower plans.

In summary, delivering and sustaining the required stroke workforce for the two HASU/ASU sites would be very challenging compared with a 1 HASU/ASU model. Combining the available workforce is much more likely to deliver the sustainable manpower levels required in the SESCNSSS and achieve SSNAP standards. A single site at Worthing with sufficient activity would allow it to develop as a specialist stroke centre of excellence, enhancing its status and acting as a considerable attraction for recruiting specialist staff across all disciplines. It would also help to retain staff with the additional educational, training and research opportunities that could be available for professional development in a larger, busier unit.

R52. Additional detail is required on the WTE and skill mix changes required for both the medical and nursing workforce.

R53. More detail is required of the necessary therapist workforce by specialism, to ensure that the WTE requirements agree with the regional stroke service specification, and how this might be delivered. This should take account of the likelihood of current staff re-locating their workplace, and of workforce development and other initiatives that will maximise recruitment and retention.

4.4.14 Patient and relative access to the HASU/ASU hospital site

R54. Private and public access to the hospital site is a key consideration for relatives and visitors to patients. The accessibility of both sites should be described, particularly for the Worthing site if it is to become the trust's single stroke unit.

4.4.12 Evidence of satisfactory engagement and involvement of patients and the public

WSHFT make no mention of any engagement work of their own with patients, carers or the public (PPE) in the evolution of their proposals. In discussion with the ECRG, they referred to the engagement work and report undertaken by the Sussex Collaborative.

R55. The ECRG would expect significant PPE in the next stage when making the case for the agreed single site, which should involve patients, carers, family and the public in co-designing the engagement work. Early involvement will help to develop robust processes and lay the foundations for meaningful co-design.

4.4.13 That the proposals are considered affordable within planned budgets

Refer to section 2.1.6 for recommendations on financial modelling.

The prediction of achieving 100% best practice tariff is ambitious, and there is a clear need to develop clear trajectories to support financial modelling and the delivery of clinical outcomes. The impact of improvements in ESD, rehabilitation and community services is unknown, but if delivered would reduce the expenditure requirements of the acute inpatient service. Financial remodelling is recommended however, including use of the national toolkit methodology (see Appendix N).

4.4.14 Summary of ECRG view of WSHFT options:

R56. The ECRG strongly supports the option of a single larger HASU/ASU at Worthing rather than maintaining two smaller units at both Chichester and Worthing. The SRH site would be too small to provide the full range of benefits of a large HASU, and would compromise the activity levels and potential patient benefits to all West Sussex patients of a larger Worthing stroke unit. It is also unlikely that sufficient staff could be recruited to all the posts required on two sites.

In progressing the single Worthing HASU option however, re-modelling should be done to take account of 45 minute conveyance times, not 30 minutes, as this may increase significantly the number of patients who would come to Worthing rather than neighbouring stroke units (particularly QAH). It is essential that QAH is joined in detailed and high level discussions with WSHFT and the Sussex commissioners, so that the implications and potential for significant changes in services and pathways are fully anticipated and planned for.

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6. Glossary

Acronym	Definition
AF	Atrial fibrillation
ASU	Acute Stroke Unit
BSUH	Brighton and Sussex Universities Hospitals NHS Trust
CCGs	Clinical Commissioning Groups
ECRG	Expert Clinical Review Group, set up by the South East Clinical Senate to undertake the work of this report
EqIA	Equality Impact Assessment
ESD	Early Supported Discharge
ESHT	East Sussex Healthcare NHS Trust
HASU	Hyper-Acute Stroke Unit
HEE	Health Education England
HRG	Healthcare Resource Group
IR	Interventional Radiology
JSNA	Joint Strategic Needs Assessment
MDT	Multi-Disciplinary Team
MCP	Multispecialty Community Providers
NICE	National Institute for Clinical Excellence
PACS	Primary and Acute Care System
PPE	Patient and Public Engagement
PRH	Princess Royal Hospital, in Haywards Heath (part of BSUH)
QAH	Queen Alexandra Hospital Portsmouth
QOF	Quality Outcomes Framework
RSCH	Royal Sussex County Hospital, in Brighton (part of BSUH)
SCCEC	Sussex Clinical Commissioning Executive Committee
SECAmb	South East Coast Ambulance Service NHS Foundation Trust
SECS	South East Clinical Senate
SESCNSSS	South East Strategic Clinical Network Stroke Services Specification
SECVSCN	South East Cardiovascular Strategic Clinical Network
SRH	St Richards Hospital, in Chichester (part of WSHFT)
SSNAP	Sentinel Stroke National Audit Programme
SSCRG	Sussex Stroke Clinical Reference Group
TIA	Transient Ischemic Attack
TPA (tPA)	Tissue Plasminogen Activator
WSHFT	Western Sussex Hospitals NHS Foundation Trust

Appendix A. Sussex Collaborative Request for Advice (Extract from project initiation document).

1. Advice Request

The South East Clinical Senate (SECS) has received a formal request for an independent clinical review from the Sussex Collaborative, to review the current proposals and potential options for future stroke services in Sussex. The Sussex Stroke review is overseen by the Sussex Clinical Commissioning Executive Committee (SCCEC), whose membership represents the seven Clinical Commissioning Groups (CCGs) in Sussex. The Sussex Stroke Clinical Reference Group (SSCRG) reports to this committee.

The Sussex Stroke Clinical Reference Group (SSCRG) plan to use the advice and any recommendations from the SECS clinical review to ensure that future plans for Sussex stroke patients enable rapid specialist assessment and intervention that reflects clinical best practice and is sustainable and fit for the future, and is compliant with the South East SCN stroke service specification and quality standards, regardless of where patients live within Sussex.

The request is for the Clinical Senate to:

- Provide an independent clinical review of the proposed options for stroke service delivery in Sussex, ensuring that they are clinically sound and the interdependencies both on acute services and cross boundaries have been considered.
- The review should consider predominantly the acute pathway. Stroke prevention and rehabilitation services are out of the scope of this review.
- Highlight any areas of concern that would need to be addressed before final recommendations, possible public consultation and implementation.
- Review the methodology used by the SSCRG to date and to make any recommendations for improvement.

In line with the advice request, the aim is to ensure that:

- The proposed pathway is robust and will be safe and of high quality.
- That there is a clinical network that is clearly understood and transparent.

In addition, the clinical senate review will ensure that:

- The data provided is sufficient to address the request for advice, and if not, identify what other information or data is required, and request that this is provided by the Sussex Stroke Clinical Reference Group (SSCRG). If this is not made available to the clinical senate in time for their review, the data deficit would be highlighted in its final report.

- The key interdependencies of other acute and support services with hyper-acute/acute stroke units are considered and highlighted, and that the implications for these resulting from any reconfiguration are identified, and make recommendations as to how those could be addressed.
- Individual trust plans and pathways across their acute sites are robust and meet the recommended standards.
- Network options and relevant hub and spoke issues are reviewed, including repatriation of patients to more local care after specialist care is completed.
- The TIA pathway meets the recommended standards and provides a 7 day a week service.
- Evidence that a pathway for patients with stroke mimic symptoms has been implemented and meets the recommended standards.
- There is consideration of any broader workforce, education and training issues.
- The responsibility for stroke units to participate in clinical research issues is considered.
- An independent Patient and Public Engagement (PPE) perspective is included.

Appendix B. Expert Clinical Review Group membership, and declarations of interest

1. Expert Clinical Reference Group Membership

Name	Job Title
Tony Rudd (Chair)	Professor of Stroke Medicine, Kings College London, Consultant Stroke Physician, Guy's and St Thomas' NHS Foundation Trust, National Clinical Director for Stroke NHS England, London Stroke Programme Director Royal College of Physicians London
Lawrence Goldberg	Chair, South East Clinical Senate, and Consultant Nephrologist, Brighton and Sussex University Hospitals
Barry Moynihan	Consultant Stroke Physician St George's University Hospitals NHS Foundation Trust
Kath Pasco	Consultant Physician, Royal Surrey County Hospital NHS Foundation Trust, Health Education England
Adam Rennie	Consultant Interventionist Neuroradiologist, Great Ormond Street Hospital for Children NHS Foundation Trust, National Hospital for Neurology and Neurosurgery, University College London Hospitals NHS Foundation Trust.
Mohit Sharma	SECS Council Member, Centre Consultant – Healthcare Public Health, Public Health England
Gill Cluckie	Stroke Nurse Consultant St George's University Hospitals NHS Foundation Trust
David Davis	Clinical Lead for AHPs on the South East Clinical Senate Council; NHS Pathways Clinical Lead; Deputy Lead Governor SECAmb; NHS111 Workforce Programme National Clinical Lead NHS England, College of Paramedics, Interim Stroke Lead
David Hamilton	Patient, Public Engagement representative Member of SEC SCN PPE Reference Group; KSS Cancer Network; Awareness and Early Diagnosis CAG; National Peer Review (Quality Surveillance) Team; KSS CCG review team and Non-Executive Director of the KSS Clinical Research Network; Chairman of the West Kent Patient Locality Group
Carolyn Morris	SECS Council Member; Member of the patient and Public Engagement Reference Group and the Sussex Cancer Partnership Group
Fiona Mooney	Clinical Manager, Community Integrated Teams and Rehabilitation Services, Professional Lead for Physiotherapy, CSH Surrey
Amanda Allen	Therapy Manager, Maidstone and Tunbridge Wells NHS Trust, SECS Council Member
Sarah Shipton	Senior Neuro Occupational Therapist Maidstone and Tunbridge Wells Hospitals NHS Trust
Michael Bosch	GP NHS East Surrey CCG, SECS Council Member
Peter Green	GP Chief Clinical Officer NHS Medway CCG
Nighat Hussain	Specialist Commissioning, NHS Sandwell & West Birmingham CCGs
Ali Parsons	SECS Manager
Eleanor Langridge	SECS Programme Manager

2. ECRG Declarations of Interest

Name	Personal pecuniary interest	Personal family interest	Non-personal pecuniary interest	Personal non-pecuniary interest
Tony Rudd (Chair)	None	None	None	None
Lawrence Goldberg[2]	None	None	None	None
Barry Moynihan	None	None	None	None
Kath Pasco	None	None	None	None
Adam Rennie	None	None	None	None
Mohit Sharma	None	None	None	None
Gill Cluckie	None	None	None	None
David Davis	None	None	None	None
David Hamilton	None	None	None	None
Carolyn Morris	None	None	None	None
Fiona Mooney	None	None	None	None
Amanda Allen	None	None	None	None
Sarah Shipton	None	None	None	None
Michael Bosch[3]	None	None	None	None
Peter Green	None	None	None	None
Nighat Hussain	None	None	None	None
Ali Parsons	None	None	None	None
Eleanor Langridge	None	None	None	None

[2] 'Lawrence Goldberg, although a consultant working in one of the Sussex provider trusts under review, is neither a stroke physician nor does he hold a management role within the trust. His participation is purely in his role as chair of the clinical senate, to provide linkage to other relevant clinical senate reports, particularly the co-dependencies report and the review of Kent and Medway case for change for stroke services, both reports which he authored and chaired the working groups. '

[3] Michael Bosch, is a GP working in East Surrey, where patients may access stroke services commissioned by Sussex CCGs

Appendix C. Listed range of supporting materials

Project Initiation Document for SE Clinical Senate Review of Sussex Stroke Services

Sussex Case for Change

Western Sussex Hospitals NHS Foundation Trust Stroke Strategic Outline Case (Options) Appendices A & B

Brighton and Sussex University Hospitals NHS Foundation Trust Stroke Options

Pan Sussex Stroke Engagement Report - Sept 15

Early Supported Discharge

Scenario modelling analysis report v3

Scenario modelling analysis on June 2015 report v2

Capgemini Sussex Stroke modelling Final Report v1

Capgemini Sussex Stroke modelling REFRESH 2 Summary Report

SECAmb stroke isochromes 07.15

Number of ambulance stroke journeys home-each Sussex hospital 2013-14

SSNAP data for Sussex providers January - June 2015

SSNAP Domain data comparison from 2013 Q4 (Includes QAH and SaSH)

ESHT Stroke Action Plan Sept 2015 draft

SASH Stroke improvement plan v2

SE SCN Stroke Services Specification October 2015

South East Coast Cardiovascular Strategic Clinical Network Stroke and TIA Service Quality and Core Standards 2014

South East Clinical Senate (SECS) Kent and Medway Stroke Review June 2015

SEC Clinical Senate: Clinical Co-Dependencies of Acute Hospital Services (2014)

South East Coast Cardiovascular Strategic Clinical Network Life after Stroke-Guide for Commissioners 2014

Stroke Service Standards (2010) British Association of Stroke Physicians

Stroke Service Standards (updated NHS2014) British Association of Stroke Physicians

Department of Health Supporting Life after Stroke (2011) Care Quality Commission

Cardiovascular Disease Outcomes Strategy – Improving Outcomes for People with or at risk of Cardiovascular Disease (2013) DOH

