



PWYLLGOR DATBLYGU STRATEGOL A CHYFLENWI GWEITHREDOL
STRATEGIC DEVELOPMENT AND OPERATIONAL DELIVERY COMMITTEE

DYDDIAD Y CYFARFOD: DATE OF MEETING:	26 June 2023
TEITL YR ADRODDIAD: TITLE OF REPORT:	Comprehensive Regional Stroke Centre (CRSC) Business Case and Assessment of the Stroke Pathway in Carmarthenshire as a Component of the ARCH Regional Stroke Pathway
CYFARWYDDWR ARWEINIOL: LEAD DIRECTOR:	Alison Shakeshaft, Director of Therapies and Health Science
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Pwrpas yr Adroddiad (dewiswch fel yn addas)

Purpose of the Report (select as appropriate)

Ar Gyfer Penderfyniad/For Decision

ADRODDIAD SCAA

SBAR REPORT

Sefyllfa / Situation

The Committee is asked to:

- Consider the Comprehensive Regional Stroke Centre (CRSC) Business Case
- Consider the impact on the Carmarthenshire Stroke Pathway and the requirements for re-design and investment set out in the Assessment of the Stroke Pathway in Carmarthenshire paper
- Recommend that both papers are put forward to the Public Board on 27 July 2023 for consideration, with a recommendation that the CRSC Business Case **is not** supported at this time, and for further work around the inpatient options to be taken forward through the Clinical Services Plan.
- Consider incremental improvement to the stroke pathway as finances allow.

Cefndir / Background

In May 2022, there was an executive level agreement to recommence the Stroke Services Re-design Programme in Hywel Dda University Health Board (the Health Board), that was paused due to the COVID-19 pandemic, to include:

- 1) Working with the A Regional Collaboration for Health (ARCH) Programme to develop a Business Case for a Hyper-acute Stroke Unit in Morriston Hospital and
- 2) An initial focus on the short to medium term stroke service within the Carmarthenshire area.

The rationale for this was:

- Re-instating the entire re-design programme for the Health Board, across the short, medium and long-term (all requiring different solutions) would take in excess of 18-24 months due to the complexity and competing solutions.

- Work had recommenced with Swansea Bay University Health Board (SBUHB) via ARCH regarding the HASU project, with Carmarthenshire residents being identified as in scope for the HASU.
- Recognition of the inter-dependencies between the HASU development and the rest of the stroke pathway in Carmarthenshire (as Carmarthenshire residents would be accessing the HASU).
- Short/medium-term medical staffing sustainability concerns for Glangwili Hospital (GGH), which relies on a single-handed clinician.
- Inability of both GGH and Prince Phillip Hospital (PPH) to meet the national stroke standards (Sentinel Stroke National Audit Programme - SSNAP).
- The inability to change any acute stroke provision in Pembrokeshire until the new hospital is built.
- The requirement to maintain acute stroke services in Ceredigion even when the new hospital is built.

The Business Case for the Comprehensive Regional Stroke Centre (CRSC), formally known as the HASU, has now been developed via the ARCH Programme and is presented to the Committee for consideration of onward consideration at the Public Board on 27 July 2023.

The Business Case has been scrutinised by a small team at Assistant Director level within the Health Board and was discussed at the Executive Team meeting on 19 April 2023.

The outcome of the Executive Team discussion was that the Health Board could not consider the Business Case in isolation of the impact on the rest of the Carmarthenshire Stroke Pathway. A request followed to assess the impact on the rest of the Carmarthenshire Pathway to support the Board's considerations.

The cost to the Health Board of supporting the CRSC Business Case is £2.1m per annum from year three of the development, however, there are some elements of the Business Case that require further scrutiny e.g., the workforce proposals for radiology, the impact on Welsh Ambulance Service NHS Trust (WAST) transport, the expected level of SSNAP performance that will be achieved and the medical cover arrangements for the unit.

The Health Board wrote to the CEO of SBUHB on 18 May 2022, to express support for the development of the CRSC, not in approval of the case but as an endorsement of the principle of our residents accessing the CRSC in the future and a commitment to continue to work with SBUHB to develop the unit. The letter stated the following areas that required further work:

- **Whole pathway:** The establishment of a CRSC is a critical element for the development of stroke care for the region, however it is only one part. Both organisations will need assurance that the overall pathway provides better outcomes and that patients can be stepped down from the CSRC at 72 hours. Understanding that the CRSC is not an isolated component, further work is required on the care models and workforce required across the entire pathway – including early supported discharge, step-down beds, and related services.
- **Welsh Ambulance Service:** Timely transfer will of course be important to the functioning of the pathway, both for emergency response and for repatriation through non-urgent patient transport services. WAST's plans to operationally support this will be crucial, including reaching agreement on any resource implications.

- **Communication and engagement:** Ensure proper communication and coordination between our respective Health Boards to allow seamless integration of this new development across our respective footprints.
- **Performance:** Our Board will naturally want to be assured that our residents would receive a higher quality and more timely service through the CRSC at Morriston before any final decision is made. We anticipate we will need to establish regular reviews, reporting structures, and performance indicators for the service to provide this evidence.
- **Implementation:** An implementation and transition plan will need to be developed for both our organisations, covering clinical practice, staff training, recruitment and resource allocation. At our Executive meeting we specifically discussed the challenge and risk associated with securing the required workforce.
- **Financial Resources and Sustainability:** To guarantee the programme's success, it is vital to address the available financial resources required for the establishment, operation, and sustainable scaling of the CSRC/HASU. We strongly advocate that detailed budgets and resource forecasts are put in place, alongside setting up robust financial control mechanisms to monitor expenditures closely. This includes consideration of the appropriate financial mechanisms between our organisations to meet this expenditure.

The accompanying Assessment of the Stroke Pathway in Carmarthenshire as a Component of the ARCH Regional Stroke Pathway paper is presented to the Committee to inform the consideration of the CRSC Business Case. If the CRSC Business Case is supported by the Board, there will need to be re-design and investment in the rest of the Carmarthenshire Stroke Pathway. As such it is essential that the CRSC Business Case is not considered in isolation of the impact on the rest of the Carmarthenshire Stroke Pathway.

In addition, in order to provide an equitable level of stroke care across the Health Board, there will need to be consideration of further investment in Ceredigion and Pembrokeshire. The assessment of the extent of this is still to be undertaken.

A National Stroke Programme Board has now been established, to improve stroke pathways and service provision across Wales, which this work programme is aligned to.

Asesiad / Assessment

The CRSC Business Case has been completed and is attached for consideration for onward consideration by Board. It has been produced via ARCH Programme Support, building on the work undertaken pre-COVID-19, including modelling by the Delivery Unit with regards to patient numbers, changing demographic projections, travel times and required bed numbers, with input and scrutiny from the multi-disciplinary stroke teams across both Hywel Dda and Swansea Bay University Health Boards. It is based on Royal College of Physician (RCP) Standards of stroke care as measured by the SSNAP audit, including national staffing standards. It has been endorsed by the ARCH Regional Recovery Board to be progressed through both Health Board's processes for consideration and approval.

The CRSC business case only focuses on the first 72 hours of the acute inpatient pathway and will include Carmarthenshire residents from year 3 of the development (2026 onwards). This is due to the need to develop the workforce in Morriston through a phased approach. The requirement for Carmarthenshire residents is four beds in the CRSC. This will release four stroke beds in Carmarthenshire, but the assumption is that it will not result in any financial savings or release of staff, as our staffing levels fall significantly short of required standards and any staff release should be used for other elements of the stroke pathway.

Residents of Pembrokeshire and Ceredigion will continue to receive this first 72 hours of inpatient care at Withybush Hospital (WGH) (until the new hospital is open) and Bronglais Hospital (BGH) as the travel times to Morriston are too great for these populations. 24/7 support from the CRSC will be provided via digital tele-health links.

In order to enable a full consideration of the CRSC Business Case, the attached Assessment of the Stroke Pathway in Carmarthenshire as a Component of the ARCH Regional Stroke Pathway paper describes the required investment to bring the staffing levels across the pathway (excluding the hyper-acute element) up to the national clinical standards in Carmarthenshire, to provide the best level of care and in order to support the timely repatriation of Carmarthenshire residents back to Hywel Dda from the CRSC.

Without this investment we would see inevitable repatriation delays and bottlenecks forming in the pathway. To prevent this would require recurrent investment of **£1.467m** post CRSC if two sites in Carmarthenshire were retained. This would reduce to a recurrent investment of **£525K** post CRSC if we moved to a one site model in Carmarthenshire due to economies of scale for consolidating the beds and the workforce. Investing in both the CRSC (£2.1m recurrently) and rightsizing the staffing in Carmarthenshire across the entire stroke pathway for a one site model (£525K) would achieve a **SSNAP score of A** providing the highest quality of clinical care and the best possible outcomes for patients suffering a stroke.

It is clear from the assessment that significant investment is required to achieve the highest quality of care and outcomes for patients. Investing in the CRSC alone will not improve the quality if the required investment in the rest of the pathway is approved and could in fact lead to a worse quality due to issues with flow. In view of this and the financial challenge facing the Health Board, the Executive Team is recommending that the CRSC Business Case **is not supported at this time** as the remaining pathway in the Health Board requires investment as a higher priority.

The most recent SSNAP scores were C for PPH and not recorded for GGH due to lack of staff to input the data. However, scores routinely fluctuate between C of D on both sites.

Recommended steps in order of consideration over the coming years:

Pre-CRSC

The paper describes the planned introduction of Early Supported Discharge (ESD) across all three counties of the Health Board in the coming months as supported by the new Welsh Government funding stream for community/primary care based Allied Health Professionals (AHPs). Welsh Government has approved the bid to implement ESD and circa £320k of this funding will be provided for this service in Carmarthenshire. The required resource for full implementation of ESD in Carmarthenshire is £425K, which would release 8 beds from the Carmarthenshire system. With the current funding available, this should release 6 beds from Carmarthenshire. This partial implementation of ESD may attain a consistent SSNAP score of C as scores for this element will improve, but is more likely to remain at a fluctuating C/D as some of the failures in standards relate to the first 24 hours of care and inpatient therapy support, which will not be improved by ESD.

The stroke leadership team and lead clinicians believe sustaining two stroke units in Carmarthenshire will remain challenging and is not sustainable. The inability to meet required standards as measured by SSNAP will not be addressed across both sites unless there is significant investment in staffing levels or consideration of moving stroke inpatient care to one site for the county.

The reduction of 6 (or 8 beds of the shortfall of £105K is funded) from 30 to 24 (or 22) pre-CRSC would facilitate the ability to consolidate the stroke beds in Carmarthenshire onto one site, providing a more easily ring-fenced stroke ward with a dedicated stroke specialist workforce consolidated on one site. This should improve quality of care and increase audit scores, even if no further investment is made to reach stroke staffing standard levels (as long as current staffing levels are maintained, although they would not reach standards level, the staff:bed ratio would improve). The total staffing requirements for one site are much lower than for two, which should also improve the likelihood of achieving those staffing levels.

There is an opportunity to consolidate stroke beds in Carmarthenshire onto one site before or irrespective of residents having access to the CRSC, with quality gains. This would require a full options appraisal and staff and public engagement, but would be expected to achieve a fluctuating SSNAP score of B/C. A review of inpatient stroke care will be taken forward via the Clinical Services Programme.

The release of 6 beds pre-CRSC could result in cash out if the beds are actually removed and not used for other specialities. There would then be opportunity for the Board to consider investing any cash released to fully implement ESD (an additional £105K for Carmarthenshire) releasing a further two beds. Likely SSNAP score fluctuating B/C.

A further investment of an additional £698K (£802K-£105K for ESD) would meet recommended staffing levels in Carmarthenshire for a one-site model (except for the hyper-acute first 72-hour element). This should achieve a consistent SSNAP score of B.

Post-CRSC (2026 onwards)

Investing in the CRSC from 2026 onwards (£2.1m) would reduce the Carmarthenshire stroke beds by a further 4, which if retained on one site would enable a reduction in staffing for the Carmarthenshire beds by £277K. This would achieve a consistent SSNAP score of A in Carmarthenshire and provide the highest standard of care and best clinical outcomes for patients.

A similar mapping exercise is underway to assess the impact of ESD and rightsizing the workforce and associated costs for stroke in Ceredigion and Pembrokeshire.

Summary

Pathway change	Impact on stroke bed numbers in Carmarthenshire	Likely impact on SSNAP score in Carmarthenshire	Associated recurrent financial impact for the Health Board
Do nothing	Nil - remain at 30	Maintain fluctuating C/D, most often D	Nil
Implement ESD to WG funded level	Reduction of 6 beds to 24	Maintain fluctuating C/D, possibly most often C	Nil – costs covered by WG
Consolidate to one site in Carmarthenshire, without investment in staffing, but retaining current staffing levels	Nil – remain at 24	Fluctuating B/C, possibly most often C (no improvement if retain 2 sites)	Nil

Invest shortfall of £105K in ESD in Carmarthenshire	Further reduction of 2 beds to 22	Fluctuating B/C, possibly most often B assuming one site model (most often C if 2 site model)	£105K	
Invest a further £698K to right-size the staffing across the pathway in Carmarthenshire except for the hyper-acute element	Nil - remain at 22	Consistent B assuming 1 site model (Fluctuating B/C if 2 site model)	£698K for 1 site model (further £2130K if 2 site model)	
Invest in the CRSC £2.1m to provide the highest standard of care across the pathway for Carmarthenshire residents	Further reduction of 4 beds to 18	Consistent A	£2.1m minus £277k reduction in staff costs in Carmarthenshire if 1 site model	

It is suggested that a phased approach is taken as described above to achieve incremental improvements in quality of stroke care as and when finances allow investment.

Argymhelliad / Recommendation

The Committee is asked to:

- Consider the Comprehensive Regional Stroke Centre (CRSC) Business Case
- Consider the impact on the Carmarthenshire Stroke Pathway and the requirements for re-design and investment set out in the Assessment of the Stroke Pathway in Carmarthenshire paper
- Recommend that both papers are put forward to the Public Board meeting on 27 July 2023 for consideration, with a recommendation that the CRSC Business Case **is not** supported at this time, and for further work around the inpatient options to be taken forward through the Clinical Services Plan.
- Consider incremental improvement to the stroke pathway as finances allow.

Amcanion: (rhaid cwblhau)

Objectives: (must be completed)

Committee ToR Reference: Cyfeirnod Cylch Gorchwyl y Pwyllgor:	3.2 Review business cases, prior to Board approval, including the development of the Programme Business Case for the new hospital and the Programme Business Case for the repurposing of the Glangwili and Withybush General Hospital sites, underpinned by a robust process for continuous engagement to support delivery.
Cyfeirnod Cofrestr Risg Datix a Sgôr Cyfredol: Datix Risk Register Reference and Score:	Risk 233 Risk Score 12
Parthau Ansawdd: Domains of Quality	7. All apply

Quality and Engagement Act (sharepoint.com)	
Galluogwyr Ansawdd: Enablers of Quality: Quality and Engagement Act (sharepoint.com)	6. All Apply
Amcanion Strategol y BIP: UHB Strategic Objectives:	All Strategic Objectives are applicable
Amcanion Cynllunio Planning Objectives	6a Clinical services plan
Amcanion Llesiant BIP: UHB Well-being Objectives: Hyperlink to HDdUHB Well-being Objectives Annual Report 2021-2022	9. All HDdUHB Well-being Objectives apply

Gwybodaeth Ychwanegol: Further Information:	
Ar sail tystiolaeth: Evidence Base:	Contained within the body of the report.
Rhestr Termau: Glossary of Terms:	Contained within the body of the report.
Partion / Pwyllgorau â ymgynhorwyd ymlaen llaw y Pwyllgor Datblygu Strategol a Chyflenwi Gweithredol: Parties / Committees consulted prior to Strategic Development and Operational Delivery Committee:	Executive Team 19 April 2023.

Effaith: (rhaid cwblhau) Impact: (must be completed)	
Ariannol / Gwerth am Arian: Financial / Service:	Outlined within the appendices.
Ansawdd / Gofal Claf: Quality / Patient Care:	Outlined within the appendices.
Gweithlu: Workforce:	Outlined within the appendices.

Risg: Risk:	Outlined within the appendices.
Cyfreithiol: Legal:	Outlined within the appendices.
Enw Da: Reputational:	Outlined within the appendices.
Gyfrinachedd: Privacy:	Outlined within the appendices.
Cydraddoldeb: Equality:	Not Applicable

Hywel Dda University Health Board

**Factual Assessment of the
Stroke Pathway in Carmarthenshire
As a component of the
A Regional Collaboration for Health (ARCH)
Regional Stroke Pathway.**



“Safe, Sustainable, Accessible and Kind”

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Hywel Dda University Health Board Factual Assessment of the Stroke Pathway in Carmarthenshire

1. Executive Summary

Stroke care in Hywel Dda University Health Board (HDdUHB) falls short of the national clinical standards as measured by the Sentinel Stroke National Audit Programme (SSNAP). This is due to no Early Supported Discharge (ESD), no access to psychology and inadequate staffing levels that fall short of the national standards across the full multidisciplinary team (MDT). As a result, Stroke services in Carmarthenshire fall short of the expected Key Performance Indicators (KPIs).

The Factual Assessment of the Stroke Pathway in Carmarthenshire specifically focuses on the staffing and associated funding required to fulfil the national expected standards of acute and rehabilitation phases of stroke care for Carmarthenshire residents. The purpose of this Paper is to enable the Board to fully consider the impact of the Morriston Comprehensive Regional Stroke Centre (CRSC) Business Case, as for the CRSC to function effectively the rest of the stroke pathway in Carmarthenshire will need to be re-designed and staffed fully to clinical standard levels. If this is not the case, there will be immediate problems with flow out from the CRSC and bottlenecks delaying discharge and repatriation to Carmarthenshire. The CRSC is wholly dependent upon suitable pathway flows within Carmarthenshire being in place before Carmarthenshire residents start accessing the CRSC, planned for year 3 of the CRSC.

As is described in this Paper, there is an intention to utilise the new allied health professionals (AHP) funding stream from Welsh Government to implement evidence based ESD across the HDdUHB footprint. This has been a long-standing ambition for the Health Board and the funding stream will enable this implementation with a shortfall of funding of **£105K** for the Carmarthenshire area (65K staffing and £40K travel costs). There is also a one-off capital cost of **£28K** for equipment to support the ESD that is not covered by the Welsh Government funding.

ESD will directly impact on the requirement for stroke beds as it enables rehabilitation to take place in the patients' own home. The modelling suggests a reduction in bed requirements for stroke in Carmarthenshire from 30 to 22 prior to the CRSC and 18 once the CRSC is accessible for Carmarthenshire residents. This enables consideration of moving to a one-site stroke unit for Carmarthenshire.

A total investment of **£820K** or **£525K** pre and post access to the CRSC would enable the stroke service in Carmarthenshire to achieve a Level B and Level A performance in the SSNAP audit respectively if we move to a one site model for inpatient stroke care in the county.

To retain stroke inpatient units at both Carmarthenshire sites would require an investment of **£2235K** and **£1467K** pre and post CRSC.

Four new scenarios are described in this Paper, all of which would improve stroke care and clinical outcomes for patients, and in addition reduce mortality rates, achieve less reliance on social care and an improved quality of life post stroke.

This Paper **has not** fully assessed the case for a one-site or two site model for stroke care in Carmarthenshire but has provided the staffing requirements and costings for each of these scenarios. In order to provide a fully engaged and appraised options proposal a more detailed piece of analysis is required but this Paper provides sufficient detail to recommend that this workstream is taken forward.

In order to provide equitable stroke care across HDdUHB, further work will be required to apply the same workforce standards to the stroke pathways in Ceredigion and Pembrokeshire, however, these are not inter-dependent on the CRSC as residents in these counties will not access the CRSC due to travel distance. Hence this is not included in this Paper due to the time-dependency for a decision regarding the CRSC Business Case.

The Board is asked to consider the Factual Assessment of the Stroke Pathway in Carmarthenshire Paper in context with the CRSC Business Case and:

- Note the plan to undertake a detailed analysis of options for inpatient care via the Clinical Services Programme.
- Note the investment required to right-size the stroke workforce in Carmarthenshire across the stroke pathway to achieve improved standards of care

2. Introduction

A Stroke is a serious life-threatening medical condition that occurs when the blood supply to part of the brain is cut off by a blood clot or bleeding from a blood vessel. Strokes are a medical emergency and urgent treatment is essential. The sooner a person receives treatment for a stroke, the better the chance of recovery. Stroke strikes suddenly and can result in a devastating range of disabilities or death. It is one of the most significant public health issues of our time, with a profound and growing impact on society, our economy, individuals, and families.

The Factual Assessment of the Stroke Pathway in Carmarthenshire Paper specifically focuses on the stroke pathway in Carmarthenshire to inform Hywel Dda University Health Board (HDdUHB) of the impact of the ARCH Comprehensive Regional Stroke Centre (CRSC) for the Southwest Wales Region,

previously known as the Hyper-acute Stroke Unit (HASU), on the rest of the pathway for Carmarthenshire residents. It incorporates the recently updated National Stroke Clinical Guidelines (April 2023). Without approval of pathway changes and investment to the correct staffing levels in Carmarthenshire the CRSC will not be able to function efficiently, and we will almost immediately create problems with flow and be unable to repatriate Carmarthenshire residents in a timely manner.

This Paper highlights the investment required in the stroke workforce and the introduction of ESD in order to provide a higher standard of stroke care and reduce the number of stroke beds required in Carmarthenshire. It provides scenarios of a one or two stroke inpatient site model within the Carmarthenshire County pre and post implementation of the CRSC.

Improving the Carmarthenshire Stroke Pathway relates only to the one element of re-designed stroke services across the Southwest Wales Region. Whilst this Paper can be taken in isolation and will lead to improvements in stroke care if supported in isolation, the combined approval of the CRSC Business Case will achieve the highest quality results for Carmarthenshire residents. Further planning to re-design the rest of the stroke pathway in Swansea Bay University Health Board (SBUHB) to support the CRSC, and pathways for Ceredigion and Pembrokeshire will be required and will result in additional business cases. The Carmarthenshire Stroke Pathway Paper will also inform the Issues Development Paper within the HDdUHB Clinical Services Plan.

This Carmarthenshire Stroke Pathway Paper has been developed in collaboration with ARCH. Contributors include HDdUHB clinical and managerial staff as well as representatives from Finance, Workforce, Wales Delivery Unit, and Welsh Ambulance Services Trust.

The ARCH Regional Stroke Programme is taking place against a background of nationally managed strategic change in Stroke in Wales. Historically, ARCH has participated in the national Programme and coordinated discussions regionally about Stroke Services and how to address the challenges; this was paused in 2020 due to the Covid-19 Pandemic.

3. Scope

To allow work to commence on developing some areas of the Regional Stroke Pathway while at the same time developing a wider Stroke Programme business plan, the ARCH Regional Stroke Programme will deliver in parallel running tranches.

The Carmarthenshire Pathway forms part of Tranche 2.

Tranche 1 Scope

CRSC Optimal Patient Pathway:

- CRSC Morriston (future sized for HDdUHB patients)
- Optimal Imaging Stroke Pathway
- Thrombolysis
- Conveyance to Thrombectomy Centre
- Admission to CRSC into a Hyper Acute Stroke Bed
- Phasing of HDdUHB patients admitted to the CRSC
- Public and staff consultation

Tranche 2 Scope

Pre-Hospital Optimal Patient Pathway:

- Pre-acute stroke services – believed stroke (process and conveyance)
- Acute Stroke Service outside the CRSC Optimal Patient Pathway
- A&E (and direct access to CRSC)
- Acute Stroke Services (including Acute Stroke Units) in HDdUHB and SBUHB
- Remote Care Units within HDdUHB
- Stroke Recovery and Rehabilitation Optimal Patient Pathway
- Rehabilitation, including early supported discharge and life after stroke services
- New Technology across all pathways

Appendix A - Optimal Patient Pathway, supplied by the National Programme

The drivers for this work include:

- *HDdUHB Stroke Pathway Performance* - inability to meet the national standards for stroke care as measured by the Sentinel Stroke National Audit Programme (SSNAP)
- *ARCH Comprehensive Regional Stroke Centre (CRSC)* – this Paper describes the resource impact for the rest of the stroke pathway in Carmarthenshire to support the CRSC ensuring appropriate flow and timely repatriation to Carmarthenshire
- *HDdUHB Clinical Services Plan* – this Paper will be a component part of the plan and inform the Issues Development Paper where opportunities and challenges in relation to resources can be better understood
- *New Stroke Clinical Guidelines April 2023* – this Paper incorporates the updated clinical standards for stroke

The scope of this Paper includes:

- *Current State* – Cost of current stroke service provision in Carmarthenshire
- *Interim State 1* – Impact of clinical guidelines changes on operational resources required to meet current levels of demand at the 2 sites in Carmarthenshire prior to the Carmarthenshire residents accessing the CRSC (excluding staffing levels to meet HASU standards).
- *Interim State 2* - Impact of clinical guidelines changes on operational resources required to meet current levels of demand condensed into 1 site

in Carmarthenshire prior to the Carmarthenshire residents accessing the CRSC (excluding staffing levels to meet HASU standards).

- *Future State 1* - Impact of clinical guidelines changes on operational resources and requirements to meet future levels of demand, based on 2 sites in Carmarthenshire to deliver the step-down care from the CRSC and the remaining Stroke Pathway.
- *Future State 2* - Impact of clinical guidelines on operational resources and requirements to meet future levels of demand condensed into 1 site in Carmarthenshire to deliver the step-down care from the CRSC and the remaining Stroke Pathway.

This Paper relates only to the one element of re-designed stroke services across the Southwest Wales Region. The areas requiring further re-design/planning within HDdUHB and out of the scope of this Paper are:

- improved pathways for Ceredigion and Pembrokeshire, applying the same level of assumptions and clinical standards for staffing to provide equitable care to residents of HDdUHB
- detailed analysis of the scenarios for inpatient care within Carmarthenshire (2 site model with stroke beds in Glangwili Hospital (GGH) and Prince Philip Hospital (PPH); 1 site model with stroke beds in GGH only; 1 site model with stroke beds in PPH only. This element will require public/staff engagement or consultation. This will also require input from the Welsh Ambulance Service NHS Trust (WAST) to consider the impact on WAST transport.
- Re-design of the inpatient pathway and flows across HDdUHB ahead of the new hospital becoming operational. This element will require public/staff engagement or consultation. This will also require input from WAST to consider the impact on WAST transport.

4. Version History

Table 1. Version History

Version	Date issues	Amendment history	Owner's Name
1.0	10MAY2023	Establishment, Comments, Formatting and Introduction DRAFT	Principal Programme Manager Transformation)
1.1	02/06/2023	Draft Paper Completed for wider review and comment	ARCH Project Manager - Transformation
1.2	06/06/2023	Sign off by the Carmarthenshire Stroke Pathway Task and Finish Group	ARCH Project Manager - Transformation
1.3	08/06/2023	Amendments and formatting based on feedback	ARCH Project Manager – Transformation Principal Programme Manager Transformation)

1.4	08/06/2023	Changed from Business Case to a Factual Assessments Paper. Sharing of Appendices with Executive Sponsor for Submission to next phase	ARCH Project Manager - Transformation
1.5	09/06/2023	Final draft for submission to Executive Team and onward submission to SDODC and Board	Director of Therapies and Health Science
1.6	16/06/2023	Final draft for submission to SDODC	Director of Therapies and Health Science

5. Case for Change

UK Context

- Stroke is the leading cause of disability and the UKs fourth largest cause of death.
- Stroke costs the UK economy £26 billion per year, including £3.2bn cost to the NHS, £5.2bn to social care, and £15.8bn in informal care. This is forecast to rise to between £61bn and £91bn by 2035. The cost of someone having a stroke over a year is over £45,000.
- By 2035, the number of strokes will increase by almost half and the number of stroke survivors by a third.
- Half of stroke survivors are living with four or more co-morbidities.
- A broad pattern of psychological difficulties can also be expected to affect recovery and disability following stroke, with high rates of anxiety, depression, and cognitive impairment being well established as common effects affecting function and recovery post-stroke; such effects can be predicted to increase hospital re-admission and un-planned care risks.

Wales Context

- Stroke incidence in Wales is 7th out of 25 developed countries.
- Stroke Disability-adjusted life years (DALYs) is 20th out of 25 developed countries.
- Sentinel Stroke National Audit Programme (SSNAP) Scores A-E. Wales Mean = E, a deterioration from pre-Covid-19 levels.
- Current cost to NHS Wales £220 million a year
- Achieving a sustainable level, A SSNAP score across Wales could result in:
 - 5% reduction in 90-day mortality
 - 85 deaths per year avoided
 - 33,901 bed days saved – across the whole pathway
 - Cost saving to NHS Wales £13.56 million a year

Stroke is the fourth leading cause of death in Wales, and it can have a significant long-term impact on survivors. Currently, almost 70,000 stroke survivors live in

Wales, and an estimated 7,400 people experience a stroke each year. Stroke can change lives instantly, but with the right support, people can make a good recovery.

The NHS Wales Health Collaborative Executive Group is the responsible governance group for the Stroke Implementation Group (SIG) and the National Stroke Programme Board (NSPB). NSPB provides oversight of the National Stroke Programme and works in partnership with the regional stroke programmes to improve the stroke pathways and develop a programme of work to scope out and develop improved regional pathways, as well as the implementation of CRSCs and ESD.

The Welsh Government's strategic direction is for Regional CRSCs to be established across Wales and the stroke end to end pathway to be reviewed to meet required standards of care and create efficiencies. The national plan is for a CRSC to be situated in the Southwest Wales Region. This should cover all SBUHB and HDdUHB residents, where distance to the CRSC allows. The work programme established within the Region has identified Morriston Hospital as the most appropriate site for the CRSC. Due to the geography covered by HDdUHB, this means that only Carmarthenshire residents live within the catchment area appropriate to access the CRSC. However, as the Clinical Plan in HDdUHB progresses, with the build of a new emergency care hospital, flows for hyper-acute stroke care may change. A further programme of work will be required to model this, which is likely to also include Pembrokeshire residents.

HDdUHB Context

Inpatient stroke services within HDdUHB are currently provided at GGH, PPH, Bronglais Hospital (BGH) and Withybush Hospital (WGH). None of our stroke services meet the national staffing recommendations for stroke care and our population does not have access to specialised hyper-acute stroke care, ESD or psychology services. HDdUHB also does not provide seven-day cover for medicine, clinical nurse specialist or therapy services. As a result, HDdUHB is not able to provide the evidence-based standard of stroke care recommended by the Royal College of Physicians and measured by the Sentinel Stroke National Audit Programme (SSNAP).

Specific challenges include admitting patients to a stroke unit within 4 hours of arrival due to wider system demand pressures and the inability to ring-fence the stroke beds, assessment by the multi-disciplinary team within 24 hours of admission, assessment for thrombectomy and delivery of adequate levels of therapy treatment.

Carmarthenshire residents who suffer a stroke are currently admitted to stroke wards in Morriston Hospital, GGH and PPH. 44 beds are currently available for stroke patients in GGH (20) and PPH (24), from a bed base of 49 across both wards, with both wards taking stroke and general medical patients.

Pre-Covid-19, January-December 2019

- A total of 402 Carmarthenshire residents were admitted as having suffered a stroke; these were admitted to GGH and PPH

During the pandemic in 2020-2021, stroke admissions fell to 332. This is believed to be due a number of factors impacted by the pandemic.

April 2022 to March 2023

- A total of 369 Carmarthenshire residents were admitted having suffered a stroke
- 345 patients were admitted to GGH and PPH
- 24 patients Carmarthenshire residents were admitted to Morriston Hospital. (This figure is from 2021/22; figures for 2023/24 are not yet available)

Approximately the same number of stroke mimics present as stroke patients, with circa 36% of the stroke-mimics admitted to a stroke unit.

Due to the impact of the pandemic on stroke admissions, the 2019 admission figures have been used for both the CRSC Business Case and this Paper. This figure also assumes growth forecasts at the noted Welsh Government figure of 5% on the 2022/23 admitted data.

Problems with the current system

Across all sites, there is pressure on emergency care for all patients, not just stroke. Stroke patients are admitted through A&E, where there are delays in triage, assessment, scanning, and reporting, door to needle time, lack of specialist assessment out of hours, and non-specialist delivered care. The services are under immense demand pressures, and it is challenging for the organisation to ensure admission to a stroke unit within 4 hours. The current service is not able to meet the required targets.

The lack of ring-fenced stroke beds and all wards having beds used by other medical patients provides a challenge to the staff working in those areas, the pressures of broader unscheduled care demand limit stroke bed availability. This impacts the provision of specialist 24-hour stroke care and can lead to delays in admission to the stroke wards.

Mechanical thrombectomy is provided by North Bristol NHS Trust from 08.00-00.00, 7 days a week. This is a complex pathway; less than 1% of stroke sufferers currently benefit from this service. There are ongoing discussions across Wales about improving referral rates. The current stroke pathway configuration does not

easily support timely assessment and referral for thrombectomy, especially out of hours.

The current workforce model is less than efficient and not staffed to recommended staffing levels or for seven-day cover. The current stroke pathways are unsustainable, for example, with GGH being supported by only one consultant.

All the above factors have a negative impact on the Key Performance Indicators (KPIs) as measured by both the SSNAP Clinical and Acute Organisational Audits.

There is a robust evidence base that providing enhanced specialist staffing levels and a full multidisciplinary response at the right time and to the required levels of care, will maximise patient outcomes and improve quality of life for stroke survivors. This will also improve compliance with the existing KPIs.

6. Current Service Performance

SSNAP is a major national healthcare quality improvement programme. SSNAP measures the quality and organisation of stroke care in the NHS and is the single source of stroke data in England, Wales, and Northern Ireland. SSNAP measures the processes of care (clinical audit) provided to stroke patients and the structure of stroke services (organisational audit) against evidence-based standards, including the 2016 National Clinical Guideline for Stroke. SSNAP covers the whole stroke pathway.

The scores are calculated by taking the average KPIs across the whole pathway. The average KPI scores are taken from each area and then given a grade of A to E (A being the highest). Appendix C, Simplified Technical Information – SSNAP Key Indicators, details how these scores are calculated

Table 2 highlights the quarterly overall SSNAP Team Centred scores for 2019 and the reported scores to date for 22/23. Audit data during the Covid-19 pandemic was not analyzed or reported nationally. *The third period in 2022/23 was not reported for GGH. As can be seen both hospital sites fall short of delivering an A score, mainly due to insufficient staffing profile and inability to ring-fence the stroke unit beds and meet the pathway requirements.

Table 2. SSNAP Team Centred Scores

SSNAP Team Centered Scores			
	2019 Pre COVID	2021/22	2022/23
Prince Philip	DCCC	CCBD	DDC
Glangwili	DBCD	DDCC	DCX*

Table 3 shows pre-COVID-19 and current performance against a subset of the KPIs measured by the SSNAP Clinical Audit. Very few individual KPIs are currently being met.

Appendix B describes the full set of Clinical Audit KPIs including baseline figures and targets.

Table 3. Pre-COVID-19 and current performance against Clinical Audit KPIs

			2019 Pre COVID	2022-23	Target
Measure Clinical	Admitted to Stroke Unit within 4 hours of arrival to hospital	Prince Philip	73.30%	21.60%	95%
		Glangwili	57.60%	9.60%	95%
	CT Scanned within 1 hour	Prince Philip	80.50%	85.60%	95%
		Glangwili	75.20%	67.70%	95%
	% of all stroke patients to received Thrombectomy	Prince Philip	0.50%	1.60%	10%
		Glangwili	0.50%	0.00%	10%
	Stroke consultant review within 24hrs	Prince Philip	96.20%	96.80%	100%
		Glangwili	90.30%	82.70%	100%
Therapies Measure	Compliance with patients receiving the required minutes for OT (3-month rolling)	HDd Prince Philip	65.20%	57.90%	95%
		Glangwili	60.60%	34.80%	95%
	Compliance with patients receiving the required minutes for Physio (3-month rolling)	HDd Prince Philip	64.60%	48.30%	95%
		Glangwili	58.50%	45.60%	95%
	Compliance with patients receiving the required minutes for SALT (3-month rolling)	Prince Philip	21.30%	24.80%	95%
		Glangwili	56.30%	19.50%	95%
Discharge Standards	Percentage of applicable patients screened for nutritional status and seen by a dietitian by discharge	Prince Philip	100.00%	100.00%	100%
		Glangwili	100.00%	100.00%	100%
	Percentage of patients discharged with ESD/community therapy multidisciplinary	Prince Philip	0.00%	0.00%	30%
		Glangwili	0.00%	0.00%	30%
	Six month follow up assessments	Prince Philip	42.60%	100.00%	100%
		Glangwili	91.40%	19.10%	100%

Table 4 shows the scores for the last two Acute Organisational Audits for GGH and PPH. In the 2021 Acute Organisational Audit GGH and PPH achieved 2/10 and 1/10 standards audited, with both sites failing on all the required staffing levels apart from one (number of nurses on the ward at 10am at weekends).

The sites failed on:

- Minimum establishment of nurses per 10 beds
- Presence of a clinical psychologist
- Out of hours presence of a stroke specialist nurse
- At least two types of therapy available at weekends
- Access to a specialist ESD team

Table 4. SSNAP Organisational Audit

SSNAP Organisational Audit		
	2019 Pre COVID-19	2021
Prince Philip	3/10	1/10
Glangwili	4/10	2/10

The Health Board's performance in both audits will not improve without correcting the staffing establishments for the entire multidisciplinary team to the level of the national standards, as described in this Paper.

7. Outline of proposal and aim of the service change

In order to successfully deliver the CRSC for the region, the Carmarthenshire stroke pathway requires re-design in order to meet required standards of care, create efficiencies and enable timely flow and repatriation of patients back to Carmarthenshire (either directly to their home with ESD or to a Carmarthenshire hospital bed for further inpatient care. This will cover all current stroke admissions to GGH and PPH. This Paper sets out the workforce and financial implications in order to achieve the National Clinical Guidelines for Stroke for the UK and Ireland 2023 [Stroke Guidelines](#).

The Paper details the requirements both **pre** and **post** the CRSC admitting Carmarthenshire residents and considers stroke services being maintained at both GGH and PPH and if they are consolidated onto one site in Carmarthenshire.

It **does not** consider which site would be preferable if a one site model is a preferred scenario. This will need to be subject to a further piece of work in line with the HDdUHB Clinical Services Plan approved by Board in March 2023 which will include staff and public engagement.

The vision/goal is to:

- Support the pathway changes required to facilitate timely repatriation back to Carmarthenshire from the CRSC
- Introduce ESD across the Health Board
- Implement the recommendations from the National Clinical Guideline for Stroke for the UK and Ireland 2023
- Ensure that services provide an excellent patient experience, including improved access, clinical outcomes, and reduced mortality and disability
- Consistently achieve a Level B score in SSNAP across Carmarthenshire pre CRSC and a Level A score post CRSC implementation
- Maintain the previous level of Life After Stroke support, currently provided by the Stroke Association

8. Future Pathway and Bed Modelling Assumptions

The data considered within the assumptions is based on Clinical Guidelines, SSNAP Data for HDdUHB and has also been checked against peer groups in Wales.

The following assumptions have been used in the Paper:

- 2019 stroke admission figures (402) used as baseline (due to reduced numbers during COVID-19 period and to align with the ARCH Regional CRSC Programme Business Case)
- Patients admitted to the stroke unit(s) within 4 hours of arrival
- Stroke unit(s) will link with the All-Wales Thrombectomy pathway provided by North Bristol NHS Trust
- Robust pathways and standard operating procedures (SOPs) in place for stroke mimics
- Mimics represent a similar number of referrals as per actual stroke presentations
- 36% of stroke mimics will require admission to a CRSC bed
- Mimics (36%) to have a 1-day length of stay in stroke unit(s)
- Carmarthenshire residents only to access the CRSC
- Average length of stay for interim state is 19.7, for future state is 16.8 days
- 10% RIP/discharged within first 72 hours with no further care needs
- A further 30% discharged with an average LOS of 3 days with ESD
- The remaining 70% will require an additional average 4 days acute stay
- 55% of these patients will require up to an additional 40-day inpatient rehabilitation stay (up to a total Average LOS of 47 days)

Early Supported Discharge

ESD is an evidence-based model of delivering stroke rehabilitation in the patient's home rather than in a hospital bed. Evidence demonstrates that ESD for those with mild to moderate disability provides better outcomes for some patients than inpatient rehabilitation. By advocating a structured rehabilitation programme suited

to the needs of each individual, ESD will be an integral part of the integrated community stroke service that will allow for flexible working and clear oversight of the patient pathways. Support from the integrated community rehabilitation service will be needs based with the option for re-referral after discharge if rehabilitation needs goals are defined and with access to support services on discharge.

Evidence suggests that up to 40% of stroke patients can benefit from ESD. Based on success of ESD introduced across Wales and due to the rurality and geography of the Hywel Dda region, the Paper assumes that 30% patients will be discharged with ESD on average on day 3. As a result, the requirement for stroke beds will reduce as a direct consequence of implementing ESD.

The implementation of ESD in Carmarthenshire has been costed at £384,719, however, the Therapies Directorate plans to utilise the new Community allied health professions (AHP) funding stream to establish ESD across the HDdUHB region. A bid has recently been considered and approved by Welsh Government releasing £320K for Carmarthenshire, reducing the cost to the Health Board for ESD implementation in Carmarthenshire to £65k. There is also a requirement of one-off capital funding of £28K for equipment to enable ESD. Without this additional Health Board funding, ESD will still be partially implemented, but the full benefits will not be achieved. If the capital element of equipment purchase is not supported, this could create a revenue cost pressure of £28K.

Table 5 describes the numbers of beds required for stroke patients in Carmarthen for each of the four future states modelled in this Paper (including stroke mimics) as a result of implementing ESD. The bed modelling does not include seasonal variations and patterns of arrival, but for more accurate modelling in relation to this, a more detailed discrete event simulation modelling would need to be developed. However, modelling stroke patients provides a robust analysis of the stroke data and information on potential demands and bed requirements.

Table 5. Future Bed State Analysis for Carmarthenshire

TABLE: Stroke Clinical Guidelines Bed Modelling	Carmarthenshire Bed State Analysis HDdUHB by Scenario					
	Interim 1 - 2 Sites PPHGGH		Interim 2 - 1 Site One Site Model	Future 1 - 2 Sites PPHGGH		Future 2 - 1 Site One Site Model
Referrals	0.2	0.2	0.4	Assumes Pathway Redirection to Collaborative Regional Stroke Centre (CRSC) at		Assumes Pathway Redirection to Collaborative Regional Stroke
	1.6	1.7	3.3			
Acute Stroke Unit (ASU)	1.4	1.4	2.8	1.4	1.4	2.8
Rehabilitation	7.6	7.7	15.3	7.6	7.7	15.3
	11	11	22	9	9	18

The total number of stroke beds modelled as required in Carmarthenshire for the interim state, before Carmarthenshire residents have access to the CRSC are 22.

If the Health Board maintains a two-site model this would require 11 stroke beds on each of the GGH and PPH sites.

Once the CRSC accepts Carmarthenshire residents, the bed requirement will reduce to 18, or 9 on each of GGH and PPH sites as 4 beds will transfer to Morriston Hospital.

This is against a current planned bed base availability of 44 beds available for stroke patients across both sites.

SSNAP Clinical Audit data shows that for the periods 2019 and 2022 an average of 30 beds per year have been accessed for stroke patients in Carmarthenshire, giving a potential reduction in stroke beds of 8 and 12 beds for the interim and future states modelled. This reduced bed requirement is based on 30% stroke patients being discharged earlier in the pathway and supported with ESD providing rehabilitation in the patient's home, rather than the current model of receiving rehabilitation in a hospital bed.

The average length of stay (ALOS) for 2022 from SSNAP data was 30.7 days. The interim and future modelling shows an ALOS of 19.7 and 16.8 respectively. The reduction is related to the implementation of ESD and the assumed introduction of the CRSC.

Life After Stroke Care

For a number of years, the Health Board and Carmarthenshire Local Authority have provided a contract with the Stroke Association to provide Life After Stroke Care to stroke survivors (£75K and £43K respectively). The Local Authority has withdrawn their element of the funding (£43K) and the Stroke Association has requested that the Health Board considers its funding to replace this reduction, supporting this request with a petition of over 1,000 names. In real terms the reduction in funding will directly impact on the support able to be given to stroke survivors by the Stroke Association. The Health Board is due to re-tender for this service shortly and a decision is required as to whether the Health Board wishes to increase its funding to this contract by £43K, up to a total contract of £118K.

9. Scenario Appraisal

This Factual Assessment of the Stroke Pathway in Carmarthenshire Paper considers 5 scenarios.

Current State / Do Nothing

Stroke service to remain split across 2 sites, at current staffing levels employing **89.17** whole time equivalent (WTE) staff and costing **£4,024K**. With an estimated 30 beds required.

Interim State 1

Meeting National Clinical Guidelines for Stroke for the UK and Ireland 2023 (this scenario meets ASU standards and not HASU standards) plus introduction of ESD, at current levels of demand across the 2 sites in Carmarthenshire prior to the Carmarthenshire residents accessing the CRSC.

- Interim State 1 requires **117.24 WTE** staff at a cost of **£6,539K** plus £40K for ESD travel, bringing the total revenue costs to **£6,579K**.
- One off capital cost of **£38K** for IT and equipment
- Estimated 22 Beds Required (11 at each site)

Interim State 2

Meeting National Clinical Guidelines for Stroke for the UK and Ireland 2023 (this scenario meets ASU standards and not HASU standards) plus introduction of ESD, at current levels of demand condensed onto one site in Carmarthenshire prior to the Carmarthenshire residents accessing the CRSC.

- Interim State 2 requires **90.9 WTE** staff at a cost of **£5,106K** plus £40K for ESD travel, bringing the total revenue costs to **£5,146K**
- One off capital cost of **£34k** for IT and equipment.
- Estimated 22 Beds at one site.

Future State 1

Meeting National Clinical Guidelines for Stroke for the UK and Ireland 2023 (HASU standards within the CRSC at Morriston, at current levels of demand based on maintaining 2 sites in and ASU Standards upon step down) plus introduction of ESD, to deliver the step-down care from the CRSC and the remaining Stroke Pathway.

- Future State 1 requires **101.67 WTE** staff at a cost of **£5,772K** plus £40K for ESD travel, bringing the total revenue costs to **£5,812K**.
- One off capital cost of **£38K** for IT and equipment support.
- Estimated 18 Beds (9 at each site)

Future State 2

Meeting National Clinical Guidelines for Stroke for the UK and Ireland 2023, (HASU standards within the CRSC at Morriston, at current levels of demand based on maintaining 2 sites in and ASU Standards upon step down) at current

levels of demand at one site in Carmarthenshire plus introduction of ESD, to deliver the step-down care from the CRSC and the remaining Stroke Pathway.

- Future State 2 requires **87.4 WTE** staff at a cost of **£4,829K** plus £40K for ESD travel, bringing the total revenue costs to **£4,869K**
- One off capital cost of **£34K** for IT and equipment.
- Estimated 18 Beds at one site

Table 6 summarises the workforce requirements and costs for each scenario. The detailed workforce breakdown and associated costs can be found in Appendix D.

Table 6. Summary of Workforce Requirements and Costs

		Current State 30 beds *costed at current staffing establishment	Interim State 1 11+11 beds *costed at TOS	Interim State 2 22 beds *costed at TOS	Future State 1 9+9 beds *costed at TOS	Future State 2 18 beds *costed at TOS
Workforce (WTE)	Medical	12	16	10	16	10
	Nursing	60.87	66.02	48.07	53.45	48.07
	clinical nurse specialist(CNS)	2	6.72	4.82	6.72	4.82
	Therapies	14.3	17.5	17	14	12
	ESD	0	9.5	9.5	9.5	9.5
	Pharmacy	0	1.5	1.5	1.5	1.5
	Total Workforce	89.17	117.24	90.9	101.67	87.4
Revenue Costings (£K)	Workforce	£4,024	£6,539	£5,106	£5,772	£4,829
	Non-Pay	£0	£40	£40	£40	£40
	Total Costs	£4,024	£6,579	£5,146	£5,812	£4,869
-WG AHP Funding (£K)			-£320	-£320	-£320	-£320
Total Health Board Costs (minus AHP Funding) (£K)		£4,024	£6,259	£4,826	£5,492	£4,549
Cost Difference from Current Service Costs (including AHP Funding) (£K)			-£2,235	-£802	-£1,467	-£525

Note the staffing costs for the interim and future states are relatively higher than the current state due to calculating for seven-day services with enhanced rates of pay and using top of scale (TOS) compared to actual current funded establishments.

Applying a more robust medical infrastructure based on five-day working, which better supports training and future sustainability of workforce, increases the medical requirements if maintaining a two-site model, but reduces the requirement if the Health Board moves to a one-site model. The medical workforce has not been applied at a seven-day level as this is only required for the hyper-acute phase.

Despite the application of the stroke staffing standards for nursing and the addition of extra CNSs, the reduction in bed numbers reduces the nursing workforce requirements in three out of the four interim and future scenarios.