Implementing the National Stroke Strategy-Imaging Guide. (DoH, 2008)

National Stroke Strategy 2008

NHS England Stroke configuration decision support guide 2015 (draft)

London-Stroke-Strategy

Five Year Forward View – NHS England October 2014

The NHS Outcomes Framework 2014/15 (2013) Department of Health

NICE CG68 ‘Diagnosis and initial management of acute stroke and transient ischaemic attack’ (2008)

NICE CG162 Stroke Rehabilitation 2013

NICE Quality Standard for Stroke (2010)

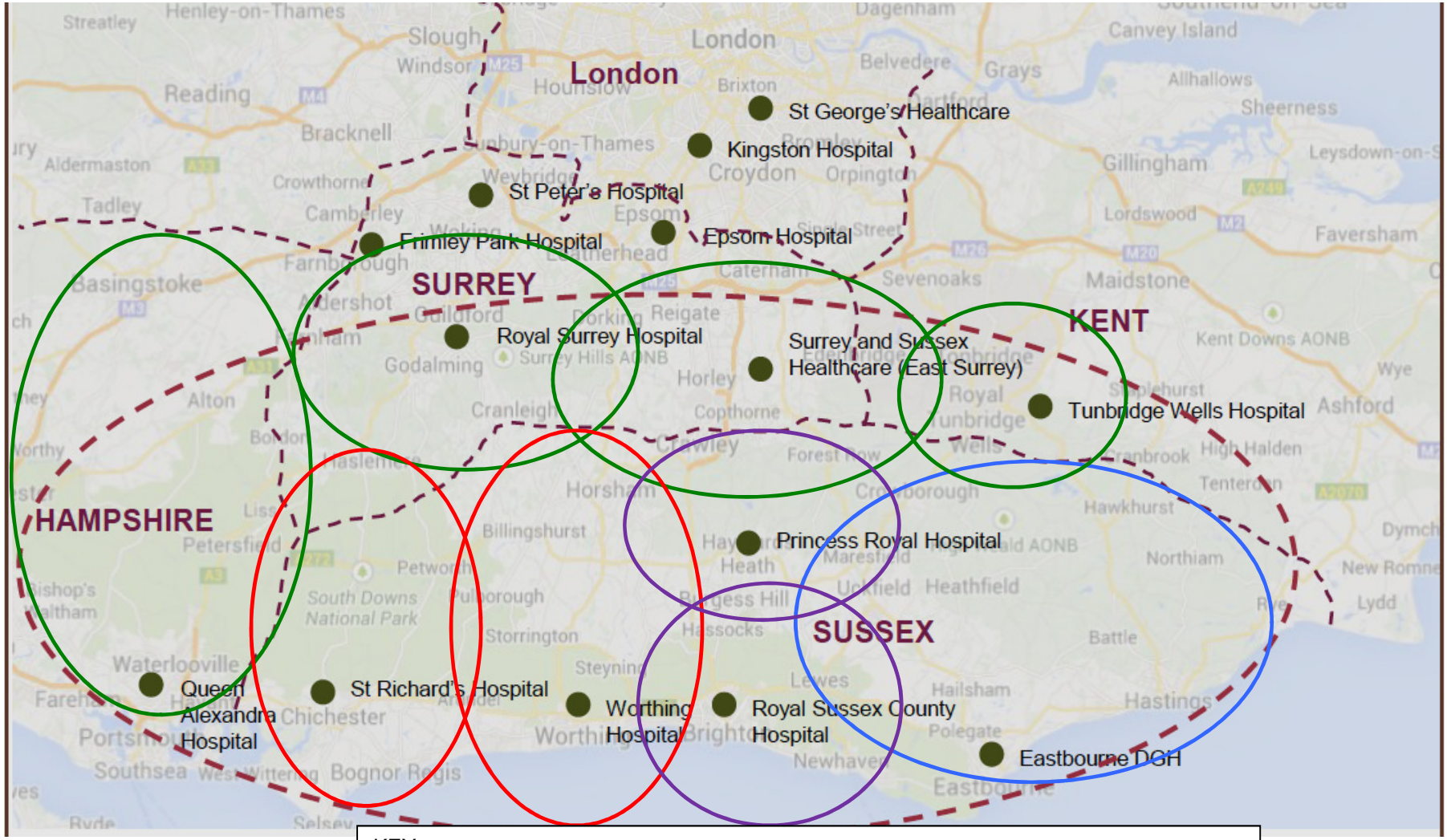
National Clinical Guidelines for Stroke 4th Edition (2012) Royal College of Physicians

Appendix D: ECRG Agenda -16/10/15

South East Clinical Senate
South East Clinical Senate Expert Clinical Review Group on Stroke Services in Sussex
Friday 16th October 2015, 12.30pm – 6.30pm (lunch available from12.30)
Holiday Inn London Gatwick Airport Povey Cross Road Gatwick RH6 0BA

	Time	Item	Attach	Lead
Introduction and meeting outline				
1.	1.00 10mins	Welcome and Mutual introductions ECRG declarations of interests Introduction and outline: • Role of the clinical senate and the ECRG. • The task in hand, materials and resources	Verbal	**Lawrence Goldberg (SECS Chair) and Tony Rudd (ECRG Chair)**
2.	1.10 30mins	Sussex Stroke Services • Background and context to the Stroke Review • Proposals for change • Questions from the ECRG	Presentation	**Minesh Patel (SRO) and Lisa Forward (Project Manager)**
3.	1.40 30mins	Sussex Stroke Services Provider - **Western Sussex Hospitals NHS Foundation Trust** Questions from the ECRG	Presentation	**Mike Jennings Commercial Director Dr David Hunt, Clinical Director for elderly medicine and neurology Western Sussex Hospitals NHS Foundation Trust**
4.	2.10 30mins	Sussex Stroke Services Provider – **Brighton and Sussex NHS Trust** Questions from the ECRG	Presentation	**Dr. Nicola Gainsborough, Clinical Lead for Stroke Services Katey Ma, Directorate Manager, Neurosciences and Stroke Services Oliver Phillips, Service Strategy Director**
5.	2.45 15mins	**Break**		
Review of the Sussex Stroke Services (using the pre-circulated framework)				
6.	3.00 2 hrs 50 mins	Review of the proposed options for stroke service delivery Sussex, in particular the acute pathway and Early Supported Discharge (ESD).	Discussion	**All**
7.	5.50 30mins	Discuss and agree key recommendations	Discussion	**All**
8.	6.20 10mins	Conclusion and next steps • Timeline for report development and completion • ECRG members roles and responsibilities • Report sign off and approval by SECS Council	Discussion	**All**
9.		**There will be two 10 minute breaks during items 6-8**		
10.	6.30	Meeting Close		

Appendix E: Current Sussex and adjacent stroke units and catchment areas.

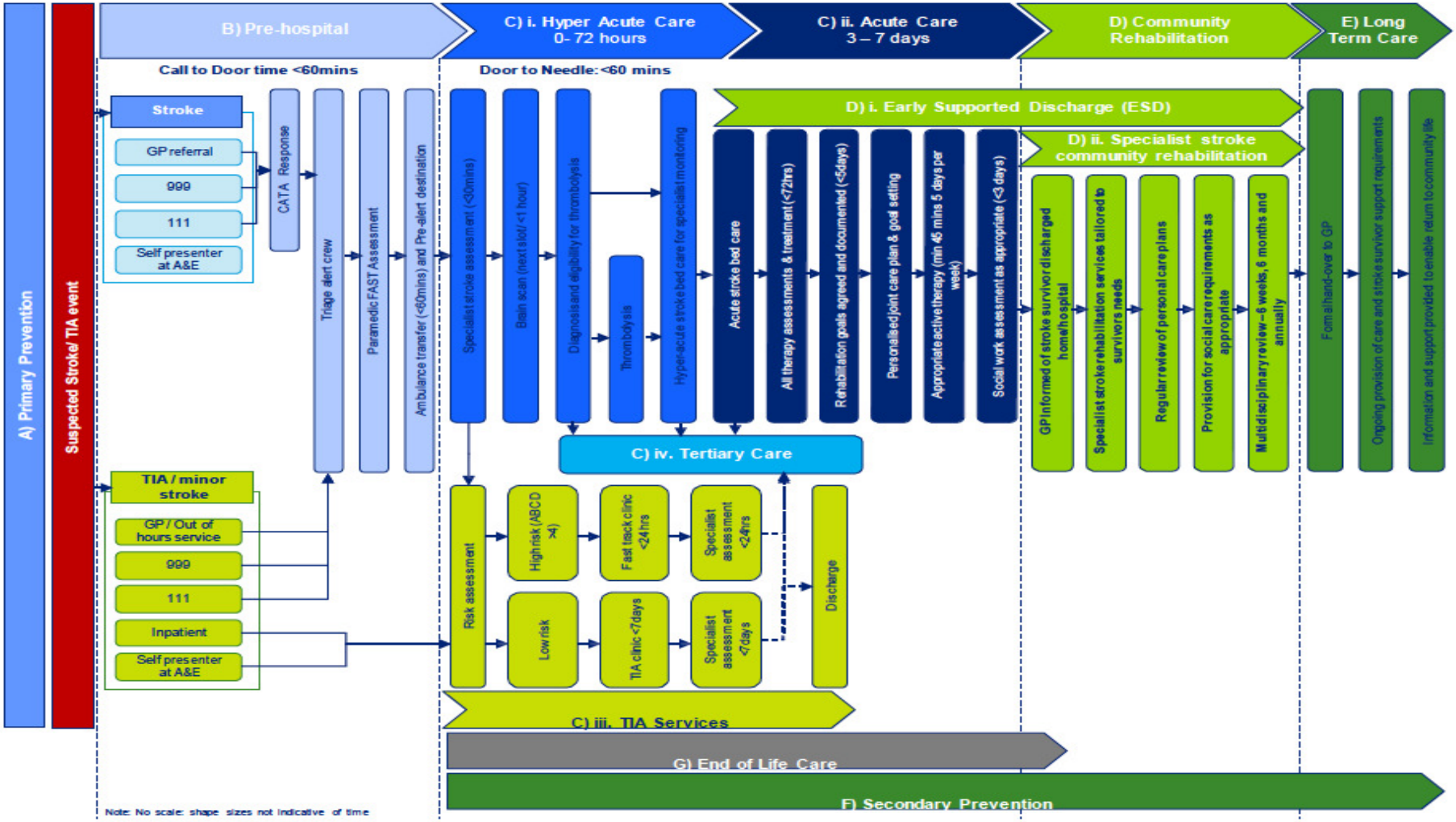


KEY:

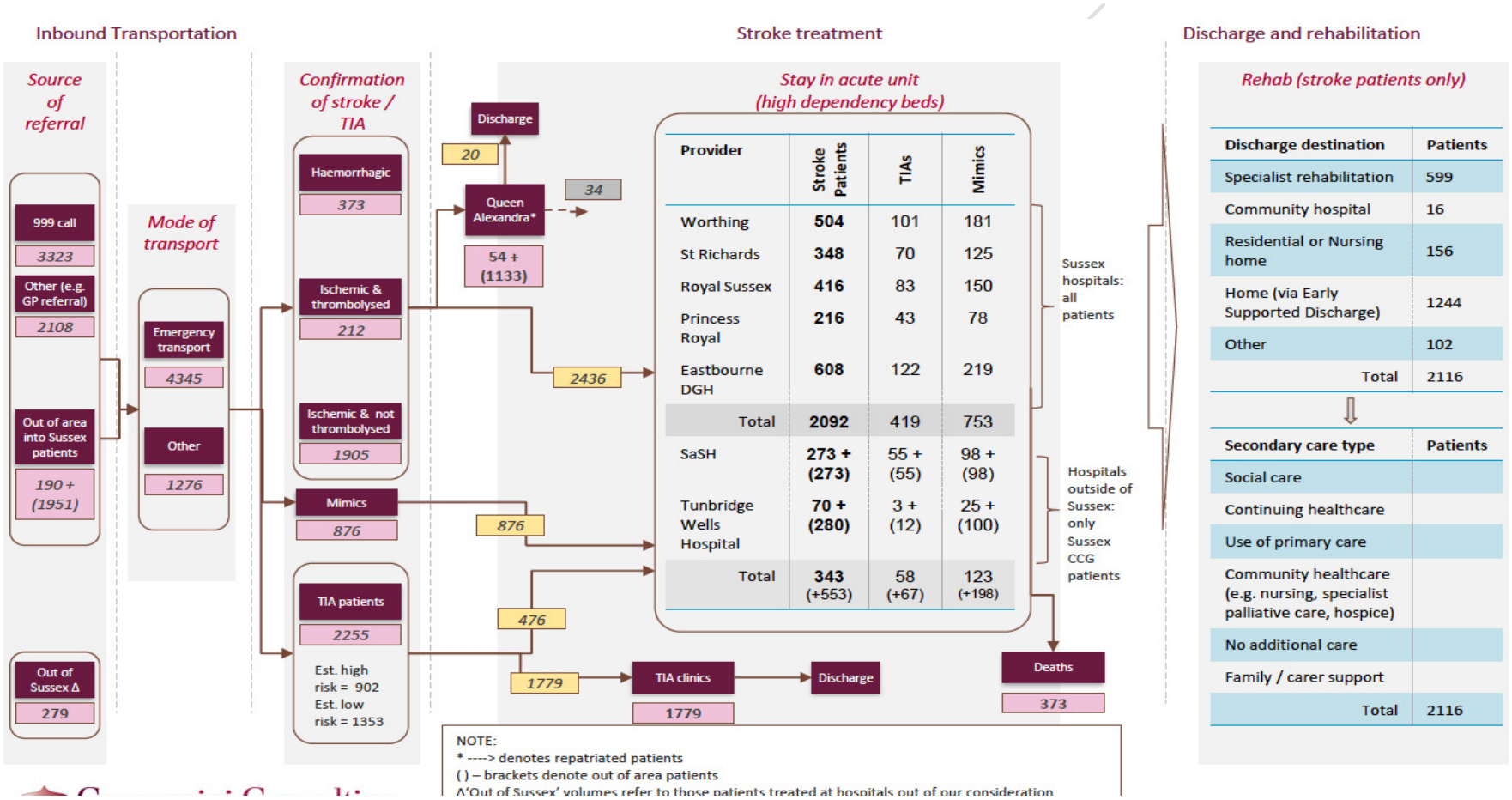
Red and **Purple** Circles:	BSUH and WSHFT (trusts that are the subject of this review)
Blue Circle:	Agreed East Sussex Healthcare Trust network
Green Circles:	Neighbouring networks in Kent, Surrey and Sussex