For therapy staffing (including psychology) the application of the staffing standards increases the inpatient staffing establishment for the interim models but reduces this slightly for the future models with the further reduction to 18 beds. The requirement for seven-day working for such a small workforce may prove challenging and will be more difficult to sustain over two sites.

In all four interim and future scenarios the implementation of ESD requires an additional 9.5WTE therapy staff. As this is split over a number of professional groups this is not anticipated to be a challenge to recruit to.

A Specialist Prescribing Pharmacist post and supporting Pharmacy Technician has been added as, although these staff are not included in the Clinical Standards, there are recognised benefits such as specialist clinical decision making around pharmaceutical use, interfacing across regional, secondary and primary care boundaries, providing follow up and input into transient ischaemic attack (TIA) clinics and reducing unnecessary costs such as costly liquid formulations of oral medicines.

The overall staffing requirements and associated costs for maintaining a two-site model in Carmarthenshire for both the interim and future states is significantly higher than moving to a one-site model of care.

Table 7 describes a high-level view of some of the perceived benefits and challenges associated with both maintaining a two-site and moving to a one-site model for stroke inpatient care. A further detailed options appraisal will be required to fully assess the implications of each scenario.

Table 7. Perceived Benefits and Challenges of a Two-site and One-site Model

	Two site model	One site model
Perceived benefits	Maintaining stroke care on both GGH and PPH would mean current staff can continue to work in the stroke specialty without moving base. Retain shorter travel time for patients and carers/visitors in ability to access closest hospital to their home.	Lower staffing requirements and reduced overall costs for the stroke pathway. Improved ability to recruit and retain staff at the required levels as lower requirement, and as a dedicated stroke specialist workforce working on one unit may improve staff satisfaction and future workforce sustainability. Easier to maintain a seven-day service. The reduced bed requirements of 22 and 18 for the interim and future states makes it feasible to move to a one-site model that is a dedicated stroke unit, without the addition of medical beds on the same ward. This should enable the ward to be ring-fenced for stroke care improving timely admission and flow.
Perceived challenges	Higher staffing requirements and costs for the stroke pathway. Bigger challenge to recruit and retain staff at the required levels. Bigger challenge to maintain a seven-day service. The reduced bed requirements of 11 and 9 per site for the interim and future states makes it challenging to retain a stroke specialist focus as a larger number of beds on each ward will be for general medicine or other specialty. This may detract from the ward being seen as a stroke unit and make it difficult to ring-fence beds for stroke care impacting on timely admission and flow. This may also impact on staff morale.	Patients and carers/visitors may have a further distance to travel as the stroke unit may not be based in their closest hospital site. Current inpatient stroke staff may need to move base in order to continue to work in the stroke specialty. If the stroke unit is in GGH, we may see more residents in southeast Carmarthenshire accessing Morriston Hospital. If the stroke unit is in PPH, we may see more residents in north/northwest/southwest Carmarthenshire accessing BGH or WGH.

Table 8 describes a high-level analysis of each scenario against a set of relevant parameters. Each of the interim and future scenarios have benefits over the current pathway.

Table 8. Summary Analysis of Scenarios

	Scenarios				
Requirements	1	2	3	4	5
National Clinical Guidelines for Stroke for the UK and Ireland 2023 standards of best practice.	×	✓	✓	✓	✓
Provide high quality hyper-acute stroke care for Carmarthenshire residents through the provision of stroke specialist care 24/7.	×	×	×	✓	✓
Prompt and optimal intervention – thrombolysis and mechanical thrombectomy.	×	✓	✓	✓	✓
Admitted to the stroke unit within 4 hours of arrival at the hospital (would be easier to ring-fence a stroke specific ward)	×	?	✓	?	✓
Provide access to a full multidisciplinary therapy team.	×	✓	✓	✓	✓
Offer Early Supportive Discharge	×	✓	✓	✓	✓
Achieving an A/B SSNAP score.	×	✓	✓	✓	✓
Achieving an Organisational Audit Score of 10	×	✓	✓	✓	✓
Sustainable Service and Workforce	×	×	✓	×	✓
Ensure that services provide an excellent patient experience, including improved access, clinical outcomes, and reduced mortality and disability.	×	✓	✓	✓	✓
Ensure equity across the region for patients within appropriate traveling distance.	×	✓	?	✓	?
Establish and implement a fair and transparent decision-making process.	×	✓	✓	✓	✓
Deliverability					
Workforce / Recruitment	×	?	✓	?	✓
Estates – ability to maintain a stroke specific ward	×	×	✓	×	✓
Cost	×	×	?	×	?

✓	Fully meets the requirements
?	Partially meets the requirements
×	Does not meet the requirements

Table 9 shows the benefits realisation plan assessed against each scenario. Both Interim State models realise some benefits over the current service model. The Future State 2 model will provide the highest level of benefit.

Table 9. Benefits Realisation Plan

Desired Objectives	Benefit	Current State (Baseline)			Target Future State	Current State	Interim State 1	Interim State 2	Future State 1	Future State 2
Improved Patient Quality, Safety & Experience	Stroke Patients receive improved experience: - Timely access to the full Multi-Disciplinary Team (MDT) - Patients / Carers / Families feel active communication to inform shared decision making with the MDT - Patients experience reduced Quality & Safety incidents	Patient Reported Experience Measure (PREM) is currently not being measured; therefore, there is no baseline. PREMs will start to be recorded, and as the charges are implemented improvements will be made.								
		SSNAP AUDIT Domain								
		Prince Philip	2019 Pre COVID DCCC	2021/22 DDC	SSNAP AUDIT Overall Future State = 'A'		?	?	✓	✓
		Glangwili	DBCD	DCX						
Improved Patient Outcomes	Stroke Patients will benefit from: - Improved Physical and Psychological Health and Wellbeing - Improved co-morbidity rate - Reduced Reoccurrence rate - Reduced Mortality rate	Patient Reported Outcome Measure (PROM) is currently not being measured; therefore, there is no baseline. PROMs will start to be recorded, and as the changes are implemented improvements will be made.								
		SSNAP AUDIT Domain								
		Prince Philip	2019 Pre COVID DCCC	2021/22 DDC	SSNAP AUDIT Overall Future State = 'A'		?	?	✓	✓
		Glangwili	DBCD	DCX						
Improved Stroke Pathway	Stroke Patients on the pathway will benefit from - There is improved patient flow within the system - Reduced Length of Stay (LOS) - Early Supported Discharge (ESD) - Reduced reliance on Local Authority services	SSNAP AUDIT Domain								
		Prince Philip	2019 Pre COVID DCCC	2022/23 DDC	SSNAP AUDIT Overall Future State = 'A'					
		Glangwili	DBCD	DCX						
		April / Dec 2022 Average LOS 30.7 days			Average LOS Interim States 19.7 days Future States 16.8 days		?	?	✓	✓
		Early Supported Discharged								
			2019 Pre COVID	2022/23	ESD 30% by day 3					

		Prince Philip Glangwili	0% 0%	0% 0%						
Improved Safe & Sustainable Workforce	Stroke workforce will benefit from a: • Dedicated and appropriately trained workforce • Improved recruitment & retention • Reduced reliance on Bank & Agency staff across the MDT. • Improved Absence rates • Improved leadership and training opportunities	SSNAP Organisational Audit			SSNAP Organisational Audit 10/10		?	?	✓	✓
			2019 Pre COVID	2021						
		Prince Philip	3/10	1/10						
		Glangwili	4/10	2/10						
Financial Efficiencies	Financial Benefits may be considered from a Value based approach including: • Invest to save and reduction in long terms costs of care for patient cohorts • Non cashable savings in LOS and Occupied bed days	TBC			TBC		×	✓	×	✓

✓	Fully meets the requirements
?	Partially meets the requirements
×	Does not meet the requirements

10. Management Case

Governance

The Governance Structure supporting the Stroke Service Re-design is multi-layered.

On a Health Board footprint, the Stroke Service is one of the priority pathways for review as part of the Clinical Services Plan and as such will be monitored via Executive Team and the Strategic Development and Operational Delivery Committee. The work is supported by the Health Board Stroke Steering Group.

On a regional level the Stroke Service Re-design is managed via the ARCH Programme and reports through the ARCH Governance structure. The Carmarthenshire Stroke Pathway is inter-dependent with the ARCH CRSC Business Case.

On a national level the National Stroke Programme Board, supported by the national Stroke Implementation Group and managed within the NHS Executive function, is striving to improve stroke care across Wales. This Paper and the ARCH CRSC Business Case are aligned to the national strategic direction from stroke in Wales.

Engagement and Communications

To support this specific stage of the stroke re-design programme, engagement with Llais Cymru (previously CHC) has been undertaken. A discussion has also been held with the Consultation Institute.

There is currently a planned national programme of engagement with reference to Stroke services at an all-Wales level.

Further Regional engagement will be included within the HDdUHB engagement for the Clinical Service Plan.

11. Next Steps

These will include:

- Targeted public and staff engagement
- Completion of an issues paper to inform the HDdUHB Clinical Services Plan
- Options development phase and a full options appraisal of the possible inpatient stroke models across the Health Board via the Clinical Services Programme
- A full impact assessment of any site changes – including staff groups, services and partners affected by any site changes
- Detailed analysis by WAST of any transport changes required to support any changes in patient flow, as a result of any site changes and to support the CRSC implementation, which may incur additional costs
- Application of the Clinical Staffing Standards to the Ceredigion and Pembrokeshire Stroke Pathways

A future piece of review work will also be required to support changes to the inpatient element of the stroke pathway ahead of the new hospital build.

12. Conclusions

This Factual Assessment of the Stroke Pathway in Carmarthenshire Paper sets out to understand the following areas that may impact Stroke services within Carmarthenshire:

- *HDdUHB Stroke Pathway Performance* - inability to meet the national standards for stroke care as measured by the Sentinel Stroke National Audit Programme (SSNAP)
- *ARCH Comprehensive Regional Stroke Centre (CRSC)* – this paper describes the resource impact for the rest of the stroke pathway in Carmarthenshire to support the CRSC ensuring appropriate flow and timely repatriation to Carmarthenshire
- *HDdUHB Clinical Services Plan* – this paper will be a component part of the plan and inform the Issues Development Paper where opportunities and challenges in relation to resources can be better understood
- *New Stroke Clinical Guidelines April 2023* – this paper incorporates the updated clinical standards for stroke

To understand the impact of the drivers described above, the following deductions have been concluded:

- Stroke Pathway performance is in a deteriorating position and maybe at risk of continuing this trajectory without intervention and investment to meet and attain the required standards. (Extract from Table 3 above)

		2019 Pre COVID	2022-23	Target
Admitted to Stroke Unit within 4 hours of arrival to hospital	HDd Prince Philip	73.30%	21.60%	95%
	HDd Glangwili	57.60%	9.60%	95%

- Audits for SSNAP show both a clinical and organisational (workforce) deteriorating position (Extract from Table 2 and 4 above). As highlighted below:

SSNAP Team Centered Scores			
	2019 Pre COVID	2021/22	2022/23
Prince Philip	DCCC	CCBD	DDC
Glangwili	DGCD	DDCC	DCX*

SSNAP Organisational Audit		
	2019 Pre COVID	2021
Prince Philip	3/10	1/10
Glangwili	4/10	2/10

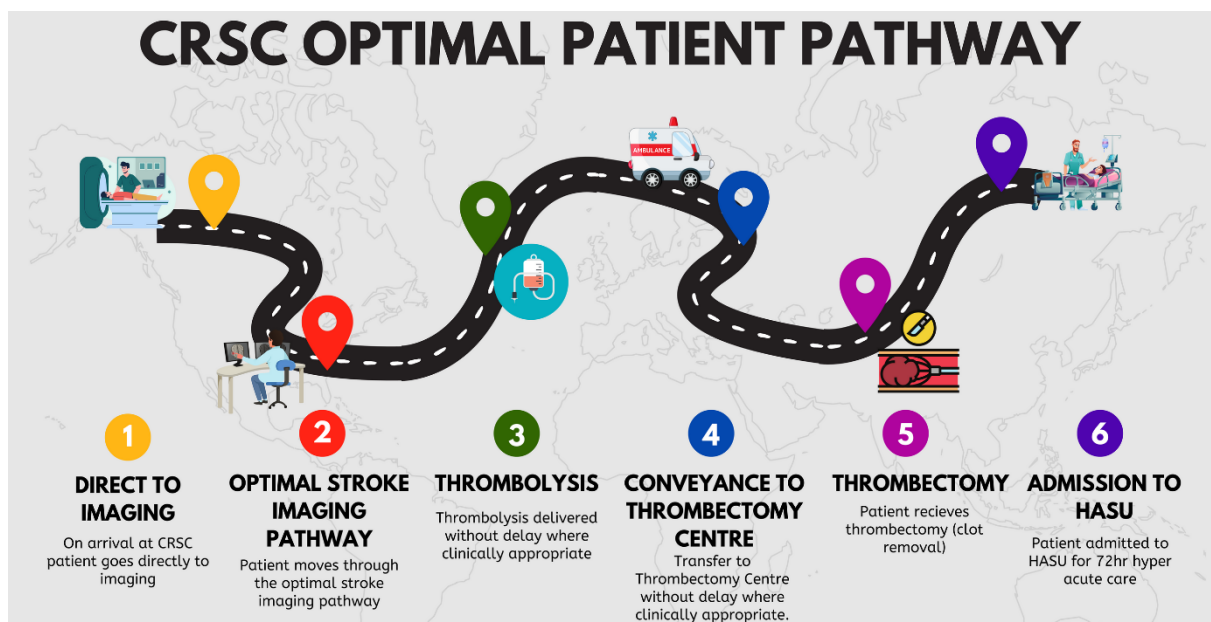
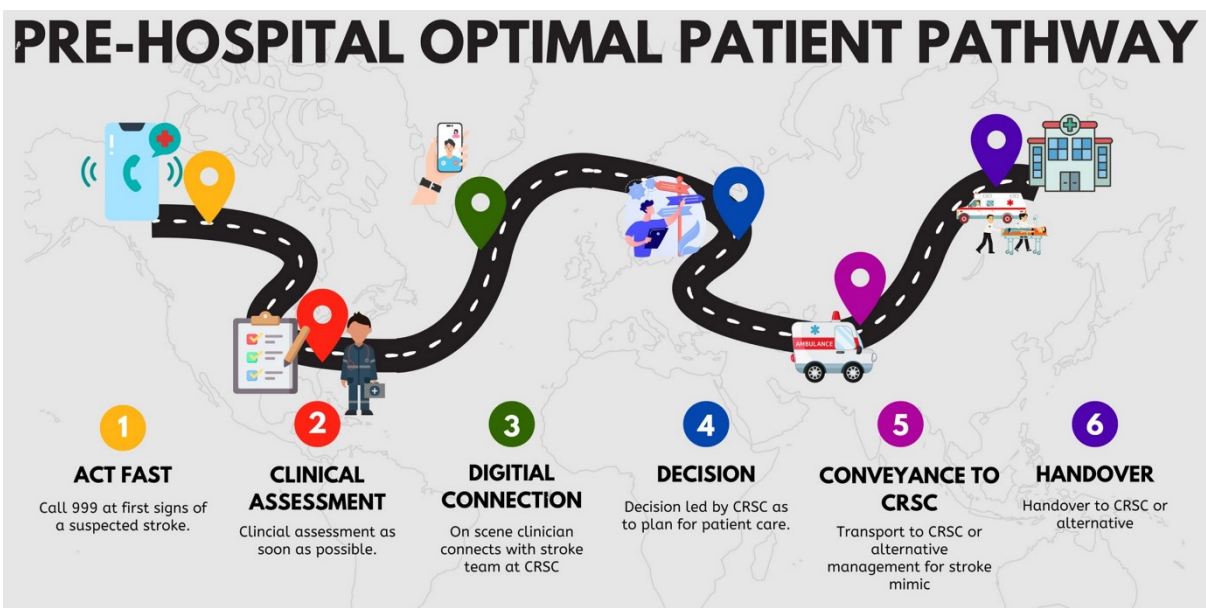
- The Benefits Realisation Plan assumes a future SSNAP performance state of 'A' and assumes achievement of 40% of patients not requiring a stay longer than 72hrs, therefore not impacting HDdUHB Hospital Beds in the future state.
- The ARCH CRSC Business Case if approved by board directly impacts operational services within Carmarthenshire and drives additional questions around workforce and financial sustainability of operational delivery when considering this paper as well as the clinical guideline changes as highlighted within Table 5 above.
- The Interim state considers the impact of meeting current clinical guidelines and meeting required staffing levels as set out within the clinical guidelines. Whereas the future case considers the impact of both the clinical guideline requirements and the ARCH CRSC Business Case treating patients for the first 72hrs.
- The current Stroke pathway has a planned bed state of 44 beds across two sites. Assessment of the current SSNAP data indicates 30 beds being utilised for stroke care., with an impact assessment of the Interim state highlighting a need for 22 beds and a future state of 18 beds.
- Taking no action in consideration of the above assessment will be at a clinical risk to patients, our workforce in delivery of safe and sustainable services.

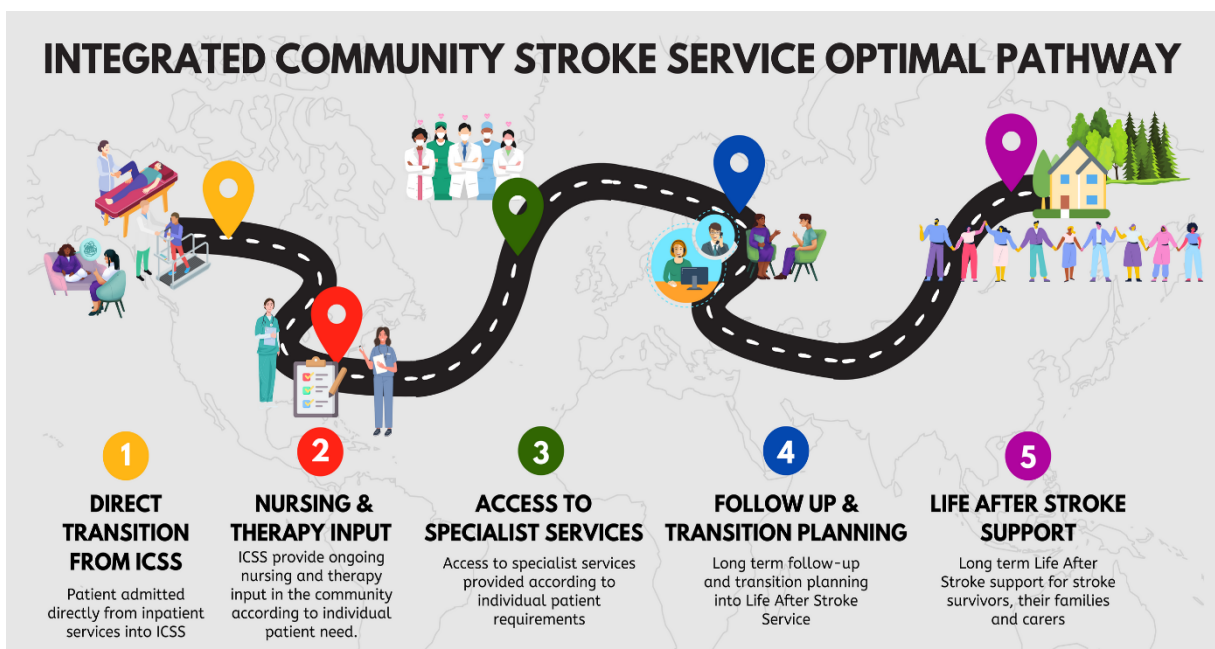
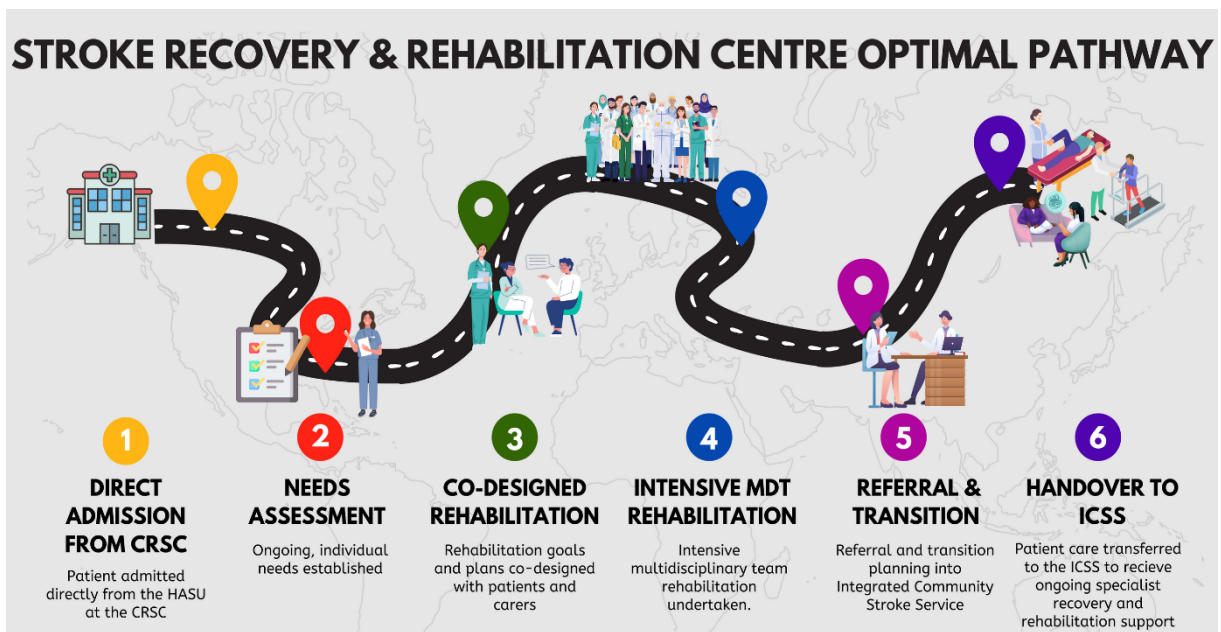
As a result of both this factual and clinical analysis, the Board is asked to:

- Note the plan to undertake a detailed analysis of options for inpatient care via the Clinical Services Programme.
- Note the investment required to right-size the stroke workforce in Carmarthenshire across the stroke pathway to achieve improved standards of care

Appendices

Appendix A - Optimal Patient Pathway, supplied by the National Programme





Appendix B – Baseline Figures and Forecasted Trajectories

See separate document

Appendix C - A Simplified Technical Information – SSNAP Key Indicators

See separate document

Appendix D – HDdUHB Financial & Workforce Breakdown

See separate document

Simplified Technical Information – SSNAP Key Indicators

Introduction

The purpose of this simplified technical information document is to explain in easy-to-follow steps how each of the key indicators is calculated. It is hoped that this document will better enable teams to understand how each of the key indicators is derived and help empower individuals to understand where performance could be improved.

Layout of this document:

Inclusion criteria: Outlines which patients are applicable for the key indicator.

Exclusion criteria: The patients for whom the key indicator does not apply are noted in a red box to help identify which patients are applicable for each standard.

A description of how to calculate the key indicator is given.

For team-centred	For patient-centred
Which patients are included in the team centred key indicator performance	Which patients are included in the patient centred key indicator performance

Examples:

Examples of how to calculate each patient's achievement of the key indicator, and how to combine patients' achievements into the team's cohort median or percentage are given.

Document: Simplified Technical Information for Key Indicators

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Definitions

Cohorts of patients

In SSNAP reporting, the processes of care and patient outcomes are reported in two ways – patient-centred and team-centred.

Patient-centred

Patient-centred attribute the results to every team which treated the patient at any point in their care. This recognises that the stroke care pathway usually involves many teams treating the patient at different points. This holistic approach is aimed at encouraging teams to work closely together to ensure consistency of care. It is 'patient-centred', because it describes the care and outcomes from the patient perspective, regardless of which team treated the patient.

Team-centred

Team-centred attribute the results to the team considered to be most appropriate to assign the responsibility for the measure to. It is recognised that it is useful to provide results on a team-centred basis so that teams can see the results for the interventions delivered.

Patient-centred 72h cohort

This section shows the patient-centred results for the first 72 hours of care and is based on records locked to 72h for patients who arrived at hospital (or had their stroke in hospital) in the respective reporting period.

Team-centred 72h cohort

The team-centred results for the first 72 hours of care are based on records locked to 72h for patients who arrived at hospital (or had their stroke in hospital) in the respective reporting period, and attributed to the first team which treated the patient, regardless of which team locked the record to 72h (i.e. the second team may have locked the record to 72h, but results are attributed to first team).

Please note: For the team-centred 72h results, all measures are attributed to the first team which treated the patient. Although this does not take account of the very small number of patients transferred within 72h, it ensures that the results are as simple as possible to follow.

Patient-centred post-72h cohort

This section shows the patient-centred results between 72 hours and discharge from inpatient care and is based on records locked to discharge for patients who were discharged from inpatient care in the respective reporting period.

It is attributed to all teams which treated the patient at any point in their care.

This means that a team which only treated the patient during the first 72h will still have the results for this patient's care between 72 hours and discharge from inpatient care. We hope that this will encourage an open dialogue between teams treating patients along a care pathway and that teams treating the patient initially reflect on the continuing care they receive, as this will also impact upon the initial team's longer term outcome results.

Team-centred post-72h cohort: 7 day team

For the team-centred post-72h results, measures are attributed to teams depending on the point at which they treated the patient along the inpatient pathway.

Results attributed to the '7 day team' are attributed to the team which had the patient in their care at 7 days following clock start (or, if the length of stay as an inpatient was less than 7 days, the team which discharged the patient from inpatient care).

These results include measures which are considered to be most appropriately designated to the team which had the patient in their care at 7 days, but does not necessarily indicate that the care was received within 7 days.

For instance, one measure in this section is whether the patient had a urinary continence plan by discharge. It is attributed to the team which had the patient at 7 days, but the measure is whether the patient had the plan by discharge, regardless of which team provided the plan.

The team-centred post-72h results are based on records locked to discharge for patients who were discharged from inpatient care in the respective reporting period.

Team-centred post-72h cohort: inpatient discharge team

Results attributed to discharging team are attributed to the team which discharged the patient from inpatient care.

The team-centred post-72h results are based on records locked to discharge for patients who were discharged from inpatient care in the respective reporting period.

Team-centred post-72h cohort: all teams

Results attributed to all teams are for measures which are answered for every patient by every team along the pathway (therapy intensity, rehab goal setting, length of stay in hospital and on stroke unit and the discharge/transfer destination).

These results are based only on what the team provided rather than what the patient received across the whole pathway, e.g. the team-centred length of stay is the length of stay at each particular team compared to the patient-centred length of stay which is the length of stay the patient had across all teams.

The team-centred post-72h all teams results are based on records locked to discharge or where a transfer to another team has been actioned in the respective reporting period. This includes all records which have either been discharged out of inpatient care or transferred to another inpatient team.

Clock start

The term 'Clock start' is used throughout SSNAP reporting to refer to the date and time of arrival at first hospital for newly arrived patients, or to the date and time of symptom onset if patient already in hospital at the time of their stroke.

i.e. the date and time of first arrival at hospital (Q1.13) for newly arrived patients (Q1.10 is "No"), or the date and time of onset/awareness of symptoms (Q1.11) if patient was already an inpatient at the time of stroke (Q1.10 is "Yes").

Proportion

The number of patients who achieved the indicator (numerator) over the number of applicable patients (if it is expressed as a percentage then this number is multiplied by 100).

$$\text{Proportion} = \frac{\text{numerator}}{\text{denominator}}$$

Percentage

The number of patients who achieved the indicator (numerator) multiplied by 100 over the number of applicable patients.

$$\text{Percentage} = 100 * \frac{\text{numerator}}{\text{denominator}}$$

1. Scanning Key Indicators:

1.1 Percentage of patients that were scanned within 1 hour of clock start

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were scanned in 1 hour or less.

Denominator = all the patients in the cohort. Patients who are not scanned are only included in the denominator.

To calculate whether a patient is included in the numerator:

For patients newly arriving at hospital, the difference between the date and time of arrival (Q 1.13) and the date and time of scan (Q 2.4) must be less than or equal to 60 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time of symptom onset (Q 1.11) and the date and time of scan (Q 2.4) must be less than or equal to 60 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort	All patients in the patient-centred 72h cohort

Example

Patient X arrived (clock start) at hospital at 18:57 on Tuesday. They were then scanned at 19:16 that same day. Patient X has achieved the indicator because 19:16-18:57 = 19 minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Friday. They were then scanned at 13:16 that same day. Patient Y has not achieved the indicator because 13:16-12:15 = 61 minutes.

Patient Z onset in hospital (clock start) at 20:08 on Saturday. They were not scanned. Patient Z has not achieved the indicator because they were not scanned.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

1.2 Percentage of patients that were scanned within 12 hours of clock start

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were scanned in 12 hours or less.

Denominator = all the patients in the cohort. Patients who are not scanned are only included in the denominator.

To calculate whether a patient is included in the numerator:

For patients newly arriving at hospital, the difference between the date and time of arrival (Q 1.13) and the date and time of scan (Q 2.4) must be less than or equal to 720 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time of symptom onset (Q 1.11) and the date and time of scan (Q 2.4) must be less than or equal to 720 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort	All patients in the patient-centred 72h cohort

Example

Patient X arrived (clock start) at hospital at 18:57 on Tuesday. They were then scanned at 19:16 that same day. Patient X has achieved the indicator because $19:16 - 18:57 = 19$ minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Friday. They were then scanned at 13:16 that same day. Patient Y has achieved the indicator because $13:16 - 12:15 = 61$ minutes.

Patient Z onset in hospital (clock start) at 20:08 on Saturday. They were not scanned. Patient Z has not achieved the indicator because they were not scanned.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

1.3 Median time between clock start and scan (hours:mins)

Included: all patients who were scanned are included in this indicator.

Excluded: Patients who were not scanned are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and scan is the difference between the date and time of arrival (Q 1.13) and the date and time of scan (Q 2.4).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and scan is the difference between the date and time of symptom onset (Q 1.11) and the date and time of scan (Q 2.4).

Cohort median: To find the median time, all the times between clock start and scan need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred	For patient-centred
All patients in the team-centred 72h cohort who receive a scan	All patients in the patient-centred 72h cohort who receive a scan

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were scanned at 13:18 that same day. Patient A's time from clock start to scan was 0:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were scanned at 10:16 that same day. Patient B's time from clock start to scan was 1:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not scanned so are excluded.

Patient D arrived (clock start) at hospital at 07:00 on Friday. They were scanned at 07:38 that same day. Patient D's time from clock start to scan was 0:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were scanned at 04:47 that same day. Patient E's time from clock start to scan was 1:32.

Patient F arrived (clock start) at hospital at 23:33 on Friday. They were scanned at 00:03 on Saturday. Patient F's time from clock start to scan was 0:30.

Listing in numerical order: 0:21 0:30 0:38 1:01 1:32

The cohort median is 0 hours 38 minutes.

2. Stroke Unit Key Indicators

2.1 Percentage of patients directly admitted to a stroke unit within 4 hours of clock start (CCG OIS C3.5 and 2016 NICE QS Statement 1)

Included: all patients who were admitted to hospital are included apart from patients whose first ward they were admitted to was Intensive Therapy Unit (ITU) / Coronary Care Unit (CCU) / High Dependency Unit (HDU) or patients who received an intra-arterial intervention for acute stroke.

Excluded: patients who were first admitted to an ITU/CCU/HDU ward or patients who received an intra-arterial intervention for acute stroke are excluded from this indicator

Numerator = the number of patients who were admitted to a stroke unit within and including 4 hours of clock start.

Denominator = all the patients in the cohort (excluding the patients who were admitted to ITU/CCU/HDU or patients who received an intra-arterial intervention).

To calculate whether a patient is included in the numerator:

- Firstly, identify the number of patients where “Stroke Unit” is the first ward the patient was admitted to at the first hospital (Q 1.14) and who did not receive an intra-arterial intervention (Q2.11 is “No”).
- Then identify the number of these patients:
 - newly arriving at hospital where the difference between the date and time of arrival (Q 1.13) and the date and time the patient first arrived on the stroke unit (Q 1.15) is less than or equal to 240 minutes
 - already in hospital where the difference between the date and time of symptom onset (Q 1.11) and the date and time the patient first arrived on the stroke unit (Q 1.15) is less than or equal to 240 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred 72h cohort except those who went to ITU/CCU/HDU or received an intra-arterial intervention

For patient-centred

All patients in the patient-centred 72h cohort except those who went to ITU/CCU/HDU or received an intra-arterial intervention

Example

Patient Q arrived (clock start) at hospital at 18:57 on Wednesday. They were directly admitted to the stroke unit at 20:57 that same day. Patient Q has achieved the indicator. They were directly admitted to a stroke unit in 120 minutes.

Patient R arrived (clock start) at hospital at 14:15 on Sunday. They were directly admitted to the stroke unit at 20:16 that same day. Patient R has not achieved this indicator. They were admitted to the stroke unit in 361 minutes which is more than 240 minutes.

Patient S arrived (clock start) at hospital at 20:08 on Saturday. They were not directly admitted to a stroke unit, they were first admitted to a general ward (MAU/AAU/CDU) before being admitted to a stroke unit at 21:08. Patient S has not achieved this indicator as they were not **directly** admitted to a stroke unit (or ITU/CCU/HDU).

Patient T arrived (clock start) at hospital at 03:45 on Tuesday. They were directly admitted to HDU. Patient T is excluded because they were first admitted to HDU.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{\text{(Patient Q)}}{\text{(Patient Q, Patient R and Patient S)}}$

2.2 Median time between clock start and arrival on stroke unit (hours:mins)

Included: all patients who were admitted to a stroke unit at the first hospital they were admitted to are included in this indicator.

Excluded: patients who were not admitted to a stroke unit at the team the patient was first admitted are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and scan is the difference between the date and time of arrival (Q 1.13) and the date and time the patient first arrived on the stroke unit (Q 1.15).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and scan is the difference between the date and time of symptom onset (Q 1.11) and the date and time the patient first arrived on the stroke unit (Q 1.15).

Cohort median: To find the median time, all the times between clock start and arrival on stroke unit need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred

All patients in the team-centred 72h cohort who went to a stroke unit at the team the patient was first admitted to

For patient-centred

All patients in the patient-centred 72h cohort who went to a stroke unit at the team the patient was first admitted to

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were admitted to the stroke unit at 16:18 that same day. Patient A's time from clock start to stroke unit was 3:21.

Patient B onset in hospital (clock start) at 09:15 on Friday. They were admitted to the stroke unit at 11:16 that same day. Patient B's time from clock start to stroke unit was 2:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not admitted to the stroke unit at this team. They stayed on a medical assessment unit (MAU). Patient C was not admitted to a stroke unit so is excluded.

Patient D arrived (clock start) at hospital at 07:00 on Friday. They were admitted to the stroke unit at 07:38 that same day. Patient D's time from clock start to stroke unit was 0:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were admitted to the stroke unit at 04:47 that same day. Patient E's time from clock start to stroke unit was 1:32.

Patient F arrived (clock start) at hospital at 23:33 on Friday. They were admitted to the HDU. Patient F was admitted to HDU so is excluded.

Patient G arrived (clock start) at hospital at 16:15 on Monday. They were admitted to the stroke unit at 17:59 that same day. Patient G's time from clock start to stroke unit was 1:44.

Listing in numerical order: 0:38 1:32 1:44 2:01 3:21

The cohort median is 1 hour 44 minutes.

2.3 Percentage of patients who spent at least 90% of their stay on stroke unit

Included: all patients are included in this indicator, except those who went directly to ITU/CCU/HDU during their stay in hospital and those who died on the same day as arrival/onset of symptoms.

Excluded: patients who were admitted to ITU/CCU/HDU and those who died on the same day as arrival/onset of symptoms are excluded from this indicator

Numerator = patients who spent at least 90% of their stay on a stroke unit.

Denominator = all patients in the cohort (apart from the patients who were admitted to ITU/CCU/HDU and those who died on the same day as arrival/onset of symptoms).

To calculate the number of patients who spent at least 90% of their stay on a stroke unit, the length of stay must first be calculated.

The length of stay is calculated as the difference between the date and time of discharge/death and either date and time of arrival for newly arrived patients or onset of symptoms for inpatient strokes.

To identify **date and time of discharge/death** for patients:

- who were discharged alive, use:
Q 7.3 Date and time of discharge/ transfer from team
- who died on a stroke unit (Q 7.1.2 is Yes), use:
Q 7.1.1 What was the date of death? with an assumed time component of 23:59
- who died in hospital but not on a stroke unit (Q 7.1.2 is “No”) and were discharged from the stroke unit on the same day as death (Q 7.2 and Q 7.1.1 is the same date), use:
Q 7.2 Date and time of discharge from stroke unit
- who died in hospital but not on a stroke unit either because they were not admitted to a stroke unit at that team (Q 4.3 is Did not stay on a stroke unit) or because they were discharged from the stroke unit before the date of death (Q 7.1.2 is “No” and Q 7.2 is before Q 7.1.1), use:
Q 7.1.1 What was the date of death? with an assumed time component of 00:00
- who were transferred to another inpatient team (Q 7.1 is “Was transferred to another inpatient care team”), use:
Q 7.3 Date and time of discharge/ transfer from team

For team-centred

The length of stay at each team is the difference between the date and time of team discharge/death as calculated above and either the date and time patient arrived at this hospital team (Q 4.1), or the date and time of symptom onset (Q 1.11) for patients already in hospital (Q 1.11 is only used for the first team).

For patient-centred

The length of stay across the whole inpatient stay is the difference between the date and time of final inpatient discharge for each patient and either date and time of arrival (Q 1.13), or date and time of symptom onset (Q 1.11) for patients already in hospital.

4 hours is then taken away from the length of stay, as this makes the inclusion of patients with short lengths of stay feasible for this indicator.

Next, the length of stay on a stroke unit must be calculated.

To identify **the length of stay on a stroke unit** for patients:

- discharged/transferred alive:
the length of stay on a stroke unit is the difference between Q 4.3 (the date and time the patient arrived on stroke unit at this hospital) and Q 7.2 (date and time of discharge from stroke unit)
- who die on a stroke unit (Q 7.1.2 is “Yes”):
the length of stay on a stroke unit is the difference between Q 4.3 (date and time the patient arrived on stroke unit at this hospital) and the date component given in Q 7.1.1 (What was the date of death?) with a time component of 23:59
- who die in hospital but not on a stroke unit (Q 7.1.2 is “No”):
the length of stay on a stroke unit is the difference between Q 4.3 (date and time the patient arrived on stroke unit at this hospital) and Q7.2 (date and time of discharge from stroke unit)
- who did not stay on a stroke unit at a given team (Q 4.3 is “Did not stay on a stroke unit”):
the length of stay on the stroke unit is **0 min**

For team-centred	For patient-centred
As calculated above	overall length of stay is calculated by adding length of stay on the stroke unit per team as calculated above

To calculate the percentage of a patient’s stay on a stroke unit:

$$\frac{\text{overall length of stay on a stroke unit}}{\text{length of stay in hospital}} \times 100$$

If the percentage of a patient’s stay on a stroke unit is **greater than or equal to 90%** the patient has achieved this indicator.

If the patient’s length of stay on the stroke unit is less than 4 hours and the patient went to the stroke unit at any time during those 4 hours, the patient is counted as having achieved the indicator.

$$\text{Cohort percentage: } 100 * \frac{\text{numerator}}{\text{denominator}}$$

Example

Patient A arrived (clock start) at hospital at 12:57 on 1st January. They were admitted to the stroke unit at 22:18 that same day. They stayed at the stroke unit until they were discharged home at 16:18 on 3rd January.

Patient B arrived (clock start) at hospital at 09:15 on 3rd January. They were admitted to the stroke unit at 11:16 that same day. They died on the stroke unit on 16th January.

Patient C arrived (clock start) at hospital at 13:08 on 10th January. They were not admitted to the stroke unit. They stayed on a medical ward. They were discharged home at 17:00 on the 15th January.

Patient D arrived (clock start) at hospital at 03:15 on 20th January. They were admitted to the stroke unit at 10:15 on the 21st January. They were transferred to another inpatient team at 09:30 on 25th January. They were discharged to a care home at 09:30 on 26th January.

Patient E arrived (clock start) at hospital at 23:33 on Friday. They were admitted to the HDU.

Step 1) Identify the **date and time of discharge/death**:

Patient A – discharged alive so 16:18 on 3rd January

Patient B – died on stroke unit so 16th January with assumed time of 23:59

Patient C – discharged alive so 17:00 on 15th January

Patient D – transferred to another team at 09:30 on 25th January (**team-centred**) and discharged to alive so 09:30 on 26th January (**patient-centred**)

Patient E – excluded because they were admitted to HDU

Step 2) Calculate the **length of stay in hospital**

Patient A – clock start 12:57 on 1st January and discharged home so 16:18 on 3rd January

The length of stay is 4521 min – 240 min (4 hours) = 4281 min.

Patient-centred will be the same as **team-centred** as the patient was only at one team.

Patient B – clock start 09:15 on 3rd January and died on stroke unit so 16th January with assumed time of 23:59.

The length of stay is 19574 min – 240 min (4 hours) = 19334 min.

Patient-centred will be the same as **team-centred** as the patient was only at one team.

Patient C – clock start 13:08 on 10th January and discharged home so 17:00 on 15th January.

The length of stay is 7432 min – 240 min (4 hours) = 7192 min.

Patient-centred will be the same as **team-centred** as the patient was only at one team.

Patient D – **Patient-centred**: clock start 03:15 on 20th January and discharged to a care home so 09:30 on 26th January.

The length of stay is 9285 min – 240 min (4 hours) = 9045 min.

Team-centred: clock start 03:15 on 20th January and transferred to another team on 09:30 on 25th January.

The length of stay is 7845 min - 240 min (4 hours) = 7605 min.

Step 3) Calculate the **length of stay on the stroke unit**

Patient A – admitted to stroke unit 22:18 on 1st January and discharged home from stroke unit at 16:18 on 3rd January.

The length of stay on the stroke unit is 2520 min.

Patient-centred will be the same as **team-centred** as the patient was only at one stroke unit.

Patient B – admitted to stroke unit 11:16 on 3rd January and died on the stroke unit on 16th January with assumed time of 23:59.

The length of stay is 19449 min.

Patient-centred will be the same as **team-centred** as the patient was only at one stroke unit.

Patient C – was not admitted to the stroke unit so length of stay is 0 min.

Patient-centred will be the same as **team-centred** as the patient was only at hospital.

Patient D – admitted to stroke unit 10:15 on the 21st January and transferred to another team on 09:30 on 25th January.

The length of stay is 5760 min.

Patient-centred will be the same as **team-centred** as the patient was only at one stroke unit.

Step 4) Calculate the percentage of time the patient spends on the stroke unit

Patient A = $\frac{2520}{4281} \times 100 = 59\%$ Patient-centred and team-centred will be the same value

Patient B = $\frac{19449}{19334} \times 100 = 101\%$ Patient-centred and team-centred will be the same value

Patient C = $\frac{0}{7192} \times 100 = 0\%$ Patient-centred and team-centred will be the same value

Patient-centred:

Patient D = $\frac{5760}{9045} \times 100 = 64\%$

Team-centred:

= $\frac{5760}{7605} \times 100 = 76\%$

Therefore only patient B has achieved this indicator.

The percentage of patients who spend at least 90% of their stay on a stroke unit is 0.25 or 25%

or $\frac{1}{4} \frac{(\text{Patient B})}{(\text{Patient A, Patient B, Patient C and Patient D})}$

Note that since patient B was admitted to a stroke unit within 4 hours of clock start, the percentage stay on stroke unit is greater than 100%.

3. Thrombolysis Key Indicators*

**Please note - teams are excluded from all team-centred domain 3 indicators if the team did not directly admit any patients who were deemed eligible for thrombolysis according to the minimum threshold in KI 3.2, nor did the team thrombolysed any patients.*

3.1 Percentage of all stroke patients given thrombolysis (CCG OIS C3.6)

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were given thrombolysis.

Denominator = all the patients in the cohort. Patients who were not thrombolysed are included in the denominator, regardless of the reason why thrombolysis was not provided.

To calculate the numerator, count the number of patients who were given thrombolysis (Q2.6 is “Yes”)

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort	All patients in the patient-centred 72h cohort

Example

Patient X was given thrombolysis.

Patient Y was not given thrombolysis for a “no” reason, and therefore did not achieve the indicator.

Patient Z was not given thrombolysis for a “no but” reason, and therefore did not achieve the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

3.2 Percentage of eligible patients (according to the RCP guideline minimum threshold) given thrombolysis

Included: patients who were eligible for thrombolysis based on the Recommendation 4.6.1B in National Clinical Guidelines for Stroke (see below) are included in this indicator.

Eligible patients:

Patients are included who are either:

- newly arrived patients aged under 80 with a precise or best estimate onset time and an onset to arrival time of less than 3.5h
- newly arrived patients aged 80 or over with a precise or best estimate onset time and an onset to arrival time of less than 2h
- patients already in hospital at time of stroke

except patients with **at least one “no but” reason for thrombolysis (Q2.6)** that is **consistent** with information given in other sections.

Information that is **not consistent** is determined as:

- Precise onset time, and “symptom onset time unknown/wake-up stroke” is the “no but” reason selected.
- Age is under 80 years, and “age” is the “no but” reason selected.
- Onset to arrival time is precise and less than 3.5 hours, age is under 80 years, and time window is the no but reason selected.
- NIHSS at arrival is 4 or more and too mild/severe is the no but reason selected.
- Onset to arrival time is precise and less than 2 hours, age is 80+, and “age” and/or “time window” is the “no but” reason selected.
- Patient is an inpatient in hospital at the time of stroke, and did not have a stroke during sleep, and “time window” is the “no but” reason selected.

Excluded: patients who are not eligible based on the Recommendation 4.6.1B in National Clinical Guidelines for Stroke (see below)

Excluded patients:

Patients are excluded who are either:

- newly arrived patients aged under 80 with a precise or best estimate onset time and an onset to arrival time of more than 3.5h
- newly arrived patients aged 80 or over with a precise or best estimate onset time and an onset to arrival time of more than 2h
- newly arrived patients with an unknown onset time
- patients who have a consistent **“no but” reason for thrombolysis (Q2.6)**

Numerator = the number of patients who were eligible for thrombolysis (according to the RCP guideline minimum threshold) and given thrombolysis.

Denominator = the total number of patients who were eligible for thrombolysis (according to the RCP guideline minimum threshold), irrespective of whether they received thrombolysis.

To calculate the numerator:

Firstly, identify all patients who were:

- either newly arrived at hospital and
 - aged under 80 years, have a precise or best estimate onset time (Q 1.11.2), and the difference between onset time (Q1.11) and arrival time (Q 1.13) is less than 3.5 hours, or
 - aged 80 years or over, have a precise or best estimate onset time (Q 1.11.2), and the difference between onset time (Q1.11) and arrival time (Q 1.13) is less than 2 hours

OR

- already in hospital at time of stroke.

Once these patients are identified, count the number of these patients who were given thrombolysis.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients eligible for thrombolysis in the team-centred 72h cohort	All patients eligible for thrombolysis in the patient-centred 72h cohort

Example

Patient A was 74 years old, their precise symptom onset was at 10:00, they arrived (clock start) at hospital at 12:30 the same day, and were given thrombolysis.

Patient A was eligible as they were under 80 years old, had a precise onset time, and their onset to arrival time (2.5 hours) was less than 3.5 hours. Patient A has achieved the indicator because they were eligible and given thrombolysis.

Patient B was 65 years old, their precise symptom onset was at 13:00, they arrived (clock start) at hospital at 14:30 the same day, and were not given thrombolysis.

Patient B was eligible as they were under 80 years old, had a precise onset time, and their onset to arrival time (1.5 hours) was less than 3.5 hours. Patient B has not achieved the indicator because they were eligible and not given thrombolysis.

Patient C was 90 years old, their best estimate symptom onset was at 20:00, they arrived (clock start) at hospital at 23:00 the same day, and were not given thrombolysis.

Patient C was not eligible as they were over 80 years old and their onset to arrival time (3 hours) was more than 2 hours. Patient C was excluded as they were not eligible.

Patient D was 87 years old, their onset time was not known, they arrived at hospital at 09:00, and were not given thrombolysis. Patient D was not eligible as the onset time was not known.

Patient D was excluded as they were not eligible.

Patient E was 92 years old, their precise symptom onset was in hospital at 14:00 (clock start), and they were not given thrombolysis. The only 'no but' reason was age which is an inconsistent reason as there is no age limit on patients with onset in hospital. Patient E was eligible as their onset was in hospital and their 'no but' reason was inconsistent.

Patient E has not achieved the indicator because they were eligible and not given thrombolysis.

Patient F was 77 years old, their precise symptom onset was at 13:30, they arrived (clock start) at hospital at 14:30 the same day, and were not given thrombolysis. The 'no but' reason was 'other medical reason'.

Patient F was not eligible as even though they were under 80 years old, had a precise onset time, and their onset to arrival time (1 hour) was less than 3.5 hours the 'no but' reason was consistent. Patient F was excluded as they were not eligible.