Appendix F: Diagram of the full stroke pathway

Taken from the SCN Stroke Service Specification 2015



Appendix G (i): Activity volumes for stroke in Sussex: CapGemini, 2013/14



Appendix G (ii): Impact of provider proposals on activity in Sussex and neighbouring HASUs

Tables looking at the impact of the two BSUH proposals and two WSHFT proposals on each other and neighbouring HASUs
Based on CapGemini June 2015
Assumption: Eastbourne, Tunbridge Wells,SASH, QAH and Royal Surrey are HASUs

Table 1. Change in stroke cases by unit, assuming Worthing has a HASU (with or without SRH).

Scenario	HASUs	RSCH	PRH	Worthing	St Richards	Eastbourne	SaSH	TW	QAH	Royal Surrey
2013/14 activity		**416**	**216**	**504**	**348**	**608**	**546**	**350**	**734*** **	**382**** **
48B	RSCH+, PRH-, W+, SRH-	123*		97 (presume 22 from PRH, 75 from SRH)		14	48*	8	256	17
58B	RSCH+, PRH-, W+, SRH+	123*		22 (assume all come from PRH)	0	14	48*	8	0	0
52B	RSCH-, PRH+, W+, SRH-		107	321 (assume 246 from RSCH, 75 from SRH)		63	0	0	256	17
59B	RSCH-, PRH+, W+, SRH+		107	246 (assume all come from RSCH unit)	0	63	0	0	0	0

*Assumes 48 of the 216 currently served by PRH would move to SASH(as modelled by CapGemini) and not south to BSUH

Table 2. Total number of stroke cases by unit, assuming Worthing has a HASU (with or without SRH).

Scenario	HASUs*	RSCH	PRH	Worthing	St Richards	Eastbourne	SaSH**	TW**	QAH	Royal Surrey
48B	RSCH+, PRH-, W+, SRH-	539*		601		622	594	358	990	399
58B	RSCH+, PRH-, W+, SRH+	539*		526	348	622	594	358	734	382
52B	RSCH-, PRH+, W+, SRH-		323	825		671	546	350	990	399
59B	RSCH-, PRH+, W+, SRH+		323	750	348	671	546	350	734	382

*Assumes 48 of the 216 currently served by PRH would move to SASH (as modelled by CapGemini) and not south to BSUH
** Projected total activity, from CapGemini (June 2015 report, pg 15) to which are added the changes modelled in table 1.
*** Provided by Sussex Collaborative
**** From Surrey modelling work

Appendix H: Stroke mimic rate references

1. Ambulance triage of stroke in semi-rural England results in high mimic transfer rates

Siddiqui M, Soliman M, Booth S, Callum A, Boyle K, Khadjooi K, O'Brien E, Martin P, Warburton E. *Cambridge University Hospitals, UK*

Introduction: Organised stroke care improves outcomes and hyperacute stroke units (HASUs) are associated with better quality indicators including mortality. Ambulance diverts from the scene involve stroke-like cases (mimics) going to the HASU Centre. The rate of mimic transfer and impact of diverts are little studied, hampering service planning. We sought to measure the rate of mimic transfer and bed utilisation at the HASU site.

Method: On September 3rd 2012, HASU care was transferred to Cambridge University Hospital from a defined local hospital area and ambulance crews were directed to divert all possible strokes including FAST negative cases thought likely to be stroke. Retrospective analysis of Emergency Department (ED) Care, Ambulance and Medical notes were performed for the initial 24 weeks, using stroke and ED databases with postcodes to define patient origins. Patients transferred under existing pathways, e.g. renal and major trauma, were excluded.

Results: Over 24 weeks, 127 patients were diverted on the new pathway. 66 (**52%) were mimics,** 48 (38%, 6 thrombolysed) stroke and 13 (10%) TIA. 51 (**77%) mimics were admitted using 454 bed days.**

Conclusion: We observed a 100% mimic rate – higher than many other studies but consistent with the small literature on ambulance stroke triage. This should help service planning including repatriation pathways for non stroke cases. Outcomes for mimics at HASU sites should be studied.

2. Stroke mimics in a district general hospital Hyper Acute Stroke Unit

Alonge O, Barrett C, Adams J, Speirs O, Clarke B, *Hyper Acute Stroke Unit, Frimley Park Hospital, Surrey UK*

Introduction: Stroke mimics are a common presentation to stroke services. Bed use is frequently determined by Emergency Department (ED) admission pressures. We aimed to determine the frequency and nature of non-stroke and stroke mimics admitted to our District General Hospital (DGH) Hyper Acute Stoke Unit (HASU).

Method: HASU admissions from April 2012 to April 2013 were analysed using the Frimley Park HASU Database. Triage and ED diagnoses, were derived from the SYMPHONY database. Discharge diagnoses were reviewed and agreed by stroke registrar and consultant.

Results: There were 1071 HASU admissions, 674(62.9%) had a final discharge diagnosis of stroke or TIA. 277(25.9%) HASU admissions were discharged with a stroke mimic diagnosis. Of these, 257 were triaged in ED as stroke or mimic and 20 were admitted via alternate routes. Most frequent diagnoses were: migraine 53(19%), seizure 32(11.5%), syncope 26(9.4%), cerebral mass 15(5.4%), functional 14(5.1%), Bell's palsy 13(4.7%), vestibular dysfunction 12(4.3%), chest infection/sepsis 10 (3.6%), subarachnoid haemorrhage 9 (3.3%), fall 8 (2.9%), old stroke signs 8 (2.9%), delirium 7(2.5%), unexplained numbness 7(2.5%), subdural haemorrhage 6(2.2%), sepsis urine 6(2.2%), peripheral neuropathy 5(1.8%) and others 48(17.3%).

120(11.2%) HASU admissions were medical patients. The most frequent diagnoses were: sepsis chest 20(16.7%), sepsis urine 15(12.5%), fall 14(11.7%) and delirium 6(5%).

Conclusion: Stroke mimics account for 25.9% of all admissions to our DGH HASU. An additional 11.2% of our admissions are medical. Knowledge and experience in managing both types of patients is essential for stroke physicians.

3. Stroke mimics in the pre-hospital setting

MJ Edwards, R T Fothergill, J Williams, P Gompertz. *London Ambulance Service NHS Trust, London, UK.* http://emj.bmj.com/content/32/5/e8.2.abstract

Accurate identification of stroke patients is essential to ensure appropriate and timely treatment. Stroke mimics—patients initially suspected to have suffered a stroke who are subsequently diagnosed with a condition other than stroke—are estimated to account for 5–33% of suspected stroke patients conveyed by paramedics to a hospital stroke unit. The prevalence of stroke mimics in London has not been investigated although pan-London hospital data suggests that one quarter of all patients admitted to hyper-acute stroke units (HASUs) are stroke mimics.

Participants were recruited as part of a larger study investigating whether the use of the Recognition of Stroke in the Emergency Room (ROSIER) tool by ambulance crews improved pre-hospital stroke recognition. Only patients indicated by the ROSIER to have potentially suffered a stroke and conveyed to a participating HASU (n=256) were included.

A final diagnosis of stroke was received by 160 patients (“strokes”) while 96 patients received a final diagnosis of non-stroke (“mimics”), resulting in a stroke mimic rate of 38%. Mimics received a wide range of diagnoses, including seizure, syncope, brain

tumour, non-organic stroke/symptoms, sepsis, somatisation, and migraine. Compared to strokes, mimics had a lower total ROSIER score, displayed fewer stroke-related symptoms, and presented with more symptoms not indicative of a stroke (e.g. loss of consciousness/syncope, seizure).

The stroke mimic rate is higher than reported by previous studies and pan-London hospital data. It is unlikely this higher rate is due to the use of the ROSIER since the specificity of the ROSIER is equal to the FAST in the pre-hospital setting (Fothergill *et al*, submitted). Stroke recognition in the pre-hospital setting needs to be improved in order to reduce the number of non-strokes falsely identified as stroke and to ensure these patients are taken to the appropriate facility for treatment.

4. Predictors of Acute Stroke Mimics in 8187 Patients Referred to a Stroke Service.

Merino JG et al. Journal of Stroke and Cerebro-vascular Diseases. 2013; 22: e397–e403 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3812364/

Some patients seen by a stroke team do not have cerebrovascular disease but a condition that mimics stroke. The purpose of this study was to determine the rate and predictors of stroke mimics in a large sample.

This is an analysis of data from consecutive patients seen by the NIH Stroke Program over 10 years. Data were collected prospectively as a quality improvement initiative. Patients with a cerebrovascular event or a stroke mimic were compared with the Student t or Pearson's chi-square test as appropriate and logistic regression was done to identify independent predictors.

The analysis included 8,187 patients: 30% had a stroke mimic. Patients with a stroke mimic were younger and the proportion of patients with a stroke mimic was higher among women, patients without any risk factors, those seen as a code stroke or who arrived to the emergency department via personal vehicle, and those who had the onset of symptoms while inpatients. The proportion of patients with a stroke mimic was marginally higher among African Americans than Caucasians. Factors associated with the greatest odds of having a stroke mimic in the logistic regression were lack of a history of hypertension atrial fibrillation, or hyperlipidemia.

A third of the patients seen by a stroke team over 10 years had a stroke mimic. Factors associated with a stroke mimic may be ascertained by an emergency physician before calling the stroke team.

Appendix I: Average LOS for stroke patients by Sussex trusts and hospitals

Rolling 12 Month Average Length of Stay for Stroke Patients by Sussex Trusts

Source: HES, Admitting Primary Diag of I61, I63, I64

Rolling 12 Month Average Length of Stay for Stroke Patients by Sussex Hospitals

Source: HES, Admitting Primary Diag of I61, I63, I64

Appendix J: The clinical co-dependencies of hyper-acute and acute stroke units

The SECS published their report titled 'The Clinical Co-Dependencies of Acute Hospital Services' in 2014. HASUs and ASUs were two of the large acute services reviewed, both for their dependencies on other clinical services, and the dependencies of the other large acute services on stroke services. The full report, grid and analysis can be found on the SECS website at http://www.secsenate.nhs.uk/news/clinical-co-dependencies-acute-hospital-services-clinical-senate-review/. An extract from the grid, which summarises the dependencies of HASUs and ASUs on other services, is shown below.

Using the colour coding used in the SECS report:

- A **P**urple-coded dependency indicates that the supporting specialty should be *based* on site.
- A **R**ed-coded dependency indicates that that the service should be able to come to the patient, but if not based in the same hospital, should be provided by visiting, or in reach from another site (either in person, or via telemedicine links if appropriate).
- **P*** Changed from the original red rating to purple following ECRG review.

The recommendations for HASUs and ASUs for on-site provision of care from other clinical services.