Patient G was 77 years old, their precise symptom onset was at 13:30, they arrived (clock start) at hospital at 15:15 the same day with a NIHSS at arrival of 4, and were not given thrombolysis. The 'no but' reason was 'stroke too mild or too severe' which is not a consistent reason as the NIHSS at arrival was greater than 3.

Patient G has not achieved the indicator because they were eligible and not given thrombolysis.

Therefore the cohort percentage is 0.25 or 25% or $\frac{1}{4}$ $\frac{\text{(Patient A)}}{\text{(Patient A, Patient B, Patient E and Patient G)}}$

3.3 Percentage of thrombolysed patients given it within 1 hour of clock start (door to needle time within 1 hour)

Included: all patients who were thrombolysed are included in this indicator.

Excluded: all patients who were not thrombolysed are excluded from this indicator

Numerator = the number of patients who were thrombolysed within and including 60 minutes.

Denominator = the total number of patients who were thrombolysed.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time patient was thrombolysed (Q 2.7) and date and time of arrival (Q 1.13) must be between 0 minutes and 60 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time patient was thrombolysed (Q 2.7) and the date and time of symptom onset (Q 1.11) must be between 0 minutes and 60 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients who were thrombolysed in the team-centred 72h cohort	All patients who were thrombolysed in the patient-centred 72h cohort

Example

Patient K arrived (clock start) at hospital at 12:15 on Friday. They were thrombolysed at 12:40 that same day. Patient K has achieved the indicator because 12:15-12:40 = 25 minutes.

Patient L had an onset in hospital (clock start) at 16:01 on Friday. They were thrombolysed at 16:37 that same day. Patient L has achieved the indicator because 16:01-16:37 = 36 minutes.

Patient M arrived (clock start) at hospital at 10:15 on Tuesday. They were thrombolysed at 11:16 that same day. Patient M has not achieved the indicator because 10:15-11:16 = 61 minutes.

Patient N arrived (clock start) at hospital at 20:08 on Saturday. They were not thrombolysed. Patient N is excluded because they were not thrombolysed.

Patient O arrived (clock start) at hospital at 08:10 on Tuesday. They were thrombolysed at 09:30 that same day. Patient O has not achieved the indicator because 08:10-09:30 = 80 minutes.

Therefore the cohort percentage is 0.50 or 50% or $\frac{2}{4}$ $\frac{(\text{Patient K and Patient L})}{(\text{Patient K, Patient L, Patient M and Patient O})}$

3.4 Percentage of applicable patients directly admitted to a stroke unit within 4 hours of clock start AND who either received thrombolysis or had a pre-specified justifiable reason ('no but') for why it could not be given

Included: all patients who were admitted to hospital are included apart from patients whose first ward they were admitted to was Intensive Therapy Unit (ITU) / Coronary Care Unit (CCU) / High Dependency Unit (HDU) or patients who received an intra-arterial intervention for acute stroke

Excluded: patients who were first admitted to an ITU/CCU/HDU ward or patients who received an intra-arterial intervention for acute stroke are excluded from this indicator

Numerator = the number of patients who were admitted to a stroke unit within 4 hours of clock start AND either received thrombolysis or had a 'no but' reason for why it could not be given.

Denominator = all the patients in the cohort (excluding the patients who were admitted to ITU/CCU/HDU or patients who received an intra-arterial intervention). Patients who did not stay on a stroke unit and/or patients where the reason for not being thrombolysed was "No" (Q2.6 is No) are included in the denominator.

To calculate whether a patient is included in the numerator:

- Firstly, identify the number of patients where "Stroke Unit" is the first ward the patient was admitted to at the first hospital (Q 1.14) and who did not receive an intra-arterial intervention (Q2.11 is "No").
- Then identify the number of those patients:
 - newly arrived to hospital where the difference between the date and time of arrival (Q 1.13) and the date and time the patient first arrived on the stroke unit (Q 1.15) is less than or equal to 240 minutes.
 - already in hospital where the date and time of symptom onset (Q 1.11) and the date and time the patient first arrived on the stroke unit (Q 1.15) is less than or equal to 240 minutes.
- Lastly, identify the number of those patients who were thrombolysed or had a justified reason as to why not (Q2.6 is "Yes" or "No but").

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort except those who went to ITU/CCU/HDU or received an intra-arterial intervention	All patients in the patient-centred 72h cohort except those who went to ITU/CCU/HDU or received an intra-arterial intervention

Example

Patient Q arrived (clock start) at hospital at 18:57 on Wednesday. They were admitted to the stroke unit at 20:57 that same day. They were thrombolysed.

Patient Q has achieved the indicator. They were admitted to a stroke unit in 120 minutes and were thrombolysed.

Patient R arrived (clock start) at hospital at 14:15 on Sunday. They were admitted to the stroke unit at 20:16 that same day. They were thrombolysed.

Patient R has not achieved this indicator. They were admitted to the stroke unit in 361 minutes (above 4 hours) and were thrombolysed.

Patient S had an onset in hospital (clock start) at 20:08 on Saturday. They were not admitted to a stroke unit, they stayed on a general ward (MAU/AAU/CDU).

Patient S has not achieved this indicator as they were not admitted to a stroke unit.

Patient T arrived (clock start) at hospital at 03:45 on Tuesday. They were directly admitted to HDU.

Patient T is excluded because they were admitted to HDU.

Patient U arrived (clock start) at hospital at 08:57 on Monday. They were admitted to the stroke unit at 10:57 that same day. The reason for not being thrombolysed was a justifiable 'no but' reason.

Patient U has achieved the indicator. They were admitted to a stroke unit in 180 minutes and were not thrombolysed with a 'no but' reason.

Patient V had an onset in hospital (clock start) at 04:01 on Tuesday. They were directly admitted to the stroke unit at 06:30 that same day. The reason for not being thrombolysed was a 'no' reason.

Patient V has not achieved the indicator. They were admitted to a stroke unit in 159 minutes but the reason for not being thrombolysed was a 'no' reason.

Patient W arrived (clock start) at hospital at 13:45 on Tuesday. They received thrombolysis and an intra-arterial intervention and were then admitted to the stroke unit at 16:45.

Patient W is excluded because they received an intra-arterial intervention, even though they were admitted to the stroke unit within 4 hours and received thrombolysis.

Therefore the cohort percentage is 0.40 or 40% or $\frac{2}{5}$ $\frac{(\text{Patient Q and Patient U})}{(\text{Patients Q, R, S, U and V})}$

3.5 Median time between clock start and thrombolysis (hours:mins)

Included: all patients who were thrombolysed are included in this indicator.

Excluded: all patients who were not thrombolysed are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and thrombolysis is the difference between the date and time of arrival (Q 1.13) and the date and time patient was thrombolysed (Q 2.7).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and thrombolysis is the difference between the date and time of symptom onset (Q 1.11) and the date and time patient was thrombolysed (Q 2.7).

Cohort median: To find the median time, all the times between clock start and thrombolysis need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred	For patient-centred
All patients who were thrombolysed in the team-centred 72h cohort	All patients who were thrombolysed in the patient-centred 72h cohort

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were thrombolysed at 13:18 that same day. Patient A's time from clock start to thrombolysis was 0:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were thrombolysed at 10:16 that same day. Patient B's time from clock start to thrombolysis was 1:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not thrombolysed so are excluded.

Patient D arrived (clock start) at hospital at 07:00 on Friday. They were thrombolysed at 07:38 that same day. Patient D's time from clock start to thrombolysis was 0:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were thrombolysed at 04:47 that same day. Patient E's time from clock start to thrombolysis was 1:32.

Patient F arrived (clock start) at hospital at 23:33 on Friday. They were thrombolysed at 00:03 on Saturday. Patient F's time from clock start to thrombolysis was 0:30.

Listing in numerical order: 0:21 0:30 0:38 1:01 1:32

The cohort median is 0 hour 38 minutes.

4. Specialist assessment Key Indicators

4.1 Percentage of patients assessed by a stroke specialist consultant physician within 24h of clock start

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were assessed by a stroke specialist consultant physician within 24h of clock start.

Denominator = all the patients in the cohort. Patients who are not assessed by a stroke consultant are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time of assessment by stroke consultant (Q 3.3) and date and time of arrival (Q 1.13) must be greater than or equal to 0 minutes and less than or equal to 1440 minutes.

For patients already in hospital stroke (Q 1.10 is 'Yes'), the difference between the date and time of assessment by stroke consultant (Q 3.3) and the date and time of symptom onset (Q 1.11) must be greater or equal to 0 minutes and less than or equal to 1440 minutes.

Please note: From Dec 2017-Mar 2018 questions were added to the dataset and therefore the times used to calculate this Key Indicator are: for patients whose first contact (Q3.3b) is "In person" or "Telemedicine", the time contact first made with a stroke specialist consultant is used (Q3.3a), and for patients whose first contact (Q3.3b) is "By telephone", the time first assessed by stroke specialist consultant in person (Q3.3c) is used.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort	All patients in the patient-centred 72h cohort

Example

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a stroke specialist consultant at 10:00 the following day. Patient X has achieved the indicator because 10:00 Wednesday – 15:00 Tuesday = 1140 minutes (19 hours).

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a stroke specialist consultant at 11:15 the following Monday. Patient Y has not achieved the indicator because 11:15 Monday – 12:15 Saturday = 2820 minutes (47 hours).

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed by a stroke specialist consultant so have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

4.2 Median time between clock start and being assessed by a stroke consultant (hours:mins)

Included: all patients who were seen by a stroke consultant within 72h of clock start.

Excluded: patients who were not seen by a stroke consultant within 72 hours of clock start are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and being assessed by a stroke consultant is the difference between the date and time of arrival (Q 1.13) and the date and time of assessment by stroke consultant (Q 3.3).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and being assessed by a stroke consultant is the difference between the date and time of symptom onset (Q 1.11) and the date and time of assessment by stroke consultant (Q 3.3).

Cohort median: To find the median time, all the times between clock start and assessment by stroke consultant need to be listed from smallest to largest. The median is then the number in the middle of this list.

Please note: From Dec 2017-Mar 2018 questions were added to the dataset and therefore the times used to calculate this Key Indicator are: for patients whose first contact (Q3.3b) is "In person" or "Telemedicine", the time contact first made with a stroke specialist consultant is used (Q3.3a), and for patients whose first contact (Q3.3b) is "By telephone", the time first assessed by stroke specialist consultant in person (Q3.3c) is used.

For team-centred

All patients in the team-centred 72h cohort who were seen by a stroke consultant within 72h of clock start

For patient-centred

All patients in the patient-centred 72h cohort who were seen by a stroke consultant within 72h of clock start

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were assessed by a stroke consultant at 15:18 that same day. Patient A's time from clock start to being assessed by a stroke consultant was 2:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were assessed by a stroke consultant at 19:16 that same day. Patient B's time from clock start to being assessed by a stroke consultant was 10:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not assessed by a stroke consultant so are excluded.

Patient D had an onset in hospital (clock start) at 22:00 on Friday. They were assessed by a stroke consultant at 09:38 the following Monday. Patient D's time from clock start to being assessed by a stroke consultant was 59:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were assessed by a stroke consultant at 11:47 on Tuesday. Patient E's time from clock start to being assessed by a stroke consultant was 20:32.

Patient F arrived (clock start) at hospital at 23:33 on Wednesday. They were assessed by a stroke consultant at 11:03 on Saturday. Patient F's time from clock start to being assessed by a stroke consultant was 59:30.

Listing in numerical order: 2:21 10:01 20:32 59:30 59:38

The cohort median is 20 hours 32 minutes.

4.3 Percentage of patients who were assessed by a nurse trained in stroke management within 24h of clock start

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were assessed by a nurse trained in stroke management within 24h of clock start.

Denominator = all the patients in the cohort. Patients who are not assessed by a nurse trained in stroke management are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time of assessment by stroke nurse (Q 3.2) and date and time of arrival (Q 1.13) must be greater than or equal to 0 minutes and less than or equal to 1440 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time of assessment by stroke nurse (Q 3.2) and the date and time of symptom onset (Q 1.11) must be greater or equal to 0 minutes and less than or equal to 1440 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort	All patients in the patient-centred 72h cohort

Example

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a stroke nurse at 10:00 the following day. Patient X has achieved the indicator because 10:00 Wednesday – 15:00 Tuesday = 1140 minutes (19 hours).

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a stroke nurse at 11:15 the following Monday. Patient Y has not achieved the indicator because 11:15 Monday – 12:15 Saturday = 2820 minutes (47 hours).

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed by a stroke nurse so have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

4.4 Median time between clock start and being assessed by a stroke nurse (hours:mins)

Included: all patients who were seen by a stroke nurse within 72h of clock start are included in this indicator.

Excluded: patients who were not seen by a stroke nurse within 72 hours of clock start are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and being assessed by a stroke nurse is the difference between the date and time of arrival (Q 1.13) and the date and time of assessment by stroke nurse (Q 3.2).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and being assessed by a stroke nurse is the difference between the date and time of symptom onset (Q 1.11) and the date and time of assessment by stroke nurse (Q 3.2).

Cohort median: To find the median time, all the times between clock start and assessment by stroke nurse need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred	For patient-centred
All patients in the team-centred 72h cohort who were seen by a stroke nurse within 72h of clock start	All patients in the patient-centred 72h cohort who were seen by a stroke nurse within 72h of clock start

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were assessed by a stroke nurse at 15:18 that same day. Patient A's time from clock start to being assessed by a stroke nurse was 2:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were assessed by a stroke nurse at 19:16 that same day. Patient B's time from clock start to being assessed by a stroke nurse was 10:01. Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not assessed by a stroke nurse so are excluded.

Patient D arrived (clock start) at hospital at 22:00 on Friday. They were assessed by a stroke nurse at 09:38 the following Monday. Patient D's time from clock start to being assessed by a stroke nurse was 59:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were assessed by a stroke nurse at 11:47 on Tuesday. Patient E's time from clock start to being assessed by a stroke nurse was 20:32. Patient F arrived (clock start) at hospital at 23:33 on Wednesday. They were assessed by a stroke nurse at 11:03 on Saturday. Patient F's time from clock start to being assessed by a stroke nurse was 59:30.

Listing in numerical order: 2:21 10:01 20:32 59:30 59:38

The cohort median is 20 hours 32 minutes.

4.5 Percentage of applicable patients who were given a swallow screen within 4h of clock start

Included: all patients are included in this indicator, except those who are either medically unwell until time of screening or refused to be screened.

Excluded: patients who are medically unwell until time of screening or refused to be screened (ie patients where Q 2.10.1 is answered 'Patient refused' or 'Patient medically unwell until time of screening') are excluded from this indicator

Numerator = the number of patients who were given a swallow screen within 4h of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but not given a swallow screen are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time of first swallow screen (Q 2.10) and date and time of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 240 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time of first swallow screen (Q 2.10) and the date and time of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 240 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort except those who are medically unwell until time of screening or refused to be screened	All patients in the patient-centred 72h cohort except those who are medically unwell until time of screening or refused to be screened

Example

Patient W arrived (clock start) at hospital at 10:00 on Monday. They were medically unwell until 10:00 on Friday. Patient W is excluded from the indicator because they were medically unwell until the time of screening.

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were given a first swallow screen at 16:30 that day. Patient X has achieved the indicator because 16:30 - 15:00 = 90 minutes

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were given a swallow screen at 17:15 that day. Patient Y has not achieved the indicator because 17:15 - 12:15 = 300 minutes

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not given a swallow screen so have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{\text{(Patient X)}}{\text{(Patient X, Patient Y and Patient Z)}}$

4.6 Percentage of applicable patients who were given a formal swallow assessment within 72h of clock start

Included: all patients are included in this indicator, except those who are either medically unwell, refused to be assessed or passed swallow screening.

Excluded: patients who are medically unwell, refused to be assessed or passed swallow screening (ie patients where Q 3.8.1 is answered 'Patient refused', 'Patient medically unwell' or 'Patient passed swallow screening') are excluded from this indicator

Numerator = the number of patients who were given a formal swallow assessment within 72h of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but not given a formal swallow assessment are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time of formal swallow assessment by a Speech and Language Therapist or another professional trained in dysphagia assessment (Q 3.8) and date and time of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 4320 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time of formal swallow assessment by a Speech and Language Therapist or another professional trained in dysphagia assessment (Q 3.8) and the date and time of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 4320 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort except those who are medically unwell, refused to be assessed or passed swallow screening	All patients in the patient-centred 72h cohort except those who are medically unwell, refused to be assessed or passed swallow screening

Example

Patient W arrived (clock start) at hospital at 10:00 on Monday. They were medically unwell until 10:00 on Friday. Patient W is excluded from the indicator because they were medically unwell. Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were given a swallow assessment at 16:30 on Wednesday. Patient X has achieved the indicator because Tuesday 15:00 – Wednesday 16:30 = 1530 minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were given a swallow assessment on Wednesday 12:15. Patient Y has not achieved the indicator because Saturday 12:15 – Wednesday 12:15 = 5760 minutes.

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not given a swallow assessment for organisational reasons so have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

5. Occupational therapy Key Indicators

5.1 Percentage of patients reported as requiring occupational therapy

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were reported as requiring occupational therapy.

Denominator = all the patients in the cohort.

To calculate the numerator:

Count the number of patients who were considered to require this therapy at any point in the admission (Q 4.4 is “Yes”)

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
The patient must be considered to require occupational therapy by the specific team	The patient must be considered to require occupational therapy by at least one inpatient team that the patient has been seen by

Example

Patient X was reported to require occupational therapy.

Patient Y was reported to require occupational therapy.

Patient Z was not reported to require occupational therapy.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

5.2 Median number of minutes per day on which occupational therapy is received

Included: all patients who are considered to require occupational therapy are included in this indicator.

Excluded: patients who are considered to not require occupational therapy are excluded from this indicator

The number of minutes of occupational therapy (OT) received per team is given in Q 4.6.
The number of days on which OT is received per team is given in Q 4.5.

Please note that SSNAP only records the **total** number of minutes of OT per team (Q 4.6) and the total number of days on which OT is received and does not take into account the number of therapy sessions or the length of the individual sessions. If a patient received therapy on 3 days and they received 15 minutes on the first day of therapy, 10 minutes on the second day of therapy and 25 minutes -split into two sessions of 10 and 15 minutes- on the third day of therapy then the total number of minutes entered on to SSNAP would be 50 minutes.

For team-centred results:

Divide the number of minutes of OT each patient received at an individual team by the number of days the patient received OT at that team.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For patient-centred results:

First, calculate the total number of minutes of OT each patient received by adding together the minutes of OT the patient received at each of the inpatient teams the patient was seen by. Then, divide by the total number of days of OT the patient received across all inpatient teams.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred	For patient-centred
Patients in the team-centred post-72h cohort (records attributed to all teams) who are considered to require occupational therapy by the specific team	Patients in the patient-centred post-72h cohort who are considered to require occupational therapy by at least one inpatient team that the patient has been seen by

Example

Team-centred:

Patient X received 3 days of OT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. The number and length of sessions are not recorded in SSNAP, so a total of 105 minutes of OT entered on to SSNAP. They also received 7 days of OT at Team B with a total of 210 minutes of OT but this is not included in the team-centred results.

Patient Y received a total of 15 days of OT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split

into two therapy sessions of 20 minutes. Patient Y received a total of 425 minutes of OT to be entered onto SSNAP.

Patient Z received a total of 8 days of OT at Team A. On all 8 days they received 30 minutes per day. Patient Z received total of 240 minutes of OT to be entered onto SSNAP.

Team A

Patient X:

Number of minutes per day = $\frac{105 \text{ minutes}}{3 \text{ days}}$ = 35 minutes per day received

Patient Y:

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z:

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which OT is received in numerical order=
28.3 minutes 30 minutes 35 minutes

Team A's **team-centred** median number of minutes per day on which OT is received 30 minutes.

Patient-centred:

Patient X received 3 days of OT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. They also received 7 days of OT at Team B. On all seven days of therapy with Team B Patient X received 30 minutes of therapy with a total of 210 minutes of OT at Team B. For Patient-Centred results the number of days on which therapy was received is added for all the teams so for Patient X this is 10 days of OT. The numbers of minutes at the all teams are also added up so for Patient X that is 315 minutes of OT.

Number of minutes per day = $\frac{315 \text{ minutes}}{10 \text{ days}}$ = 31.5 minutes per day received

Patient Y received a total of 15 days of OT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split into two therapy sessions of 20 minutes. They did not receive any OT at any other team. Patient Y received a total of 425 minutes of OT to be entered onto SSNAP.

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z received a total of 8 days of OT at Team A. On all 8 days they received 30 minutes per day. They did not receive any OT at any other team. Patient Z received total of 240 minutes of OT to be entered onto SSNAP.

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which OT is received in numerical order=
28.3 minutes 30 minutes 31.5 minutes

The **patient-centred** median number of minutes per day on which OT is received 30 minutes.

5.3 Median percentage of a patient's days as an inpatient on which occupational therapy is received

Included: all patients who are considered to require occupational therapy are included in this indicator.

Excluded: patients who are considered to not require occupational therapy are excluded from this indicator

To calculate the length of stay at an inpatient team a patient was considered to require OT at:

The team centred length of stay at a team, if the patient was considered to require OT and the team was the first team the patient was seen by:

For newly arrived patients, the difference between the date the patient was considered to no longer require Occupational Therapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival (Q 1.13).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date the patient was considered to no longer require Occupational Therapy (Q 4.4.1b) with a time component of 00:00 and date and the date and time of symptom onset (Q 1.11).

The team centred length of stay at a team, if the patient was considered to require OT and the team was NOT the first team the patient was seen by:

The difference between the date the patient was considered to no longer require Occupational Therapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival at this hospital (Q 4.1).

Please note that the date of assessment for therapy is **not** used when calculating the length of stay. Question 4.4.1b was added to the data set on the 1st April 2014. A different end date is used for patients with a clock start before this date.

The shortest length of stay in a given team where a patient is deemed to require OT is set at 24 hours, therefore any shorter lengths of stay are rounded up to reflect this.

Team-centred: The length of stay applicable for OT at that team (if the patient was considered to require OT) is the patient's length of stay applicable for OT.

Patient-centred: The length of stay applicable for OT at each team where the patient is considered to require OT are summed together to give the patient's total inpatient length of stay which is applicable for OT.

2) Then, calculate the number of days on which the patient received OT:

For **team-centred**: the number of days of OT the patient received (Q 4.5) at the specific team.

For **patient-centred**: the number of days of OT the patient received (Q 4.5) at each inpatient team the patient was deemed to required OT at are summed together to give the total number of days on which OT was received.

3) Then, calculate the percentage of a patient's days in hospital on which occupational therapy is received:

Divide the total number of days on which OT was received, by the patient's length of stay which is applicable for OT.

Due to the way length of stay is calculated, some patients' percentages may be over 100%. This is capped then capped at 100%.

Cohort median:

4) Lastly to find the median percentage, all percentages for each patient need to be listed in numerical order. The median is then the number in the middle of this list.

For team-centred	For patient-centred
The patient must be considered to require occupational therapy by the specific team	The patient must be considered to require occupational therapy by at least one inpatient team that the patient has been seen by

Example

Patient W arrived (clock start) at Team A at 12:00 on 2nd January. They required OT at Team A until the 13th January, but did not receive any OT. They were transferred to Team B on 13th January at 12:00. They received OT at Team B on 5 days during their stay, and no longer required OT on the 19th January.

Patient X arrived (clock start) at Team A at 12:00 on 1st January. They no longer required OT on 13th January. They received OT on 5 days during their stay.

Patient Y arrived (clock start) at Team A at 12:00 on 3rd January. They required OT at Team A until the 5th January and received 2 days of OT. They were transferred to Team B at 09:00 on 6th January. They no longer required inpatient rehabilitation from Team B on 16th January. They received OT on 8 days during their stay.

Team-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan = 10.5 days
- 2) Number of days OT received = 0 days
- 3) Percentage of patient's days at Team A in which OT is received = $\frac{0 \text{ days}}{10.5 \text{ days}} = 0.00 = 0\%$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days OT received = 5 days
- 3) Percentage of patient's days at Team A in which OT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = 43\%$

Patient Y:

- 1) Length of stay = 12:00 3rd January – 00:00 5th January = 1.5 days
- 2) Number of days OT is received = 2 days
- 3) Percentage of patient's days at Team A in which OT is received = $\frac{2 \text{ days}}{1.5 \text{ days}} = 1.33 \geq 100\%$

Note, due to the way this indicator is calculated, Patient Y's percentage has been capped at 100%

- 4) Median percentage of all patient's days in hospital in which OT is received in numerical order = 0% 43% 100%

Team A's **team-centred** median percentage of all patients' days in hospital in which OT is received is 43%

Patient-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan + 12:00 13th Jan – 00:00 19th Jan = 10.5 + 5.5 days = 16 days
- 2) Number of days OT received = 5 days
- 3) Percentage of patient's days in hospital in which OT is received = $\frac{5 \text{ days}}{16 \text{ days}} = 0.31 = \underline{31\%}$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days OT received = 5 days
- 3) Percentage of patient's days in hospital in which OT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = \underline{43\%}$

Patient Y:

- 1) Length of stay = 12:00 3rd Jan – 00:00 5th Jan + 09:00 6th Jan – 00:00 16th Jan = 1.5 days + 9.6 days = 11.1 days
- 2) Number of days OT is received = 2 days + 8 days = 10 days
- 3) Percentage of patient's days in hospital in which OT is received = $\frac{10 \text{ days}}{11.1 \text{ days}} = 0.90 = \underline{90\%}$

Cohort median (patient-centred):

- 4) Median percentage of all patient's days in hospital in which OT is received in numerical order = 31% 43% 90%

The **patient-centred** median percentage of all patients' days in hospital in which OT is received is 43%

5.4 Compliance (%) against the therapy target of an average of 25.7 minutes of occupational therapy across all patients (2016 NICE QS Statement 2)
[Target = 45 minutes of occupational therapy on 5 out of 7 days a week for 80% of patients = $45 \times (5/7) \times 0.8$]

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

The average number of minutes of occupational therapy per day across all patients is calculated as:

The percentage of patients reported as requiring OT (**as per Key Indicator 5.1**)
 multiplied by
 the median number of minutes per day on which OT is received (**as per Key Indicator 5.2**)
 multiplied by
 the median percentage of a patient's days in hospital on which OT is received (**as per Key Indicator 5.3**)

The target for the average number of minutes of occupational therapy per day across all patients is calculated as 80% multiplied by 45 minutes, multiplied by 5/7 days, which is 25.7 minutes for all teams.

Cohort percentage: The percentage of the target achieved is calculated as the average number of minutes of OT per day across all patients divided by the target number of minutes.

For team-centred	For patient-centred
All patients in the team-centred post-72h cohort	All patients in the patient-centred post-72h cohort

Example

Using calculations from the examples in Key Indicator 5.1, Key Indicator 5.2 and Key Indicator 5.3

Team-centred = Key Indicator 5.1 x Key Indicator 5.2 x Key Indicator 5.3

Team A = $0.67 \times 30 \text{ minutes} \times 0.43 = 13.5 \text{ minutes}$
 = 8.6 minutes
 25.7 minutes

Compliance = 33.6%

Team B = $0.67 \times 35 \text{ minutes} \times 0.87 = 20.4 \text{ minutes}$
 = 20.4 minutes
 25.7 minutes

Compliance = 79.4%

Patient-centred = Key Indicator 5.1 x Key Indicator 5.2 x Key Indicator 5.3

= $0.67 \times 30 \text{ minutes} \times 0.43 = 8.6 \text{ minutes}$
 = 8.6 minutes
 25.7 minutes

Compliance = 33.6%

6. Physiotherapy Key Indicators

6.1 Percentage of patients reported as requiring physiotherapy

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were reported as requiring physiotherapy.

Denominator = all the patients in the cohort.

To calculate the numerator:

Count the number of patients who were considered to require this therapy at any point in the admission (Q 4.4 is “Yes”)

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

The patient must be considered to require physiotherapy by the specific team

For patient-centred

The patient must be considered to require physiotherapy by at least one inpatient team that the patient has been seen by

Example

Patient X was reported to require physiotherapy.

Patient Y was reported to require physiotherapy.

Patient Z was not reported to require physiotherapy.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

6.2 Median number of minutes per day on which physiotherapy is received

Included: all patients who are considered to require physiotherapy are included in this indicator.

Excluded: patients who are considered to not require physiotherapy are excluded from this indicator

The number of minutes of physiotherapy (PT) received per team is given in Q 4.6.

The number of days on which PT is received per team is given in Q 4.5.

Please note that SSNAP only records the **total** number of minutes of PT per team (Q 4.6) and the total number of days on which PT is received and does not take into account the number of therapy sessions or the length of the individual sessions. If a patient received therapy on 3 days and they received 15 minutes on the first day of therapy, 10 minutes on the second day of therapy and 25 minutes -split into two sessions of 10 and 15 minutes- on the third day of therapy then the total number of minutes entered on to SSNAP would be 50 minutes.

For team-centred results:

Divide the number of minutes of PT each patient received at an individual team by the number of days the patient received PT at that team.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For patient-centred results:

First, calculate the total number of minutes of PT each patient received by adding together the minutes of PT the patient received at each of the inpatient teams the patient was seen by. Then, divide by the total number of days of PT the patient received across all inpatient teams.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred	For patient-centred
Patients in the team-centred post-72h cohort (records attributed to all teams) who are considered to require physiotherapy by the specific team	Patients in the patient-centred post-72h cohort who are considered to require physiotherapy by at least one inpatient team that the patient has been seen by

Example

Team-centred:

Patient X received 3 days of PT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. The number and length of sessions are not recorded in SSNAP, so a total of 105 minutes of PT entered on to SSNAP. They also received 7 days of PT at Team B with a total of 210 minutes of PT but this is not included in the team-centred results.

Patient Y received a total of 15 days of PT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split into two therapy sessions of 20 minutes. Patient Y received a total of 425 minutes of PT to be entered onto SSNAP.

Patient Z received a total of 8 days of PT at Team A. On all 8 days they received 30 minutes per day. Patient Z received total of 240 minutes of PT to be entered onto SSNAP.

Team A

Patient X:

Number of minutes per day = $\frac{105 \text{ minutes}}{3 \text{ days}}$ = 35 minutes per day received

Patient Y:

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z:

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which PT is received in numerical order=
28.3 minutes 30 minutes 35 minutes

Team A's **team-centred** median number of minutes per day on which PT is received 30 minutes.

Patient-centred:

Patient X received 3 days of PT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. They also received 7 days of PT at Team B. On all seven days of therapy with Team B Patient X received 30 minutes of therapy with a total of 210 minutes of PT at Team B. For Patient-Centred results the number of days on which therapy was received is added for all the teams so for Patient X this is 10 days of PT. The numbers of minutes at the all teams are also added up so for Patient X that is 315 minutes of PT.

Number of minutes per day = $\frac{315 \text{ minutes}}{10 \text{ days}}$ = 31.5 minutes per day received

Patient Y received a total of 15 days of PT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split into two therapy sessions of 20 minutes. They did not receive any PT at any other team. Patient Y received a total of 425 minutes of PT to be entered onto SSNAP.

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z received a total of 8 days of PT at Team A. On all 8 days they received 30 minutes per day. They did not receive any PT at any other team. Patient Z received total of 240 minutes of PT to be entered onto SSNAP.

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which PT is received in numerical order=
28.3 minutes 30 minutes 31.5 minutes

The **patient-centred** median number of minutes per day on which PT is received 30 minutes.

6.3 Median percentage of a patient's days as an inpatient on which physiotherapy is received

Included: all patients who are considered to require physiotherapy are included in this indicator.

Excluded: patients who are considered to not require physiotherapy are excluded from this indicator

To calculate the length of stay at an inpatient team a patient was considered to require PT at:

The team centred length of stay at a team, if the patient was considered to require PT and the team was the first team the patient was seen by:

For newly arrived patients, the difference between the date the patient was considered to no longer require Physiotherapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival (Q 1.13).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date the patient was considered to no longer require Physiotherapy (Q 4.4.1b) with a time component of 00:00 and date and the date and time of symptom onset (Q 1.11).

The team centred length of stay at a team, if the patient was considered to require PT and the team was NOT the first team the patient was seen by:

The difference between the date the patient was considered to no longer require Physiotherapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival at this hospital (Q 4.1).

Please note that the date of assessment for therapy is **not** used when calculating the length of stay. Question 4.4.1b was added to the data set on the 1st April 2014. A different end date is used for patients with a clock start before this date.

The shortest length of stay in a given team where a patient is deemed to require PT is set at 24 hours, therefore any shorter lengths of stay are rounded up to reflect this.

Team-centred: The length of stay applicable for PT at that team (if the patient was considered to require PT) is the patient's length of stay applicable for PT.

Patient-centred: The length of stay applicable for PT at each team where the patient is considered to require PT are summed together to give the patient's total inpatient length of stay which is applicable for PT.

2) Then, calculate the number of days on which the patient received PT:

For **team-centred**: the number of days of PT the patient received (Q 4.5) at the specific team.

For **patient-centred**: the number of days of PT the patient received (Q 4.5) at each inpatient team the patient was deemed to required PT at are summed together to give the total number of days on which PT was received.

3) Then, calculate the percentage of a patient's days in hospital on which physiotherapy is received:

Divide the total number of days on which PT was received, by the patient's length of stay which is applicable for PT.

Due to the way length of stay is calculated, some patients' percentages may be over 100%. This is capped then capped at 100%.

Cohort median:

4) Lastly to find the median percentage, all percentages for each patient need to be listed in numerical order. The median is then the number in the middle of this list.

For team-centred	For patient-centred
The patient must be considered to require physiotherapy by the specific team	The patient must be considered to require physiotherapy by at least one inpatient team that the patient has been seen by

Example

Patient W arrived (clock start) at Team A at 12:00 on 2nd January. They required PT at Team A until the 13th January, but did not receive any PT. They were transferred to Team B on 13th January at 12:00. They received PT at Team B on 5 days during their stay, and no longer required PT on the 19th January.

Patient X arrived (clock start) at Team A at 12:00 on 1st January. They no longer required PT on 13th January. They received PT on 5 days during their stay.

Patient Y arrived (clock start) at Team A at 12:00 on 3rd January. They required PT at Team A until the 5th January and received 2 days of PT. They were transferred to Team B at 09:00 on 6th January. They no longer required inpatient rehabilitation from Team B on 16th January. They received PT on 8 days during their stay.

Team-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan = 10.5 days
- 2) Number of days PT received = 0 days
- 3) Percentage of patient's days at Team A in which PT is received = $\frac{0 \text{ days}}{10.5 \text{ days}} = 0.00 = \underline{0\%}$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days PT received = 5 days
- 3) Percentage of patient's days at Team A in which PT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = \underline{43\%}$

Patient Y:

- 1) Length of stay = 12:00 3rd January – 00:00 5th January = 1.5 days
- 2) Number of days PT is received = 2 days
- 3) Percentage of patient's days at Team A in which PT is received = $\frac{2 \text{ days}}{1.5 \text{ days}} = 1.33 > \underline{100\%}$

Note, due to the way this indicator is calculated, Patient Y's percentage has been capped at 100%

- 4) Median percentage of all patient's days in hospital in which PT is received in numerical order = 0% 43% 100%

Team A's **team-centred** median percentage of all patients' days in hospital in which PT is received is 43%

Patient-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan + 12:00 13th Jan – 00:00 19th Jan = 10.5 + 5.5 days = 16 days
- 2) Number of days PT received = 5 days
- 3) Percentage of patient's days in hospital in which PT is received = $\frac{5 \text{ days}}{16 \text{ days}} = 0.31 = \underline{31\%}$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days PT received = 5 days
- 3) Percentage of patient's days in hospital in which PT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = \underline{43\%}$

Patient Y:

- 1) Length of stay = 12:00 3rd Jan – 00:00 5th Jan + 09:00 6th Jan – 00:00 16th Jan = 1.5 days + 9.6 days = 11.1 days
- 2) Number of days PT is received = 2 days + 8 days = 10 days
- 3) Percentage of patient's days in hospital in which PT is received = $\frac{10 \text{ days}}{11.1 \text{ days}} = 0.90 = \underline{90\%}$

Cohort median (patient-centred):

- 4) Median percentage of all patient's days in hospital in which PT is received in numerical order = 31% 43% 90%

The **patient-centred** median percentage of all patients' days in hospital in which PT is received is 43%

6.4 Compliance (%) against the therapy target of an average of 27.3 minutes of physiotherapy across all patients (2016 NICE QS Statement 2)

[Target = 45 minutes of physiotherapy on 5 out of 7 days a week for 85% of patients = $45 \times (5/7) \times 0.85$]

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

The average number of minutes of physiotherapy per day across all patients is calculated as:

The percentage of patients reported as requiring PT (**as per Key Indicator 6.1**)

multiplied by

the median number of minutes per day on which PT is received (**as per Key Indicator 6.2**)

multiplied by

the median percentage of a patient's days in hospital on which PT is received (**as per Key Indicator 6.3**)

The target for the average number of minutes of physiotherapy per day across all patients is calculated as 85% multiplied by 45 minutes, multiplied by 5/7 days, which is 27.3 minutes for all teams.

Cohort percentage: The percentage of the target achieved is calculated as the average number of minutes of PT per day across all patients divided by the target number of minutes.

For team-centred	For patient-centred
All patients in the team-centred post-72h cohort	All patients in the patient-centred post-72h cohort

Example

Using calculations from the examples in Key Indicator 6.1, Key Indicator 6.2 and Key Indicator 6.3

Team-centred = Key Indicator 6.1 x Key Indicator 6.2 x Key Indicator 6.3

Team A = $0.67 \times 30 \text{ minutes} \times 0.43 = 13.5 \text{ minutes}$

= 8.6 minutes

27.3 minutes

Compliance = 31.5%

Team B = $0.67 \times 35 \text{ minutes} \times 0.87 = 20.4 \text{ minutes}$

= 20.4 minutes

27.3 minutes

Compliance = 74.7%

Patient-centred = Key Indicator 6.1 x Key Indicator 6.2 x Key Indicator 6.3

= $0.67 \times 30 \text{ minutes} \times 0.43 = 8.6 \text{ minutes}$

= 8.6 minutes

27.3 minutes

Compliance = 31.5%

7. Speech and Language Therapy Key Indicators

7.1 Percentage of patients reported as requiring speech and language therapy

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

Numerator = the number of patients who were reported as requiring speech and language therapy.

Denominator = all the patients in the cohort.

To calculate the numerator:

Count the number of patients who were considered to require this therapy at any point in the admission (Q 4.4 is “Yes”)

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

The patient must be considered to require speech and language therapy by the specific team

For patient-centred

The patient must be considered to require speech and language therapy by at least one inpatient team that the patient has been seen by

Example

Patient X was reported to require speech and language therapy.

Patient Y was reported to require speech and language therapy.

Patient Z was not reported to require speech and language therapy.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

7.2 Median number of minutes per day on which speech and language therapy is received

Included: all patients who are considered to require speech and language therapy are included in this indicator.

Excluded: patients who are considered to not require speech and language therapy are excluded from this indicator

The number of minutes of speech and language therapy (SALT) received per team is given in Q 4.6. The number of days on which SALT is received per team is given in Q 4.5.

Please note that SSNAP only records the **total** number of minutes of SALT per team (Q 4.6) and the total number of days on which SALT is received and does not take into account the number of therapy sessions or the length of the individual sessions. If a patient received therapy on 3 days and they received 15 minutes on the first day of therapy, 10 minutes on the second day of therapy and 25 minutes -split into two sessions of 10 and 15 minutes- on the third day of therapy then the total number of minutes entered on to SSNAP would be 50 minutes.

For team-centred results:

Divide the number of minutes of SALT each patient received at an individual team by the number of days the patient received SALT at that team.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For patient-centred results:

First, calculate the total number of minutes of SALT each patient received by adding together the minutes of SALT the patient received at each of the inpatient teams the patient was seen by. Then, divide by the total number of days of SALT the patient received across all inpatient teams.

Cohort median: To find the median number of minutes per day received, all numbers for each patient need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred

Patients in the team-centred post-72h cohort (records attributed to all teams) who are considered to require speech and language therapy by the specific team

For patient-centred

Patients in the patient-centred post-72h cohort who are considered to require speech and language therapy by at least one inpatient team that the patient has been seen by

Example

Team-centred:

Patient X received 3 days of SALT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. The number and length of sessions are not recorded in SSNAP, so a total of 105 minutes of SALT entered on to SSNAP. They also received 7 days of SALT at Team B with a total of 210 minutes of SALT but this is not included in the team-centred results.

Patient Y received a total of 15 days of SALT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split

into two therapy sessions of 20 minutes. Patient Y received a total of 425 minutes of SALT to be entered onto SSNAP.

Patient Z received a total of 8 days of SALT at Team A. On all 8 days they received 30 minutes per day. Patient Z received total of 240 minutes of SALT to be entered onto SSNAP.

Team A

Patient X:

Number of minutes per day = $\frac{105 \text{ minutes}}{3 \text{ days}}$ = 35 minutes per day received

Patient Y:

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z:

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which SALT is received in numerical order= 28.3 minutes 30 minutes 35 minutes

Team A's **team-centred** median number of minutes per day on which SALT is received 30 minutes.

Patient-centred:

Patient X received 3 days of SALT at Team A. On the first day of therapy they received 25 minutes, on the second day they received 45 minutes split over two sessions of 25 minutes and 20 minutes, and on the third day they received 35 minutes of therapy. They also received 7 days of SALT at Team B. On all seven days of therapy with Team B Patient X received 30 minutes of therapy with a total of 210 minutes of SALT at Team B. For Patient-Centred results the number of days on which therapy was received is added for all the teams so for Patient X this is 10 days of SALT. The numbers of minutes at the all teams are also added up so for Patient X that is 315 minutes of SALT.

Number of minutes per day = $\frac{315 \text{ minutes}}{10 \text{ days}}$ = 31.5 minutes per day received

Patient Y received a total of 15 days of SALT with Team A. On the first five days of therapy they received 25 minutes per day and on the remaining 10 days they received 40 minutes per day split into two therapy sessions of 20 minutes. They did not receive any SALT at any other team. Patient Y received a total of 425 minutes of SALT to be entered onto SSNAP.

Number of minutes per day = $\frac{425 \text{ minutes}}{15 \text{ days}}$ = 28.3 minutes per day received

Patient Z received a total of 8 days of SALT at Team A. On all 8 days they received 30 minutes per day. They did not receive any SALT at any other team. Patient Z received total of 240 minutes of SALT to be entered onto SSNAP.

Number of minutes per day = $\frac{240 \text{ minutes}}{8 \text{ days}}$ = 30 minutes per day received

The median number of minutes per day on which SALT is received in numerical order= 28.3 minutes 30 minutes 31.5 minutes

The **patient-centred** median number of minutes per day on which SALT is received 30 minutes.

7.3 Median percentage of a patient's days as an inpatient on which speech and language therapy is received

Included: all patients who are considered to require speech and language therapy are included in this indicator.

Excluded: patients who are considered to not require speech and language therapy are excluded from this indicator

To calculate the length of stay at an inpatient team a patient was considered to require SALT at:

The team centred length of stay at a team, if the patient was considered to require SALT and the team was the first team the patient was seen by:

For newly arrived patients, the difference between the date the patient was considered to no longer require Speech and language therapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival (Q 1.13).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date the patient was considered to no longer require Speech and language therapy (Q 4.4.1b) with a time component of 00:00 and date and the date and time of symptom onset (Q 1.11).

The team centred length of stay at a team, if the patient was considered to require SALT and the team was NOT the first team the patient was seen by:

The difference between the date the patient was considered to no longer require Speech and language therapy (Q 4.4.1b) with a time component of 00:00 and date and time of arrival at this hospital (Q 4.1).

Please note that the date of assessment for therapy is **not** used when calculating the length of stay. Question 4.4.1b was added to the data set on the 1st April 2014. A different end date is used for patients with a clock start before this date.

The shortest length of stay in a given team where a patient is deemed to require SALT is set at 24 hours, therefore any shorter lengths of stay are rounded up to reflect this.

Team-centred: The length of stay applicable for SALT at that team (if the patient was considered to require SALT) is the patient's length of stay applicable for SALT.

Patient-centred: The length of stay applicable for SALT at each team where the patient is considered to require SALT are summed together to give the patient's total inpatient length of stay which is applicable for SALT.

2) Then, calculate the number of days on which the patient received SALT:

For **team-centred**: the number of days of SALT the patient received (Q 4.5) at the specific team.

For **patient-centred**: the number of days of SALT the patient received (Q 4.5) at each inpatient team the patient was deemed to required SALT at are summed together to give the total number of days on which SALT was received.

3) Then, calculate the percentage of a patient's days in hospital on which speech and language therapy is received:
 Divide the total number of days on which SALT was received, by the patient's length of stay which is applicable for SALT.
 Due to the way length of stay is calculated, some patients' percentages may be over 100%. This is capped then capped at 100%.

Cohort median:

4) Lastly to find the median percentage, all percentages for each patient need to be listed in numerical order. The median is then the number in the middle of this list.

For team-centred	For patient-centred
The patient must be considered to require speech and language therapy by the specific team	The patient must be considered to require speech and language therapy by at least one inpatient team that the patient has been seen by

Example

Patient W arrived (clock start) at Team A at 12:00 on 2nd January. They required SALT at Team A until the 13th January, but did not receive any SALT. They were transferred to Team B on 13th January at 12:00. They received SALT at Team B on 5 days during their stay, and no longer required SALT on the 19th January.

Patient X arrived (clock start) at Team A at 12:00 on 1st January. They no longer required SALT on 13th January. They received SALT on 5 days during their stay.

Patient Y arrived (clock start) at Team A at 12:00 on 3rd January. They required SALT at Team A until the 5th January and received 2 days of SALT. They were transferred to Team B at 09:00 on 6th January. They no longer required inpatient rehabilitation from Team B on 16th January. They received SALT on 8 days during their stay.

Team-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan = 10.5 days
- 2) Number of days SALT received = 0 days
- 3) Percentage of patient's days at Team A in which SALT is received = $\frac{0 \text{ days}}{10.5 \text{ days}} = 0.00 = \underline{0\%}$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days SALT received = 5 days
- 3) Percentage of patient's days at Team A in which SALT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = \underline{43\%}$

Patient Y:

- 1) Length of stay = 12:00 3rd January – 00:00 5th January = 1.5 days
- 2) Number of days SALT is received = 2 days
- 3) Percentage of patient's days at Team A in which SALT is received = $\frac{2 \text{ days}}{1.5 \text{ days}} = 1.33 \geq \underline{100\%}$

Note, due to the way this indicator is calculated, Patient Y's percentage has been capped at 100%

- 4) Median percentage of all patient's days in hospital in which SALT is received in numerical order
= 0% 43% 100%

Team A's **team-centred** median percentage of all patients' days in hospital in which SALT is received is 43%

Patient-centred (Team A):

Patient W:

- 1) Length of stay = 12:00 2nd Jan – 00:00 13th Jan + 12:00 13th Jan – 00:00 19th Jan = 10.5 + 5.5 days = 16 days
- 2) Number of days SALT received = 5 days
- 3) Percentage of patient's days in hospital in which SALT is received = $\frac{5 \text{ days}}{16 \text{ days}} = 0.31 = \underline{31\%}$

Patient X:

- 1) Length of stay = 12:00 1st Jan – 00:00 13th Jan = 11.5 days
- 2) Number of days SALT received = 5 days
- 3) Percentage of patient's days in hospital in which SALT is received = $\frac{5 \text{ days}}{11.5 \text{ days}} = 0.43 = \underline{43\%}$

Patient Y:

- 1) Length of stay = 12:00 3rd Jan – 00:00 5th Jan + 09:00 6th Jan – 00:00 16th Jan = 1.5 days + 9.6 days = 11.1 days
- 2) Number of days SALT is received = 2 days + 8 days = 10 days
- 3) Percentage of patient's days in hospital in which SALT is received = $\frac{10 \text{ days}}{11.1 \text{ days}} = 0.90 = \underline{90\%}$

Cohort median (patient-centred):

- 4) Median percentage of all patient's days in hospital in which SALT is received in numerical order
= 31% 43% 90%

The **patient-centred** median percentage of all patients' days in hospital in which SALT is received is 43%

7.4 Compliance (%) against the therapy target of an average of 16.1 minutes of speech and language therapy across all patients (2016 NICE QS Statement 2)

[Target = 45 minutes of speech and language therapy on 5 out of 7 days a week for 50% of patients = $45 \times (5/7) \times 0.5$]

Included: all patients are included in this indicator.

Excluded: no patients are excluded from this indicator

The average number of minutes of speech and language therapy per day across all patients is calculated as:

The percentage of patients reported as requiring SALT (**as per Key Indicator 7.1**)
 multiplied by
 the median number of minutes per day on which SALT is received (**as per Key Indicator 7.2**)
 multiplied by
 the median percentage of a patient's days in hospital on which SALT is received (**as per Key Indicator 7.3**)

The target for the average number of minutes of speech and language therapy per day across all patients is calculated as 50% multiplied by 45 minutes, multiplied by 5/7 days, which is 16.1 minutes for all teams.

Cohort percentage: The percentage of the target achieved is calculated as the average number of minutes of SALT per day across all patients divided by the target number of minutes.