Clinical specialties and functions supporting Hyper-Acute and Acute Stroke Units	Hyper-Acute Stroke Unit	Acute Stroke Unit
A&E /Emergency Medicine	P	P
Acute and General Medicine	P	P
Acute Cardiology	P	P
Acute Inpatient Rehabilitation	(ideally on site but could be available through network)	P
Acute Mental Health Services	P	P
Critical Care (adult)	P	P
CT Scan/Angiography	P*	R
Dietetics	R	R
Elderly Medicine	P	P
General Anaesthetics	P	P
MRI Scan	P	(not required on site)
Nephrology (not including dialysis)	R	R
Neurology	R	R
Occupational Therapy	P	P
Palliative Care	R	R
Clinical specialties and functions supporting Hyper-Acute and Acute Stroke Units	**Hyper-Acute Stroke Unit**	**Acute Stroke Unit**
Physiotherapy	P	P
Respiratory Medicine (including bronchoscopy)	P	P
Speech and Language	P*	R
Urgent GI Endoscopy (upper & lower)	P	R (within 4 hrs)
X-ray and Diagnostic Ultrasound	P	P

Appendix K. Average cost per spell for stroke patients on a HASU (days 0-3), and % decrease with increasing activity (spells)

Average Cost per Spell for stroke patients on a HASU (days 0-3), and % decrease with increasing activity (spells)

Based on 2013/14 financial modelling data done by Sandwell and West Birmingham CCG across the Birmingham, Solihull and Black Country Provider footprint* this should be used as indicative measures only in identifying which HASU volumes give the biggest returns

Spells	Average Cost per Spell (£)	% Decrease in Cost per Spell
600	2,471	
900	2,147	(13%)
1200	1,970	(8%)
1500	1,900	(4%)
1800	1,817	(4%)
2100	1,792	(1%)
2400	1,747	(2%)

% Reduction in cost per spell is greatest between 600 and 900.

There is a 26% reduction in the HASU Cost per Spell between 600 and 1800.

Financial impact of Economies of scale reduce as the spells increase.

*James Green. jmg@nhs.net methodology details available on request

Appendix L: Sentinel Stroke National Audit Programme data

These tables provide a summary of performance for named teams based on 10 domains of care. Both patient-centred (PC) domain scores (whereby scores are attributed to every team which treated the patient at any point in their care) and team-centred (TC) domain scores (whereby scores are attributed to the team considered to be most appropriate to assign the responsibility for the measure to) are calculated. Each domain is given a performance level (level A to E) and a key indicator score is calculated based on the average of the 10 domain levels for both patient-centred and team centred domains.
The overall performance section of the table consists of:

- A Combined Key Indicator (KI) Score derived from the average of the patient- and team-centred total KI score.
- Case ascertainment and audit compliance levels

Colour	Level
	A
	B
	C
	D
	E

- SSNAP level which is the combined total key indicator score adjusted for case ascertainment and audit compliance.

Across the SSNAP domain results a consistent colour code is used to represent each team's performance for specific domains and overall.
The results in the tables should be read in combination with the SSNAP Summary Report which includes named team results for the 44 key indicators which comprise the 10 domains. This report is available to download from the RCP website: www.strokeaudit.org/results
Changes between the Jan – Mar 2015 results and the previous quarter are illustrated within the table by arrows. Upward pointing arrows indicate that the team has achieved a higher level this quarter than in the previous quarter; downward pointing arrows that the team has achieved a lower level this quarter than previously. The number of arrows represents the extent of the change.
For example, an increase of 2 levels from D to B would be shown by the symbol: B↑↑

Six month reporting
SSNAP is reporting the numbers and proportion of patients going on to receive a 6 month assessment. Results are patient-centred (i.e. attributed to all teams who treated the patient). Therefore, the named-team results do not necessarily indicate that these were the team who carried out the 6 month assessments, just that their patients went on to have them.

Summary Report for Sussex January – June 2015 (admissions and discharges)

Patient Centred Data	East Sussex Healthcare NHS Trust		Brighton and Sussex University Hospitals NHS Trust				Western Sussex Hospitals NHS Trust			
	Eastbourne District General Hospital		Princess Royal Hospital Haywards Heath		Royal Sussex County Hospital Brighton		St Richards Hospital Chichester		Worthing Hospital	
	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015
SSNAP Level	D	C	C	D↓	D↓	D	C	C	B	B
Case ascertainment band	A	A	A	B↓	A	A	A	A	A	A
Audit compliance band	B	B	A	A	A	A	A	A	A	A
Combined Total Key Indicator level	D	C	C	D↓	D↓	D	C	C	B	B
Patient-centred KI levels	D	C	C	D↓	D↓	D	B	C↓	B	B
Patient-centred Domain levels										
1 Scanning	A	A	A	A	A	A	B	C↓	B	B
2 Stroke unit	B	B	B	C↓	D↓	C	C	C	B	B
3 Thrombolysis	D	C	B	D↓↓	C	D↓	A	B↓	B	B
4 Specialist assessments	C	B	B	D↓↓	B↓	A	C	B	B	A
5 Occupational therapy	D	C	E	D	D	E↓	A	B↓	A	B↓
6 Physiotherapy	C	C	C	B	D	D	C↓	D↓	B	A
7 Speech and Language therapy	E	E	C	C	D↓	D	C	C	C	D↓
8 MDT working	E	E	D	E↓	D	D	C	D↓	C	D↓
9 Standards by discharge	C	B	D	D	B	B	B	A	A	A
10 Discharge process	B	A	C	C↓	C	C	D	D	C	C

Six Month Assessment										
Number applicable	256	252	105	115	178	121	141	145	181	195
% applicable	96%	98%	100%	100%	91%	98%	100%	100%	100%	100%
Number assessed	47	38	0	0	124	16	1	0	1	1
% assessed	18%	15%	0%	0%	71%	13%	1%	0%	1%	1%

Team Centred Data	East Sussex Healthcare NHS Trust		Brighton and Sussex University Hospitals NHS Trust				Western Sussex Hospitals NHS Trust			
	Eastbourne District General Hospital		Princess Royal Hospital Haywards Heath		Royal Sussex County Hospital Brighton		St Richards Hospital Chichester		Worthing Hospital	
	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015	Jan - March 2015	April - June 2015
Team-centred KI levels	D↓	C	C	D↓	D↓	D	C	C	B	B
Team-centred Domain levels										
1 Scanning	A	A	A	A	A	A	C	C	B	B
2 Stroke unit	B	B	B	C↓	D↓	C	C	C	B	B
3 Thrombolysis	D	C	B	D↓↓	C	D↓	B	B	B	B
4 Specialist assessments	C	B	C	D↓	B↓	B	D↓	B	B	A
5 Occupational therapy	D↓	C	E	E	E↓	E	A	B↓	A	B↓
6 Physiotherapy	C↓	C	C	B	D	D	C	D↓	B	A
7 Speech and Language therapy	E	E	C	C	D↓	C	C	C	C	E↓↓
8 MDT working	E	D	D	D	D	D	C	C	C	D↓
9 Standards by discharge	C	B	D	E↓	B	B	B	A	A	A
10 Discharge process	B	B	C↓	C	C	C	D	D	C	C

Appendix M. Clinical senates and the clinical review process

The South East Clinical Senate (SECS), along with the other 11 Clinical Senates in England, is a non-statutory body set up to provide independent strategic clinical advice to health care commissioners and systems, including the CCGs, NHS England and Health and Wellbeing Boards of Kent, Surrey and Sussex.

SECS aims to provide advice that is evidence based and impartial, informed through engagement with a broad range of health and care professionals, together with patients and public, in its formulation.

Clinical senates are available to provide a clinical component to the assurance process of service change and reconfiguration proposals, to give confidence to patients, staff and the public that proposals are well thought through, have taken on board their views and will deliver real clinical benefits to patients.

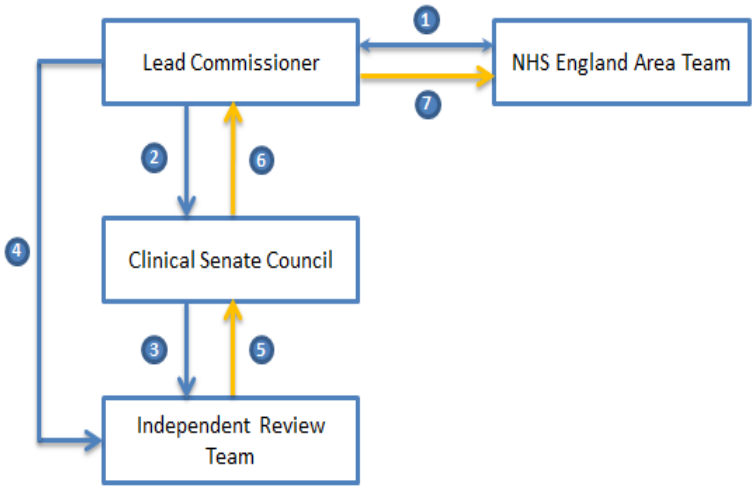
NHS England's 'Planning and delivering service changes for patients' (December 2013) [Planning and delivering service changes for patients [Internet]. 2013 p.1–44. Available from: http://www.england.nhs.uk/wp-content/uploads/2013/12/plan-del-serv-chge1.pdf] describes the high level framework and oversight of service change, supported by the document 'Effective Service Change: A Support and Guidance Toolkit' [Effective Service Change: A Support and Guidance Toolkit [Internet] London: 2013 Available from: www.eoesenate.nhs.uk/index.php/download_file/view/49/222], which details the assurance process which NHS England applies to service change proposals.

The guidance describes the clinical assurance role in this process for clinical senates as:
The aim of clinical assurance is to establish whether the proposed changes are supported by a clear clinical evidence base and will improve the quality of the service provided. The decision to request an external clinical assurance review should follow discussions between the relevant commissioner(s), area teams at the strategic sense check – with input where required from the local clinical senate, who can bring multi-disciplinary strategic advice to the development of proposals.
The advice provided by clinical senates is part of the broader assurance process and is considered alongside assurance of the other aspects of a service change proposal.

This review process is described in figure 1. below, and this current clinical senate review has followed this process.

The Independent Clinical Review Process: a worked example

1. NHS England agrees level of assurance required with lead commissioner (at stage 1 of NHS England assurance process)
2. Lead commissioner requests clinical senate advice as part of assurance process. Clinical senate and lead commissioner agree terms of reference for independent clinical review
3. Clinical senate establishes independent review team and appoints chair of review
4. Lead commissioner provides key documents to independent review team and supports other review requirements
5. Review undertaken and draft report sent to Clinical Senate Council
6. Clinical Senate Council agrees final report and returns to lead commissioner
7. Report submitted by lead commissioner as part of NHS England's assurance process.



Appendix N (i) DRAFT NHSE Stroke Tool Kit: financial modelling

Introduction

NHS hospitals face financial and workforce pressures, reconfiguration of hospital services can provide a powerful means of improving quality in an environment where money and skilled health care workers are scarce (Kings Fund 2011).

This section describes a potential framework to support the review of the financial framework to support commissioners in the review of services and decision making process. It is important to recognise that financial analysis of services is only one component and the decision to change the configuration of services should be considered as one component of the assessment and therefore not be the only decision making tool

The framework described here is based primarily on the Birmingham, Solihull and the Black Country (BSBC) CCGs review of stroke services, the CCG collectively agreed to understand the need and role that reconfiguration could play to further improve the quality of patient care.

BSBC CCG's and other stakeholders considering potential configurations, commonly require some assessment of the likely impact on Provider expenditure. It is essential that the whole pathway is modelled; from the point of 999 call, through the Acute and the impact of long term patient rehabilitation and care.

This chapter draws upon a recent project to reconfigure stroke services in Birmingham, Solihull and the Black Country. The Financial model was created by Sandwell and West Birmingham CCG, with oversight and support from NHSE, to consider the incremental impact of Stroke Reconfigurations on the underlying surplus/deficit of the providers involved.

Defining and Identifying Stroke and TIA Activity

Acute Stroke care is paid through PBR and any local tariffs. For the Acute phase, Stroke activity data can be identified with a HRG and diagnosis code listed below in table 1. Where activity modelling is carried out independently of financial impact analysis, CCG's ensure that the activity model is able to generate HRG's per unit of activity, as one of its outputs.

Rehabilitation Stroke care is often paid through block contracts or local cost and volume contracts. The activity for these contracts more difficult to obtain as Stroke

Beds are often paid for as part of larger Neuro Rehabilitation contracts. Community activity information is often not recorded.