For team-centred	For patient-centred
All patients in the team-centred post-72h cohort	All patients in the patient-centred post-72h cohort

Example

Using calculations from the examples in Key Indicator 7.1, Key Indicator 7.2 and Key Indicator 7.3

Team-centred = Key Indicator 7.1 x Key Indicator 7.2 x Key Indicator 7.3

Team A = $0.67 \times 30 \text{ minutes} \times 0.43 = 13.5 \text{ minutes}$

= 8.6 minutes
 16.1 minutes

Compliance = 53.4%

Team B = $0.67 \times 35 \text{ minutes} \times 0.87 = 20.4 \text{ minutes}$

= 20.4 minutes
 16.1 minutes

Compliance = 126.7%

Patient-centred = Key Indicator 7.1 x Key Indicator 7.2 x Key Indicator 7.3

= $0.67 \times 30 \text{ minutes} \times 0.43 = 8.6 \text{ minutes}$

= 8.6 minutes
 16.1 minutes

Compliance = 53.4%

8. Multi-Disciplinary Team (MDT) working Key Indicators

8.1 Percentage of applicable patients who were assessed by an occupational therapist within 72h of clock start

Included: all patients are included in this indicator, except those who are either medically unwell, refused to be screened or had no relevant deficit.

Excluded: patients who are medically unwell, refused to be assessed or had no relevant deficit (ie patients where Q 3.5.1 is answered 'Patient refused', 'Patient medically unwell' or 'Patient had no relevant deficit') are excluded from this indicator

Numerator = the number of patients who were assessed by an occupational therapist within 72h of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but not assessed are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time first assessed by an occupational therapist (Q 3.5) and date and time of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 4320 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time first assessed by an occupational therapist (Q 3.5) and the date and time of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 4320 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit

For patient-centred

All patients in the patient-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit

Example

Patient W arrived (clock start) at hospital at 10:00 on Monday. They were medically unwell until 10:00 on Friday. Patient W is excluded from the indicator because they were medically unwell until the time of assessment.

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by an OT at 16:30 on Wednesday. Patient X has achieved the indicator because Tuesday 15:00 – Wednesday 16:30 = 1530 minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by an OT on Wednesday 12:15. Patient Y has not achieved the indicator because Saturday 12:15 – Wednesday 12:15 = 5760 minutes.

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed due to Organisational Reasons, so are applicable but not assessed, and therefore have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{\text{(Patient X)}}{\text{(Patient X, Patient Y and Patient Z)}}$

8.2 Median time between clock start and being assessed by an occupational therapist (hours:mins)

Included: all patients who were seen by an occupational therapist within 72h of clock start are included in this indicator.

Excluded: patients who were not seen by an occupational therapist within 72 hours of clock start are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and being assessed by an occupational therapist is the difference between the date and time of arrival (Q 1.13) and the date and time of assessment by occupational therapist (Q 3.5).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and being assessed by an occupational therapist is the difference between the date and time of symptom onset (Q 1.11) and the date and time of assessment by occupational therapist (Q 3.5).

Cohort median: To find the median time, all the times between clock start and assessment by occupational therapist need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred

All patients in the team-centred 72h cohort who were seen by an occupational therapist within 72h of clock start

For patient-centred

All patients in the patient-centred 72h cohort who were seen by an occupational therapist within 72h of clock start

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were assessed by an OT at 15:18 that same day. Patient A's time from clock start to being assessed by an OT was 2:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were assessed by an OT at 19:16 that same day. Patient B's time from clock start to being assessed by an OT was 10:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not assessed by an OT so are excluded.

Patient D arrived (clock start) at hospital at 22:00 on Friday. They were assessed by an OT at 09:38 the following Monday. Patient D's time from clock start to being assessed an OT was 59:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were assessed by an OT at 11:47 on Tuesday. Patient E's time from clock start to being assessed by an OT was 20:32.

Patient F arrived (clock start) at hospital at 23:33 on Wednesday. They were assessed by an OT at 11:03 on Saturday. Patient F's time from clock start to being assessed by an OT was 60:00.

Listing in numerical order: 2:21 10:01 20:32 59:38 60:00

The cohort median is 20 hours 32 minutes.

8.3 Percentage of applicable patients who were assessed by a physiotherapist within 72h of clock start

Included: all patients are included in this indicator, except those who are either medically unwell, refused to be screened or had no relevant deficit.

Excluded: patients who are medically unwell, refused to be assessed or had no relevant deficit (ie patients where Q 3.6.1 is answered 'Patient refused', 'Patient medically unwell' or 'Patient had no relevant deficit') are excluded from this indicator

Numerator = the number of patients who were assessed by a physiotherapist within 72h of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but not assessed are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time first assessed by a physiotherapist (Q 3.6) and date and time of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 4320 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time first assessed by a physiotherapist (Q 3.6) and the date and time of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 4320 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit	All patients in the patient-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit

Example

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a PT at 16:30 on Wednesday. Patient X has achieved the indicator because Tuesday 15:00 – Wednesday 16:30 = 1530 minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a PT on Wednesday 12:15. Patient Y has not achieved the indicator because Saturday 12:15 – Wednesday 12:15 = 5760 minutes.

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed due to Organisational Reasons, so are applicable but not assessed, and therefore have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

8.4 Median time between clock start and being assessed by a physiotherapist (hours:mins)

Included: all patients who were seen by a physiotherapist within 72h of clock start are included in this indicator.

Excluded: patients who were not seen by a physiotherapist within 72 hours of clock start are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and being assessed by a physiotherapist is the difference between the date and time of arrival (Q 1.13) and the date and time of assessment by physiotherapist (Q 3.6).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and being assessed by a physiotherapist is the difference between the date and time of symptom onset (Q 1.11) and the date and time of assessment by physiotherapist (Q 3.6).

Cohort median: To find the median time, all the times between clock start and assessment by physiotherapist need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred

All patients in the team-centred 72h cohort who were seen by a physiotherapist within 72h of clock start

For patient-centred

All patients in the patient-centred 72h cohort who were seen by a physiotherapist within 72h of clock start

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were assessed by a PT at 15:18 that same day. Patient A's time from clock start to being assessed by a PT was 2:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were assessed by a PT at 19:16 that same day. Patient B's time from clock start to being assessed by a PT was 10:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not assessed by a PT so are excluded.

Patient D arrived (clock start) at hospital at 22:00 on Friday. They were assessed by a PT at 09:38 the following Monday. Patient D's time from clock start to being assessed a PT was 59:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were assessed by a PT at 11:47 on Tuesday. Patient E's time from clock start to being assessed by a PT was 20:32.

Patient F arrived (clock start) at hospital at 23:33 on Wednesday. They were assessed by a PT at 11:03 on Saturday. Patient F's time from clock start to being assessed by a PT was 60:00.

Listing in numerical order: 2:21 10:01 20:32 59:38 60:00

The cohort median is 20 hours 32 minutes.

8.5 Percentage of applicable patients who were assessed by a speech and language therapist within 72h of clock start

Included: all patients are included in this indicator, except those who are either medically unwell, refused to be screened or had no relevant deficit.

Excluded: patients who are medically unwell, refused to be assessed or had no relevant deficit (ie patients where Q 3.7.1 is answered 'Patient refused', 'Patient medically unwell' or 'Patient had no relevant deficit') are excluded from this indicator

Numerator = the number of patients who were assessed by a speech and language therapist within 72h of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but not assessed are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date and time first assessed by a speech and language therapist (Q 3.7) and date and time of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 4320 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time first assessed by a speech and language therapist (Q 3.7) and the date and time of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 4320 minutes.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit	All patients in the patient-centred 72h cohort except those who are medically unwell, refused to be assessed or had no relevant deficit

Example

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a SALT at 16:30 on Wednesday. Patient X has achieved the indicator because Tuesday 15:00 – Wednesday 16:30 = 1530 minutes.

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a SALT on Wednesday 12:15. Patient Y has not achieved the indicator because Saturday 12:15 – Wednesday 12:15 = 5760 minutes.

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed due to Organisational Reasons, so are applicable but not assessed, and therefore have not achieved the indicator.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

8.6 Median time between clock start and being assessed by a speech and language therapist (hours:mins)

Included: all patients who were seen by a speech and language therapist within 72h of clock start are included in this indicator.

Excluded: patients who were not seen by a speech and language therapist within 72 hours of clock start are excluded from this indicator

For patients newly arriving at hospital, the time between clock start and being assessed by a speech and language therapist is the difference between the date and time of arrival (Q 1.13) and the date and time of assessment by speech and language (Q 3.7).

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the time between clock start and being assessed by a speech and language therapist is the difference between the date and time of symptom onset (Q 1.11) and the date and time of assessment by speech and language (Q 3.7).

Cohort median: To find the median time, all the times between clock start and assessment by speech and language therapist need to be listed from smallest to largest. The median is then the number in the middle of this list.

For team-centred

All patients in the team-centred 72h cohort who were seen by a speech and language therapist within 72h of clock start

For patient-centred

All patients in the patient-centred 72h cohort who were seen by a speech and language therapist within 72h of clock start

Example

Patient A arrived (clock start) at hospital at 12:57 on Tuesday. They were assessed by a SALT at 15:18 that same day. Patient A's time from clock start to being assessed by a SALT was 2:21.

Patient B arrived (clock start) at hospital at 09:15 on Friday. They were assessed by a SALT at 19:16 that same day. Patient B's time from clock start to being assessed by a SALT was 10:01.

Patient C arrived (clock start) at hospital at 13:08 on Sunday. They were not assessed by a SALT so are excluded.

Patient D arrived (clock start) at hospital at 22:00 on Friday. They were assessed by a SALT at 09:38 the following Monday. Patient D's time from clock start to being assessed a SALT was 59:38.

Patient E arrived (clock start) at hospital at 03:15 on Monday. They were assessed by a SALT at 11:47 on Tuesday. Patient E's time from clock start to being assessed by a SALT was 20:32.

Patient F arrived (clock start) at hospital at 23:33 on Wednesday. They were assessed by a SALT at 11:03 on Saturday. Patient F's time from clock start to being assessed by a SALT was 60:00.

Listing in numerical order: 2:21 10:01 20:32 59:38 60:00

The cohort median is 20 hours 32 minutes.

8.7 Percentage of patients who have rehabilitation goals agreed within 5 days of clock start

Included: all patients are included unless:

- the patient refused,
- the patient is medically unwell for entire admission
- the patient is considered to have no rehabilitation potential for all teams the patient is seen by within the first 5 days of clock start AND it has been decided either in the first 72 hours or by discharge that the patient is for palliative care.

Excluded: patients who refused or are medically unwell for the entire admission are excluded. Patients considered to have no rehabilitation potential for all teams the patient is seen by within the first 5 days of clock start and where it has been decided either in the first 72 hours or by discharge that the patient is for palliative care are also excluded from this indicator.

Numerator = the number of patients who have rehabilitation goals agreed within 5 days of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but did not have rehabilitation goals are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the first date rehabilitation goals agreed (Q 6.10) and the date of arrival (Q 1.13) must be greater than or equal to 0 days and less than or equal to 5 days.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between first date rehabilitation goals agreed (Q 6.10) and the date of symptom onset (Q 1.11) must be greater than or equal to 0 days and less than or equal to 5 days.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
N/A	All patients eligible in the patient-centred post-72h cohort

Example

Patient W onset in hospital on the 4th January. The patient was for palliative care within 72h and the reason no goals were set was because the patient was deemed to have no rehabilitation potential. Patient W was therefore excluded from this indicator.

Patient X arrived (clock start) at hospital on 1st January. They had rehabilitation goals agreed on by 4th January. Patient X has achieved the indicator because 1st January – 4th January = 3 days.

Patient Y arrived (clock start) at hospital on 2nd January. They had rehabilitation goals agreed on by 10th January. Patient Y has not achieved the indicator because 2nd January – 10th January = 8 days.

Patient Z arrived (clock start) at hospital on 3rd January. They did not have rehabilitation goals set because of organisational reasons.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient X, Patient Y and Patient Z})}$

8.8 Percentage of applicable patients who are assessed by a nurse within 24h AND at least one therapist within 24h AND all the relevant therapists within 72h AND have rehabilitation goals agreed within 5 days

This Key Indicator can be broken down into four components

- 1) assessment by a nurse within 24h
- 2) at least one therapist within 24h
- 3) all the relevant therapists within 72h
- 4) have rehabilitation goals agreed within 5 days

Patients **included if eligible for all four components:**

- 1) as in **Key Indicator 4.3**
- 2) all patients are included except those who are either medically unwell, refused to be assessed or had no relevant deficit
- 3) all patients are included except those who are either medically unwell, refused to be assessed or had no relevant deficit
- 4) as in **Key Indicator 8.7**

Patients must be eligible for all four parts to be deemed eligible for this Key Indicator.

Excluded:

- 1) no patients are excluded
- 2) patients who either refused, are medically unwell, or had no relevant deficit for all three therapies
- 3) patients who either refused, are medically unwell, or had no relevant deficit for all three therapies
- 4) patients who refused or are medically unwell for the entire admission are excluded. Patients considered to have no rehabilitation potential for all teams the patient is seen by within the first 5 days of clock start and where it has been decided either in the first 72 hours or by discharge that the patient is for palliative care are also excluded.

Numerator = the number of patients who achieve all 4 components of the indicator.

Denominator = all the applicable patients in the cohort. Patients who are applicable for all four components but did not achieve all four components are included in the denominator.

To calculate whether a patient is included in the numerator:

Part 1)

For newly arrived patients, the difference between the date and time first assessed by nurse trained in stroke management (Q 3.2) and the date of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 1440 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between date and time first assessed by nurse trained in stroke management (Q 3.2) and the date of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 1440 minutes.

AND

Part 2)

For newly arrived patients, the difference between the date and time first assessed by at least one of: an occupational therapist, a physiotherapist, communication assessed by speech and language therapist (Q 3.5, 3.6, 3.7), and the date of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 1440 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date and time first assessed by at least one of: an occupational therapist, a physiotherapist, communication assessed by speech and language therapist (Q 3.5, 3.6, 3.7), and the date of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 1440 minutes.

AND

Part 3)

For newly arrived patients, the difference between the date and time between receiving all required therapies (Q 3.5, 3.6, 3.7) and the date of arrival (Q 1.13) must be greater than 0 minutes and less than or equal to 4320 minutes.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), difference between the date and time between receiving all required therapies (Q 3.5, 3.6, 3.7) and the date of symptom onset (Q 1.11) must be greater than 0 minutes and less than or equal to 4320 minutes.

AND

Part 4)

For newly arrived patients, the difference between the first date rehabilitation goals agreed (Q 6.10) and the date of arrival (Q 1.13) must be greater than or equal to 0 days and less than or equal to 5 days.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between first date rehabilitation goals agreed (Q 6.10) and the date of symptom onset (Q 1.11) must be greater or equal to 0 days and less than or equal to 5 days.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
N/A	All patients eligible in the patient-centred post-72h cohort

Example

Part 1)

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a stroke nurse at 10:00 the following day. Patient X has achieved Part 1 of the indicator because 10:00 Wednesday – 15:00 Tuesday = 1140 minutes (19 hours).

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a stroke nurse at 11:15 the following Monday. Patient Y has not achieved Part 1 of the indicator because 11:15 Monday – 12:15 Saturday = 2820 minutes (47 hours).

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were not assessed by a stroke nurse so has not achieved Part 1 of the indicator.

Therefore only Patient X has achieved Part 1.

Part 2)

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a physiotherapist at 10:00 on Wednesday. Patient X has achieved Part 2 of the indicator because Tuesday 15:00 – Wednesday 16:30 = 1140 minutes (19 hours).

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a physiotherapist, occupational therapist and speech and language therapist on Monday at 12:15. Patient Y has not achieved Part 2 of the indicator because Saturday 12:15 – Monday 12:15 = 2280 minutes (48 hours) and therefore they were not assessed by any therapist within 24 hours.

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. Patient Z was applicable for an assessment but not assessed by an occupational therapist or a speech and language therapist. They were applicable for physiotherapy assessment but not assessed by a physiotherapist so have not achieved Part 2 of the indicator.

Therefore only Patient X has achieved Part 2.

Part 3)

Patient X arrived (clock start) at hospital at 15:00 on Tuesday. They were assessed by a physiotherapist, occupational therapist and speech and language therapist at 10:00 on Wednesday. Patient X has achieved Part 3 of the indicator because Tuesday 15:00 – Wednesday 16:30 = 1140 minutes (19 hours).

Patient Y arrived (clock start) at hospital at 12:15 on Saturday. They were assessed by a physiotherapist, occupational therapist and speech and language therapist on Monday at 12:15. Patient Y has achieved Part 3 of the indicator because Saturday 12:15 – Monday 12:15 = 2880 minutes (48 hours).

Patient Z arrived (clock start) at hospital at 20:08 on Thursday. They were applicable but not assessed by a physiotherapist, occupational therapist or speech and language therapist so have not achieved Part 3 of the indicator.

Therefore Patient X and Patient Y have achieved Part 3.

Part 4)

Patient X arrived (clock start) at hospital on 1st January. They had rehabilitation goals agreed on by 4th January. Patient X has achieved Part 4 of the indicator because 1st January – 4th January = 3 days.

Patient Y arrived (clock start) at hospital on 2nd January. They did not have rehabilitation goals set because the patient refused. Patient Y therefore is excluded from the indicator.

Patient Z arrived (clock start) at hospital on 3rd January. They had rehabilitation goals agreed on by 5th January. Patient Z has achieved Part 4 of the indicator as 2nd January – 5th January = 3 days.

Therefore Patient X and Patient Z have achieved Part 4, and Patient Y is excluded.

The only patient to achieve all four components is Patient X.

The percentage applicable patients who are assessed by a nurse within 24h AND at least one therapist within 24h AND all the relevant therapists within 72h AND have rehabilitation goals agreed within 5 days =

$$\underline{0.50} \quad \text{or} \quad \underline{50\%} \quad \text{or} \quad \frac{1}{2} \quad \frac{(\text{Patient X})}{(\text{Patient X and Patient Z})}$$

9. Standards by discharge Key Indicators

9.1 Percentage of applicable patients screened for nutrition and seen by a dietitian by discharge

Included: all patients who were identified as high risk of malnutrition following nutritional screening or not screened are included, except those who are for palliative care at any point.

Excluded: patients who were identified to not be high risk of malnutrition following nutritional screening and patients where it is decided they are for palliative care at any point (either within 72h or by discharge) are excluded from this indicator

Numerator = the number of patients who were seen by a dietitian by discharge.

Denominator = all the applicable patients in the cohort. Patients who are applicable but did not see a dietitian are included in the denominator.

To calculate the numerator:

Count the number of patients for whom a date is given for when they saw a dietitian (Q 6.6.1).

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred post-72h cohort (records attributed to 7 day team) who were identified as high risk of malnutrition following nutritional screening or not screened, except those for palliative care

For patient-centred

All patients in the patient-centred post-72h cohort who were identified as high risk of malnutrition following nutritional screening or not screened, except those for palliative care

Example

Patient W was not screened, and was not for palliative care. Patient W therefore has not achieved the indicator.

Patient X was screened and identified as being at high risk of malnutrition, and seen by a dietitian on the 03/02/2015. Patient X achieved the indicator.

Patient Y was screened and identified as being at high risk of malnutrition, but was not seen by a dietitian during their inpatient stay. Patient Y was not for palliative care, therefore Patient Y has not achieved the indicator.

Patient Z was not identified as at high risk of malnutrition following nutritional screening. Patient Z is therefore excluded.

Therefore the cohort percentage is 0.33 or 33% or $\frac{1}{3}$ $\frac{(\text{Patient X})}{(\text{Patient W, Patient X, and Patient Y})}$

9.2 Percentage of applicable patients who have a continence plan drawn up within 3 weeks of clock start

Included: all patients are included, except those who are either continent or refused a continence plan.

Excluded: patients who are continent or refused a continence plan are excluded from this indicator

Numerator = the number of patients who have a continence plan drawn up within 3 weeks of clock start.

Denominator = all the applicable patients in the cohort. Patients who are applicable but did not have a continence plan drawn up are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the date urinary continence plan drawn up (Q 6.5) and date of arrival (Q 1.13) must be greater than or equal to 0 weeks and less than or equal to 3 weeks.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the date urinary continence plan drawn up (Q 6.5) and the date of symptom onset (Q 1.11) must be greater or equal to 0 weeks and less than or equal to 3 weeks.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred post-72h cohort (records attributed to 7 day team) who were not continent or did not refuse a continence plan

For patient-centred

All patients in the patient-centred post-72h cohort who were not continent or did not refuse a continence plan

Example

Patient X arrived (clock start) at hospital on 1st January. They had a continence plan drawn up by 14th January. Patient X has achieved the indicator because 1st January – 14th January = 2 weeks.

Patient Y arrived (clock start) at hospital on 2nd January. They had a continence plan drawn up by 10th January. Patient Y has achieved the indicator because 2nd January – 10th January = 8 days.

Patient Z arrived (clock start) at hospital on 3rd January. They did not have a continence plan drawn up for organisational reasons, and therefore did not achieve this indicator.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

9.3 Percentage of applicable patients who have mood and cognition screening by discharge

Included: all patients are included, except those who either refused or were medically unwell for entire admission and those who are discharged from inpatient care within 7 days of clock start without receiving both mood and cognition screens.

Excluded: patients who refused either or both screens, patients who were medically unwell for entire admission, and patients who were discharged from inpatient care within 7 days of clock start without receiving both screens are excluded from this indicator

Numerator = the number of patients who have mood and cognition screening by discharge.

Denominator = all the applicable patients in the cohort. Patients who are applicable but did not have mood and cognition screening by discharge are included in the denominator.

To calculate whether a patient is included in the numerator:

For newly arrived patients, the difference between the dates patient screened for mood using a validated tool/date patient screened for cognition using a simple standardised measure (Q 6.7/Q 6.8) and date of arrival (Q 1.13) both must be greater than or equal to 0 weeks and less than or equal to 6 weeks.

For patients already in hospital at the time of their stroke (Q 1.10 is 'Yes'), the difference between the dates patient screened for mood using a validated tool/date patient screened for cognition using a simple standardised measure (Q 6.7/Q 6.8) and the date of symptom onset (Q 1.11) both must be greater or equal to 0 weeks and less than or equal to 6 weeks.

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred post-72h cohort (records attributed to discharging team) who were applicable for both mood and cognition screening, except where the patient does not receive both screenings AND the patient's length of stay in inpatient care is less than 7 days

For patient-centred

All patients in the patient-centred post-72h cohort who were applicable for both mood and cognition screening, except where the patient does not receive both screenings AND the patient's length of stay in inpatient care is less than 7 days

Example

Patient W onset in hospital (clock start) on the 1st February, and was discharged to a care home on the 4th February. They did not have mood and cognition screening for organisational reasons. Patient W is excluded from this indicator because their length of stay in hospital is less than 7 days and they did not receive both screens.

Patient X arrived (clock start) at hospital on 1st January. They had a mood and cognition screening on 14th January. Patient X has achieved the indicator because 1st January – 14th January = 2 weeks.

Patient Y arrived (clock start) at hospital on 2nd January. They had mood and cognition screening on 30th January. Patient Y has achieved the indicator because 2nd January – 30th January = 4 weeks.

Patient Z arrived (clock start) at hospital on 3rd January and was discharged home on the 3rd February. They did not have mood and cognition screening for organisational reasons. Patient Z therefore did not achieve this indicator.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

10. Discharge processes Key Indicators

10.1 Percentage of applicable patients receiving a joint health and social care plan on discharge (CCG OIS C3.7)

Included: all patients who are discharged alive from inpatient care are included, except where 'Not applicable' has been chosen for documented evidence of joint care planning between health and social care for post discharge management.

Excluded: patients who died in inpatient care or 'Not applicable' has been chosen for documented evidence of joint care planning between health and social care for post discharge management are excluded from this indicator

Numerator = the number of patients who received a joint health and social care plan on discharge.

Denominator = all the applicable patients in the cohort. Patients who are applicable but did not receive a joint health care and social plan are included in the denominator.

To calculate the numerator:

Count the number of patients for whom there is documented evidence of joint care planning between health and social care for post discharge management (Q 7.11 is 'Yes').

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred post-72h cohort who were discharged alive from inpatient care

For patient-centred

All patients in the patient-centred post-72h cohort who were discharged alive from inpatient care

Example

Patient V died in inpatient care and is therefore excluded from this indicator.

Patient X received a joint health care and social plan, and therefore achieved this indicator.

Patient Y did not receive a joint health care and social plan (Q7.11="No") and therefore did not achieve this indicator.

Patient Z was not applicable for a joint health care and social plan (Q7.11="Not applicable") and therefore was excluded from this indicator.