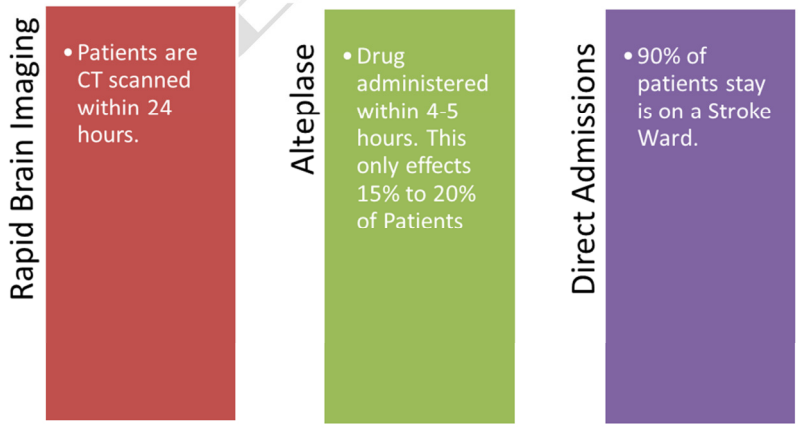
Table 1: Confirmed Acute Stroke and TIA HRG and Diagnosis Codes

HRG / Diagnosis Code	Description
AA22A	Non-Transient Stroke or Cerebrovascular Accident Nervous system infections or Encephalopathy with CC
AA22B	Non-Transient Stroke or Cerebrovascular Accident Nervous system infections or Encephalopathy without CC
AA23A	Haemorrhagic Cerebrovascular Disorders with CC
AA23B	Haemorrhagic Cerebrovascular Disorders without CC
AA29A	Transient Ischaemic Attack with CC
AA29B	Transient Ischaemic Attack without CC
I61	Intracerebral haemorrhage
I63	Cerebral infarction
I64	Stroke not specified as haemorrhage or infarction
G45	Transient cerebral ischaemic attacks and related syndromes

In addition to income from the standard Stroke Tariffs above, Providers are eligible to a Best Practice top up tariff, should they fulfil certain criteria. There are three opportunities to earn best practice tariff during a stroke spell;

1. CT scan within 24 hours of suspected stroke
2. Alteplase administered in relevant cases
3. The length of time a Stroke patient spends on Stroke Ward. See fig. 1 below for more details.

Illustration of Best Practice Elements



The maximum income which can be received by each provider (and cost to each CCG), for each HRG are illustrated below in table 2. This information has been taken

from the national PBR tariff guidance for 2014/15 and can be found at: https://www.gov.uk/government/publications/national-tariff-payment-system-2014-to-2015
When considering the breakdown of income across the proposed stroke pathways, Rapid Brain Imaging and Alteplase admission should be only be considered relevant to the HASU element of the spell, as they only attract Best Practice top-up if administered in the first 24 hours.

During the financial modelling, consideration should be given on whether to allocate 100% of the Best Practice top up for Alteplase. In the table below, only 20% of the total available top up is shown, because only 15%-20% of patients are eligible to receive the drug.

Table 2 – Maximum income under Best Practice Tariff per Provider

2014-15 PBR				Conditional Top Ups				
Stroke/TIA	HRG	Name	Base Tariff (£)	Rapid brain imaging (£)	Direct admission (£)	Alteplase (£)	Maximum Tariff under 14/15 BPT (£)	Non-Elective Tariff (£)
Stroke	AA22A	Non-Transient Stroke... with CC	2,733	399	1,026	828	4,986	3,875
Stroke	AA22B	Non-Transient Stroke... without CC	1,745	399	1,026	828	3,998	2,886
Stroke	AA23A	Haemorrhagic Cerebrovascular Disorders with CC	2,820	399	1,026		4,245	3,961
Stroke	AA23B	Haemorrhagic Cerebrovascular Disorders without CC	1,362	399	1,026		2,787	2,502
TIA	AA29A	Transient Ischaemic Attack with CC	1,261				1,261	1,261
TIA	AA29B	Transient Ischaemic Attack without CC	555				555	555

Primary Conveyance – The impact on Ambulance Services

Any Acute reconfiguration has an impact on Ambulance Pathways and therefore it is important to engage the Ambulance providers in discussions early and to model the impact locally. During the Birmingham reconfiguration, the Ambulances nominated a Stroke lead who was responsible for Ambulance modelling, using the CSU to support with the local analysis.

In a reduced site model, Ambulances would be displaced by having to travel further to reach destination HASU's. This creates a vortex where areas may be left without cover for certain amounts of time. The providers should be engaged to analyse the conveyances to each of the sites in the current configuration, analyse how patient flows would change as a result of reconfigurations and calculate the difference in drive times. The view in Birmingham, Black Country and Solihull (BBCSol) was that Ambulances should be considered Stepped Fixed in nature.

Gathering Provider Cost Information for Delivering Acute Stroke and TIA Activity

In order to understand the cost of delivering Stroke activity, CCG's need to obtain information on the cost base of each provider involved in the reconfiguration (please see Financial Template.) The method used across Birmingham, Solihull and the Black Country was to request cost information for Pay, Non Pay, Income and Overheads for each stage of the pathway, through a standardised template.

The standard template requires providers to insert costs for varying levels of activity, as well as current activity for the acute pathway, inpatient rehabilitation, outpatient TIA, early supportive discharge (ESD) and community rehabilitation. The ranges of activity for the acute stages are shown below.

Activity Split between HASU and ASU

The HASU part of the Acute Stay is the first 3 days. After 3 days patients are repatriated to their local ASU ward for the 4 to 7th day. The 8th day onwards is also spent in the ASU and is likely to consist of mainly rehabilitation.

HASU Activity (Increments of 300)							
Current	600	900	1200	1500	1800	2100	2400

ASU Activity	
Current	Forecast

Setting the Activity Range

It is advisable that CCG's perform some activity modelling before finalising provider templates, to understand the range of activity in any reconfiguration. Generally it is considered that the minimum activity to pass through a stroke ward should be no fewer than 600 and the maximum to be 1500 where critical mass is achieved. The Birmingham, Solihull and Black Country reconfiguration modelled its activity ranges under the new specification as 600, rising in increments of 300 units to a maximum of 2400. Small increments of 300 units of activity allows CCG's to more accurately "flex" provider cost basis which most closely match modelled activity.

Furthermore, it was felt that due to the impact on Ambulance conveyance times, 6 units would be the maximum number of HASU's but 3 would be the minimum number.

For the ASU (4-7 LOS) and ASU (8+ LOS) activity can be modelled by looking at the current LOS for each spell from the data source. For example a patient with a LOS of 10 would have 3 days in HASU (0-3 LOS), 4 days in the ASU (4-7 LOS) and 3 days in the ASU (8+ LOS).

Repatriations (2nd Conveyance)

In the Birmingham, Solihull and Black Country review it was agreed that patients would be repatriated to their local ASU, regardless of the configuration option. The base cohort of patients will not change and therefore the provider template only considers two activity options.

Repatriations can be modelled through the Ambulance modelling phase(discussed previously) however CCG's may decide to consider flexing local Patient Transport

Contracts (PTS) contracts to cover the additional repatriations rather than using Ambulances for the 2nd conveyance and impacting on the Ambulance contract.

Commissioners may wish to consider a collocated model, where patients are not repatriated after the initial 3 days of their spell. If this is the case then commissioners should consider the impact on provider bed capacity for the additional Strokes beds and stroke mimic.

Comparing Provider Returns

The provider returns allow commissioners to compare cost and activity on a consistent basis. This allows for quick identification of returns which stray away from the average. During the Birmingham and Black Country review providers did not appear to experience difficulty in completing the returns.

Overhead Treatment

Providers should be encouraged to take careful consideration over how overheads are treated. Overheads are generally not considered to be a variable cost and therefore should not increase at the same rate as activity. An increase in overheads due to activity is merely a reapportionment of overheads and not a real increase in cost. The real value of overheads should not increase unless increased activity leads to new wards or facilities being opening to deal with the increased demand.

Consultant Pay

Commissioners should ensure that the amount of consultant time required is made explicit in the specification, as well as in the template instructions. In the Midlands and East specification, the level of Consultant input is 1 headcount, regardless of the level of activity. As consultants pay is so significant, different interpretations could lead to significantly different cost submissions from provider returns.

Review and 1:1 Meetings

The first cut of Provider returns should be analysed for consistency. Appropriate ratios might include:

- Cost per bed (help identify errors in bed calculations and exceptionally high/low cost services.
- Overheads as a percentage of total costs (if overheads are increasing at the same proportion it could point to an incorrect treatment by the provider.)
- Average length of stay (if ALOS is significantly different between providers it could point to an alternate pathway or explain variances in total beds)
- Cost per spell (this simply compares providers on a spell by spell basis and could help identify outliers, as well as an average trend)

CCG's should consider post review 1:1 meeting with the providers to discuss findings from the review. Provider information is sensitive and should never be shared with other trusts, however the results of the review should help CCG's to identify benchmarks and acceptability thresholds to challenge provider assumptions. Providers should submit a revised template considering discussions in the 1:1 meetings.

It is advisable that CCG's pay close attention to local pathway variations, as this could be the cause of significant variation in ALOS or costs. For example:

Provider 1: Only provides the acute stroke care and already repatriates patients on day 2 to a separate inpatient facility. In this situation, there are virtually no rehabilitation costs in the acute phase. This makes it appear comparably cheaper.

Provider 2: Provides the acute stroke service but also some of the rehabilitation service. For this provider, some of the costs of providing rehabilitation will be included in the ASU 8+ section of the return making it much more expensive compared to provider 1.

In the scenario above Provider 1 is paid for rehab and acute care through PBR, but only delivering the acute phase. The commissioners to Provider 1 could be paying noticeably more for Stroke care compared to the commissioners of provider 2.

Other Benchmarks

Users should consider using other benchmarks to validate submitted provider returns. By multiplying the provider submitted **reference cost** (for stroke/TIA HRG's) by the activity in provider returns, a total cost of the service can be estimated. CCG's should compare this to the total cost of the Stroke service in the provider returns. Any significant mismatch should be investigated. Referenced costs are nationally published and can be found online: https://www.gov.uk/government/collections/nhs-reference-costs

London already operates a reconfigured Stroke service; following a HASU (0-3 LOS), ASU (4-7 LOS) ASU (8+LOS) model. CCG's should consider using the London Tariffs and multiplying against the activity submitted in the provider returns to see whether the level of income is similar to the proposed income quantum under the new specification. London has successfully implemented and maintained the reconfigured service under these local tariffs. By comparing total income quantum of using London Tariffs, against the total income quantum under the new specification, CCG's can judge the value for money provided by the local reconfiguration.

The provider returns require provides to enter the current level of activity under each of the Stroke/TIA HRG's. In order to validate the activity volume and mix submitted by the trust, CCG's should query SUS databases and verify provider accuracy.

Pricing Model

The Pricing Model allows users to estimate the total expenditure on Acute Stroke Services, by calculating the cost of each proposed stage individually, using information from submitted provider returns.

Model Outputs

The model is designed to show how provider costs change under the new configuration. The provider "Income" and corresponding commissioner costs are assumed to be fixed in this model at the maximum possible income available to the providers.

In the Midlands, the view was taken that the maximum CCG investment would be tariff plus BPT and therefore, the maximum available income available to providers (and which CCG's should be able to fund) would be tariff plus 100% BPT.

By fixing the income, configurations can be compared to the existing Stroke surplus or deficit. In the West Midlands, the decision as to whether a configuration is acceptable would be dependent on whether it worsened the current provider position.

Overheads

Overheads should be modelled as the CCG's see fit. The model currently assumes the overheads are stepped fixed in nature for HASU and increase in spell increments. For ASU the overheads in the provider submissions are used.

However if provider overhead modelling appears unreasonable compared to the increase in spells, the CCG should consider using the provider current overheads. The extent of provider capital costs and capacity will impact on the overhead modelling assumptions, depending on the local impacts.

Other Considerations

It is important to note that the model excludes:

- Income from excess OBD's
- Short stay income adjustments (all income is assumed to be paid at the base tariff)
- Repatriation costs
- Additional cost associated with increased Ambulance Drive time.
- Transformation costs associated with reconfiguration are also excluded.

The model should be used as a tool to give users an indication of total estimated expenditure. Local differences in pathways and specifications mean that this model might not be suitable for all reconfigurations.

Users should complete the User input tabs highlighted in yellow. Providing the provider returns use the same range of modelled spells and same increments as in the BBCSol reconfiguration, the model automatically calculate the costs of Stroke and TIA services.

Analysis update from Birmingham, Solihull and Black Country

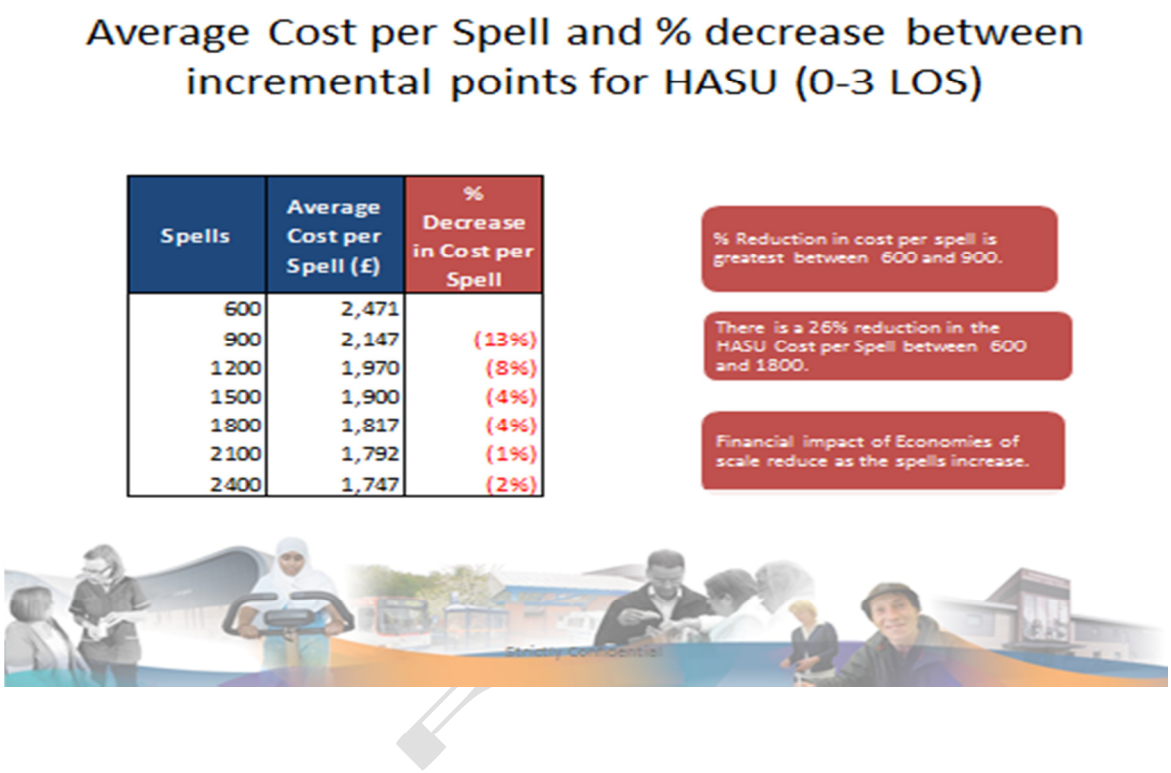
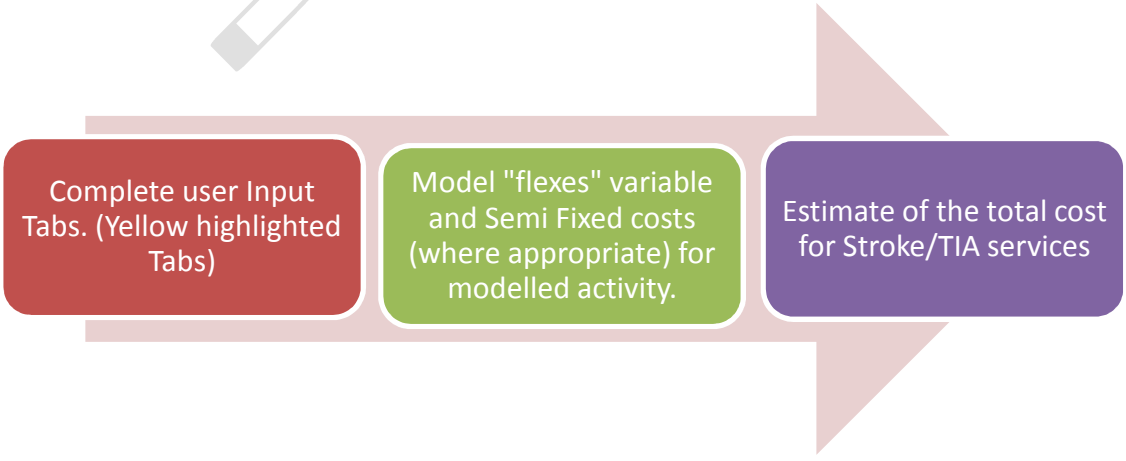


Illustration of Input – Process - Output



Assumptions

The Pricing Model has been specifically designed for the reconfiguration in Birmingham, Black Country and Solihull but can be used as a tool for other similar local reconfigurations. The following assumptions are relevant.

- The model costs Stroke Services for three separate stages of the Acute Pathway; HASU (0-3 LOS) ASU (4-7 LOS) and ASU (8+ LOS).
- Short Stay and XS OBD adjustments have not been considered in this model.
- The model does not take into account mimic income as locally, HRG's for mimics were unknown at the time of evaluation.
- No cost efficiencies are assumed from combining the HASU and ASU 4-7 stages of the pathway.
- Total expenditure is calculated based on a fixed range and activity increments in trust returns. This starts at 600 and increased in increments of 300 up until 2400 units. These metrics are annualised stroke activity.
- Ambulance capital costs are not considered in this model.
- Savings from LOS reductions are not considered in this model.
- Best Practice tariff is assumed to be recovered on 100% of the activity under the new specification. This is assumed to be the overall income quantum, i.e. the maximum income available to providers for delivering stroke activity.

The model assumes that the average cost of the provider receiving activity will be used to estimate the total cost. Further local modelling may be required if activity is being diverted away from specialist centres which would have a much higher average cost per spell. The issue is that the model will favour sites with the cheapest unit costs but the HASU with the currently most expensive unit cost of care may be the most expensive because it treats proportionately more complicated cases.

User Input Tabs

Activity Raw Data Tab:

CCG's should complete the user input tabs highlighted in yellow. The *"Activity Raw Data"* tab should be used to enter estimated provider activity, against each provider for each reconfiguration option. This should be completed 3 times for HASU 0-3, ASU 4-7 and ASU 8+.

ASU Unit Cost Calculation:

The "*ASU Unit Cost Calculation*" tab should be used to insert the **current activity** and **current cost** of delivering ASU activity. This information can be drawn from submitted provider returns. The sheet works out the unit cost of ASU 4-7 and ASU 8+, then calculates an estimated cost for the modelled ASU 4-7 and ASU 8+ activity under the new configurations. It is unlikely that Provider activity will be materially

altered as a result of adopting a repatriation model, so users should gain reasonable assurance that a materially correct cost will be provided by the pricing model.

Provider Return Summary

The "*Provider Return Summary"* tab requires users to break down provider expenditure between fixed, semi fixed and variable. This action is required for HASU (0-3 LOS), ASU (4-7 LOS) and ASU (8+ LOS). Users can obtain the input information from provider returns submitted.

Calculating PBR

To calculate the total income, users should obtain the total activity under each of the stroke HRG's, for each configuration option. Activity should be multiplied by the tariff price at each HRG, then grossed up/down by the Market forces factor (MFF) percentage. The income estimate is allocated to each stage of the pathway based on the % of total Acute Cost at each stage.

Matrices Tabs

The Matrices tabs calculate the costs of ASU 4-7 and HASU stages of the acute pathway. Different modelling assumptions are applied depending on whether the cost nature is fixed, semi fixed and variable.

The tabs work by pulling through a provider return cost for all levels of activity. Depending on the type of cost behaviour, a different method is used to calculate total cost:

- Variable costs are flexed directly with activity. Examples of variable costs would be drugs and nurses.
- Stepped costs / Semi Fixed Costs is increased in increments of 300 (at mid point). An example of Stepped / Semi Fixed Cost would be consultant pay or additional ambulances required. Semi Fixed Costs are anything which don't move directly with activity but will require increased input at certain points. For example, a consultant wouldn't be required for every patient, but a new consultant might be required if 100 new patients are flowing through the Stroke unit every week.
- Fixed costs increase to the provider return value at every increment of 300. This assumes the overheads provided in the trust return are used.

Commissioners should consider whether it appropriate to use overheads submitted by providers in returns. Unless increased Stroke activity results in new wards being constructed, renovated, the real trust overheads should not increase significantly. In some cases providers apply a standard percentage on service cost to account for a proportion of trust overheads. This is merely a reallocation of apportioned

expenditure and should not be seen as an incremental increase in cost as a result of the stroke reconfiguration.

Configuration Cost Tab

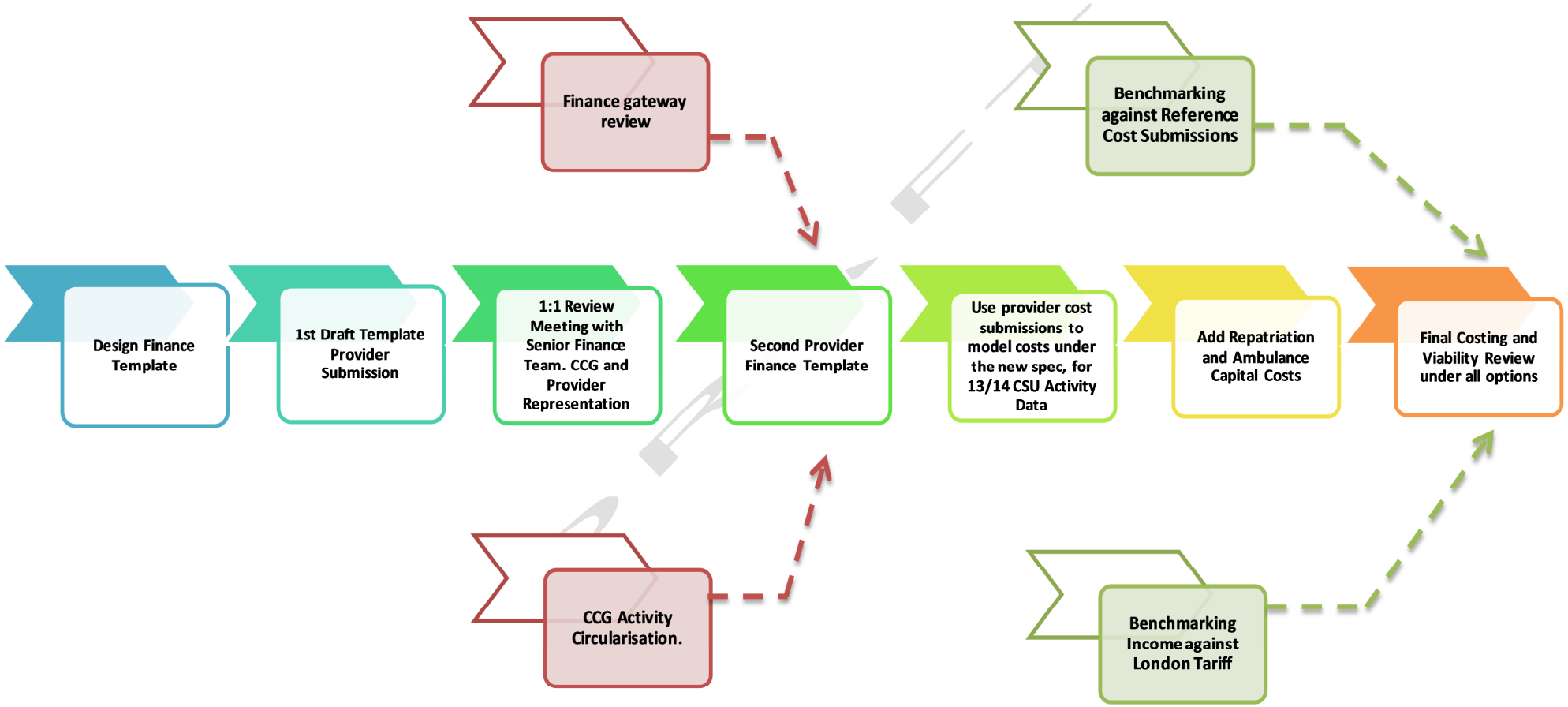
Users are required to insert the current provider surplus/ (deficit) into the column BX. Commissioners in the BBCSol reconfiguration drew the conclusion that a reconfiguration option would be acceptable if it didn't worsen any current deficit held by providers.

Assumptions Cost Tab

Users should detail any assumptions here to ensure an audit trail is retained.

APPENDIX 1

The diagram below shows the process of Financial Evaluation followed in Birmingham, Black Country and Solihull reconfigurations.



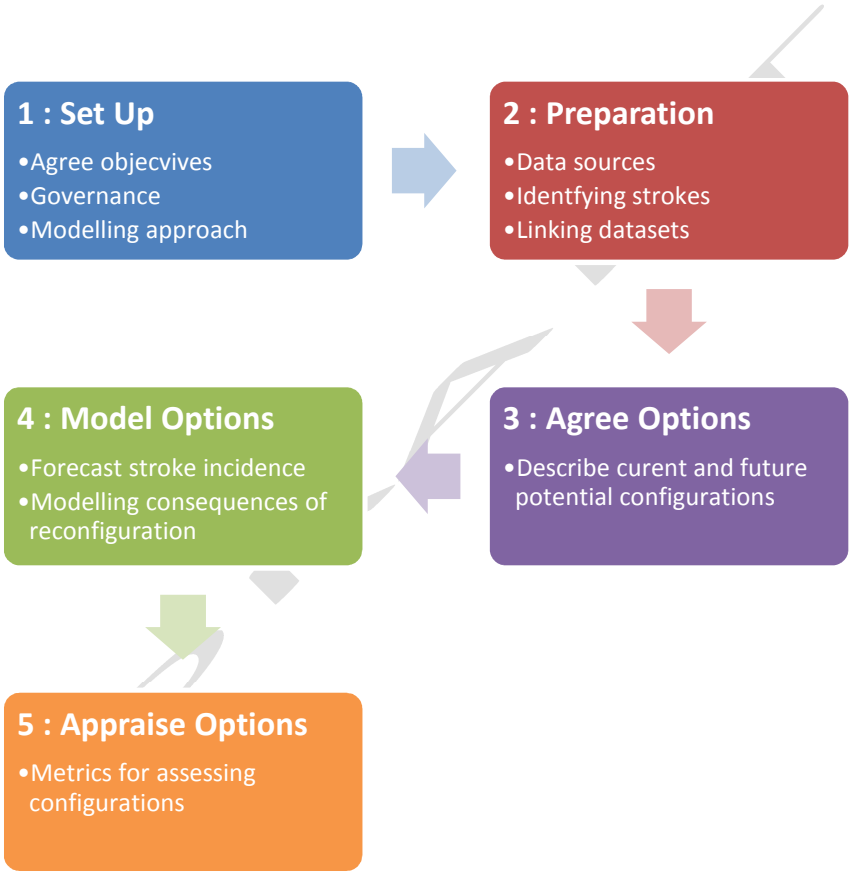
APPENDIX 2 – ACRONYM GLOSSARY

HRG	Healthcare Resource Groups (HRGs) are standard groupings of clinically similar treatments which use common levels of healthcare resource. Tariffs are attached to HRG to remunerate providers for delivering care to patients.
CCG	Clinical Commissioning Groups are NHS commissioning bodies who are commission healthcare for local communities.
HASU	Hyper Acute Stroke Unit's deliver the initial stage of Stroke Care in the Spell. It is believed that the level of care is the most intensive at this stage in order to stabilise patients.
ASU	Acute Stroke Unit deliver acute care to patients after the hyper acute stay. This may include an element of rehabilitation.
BPT	Best Practice Tariff payments are additional topup's available to providers for delivering certain elements of care. This is designed to improve quality of service and penalise providers who don't provide best practice treatment.
ALOS	Average Length of Stay for a spell. (Days between admission and Discharge)
LOS	LOS of stay for an individual between admission and discharge.
OBD	Occupied bed days – a unit to measure LOS.

Appendix N (ii) DRAFT NHSE Stroke Tool Kit: travel, activity and accessibility modelling

Introduction

Decision-makers and stakeholders considering potential configurations of stroke services, commonly require some assessment of the likely impact of a reconfiguration on provider activity levels and patient travel times. This chapter sets out the methodological and logistical issues that health economies may wish to consider when commissioning or carrying out modelling of this type using a five-stage process.



This chapter draws upon the project to reconfigure stroke services in Birmingham, Solihull and the Black Country. The activity and accessibility model for this project was developed by the strategy unit hosted by NHS Midlands and Lancashire Commissioning Support Unit.

12.2 Stage1: Set-up

Stage 1

Modelling objectives and governance

Although activity and accessibility modelling is commonly regarded as a technical and objective exercise, it is more often the case that the modelling outputs are highly dependent on a range of subjective decisions about the model scope, methods and parameters. Given the controversial nature of health service reconfigurations, local health economies may wish to consider establishing a reference group to oversee and guide the modelling process to ensure greater transparency of the model development and greater ownership of the model results.

Membership of a reference group might include: clinicians and managers from local acute and community service providers, clinical commissioning groups, ambulance services, patient and carer representatives, the third sector and independent clinical and technical advisors. Terms of reference should include objectives, scope, deliverables, stakeholders, roles and responsibilities, resource and support implications and a meeting schedule.

The objectives of a modelling exercise are likely to be manifold and diverse. Discussions leading to clear decisions about the model scope and the nature of the outputs that are required will result in a more efficient modelling process. When considering the model scope and objectives, local health economies might wish to consider the following issues:

Scope

Coverage:

- geographical/population
- providers
- patients (stroke, TIA, mimics)
- level of care (hyperacute, acute, rehabilitation)

Baseline period and model time horizon

Factors outside the control of the reconfiguration process:

- demographic changes
- lifestyle changes
- patient behaviour changes
- other service reconfigurations
- new medical technologies

The number of potential future configurations

Possible objectives

To estimate the likely impact on:

- the level and distribution of acute hospital admissions
- acute and community bed day usage
- the journey times for patients
- ambulance service resources and logistics
- repatriations between hospitals
- travel times and costs for visitors.

Local health economies should be aware that as the model scope and objectives increase, so too do the timescales and costs associated with model development, the difficulty of auditing the model and the likelihood for the model results to be complex and equivocal.

Modelling approaches and methodologies

At the heart of any activity or accessibility modelling is the question: '*How would the distribution of patients between providers and associated travel times change if services were reconfigured?*' The core task therefore of any model is to redistribute patients on some logical basis to providers under one or more potential configurations.

While assessments of activity and accessibility of future potential configurations may be useful in their own right, health economies may wish to understand how these future states compare to levels of activity and accessibility in an agreed baseline period and to a future state where no service configuration takes place (the 'do nothing' scenario).

Models and modelling methods are often described as either deterministic or probabilistic. Deterministic models take no account of underlying randomness of the characteristics of the model subjects (for example patients) or the events that occur to these model subjects. One of the important implications of this distinction is that deterministic models will always return the same results so long as the model parameters are not changed. Probabilistic models reflect inherent randomness in subject characteristics and events and therefore return different results each time the model is run.

A deterministic model was developed to support the stroke reconfiguration programme in Birmingham, Solihull and the Black Country. This decision was taken for two reasons: to minimise the timeframe for the model construction and to enable providers to reconcile the model results within a baseline period.

12.3 Stage 2: Preparation

Stage 2

Useful data sources

While it may be possible to arrange bespoke data collection exercises to populate an activity and accessibility model, local health economies should first consider whether existing data (routinely collected, published or proprietary data) is sufficient.

The Hospital Episode Statistics data, in its processed and validated form from the Health and Social Care Information Centre (HSCIC) or via the Secondary Uses Service, is detailed record-level datasets of inpatient consultant episodes, outpatient attendances and accident and emergency department attendances. These datasets contain a mix of administrative (for example,. admission date, provider name), demographic (for example,. patient's age, gender), geographic (for example, local authority for patient's address), clinical (for example, diagnoses, procedures, consultant specialty) and costing (for example,. HRG, excess bed days) data. Data dictionaries for these datasets are available from HSCIC[4]. The data may be supplied in anonymised or pseudonymised form or with patient identifiers, depending on the arrangements governing the supply of the data by HSCIC.

Extracts may be obtained from ambulance service computer-aided dispatch systems containing information about calls received, ambulances dispatched and the onward conveyance of patients. The format of these datasets will vary between ambulance services but will contain a mix of administrative, demographic, geographic and clinical data that serves to describe a call and its handling. Information sharing agreements may be required to facilitate the transfer of this data from ambulance services to support the development of an activity and accessibility model. Additional summary data about ambulance activity and performance is published by NHS England[5].

HSCIC maintains lists of NHS organisations and sites and makes these available via the Organisation Data Service[6] (ODS). These tables contain information about the status, type and location of hospitals and other services. This information will need to be supplemented with local intelligence about the nature of services offered at these hospitals and sites.

Midyear population estimates and sub-national population projections published by the Office for National Statistics[7] provide information about the current and forecast population size by age and gender at CCG and local authority level.

Geographic data (for example, boundary files and transport networks) can be obtained from the Ordnance Survey Public Sector Mapping Agreement[8] (PSMA) and through ONS Geography[9].

A number of commercial organisations supply data on the average or expected journey time from one location to another at different times of day using private

[4] http://www.hscic.gov.uk/hesdatadictionary
[5] http://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/
[6] http://systems.hscic.gov.uk/data/ods
[7] http://www.ons.gov.uk/ons/index.html
[8] http://www.ordnancesurvey.co.uk/business-and-government/public-sector/mapping-agreements/
[9] http://www.ons.gov.uk/ons/guide-method/geography/about-ons-geography/index.html

vehicles and public transport. Software applications are usually required to integrate these datasets with transport networks to allow effective interrogation.

Defining and identifying stroke and TIA activity

Inpatient hospital episode statistics are organised by consultant episode. A consultant episode is a period of care under the care of a particular hospital consultant. A stay in hospital, often referred to as a spell, may be made up of one or more consultant episodes, with the start of one episode coinciding with the end of another. The admission method code can be used to identify the patient's route into hospital.

The patient's primary diagnosis and as many as 20 secondary diagnoses are recorded for each consultant episode using the International Classification of Diseases version 10 (ICD10). The table below lists ICD10 codes that may warrant inclusion in a stroke/TIA reconfiguration model, although health economies may wish to consider all codes between I60.0 and I69.8 and between G45.0 and G45.9:

ICD10 code	Description
I61.0 to I61.9	Intra-cerebral haemorrhage
I63.0 to I63.9	Cerebral infarction
I64.0 to I64.9	Stroke, not specified as haemorrhage or infarction
G45.4	Transient global amnesia
G45.8	Other transient cerebral ischaemic attacks and related syndromes
G45.9	Transient cerebral ischaemic attack, unspecified

To define a hospital admission as an emergency admission following a stroke or TIA requires a number of key decisions[10]:

- which admission method codes should be used to define an emergency admission
- which of the ICD10 codes above should be used to define a stroke or TIA
- should the definition of a stroke admission refer to the primary diagnosis only or include any of the secondary diagnoses
- should the definition of a stroke admission refer to the admission episode, dominant episode, discharge episode or to any episode within the spell.

[10] For the Birmingham, Solihull and Black Country Stroke Services Reconfiguration model, emergency admissions (admimeth = 2*) with primary diagnosis in I61.*, I63.*, I64.*, G45.4, G45.8 or G45.9 in any episode within the spells were included.

As an alternative, Healthcare Resource Groups could be used to identify stroke or TIA admissions or episodes. The table below lists the relevant HRG codes:

HRG code	Description
AA23A	Haemorrhagic cerebrovascular disorders with complications and comorbidities
AA23B	Haemorrhagic cerebrovascular disorders without complications and comorbidities
AA24A	Brain tumours or cerebral cysts with complications and comorbidities
AA24B	Brain tumours or cerebral cysts without complications and comorbidities
AA29A	Transient ischaemic attack with complications and comorbidities
AA29B	Transient ischaemic attack without complications and comorbidities

Identifying stroke and TIA related activity in accident and emergency is more problematic. While a patient's presenting condition should be recorded using the standard A&E diagnosis classification system, many acute trusts do not comply with this requirement. Furthermore, the A&E diagnosis classification system does not allow patients with a stroke or TIA to be differentiated from patients with other cerebrovascular conditions[11]. Investigations and treatments are somewhat more reliably and consistently recorded and while CT scans[12] and thrombolysis[13] can be identified, these are neither sufficient nor necessary indicators of a stroke or TIA.

A patient's chief complaint is routinely recorded by the ambulance service at the point a telephone call is received. Strokes are well-recorded at this stage and ambulance crews are subsequently dispatched. While many of these patients will be identified as FAST[14] positive by the ambulance crew at scene, a substantial proportion will be FAST negative and the outcome of this assessment is not always recorded in computer-aided dispatch (CAD) systems. Moreover, many patients who are assessed as FAST positive following a face-to-face assessment by the ambulance crew at the scene may have initially indicated an alternative chief complaint. Tracking the onward conveyance of all FAST positive patients is therefore not trivial.

Linking datasets to track patients through the urgent care system

Many patients seen in A&E with a suspected stroke or TIA are subsequently admitted. Although Hospital Episode Statistics (HES) A&E and HES inpatient tables

[11] Cerebrovascular conditions – HES A&E diagnosis code 21
[12] Computerised tomography – HES A&E Investigation code 12
[13] Thrombolysis – HES A&E treatment code 28
[14] http://www.nhs.uk/actfast/pages/stroke.aspx

do not contain a specific field to allow an A&E attendance to be linked to a resultant inpatient admission, deterministic linkage is still feasible using the following fields:

- A&E and inpatient NHS number (or its pseudonym)[15]
- A&E disposal code
- Inpatient admission method
- A&E arrival date and conclusion time and inpatient admission date.

Some pragmatic prioritisation method may be required to select a single A&E attendance or inpatient admission where multiple matches occur.

It is uncommon for data from ambulance service computer-aided dispatch systems to record a patient's NHS number and so probabilistic /fuzzy data linkage is required to match an ambulance conveyance and resultant A&E attendance. Weights for probabilistic data linkage might refer to the following fields:

- ambulance arrival (at hospital) date-time and A&E arrival date-time
- ambulance incident postcode and A&E patient postcode (or postcode sector or output area)[16]
- A&E arrival mode
- ambulance and A&E patient gender
- ambulance and A&E patient age
- ambulance chief complaint and A&E diagnosis (cerebrovascular condition)
- ambulance chief complaint and A&E investigation (CT scan)
- ambulance chief complaint and A&E treatment (thrombolysis).

Note that in some instances and at certain hospitals, patients arriving by ambulance bypass A&E and are admitted directly onto a ward or assessment unit. In this case, weights for probabilistic data linkage might refer to the following fields:

- ambulance arrival (at hospital) date-time and inpatient admission date
- ambulance incident postcode and inpatient patient postcode (or postcode sector or output area)[17]
- inpatient admission method
- ambulance and inpatient patient gender
- ambulance and inpatient patient age
- ambulance chief complaint and inpatient primary diagnosis.

[15] Probabilistic /fuzzy matching may be required where NHS numbers (or a pseudonym) are not available, using for example age, sex and geographic location of residence (level available may vary for example, postcode or lower super output area).

[16] Bearing in mind that the incident may not have been at home, this match should be used to confirm but not discount matches.

[17] Bearing in mind that the incident may not have been at home, this match should be used to confirm but not discount matches.

The results of data matching can be interpreted as follows:

Ambulance record	A&E record	Inpatient record	Pathway	Stroke /TIA or mimic
N / S	N / S	S	Patient conveyed by ambulance to A&E and subsequently admitted	confirmed stroke/TIA
S	N / S	N	Patient conveyed by ambulance to A&E and subsequently admitted	mimic
N / S	S	-	Patient conveyed by ambulance to A&E and then discharged	either stroke/TIA or mimic
S	N	-	Patient conveyed by ambulance to A&E and then discharged	mimic
N / S	-	S	Patient conveyed by ambulance to hospital and admitted, bypassing A&E	confirmed stroke/TIA
N / S	-	N	Patient conveyed by ambulance to hospital and admitted, bypassing A&E	mimic
-	N / S	S	Patient conveyed to A&E by means other than ambulance and subsequently admitted	confirmed stroke/TIA
-	S	N	Patient conveyed to A&E by means other than ambulance and subsequently admitted	mimic
S	-	-	Patient not conveyed to hospital	either stroke/TIA or mimic
-	S	-	Patient conveyed to A&E by means other than ambulance and then discharged	either stroke/TIA or mimic
-	-	S	GP directed admission or transfer	confirmed stroke/TIA

S Record indicates presence of stroke/TIA
N Record does not indicate presence of stroke/TIA
- No record

12.4 Stage 3: Agree options

Stage 3

Identifying current and potential future configurations

Mapping current secondary care service provision for patients with hyperacute and acute stroke and TIA is an essential prerequisite for the development of an activity and accessibility model. This should include services outside the geographical scope of the reconfiguration programme, which may become the closest service provider

for local patients under some future configurations[18]. Thematic maps may assist stakeholders to understand the flows of patients from incident or resident locations to hospitals via ambulance or by other means. Maps might plot the location of each stroke incident, coloured according to the hospital to which the patient was conveyed.

Stroke reconfiguration programmes usually seek to test the benefits of reducing the number of hyperacute stroke units, although in some cases, there may also be an interest in rationalising the number of acute stroke units. Health economies considering stroke service reconfiguration should consider drawing up a longlist of all potential future configurations.

Without other constraints, if the number of stroke units is currently *n* and the plan is to reduce to *k* hyperacute stroke units, then there are no!/k!(n-k)![19] potential configurations. Note that this number can become large and unmanageable from a practical perspective as *n* increases and approaches n/2. In these cases, a reference group may need to agree a pragmatic list of potential configurations that should be modelled. This number may increase further if there is uncertainty about the location of acute stroke units.

Health economies will also need to make an assessment of the likely changes to stroke services in areas neighbouring the geographical scope of the programme.

12.5 Stage 4: Model options

Stage 4

Forecasting changes in stroke activity resulting from changes in stroke incidence

For the purposes of this guide, we define stroke incidence rates, emergency hospitalisation rates and prevalence rates for the population of a geographic area as follows:

- incidence rate – the number of stroke or TIA incidents per head of population per year (note that an individual may have more than one incident per year)

- emergency hospitalisation rate – the number of emergency admissions to hospital following a stroke or TIA per head of population per year

[18] In many areas, the provision of stroke services has evolved over an extended period. Indeed, changes may have occurred to stroke service provision during the agreed baseline period for the model. In this case, health economies may wish to construct a modelled baseline against which any future configurations are assessed.
[19] Where n! is 1x2x3x……x(n-1)xn

- prevalence rate – the number of people receiving ongoing treatment or management following a stroke or TIA per head of population at a given point in time (note that this treatment or management could take place in a range of primary, community or secondary care settings).

While stroke and TIA prevalence rates are routinely published[20] and are useful as an indication of the burden of the disease or of the capacity requirement for chronic disease management of primary care, they are less useful when modelling a service reconfiguration focusing on the acute and hyperacute aspect of stroke care.

Stroke incidence rates are infrequently published following specific research studies. However, hospitalisation rates for strokes and TIAs should be broadly aligned with incidence rates and can be derived from routinely available data such as Hospital Episode Statistics.

Trends in age/sex specific stroke incidence rates can be estimated by dividing the number of emergency hospital admissions for stroke in a given age/sex group each year by the size of population in that age/sex group.

The number of people admitted to hospital in an emergency for a stroke or TIA are driven by two factors:

- the size and age/sex profile of the population
- the stroke and TIA incidence rates for the population in each age/sex sub-group.

Similarly, changes in these two factors will influence the number of emergency hospitalisations for stroke and TIA in the future.

Trends in age/sex specific hospitalisation rates[21] can be forecast to some future year[22] and multiplied by the projected population in the relevant age/sex group to estimate the number of hospitalisations for stroke and TIA in a future year. These estimates can be summed up across all age/sex groups to estimate the total number of hospitalisations for stroke or TIA in a given future year.

While these total estimates of emergency hospitalisations for stroke or TIA are useful in their own right, they are also required as a component of the activity and

[20] Stroke and TIA prevalence and management indicators are published by HSCIC as part of the Quality and Outcomes Framework (QOF) collected from general practices in England: http://www.hscic.gov.uk/qof. The disparity between stroke prevalence estimates from the Health Survey for England (HSfE), and the number reported in QOF led to the production of a stroke prevalence model from the former Association of Public Health Observatories: http://www.apho.org.uk/default.aspx?RID=61214

[21] The age/sex specific rates could be refined further with reference to deprivation, smoking status etc.

[22] Given reductions in smoking prevalence (a key risk factor for stroke) and improvements in chronic disease management, reductions in age/sex specific rates might be anticipated. These improvements may be offset in total or in part by increases in the number of adults aged 75+.

accessibility model. In particular, the model will require multipliers (the ratio of future hospitalisations to current hospitalisations) by age group, gender and area.

Modelling activity and accessibility changes under potential future configurations

Decision-makers and stakeholders will want to assess differences between activity levels, resource use for each provider service and travel times in:

- the baseline year
- the end year of the model (or some intermediate point) without a reconfiguration
- the end year of the model (or some intermediate point) for each of the longlisted configurations.

Activity levels and resource use in the baseline year can be derived directly from the linked ambulance service, accident and emergency and inpatient datasets described above.

While ambulance journey times in the baseline year should be available in the ambulance service extract, other journey times will need to be estimated using information about the patient's postcode (or postcode sector or output area)[23], the location of the hospital they attended and drive time datasets/software.

Activity levels, resource use and travel times in future years without reconfiguration can be estimated using the stroke/TIA incidence multipliers described above.

To estimate activity levels, resource use and travel times in future years under specific configurations requires the redistribution of activity, weighted by the stroke/TIA incidence multipliers, to stroke services. A model will require a set of rules that encode this redistribution.

Rules for distributing or assigning patients to hyperacute stroke units in any future configuration might take one of the following forms:

a) Patients should be assigned (in other words. travel to) a hyperacute stroke service by minimising the travel time (or distance) from the patient's stroke incident (or residence)
b) Patients should be assigned to the hospital that they attended in the baseline year unless this hospital is not a HASU in the configuration under consideration, in which case the patient should be assigned to a hyperacute stroke service by minimising the travel time (or distance) from the patient's stroke incident (or residence)
c) Patients should be assigned to the hospital that they attended in the baseline

[23] As a proxy for the origin of their journey to hospital

year unless this hospital is not a HASU in the configuration under consideration, in which case the patient should be onward conveyed to a hyperacute stroke service by minimising the travel time (or distance) from the hospital attended

d) Patients should be assigned to hyperacute stroke services such that the number of patients attending each HASU is equal, HASU catchment populations are contiguous and the total patient travel time/distance is minimised[24]
e) Other more complex scenarios may consider patient movements in which boundary retention or creation for one or more hospitals is required due to capacity limitations, although the impact on travel times needs to be closely assessed in this instance.

Different rules may be selected for different groups of patients (for example, rule (a) may be used to assign ambulance conveyed patients, whereas rule (c) may be used to assign self-conveyed patients).

Rules that describe the movement of patients from hyperacute stroke units to stroke units might take one of the following forms:

- patients whose stay in the baseline year was four days[25] or more will be transferred from a hyperacute stroke unit to an acute stroke unit by minimising the travel time (or distance) from the patient's resident postcode
- patients whose stay in the baseline year was four days or more will be transferred from a hyperacute stroke unit to an acute stroke unit. If, in the configuration under consideration, the hyperacute stroke unit to which the patient has been assigned has a co-located acute stroke unit, then the patient will be transferred to this unit. Otherwise, the patient will be transferred to an acute stroke unit by minimising the travel time (or distance) from the hyperacute stroke unit.

Rules that describe the movement of stroke-mimic patients from hyper-acute stroke units to local general hospitals may take the following form:

- patients whose stay in the baseline year was two days or more will be transferred from a hyperacute stroke unit to local general hospital by minimising the travel time (or distance) from the patient's resident postcode
- patients whose stay in the baseline year was two days or more will be transferred from a hyperacute stroke unit to a general ward in the same hospital on day one of their stay.

More complex models could:

- move patients on the basis of a distribution of length of stay before

[24] Note that implementing this rule is not trivial
[25] Or some other length of stay

repatriation
- include transport to computerised tomographic angiography (CTA) thrombectomy services
- assume some failure rate for repatriations
- describe the management of patients who have a stroke while in hospital, having been admitted for another medical condition.

While commercial travel time datasets estimate journey times for privately owned vehicles, it is possible to derive estimates of ambulance conveyance durations under 'blue-light' conditions as follows:

- A_x : ambulance conveyance duration ('blue light') to hospital x in baseline period
- T_x : estimated travel time for privately owned vehicle to hospital x in baseline period
- T_y : estimated travel time for privately owned vehicle to hospital y in future configuration
- $A_y = T_y.A_x/T_x$: ambulance conveyance duration ('blue light') to hospital y in future configuration.

12.6 Stage 5: Appraise options

Stage 5

Metrics for assessing performance of potential future configurations

Having constructed a model to estimate activity levels and accessibility levels in the baseline period, for a 'do nothing' scenario and under each future potential configuration, health economies will require a high level assessment of each. Health economies may wish to consider using the following metrics to assess and compare configurations. These metrics aim to provide coverage of the main issues that preoccupy health economies when assessing the relative merits of configurations from an activity and accessibility perspective[26]: changes in time-critical ambulance journeys, the relationship between HASU activity levels and clinical quality and sustainability, the impact on ambulance service resources, the number of patient moves between hospitals and the impact on patient visitors' journey times and costs.

Time-critical ambulance journeys

- the proportion of patients with suspected stroke or TIA following face-to-face assessment by an ambulance crew or paramedic that are conveyed to a hyperacute stroke unit within 45 minutes of departure from the incident
- the average conveyance durations of patients with suspected stroke or TIA following a face-to-face assessment by an ambulance crew or paramedic
- the proportion of patients with suspected stroke or TIA whose conveyance

[26] Other perspectives (for example, finances) are discussed in other chapters.

duration, following a face-to-face assessment by an ambulance crew or paramedic, is more than 10 minutes greater than in the 'do nothing scenario'.

HASU activity levels

- The number of HASUs with anticipated activity levels lower than some agreed minimum threshold required to maintain clinical standards or ensure financial viability
- the number of HASUs with anticipated activity levels higher than some agreed maximum threshold required to avoid diseconomies of scale or safe staffing ratios.

Impact of ambulance services

- the sum of ambulance conveyance durations[27].

Patient repatriation levels

- the number of patients who require repatriation from HASU to ASU at a different site
- the number of patients who require repatriation from HASU to a general ward at a different site.

Impact of visitors

- the total journey times for patient visitors
- he total cost of visitor journeys.

While other variables may also be of interest to health economies (for example, HASU bed days usage), these may not serve to differentiate between the potential configurations.

[27] The additional ambulances crews required may not be proportional to the sum of the additional conveyance durations.