Therefore the cohort percentage is 0.50 or 50% or $\frac{1}{2} \frac{(\text{Patient X})}{(\text{Patient X and Patient Y})}$

10.2 Percentage of patients supported by a stroke skilled Early Supported Discharge team (2016 NICE QS Statement 4)

Included: all patients who are discharged alive from inpatient care are included in this indicator.

Excluded: patients who died in inpatient care or who were transferred to another inpatient team are excluded from this indicator

Numerator = the number of patients who were supported by a stroke skilled ESD team.

Denominator = all the discharged alive patients in the cohort. Patients who did not have the support of a stroke skilled ESD team are included in the denominator.

To calculate the numerator:

Count the number of patients who were discharged with a stroke/neurology specific Early Supported Discharge multidisciplinary team (Q 7.7 is “Yes, stroke/neurology specific”).

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred post-72h cohort who were discharged alive from inpatient care	All patients in the patient-centred post-72h cohort who were discharged alive from inpatient care

Example

Patient V died in inpatient care and is excluded from this indicator.

Patient W was transferred to another inpatient team on SSNAP so is excluded from the indicator.

Patient X was discharged with the support of a stroke/neurology specific ESD team, and therefore achieved this indicator.

Patient Y was discharged with the support of a stroke/neurology specific ESD team, and therefore achieved this indicator.

Patient Z was discharged alive with the support of a non-specialist ESD team, and therefore did not achieve this indicator.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

10.3 Percentage of patients in atrial fibrillation on discharge who are discharged on anticoagulants or with a plan to start anticoagulation

Included: all patients who are discharged alive from inpatient care and where there is documented evidence that the patient is in atrial fibrillation on discharge are included, except where there is a 'No but' reason as to why the patient who was in atrial fibrillation on discharge was not discharged with a plan to start on anticoagulation within the next month.

Excluded: patients who died in inpatient care, patients where there was no evidence the patient was in atrial fibrillation on discharge, and patients in atrial fibrillation who had a 'no but' reason as to why the patient was not discharged with a plan to start on anticoagulation within the next month are excluded from this indicator

Numerator = the number of patients who were discharged on anticoagulants or with a plan to start anticoagulation within the next month.

Denominator = all the patients in the cohort where there is documented evidence that the patient is in atrial fibrillation. Patients who were discharged not on anticoagulants or with a plan to start on anticoagulation but with documented evidence of being in atrial fibrillation are included in the denominator.

To calculate the numerator:

Count the number of patients who were discharged on anticoagulants (not anti-platelet agent) or with a plan to start on anticoagulants within the next month (Q 7.10.1 is 'Yes').

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred	For patient-centred
All patients in the team-centred post-72h cohort who were discharged alive from inpatient care by this team with documented evidence of being in atrial fibrillation	All patients in the patient-centred post-72h cohort who were discharged alive from inpatient care with documented evidence of being in atrial fibrillation

Example

Patient W was not discharged alive so is excluded from this indicator.

Patient X had documented evidence of being in atrial fibrillation on discharge, and was discharged on anticoagulants (or with a plan to start within the next month). Patient X therefore achieved this indicator.

Patient Y had documented evidence of being in atrial fibrillation on discharge, but was not discharged on anticoagulants (Q7.10.1="No"). Patient Y therefore did not achieve this indicator.

Patient X had documented evidence of being in atrial fibrillation on discharge, but was not discharged on anticoagulants for a "no but" reason (Q7.10.1="No but"). Patient Z was therefore excluded from this indicator.

Therefore the cohort percentage is 0.50 or 50% or $\frac{1}{2} \frac{(\text{Patient X})}{(\text{Patient X and Patient Y})}$

10.4 Percentage of patients who are discharged alive who are given a named person to contact after discharge

Included: all patients who are discharged alive from inpatient care are included in this indicator.

Excluded: patients who died in inpatient care or who were transferred to another inpatient team are excluded from this indicator

Numerator = the number of patients who are given a named person to contact after discharge.

Denominator = all the patients discharged alive in the cohort. Patients who are not given a named person to contact after discharge are included in the denominator.

To calculate the numerator:

Count the number of patients who were discharged with a named person to contact after discharge (Q 7.12 is 'Yes').

Cohort percentage: $100 * \frac{\text{numerator}}{\text{denominator}}$

For team-centred

All patients in the team-centred post-72h cohort who were discharged alive from inpatient care

For patient-centred

All patients in the patient-centred post-72h cohort who were discharged alive from inpatient care

Example

Patient W died in inpatient care and is therefore excluded from this indicator.

Patient X was discharged with a named contact, and therefore achieved this indicator.

Patient Y was discharged with a named contact, and therefore achieved this indicator.

Patient Z was discharged alive but not with a named contact, and therefore did not achieve this indicator.

Therefore the cohort percentage is 0.67 or 67% or $\frac{2}{3}$ $\frac{(\text{Patient X and Patient Y})}{(\text{Patient X, Patient Y and Patient Z})}$

Audit Compliance

We have categorised the audit compliance score into five bands as follows:

Band 1: 90.0-100.0

Band 2: 80.0-89.9

Band 3: 70.0-79.9

Band 4: 50.0-69.9

Band 5: 0.0-49.9

The overall Audit Compliance score is based on **SIX** categories.

Where a team does not have the relevant results for a particular category, e.g. if the team has not thrombolysed any patients, the "NIHSS 24h after thrombolysis is known" result is irrelevant and therefore does not contribute to the audit compliance score. The score is therefore based on the remaining categories, with the weighting adjusted accordingly.

Categories

1) NIHSS at arrival: 30% of score (team-centred 72h cohort)

Percentage of patients where NIHSS at arrival is fully complete

2) NIHSS 24h: 20% of score (team-centred 72h cohort)

Percentage of patients where NIHSS 24h after thrombolysis is known

3) Transfers: 10% of score (team-centred 72h cohort and team-centred post-72h all teams cohort)

Percentage of records which are ready to transfer and have been transferred to next team (team-centred 72h cohort)

"Median number of days from patient transferred to next team to when the record is transferred on the webtool (team-centred post-72h all teams cohort)

- A score of 100 is obtained if the median time is less than 7 days
- A score of 75 is obtained if the median time is between 7 and less than 14 days
- A score of 50 is obtained if the median time is between 14 and <21 days
- A score of 25 is obtained if the median time is between 21 and <28 days
- A score of 0 is obtained if the median time is 28 days or longer"

Percentage of patients who have been transferred to an ESD or CRT out of those who have been recorded as discharged with ESD or CRT in Q7.7 or Q7.8 (team-centred post-72h all teams cohort)

4) Data Entry: 10% of score (team-centred 72h cohort and team-centred post-72h inpatient discharge cohort)

"Median number of days from when patient is admitted/onset to when the record is started (team-centred 72h cohort)

- A score of 100 is obtained if the median time is less than 7 days
- A score of 75 is obtained if the median time is between 7 and less than 14 days
- A score of 50 is obtained if the median time is between 14 and <21 days
- A score of 25 is obtained if the median time is between 21 and <28 days
- A score of 0 is obtained if the median time is 28 days or longer"

"Median number of days from when the patient is discharged from the team's care to when the record is locked to discharge (not transferred) (team-centred post-72h inpatient discharge cohort)

- A score of 100 is obtained if the median time is less than 7 days
- A score of 75 is obtained if the median time is between 7 and less than 14 days
- A score of 50 is obtained if the median time is between 14 and <21 days
- A score of 25 is obtained if the median time is between 21 and <28 days

- A score of 0 is obtained if the median time is 28 days or longer"

All applicable scores in this section are added together and divided by the total number of applicable components to calculate the data entry score.

5) 72h measures: 15% of score (team-centred 72h cohort)

Percentage of patients whose ethnicity is known

Percentage of patients where reason for no swallow screen within 4h is known

Percentage of patients where reason for no swallow screen within 72h is known

Percentage of patients where reason for no OT assessment within 72 is known

Percentage of patients where reason for no PT assessment within 72 is known

Percentage of patients where reason for no SALT communication assessment within 72 is known

Percentage of patients where reason for no formal swallow assessment within 72 is known

6) Post-72h measures: 15% of score (team-centred post-72h cohorts)

Percentage of patients where reason for no rehabilitation goals is known (all teams cohort)

Percentage of patients where development of urinary tract infection is known (7 day cohort)

Percentage of patients where receipt of antibiotics for pneumonia is known (7 day cohort)

Percentage of patients where reason for no urinary continence plan is known (7 day cohort)

Percentage of patients where reason for no OT assessment by discharge is known (inpatient discharge cohort)

Percentage of patients where reason for no PT assessment by discharge is known (inpatient discharge cohort)

Percentage of patients where reason for no SALT communication assessment by discharge is known (inpatient discharge cohort)

Percentage of patients where reason for no SALT swallow assessment by discharge is known (inpatient discharge cohort)

Percentage of patients where reason for no mood screening by discharge is known (inpatient discharge cohort)

Percentage of patients where reason for no cognition screening is known (inpatient discharge cohort)

Percentage of patients where discharge home and living alone is known (inpatient discharge cohort)

Percentage of patients where number of social service visits is known (inpatient discharge cohort)

All applicable percentages in this section are added together and divided by the total number of applicable components to calculate the post-72h measures score.

Case Ascertainment

Currently, we have only used HES figures for routinely admitting teams. For teams who are typically transferred patients from other hospitals, we have used a different method for calculating case ascertainment. The case ascertainment percentage for these teams is the percentage of records that a team discharges from their care (either by transferring to another team or by discharging from inpatient care) in this reporting period compared to the number of records the team receives into their care (either by starting a record or by being transferred a record from another team). Please note, the patients who are discharged do not have to be the same patients as those who arrived within a reporting period – patients may have lengths of stay that span the reporting period deadlines.

			2019 Pre COVID	Current Service Dec 21 - Nov 22	End of Year 1	End of Year 2	End of Year 3 Full CRSC Service
Staff - Nursing	Ward - B7	SB		1	1	1	1
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		0	0	0	0
	Ward - B6	SB		2	2	2	2
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		0	0	0	0
	Ward - B5	SB		20.62	32.42	44.22	52
		HDd Prince Philip		5.2	5.2	5.2	-5.2
		HDd Glangwili		5.2	5.2	5.2	-5.2
	Ward - B4	SB		0	0	0	0
		HDd Prince Philip		2.6	2.6	2.6	-2.6
		HDd Glangwili		0	0	0	0
	Ward - B3	SB		6	6	6	6
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		0	0	0	0
	Ward - B2	SB		20.9	18.77	16.64	15.23
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		5.2	5.2	5.2	-5.2
Staffing - Medics	Consultants	SB		3	5	8	8
		HDd Prince Philip		1	1	1	1
		HDd Glangwili		1	1	1	1
	F1	SB		1	1	1	1
		HDd Prince Philip		1	1	1	1
		HDd Glangwili		1	1	1	1
	F2	SB		1	1	1	1
		HDd Prince Philip		1	1	1	1
		HDd Glangwili		1	1	1	1
	Physicians Associate	SB		2	2	2	2
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		0	0	0	0
	IMT	SB		2	2	2	2
		HDd Prince Philip		1	1	1	1
		HDd Glangwili		1	1	1	1
	Clin.Fellow	SB		1	1	1	1
		HDd Prince Philip		1	1	1	1
		HDd Glangwili		1	1	1	1
Staffing - Therapies (that work on ASU's)	B8	SB		0	1	1	1
		HDd Prince Philip		0	0	0	0
		HDd Glangwili		0.2	0.2	0.2	-0.2
	B7	SB		2.1	4.1	4.1	4.1
		HDd Prince Philip		0.35	0.35	0.35	-0.35
		HDd Glangwili		0.32	0.32	0.32	-0.32
	B6	SB		3.8	7.8	11.8	12.8
		HDd Prince Philip		0.81	0.68	0.68	-0.68
		HDd Glangwili		0.28	0.28	0.28	-0.28
	B5	SB		2.6	2.6	2.6	3.6
		HDd Prince Philip		0.04	0.04	0.04	-0.04
		HDd Glangwili		0.71	0.71	0.71	-0.71
	B4	SB		0	0	0	0
		HDd Prince Philip		0.375	0.375	0.375	-0.375
		HDd Glangwili		0.2	0.2	0.2	-0.2
	B3 (generic techs)	SB		0	0	0	4
		HDd Prince Philip		0.125	0.125	0.125	-0.125
		HDd Glangwili		0.1	0.1	0.1	-0.1
Staffing Radiology (Additional Staff required to deliver HASU)	B7	SB		N/A	1	1	1
	B6	SB		N/A	5	5	5
	B3	SB		N/A	5	5	5
	Neuro Radiologist	SB		N/A	4	4	4
Bed Numbers	ASU (1st 72 hours)	Morrison		24	18	12	8
		HDd Prince Philip		5	5	5	0
		HDd Glangwili		4	4	4	0
	Rehab / Type 2 ASU Beds (plue 72 hous)	NPTH		28	28	28	28
		HDd Prince Philip		19	19	19	19
		HDd Glangwili		16	16	16	16
Patient Numbers	HASU	Morrison			6	12	16
		HDd Prince Philip					
		HDd Glangwili					
	Stroke	Morrison	584	615	644	711	1156
		Princess of Wales (M	26	33	35	0	0
		HDd Prince Philip	200	136	142	149	0
		HDd Glangwili	202	222	233	244	0
	Stroke Mimics	SB	584	615	644	711	1156
		Princess of Wales (M	26	33	35	0	0
		HDd Prince Philip	200	136	142	149	0
		HDd Glangwili	202	222	233	244	0

Patient Numbers	Stroke Mimics - Admitted to stroke wards	SB	210	221	232	256	416
		Princess of Wales (M	9	12	12	0	0
		HDd Prince Philip	72	49	51	54	0
		HDd Glangwili	73	80	84	88	0
	Total number of patients admitted to HASU / 1st 72 hour ASU	SB	794	836	876	967	1573
		Princess of Wales (M	35	45	47	0	0
		HDd Prince Philip	272	185	194	203	0
HDd Glangwili		275	302	316	331	0	
Measure Therapies	Therapist Assessment <=24 hours	SB	96.70%	91.40%	95.00%	95%	95%
		HDd Prince Philip	84.50%	69.10%	69.10%	69.10%	
		HDd Glangwili	78.20%	82.90%	82.90%	82.90%	
	Physiotherapist Assessment <=72 hours	SB	98.68%	94.83%	95.00%	95.00%	95%
		HDd Prince Philip	91.56%	93.48%	93.48%	93.48%	
		HDd Glangwili	96.35%	95.96%	95.96%	95.96%	
	Occupational therapist assessment <=72 hours	SB	97.69%	95.55%	95.00%	95.00%	95%
		HDd Prince Philip	82.66%	90.52%	90.52%	90.52%	
		HDd Glangwili	93.42%	93.19%	93.19%	93.19%	
	Speech & Language Therapist Assessment <=72 hours	SB	96.09%	88.90%	95.00%	95.00%	95%
		HDd Prince Philip	87.31%	86.53%	86.53%	86.53%	
		HDd Glangwili	92.25%	91.29%	91.29%	91.29%	
Therapy sessions offered - in 1st 5 days	SB	Not Currently Mea	Not Currently Meas	95.00%	95.00%	95%	
	HDd Prince Philip	Not Currently Mea	Not Currently Measured				
	HDd Glangwili	Not Currently Mea	Not Currently Measured				
Measure Clinical	Initial assessment of arriving at hospital <=1 hour	SB	Not Currently Mea	Not Currently Measured	95% (SB Patients o		95%
		HDd Prince Philip	Not Currently Mea	Not Currently Measured			
		HDd Glangwili	Not Currently Mea	Not Currently Measured			
	Admitted to Stroke Unit within 4 hours of arrival to hospital	SB	53.00%	10.90%	38.93%	66.97%	95%
		HDd Prince Philip	73.30%	22.20%	22.20%	22.20%	
		HDd Glangwili	57.60%	18.90%	18.90%	18.90%	
	Swallow screen assessment within 4 hrs	SB	79.30%	76.30%	82.53%	88.77%	95%
		HDd Prince Philip	97.10%	92.60%	92.60%	92.60%	
		HDd Glangwili	92.90%	93.60%	93.60%	93.60%	
	Formal Swallow screen assessment within <=72 hrs	SB	95.00%	91.50%	94.33%	97.17%	100%
		HDd Prince Philip	96.20%	93.80%	93.80%	93.80%	
		HDd Glangwili	90.30%	91.60%	91.60%	91.60%	
	CT Scanned within 1 hour	SB	51.20%	38.50%	57.33%	76.17%	95%
		HDd Prince Philip	80.50%	84.60%	84.60%	84.60%	
		HDd Glangwili	75.20%	74.60%	74.60%	74.60%	
	MRI Brain Imaging - 1 hour	SB	Not Currently Mea	Not Currently Measured	48% (SB Patients o		48%
		HDd Prince Philip	Not Currently Mea	Not Currently Measured			
		HDd Glangwili	Not Currently Mea	Not Currently Measured			
	MRI Brain Imaging - 12 hour	SB	Not Currently Mea	Not Currently Measured	95% (SB Patients o		95%
		HDd Prince Philip	Not Currently Mea	Not Currently Measured			
		HDd Glangwili	Not Currently Mea	Not Currently Measured			
	Stroke specialist nurse assessment under 30 minutes	SB	Not Currently Mea	Not Currently Measured	95% (SB Patients o		95%
		HDd Prince Philip	Not Currently Mea	Not Currently Measured			
		HDd Glangwili	Not Currently Mea	Not Currently Measured			
	% of all stoke patients to received thrombolysis	SB	23.50%	19.00%	29.33%	39.67%	50%
		HDd Prince Philip	14.50%	5.90%	5.90%	5.90%	
		HDd Glangwili	15.80%	12.20%	12.20%	12.20%	
	Door to needle thrombolysis - 45 mins	SB	17.50%	8.50%	35.67%	62.83%	90%
		HDd Prince Philip	34.50%	0.00%	0.00%	0.00%	
		HDd Glangwili	31.30%	18.50%	18.50%	18.50%	
	% of all stoke patients to received Thrombectomy	SB	0.20%	0.50%	3.67%	6.83%	10%
		HDd Prince Philip	0.50%	0.00%	0.00%	0.00%	
		HDd Glangwili	0.50%	0.00%	0.00%	0.00%	
	Stroke consultant review within 24hrs	SB	95.00%	95.50%	97.00%	98.50%	100%
		HDd Prince Philip	96.20%	95.60%	95.60%	97.20%	
		HDd Glangwili	90.30%	99.50%	99.50%	95.60%	
Measure PROMS	PROMS - ASU	SB	Not Currently Mea	Not Currently Measured			
		HDd Prince Philip	Not Currently Mea	Not Currently Measured			
		HDd Glangwili	Not Currently Mea	Not Currently Measured			
	PROMS - HASU	SB					
		HDd Prince Philip					
HDd Glangwili							
SSNAP	SSNAP	SB	BBBB	DDDD	C	B	A
		HDd Prince Philip	DCCC	BDDD	D	D	
		HDd Glangwili	DBCD	CCDC	C	C	

			Current State		Interim State 1		Interim State 2		Future State 1		Future State 2	
Staff Type	Role	Band	WTE Total	£	WTE Total	£	WTE Total	£	WTE Total	£	WTE Total	£
Nursing	Nurse	6	2.45	£ 135,067	2.00	£ 125,516	2.00	£ 125,516	2.00	£ 123,663	2.00	£ 125,516
	Nurse	5	22.43	£ 982,045	39.46	£ 1,997,877	26.90	£ 1,361,959	32.34	£ 1,637,389	26.90	£ 1,361,959
	Nurse	4	1.67	£ 62,560	-	£ -	-	£ -	-	£ -	-	£ -
	Nurse	3	3.67	£ 120,670	5.44	£ 200,548	2.72	£ 100,426	5.45	£ 200,548	2.72	£ 100,426
	Nurse	2	28.21	£ 962,700	12.56	£ 435,525	11.73	£ 406,745	7.11	£ 246,197	11.73	£ 406,745
	Supervisor	7	1.22	£ 74,628	2.00	£ 121,498	1.00	£ 60,749	2.00	£ 121,498	1.00	£ 60,749
	Ward Admin	4	-	£ -	1.00	£ 31,618	1.00	£ 32,919	1.00	£ 31,618	1.00	£ 32,919
CNS	Ward Admin/Clerk	2	1.22	£ 31,043	3.56	£ 123,444	2.72	£ 94,318	3.56	£ 123,444	2.72	£ 94,318
	CNS	7	-	£ -	1.00	£ 60,749	1.00	£ 60,749	1.00	£ 60,749	1.00	£ 60,749
	CNS	6	2.00	£ 103,101	4.45	£ 279,275	2.55	£ 160,235	4.45	£ 279,275	2.55	£ 160,235
	CNS Admin	2	-	£ -	1.27	£ 33,375	1.27	£ 33,375	1.27	£ 33,375	1.27	£ 33,375
Medical	Consultants		3.00	£ 413,218	4.00	£ 565,982	3.00	£ 413,218	4.00	£ 565,982	3.00	£ 413,218
	Physician Associate (band 7)	7	-	£ -	2.00	£ 104,286	1.00	£ 52,143	2.00	£ 104,286	1.00	£ 52,143
	F1		2.00	£ 90,292	2.00	£ 90,292	1.00	£ 45,146	2.00	£ 90,292	1.00	£ 45,146
	F2		2.00	£ 92,778	2.00	£ 92,778	1.00	£ 46,389	2.00	£ 92,778	1.00	£ 46,389
	IMT		2.00	£ 128,016	2.00	£ 128,016	1.00	£ 64,008	2.00	£ 128,016	1.00	£ 64,008
	GPST		1.00	£ 63,428	2.00	£ 126,856	1.00	£ 63,428	2.00	£ 126,856	1.00	£ 63,428
	Reg		2.00	£ 152,980	2.00	£ 152,980	2.00	£ 152,980	2.00	£ 152,980	2.00	£ 152,980
Pharmacy	Pharmacist	8A	-	£ -	1.00	£ 120,995	1.00	£ 120,995	1.00	£ 120,995	1.00	£ 120,995
	Pharmacy Technician	5	-	£ -	0.50	£ 36,046	0.50	£ 36,046	0.50	£ 36,046	0.50	£ 36,046
Therapies	Occupational Therapy	7	1.70	£ 94,751	2.00	£ 170,150	2.00	£ 170,150	2.00	£ 170,150	1.00	£ 85,075
		6	2.00	£ 90,048	3.00	£ 216,512	3.00	£ 216,512	3.00	£ 216,512	3.00	£ 216,512
		5	1.00	£ 36,708	-	£ -	-	£ -	-	£ -	-	£ -
		4	1.50	£ 49,406	-	£ -	-	£ -	-	£ -	-	£ -
	Physio	7	0.60	£ 33,442	2.00	£ 170,150	2.00	£ 170,150	2.00	£ 170,150	1.00	£ 85,075
		6	2.80	£ 126,067	4.00	£ 288,683	3.50	£ 252,597	3.00	£ 216,512	4.00	£ 288,683
		5	1.00	£ 36,708	-	£ -	-	£ -	-	£ -	-	£ -
		4	0.50	£ 16,469	-	£ -	-	£ -	-	£ -	-	£ -
	Speech & Language Therapy	7	0.40	£ 22,294	1.00	£ 85,075	1.00	£ 85,075	1.00	£ 85,075	1.00	£ 85,075
		6	0.50	£ 22,512	1.00	£ 72,171	1.00	£ 72,171	1.00	£ 72,171	1.00	£ 72,171
		5	0.70	£ 25,696	1.00	£ 58,229	1.00	£ 58,229	-	£ -	-	£ -
		3	0.90	£ 26,008	-	£ -	-	£ -	-	£ -	-	£ -
	Psychology	6	-	£ -	2.00	£ 170,150	2.00	£ 170,150	1.00	£ 85,075	1.00	£ 85,075
	Dietetics	6	0.70	£ 31,517	1.00	£ 72,171	1.00	£ 72,171	1.00	£ 72,171	1.00	£ 72,171
	Coordinator & Support	4	-	£ -	0.50	£ 23,056	0.50	£ 23,056	0.50	£ 23,056	0.50	£ 23,056
ESD	Occupational Therapy	6	-	£ -	2.00	£ 90,050	2.00	£ 90,050	2.00	£ 90,050	2.00	£ 90,050
	Physio	6	-	£ -	2.00	£ 90,050	2.00	£ 90,050	2.00	£ 90,050	2.00	£ 90,050
	Speech & Language Therapy	6	-	£ -	0.50	£ 22,512	0.50	£ 22,512	0.50	£ 22,512	0.50	£ 22,512
	Psychology	8B	-	£ -	0.50	£ 35,907	0.50	£ 35,907	0.50	£ 35,907	0.50	£ 35,907
	Therapy Assistant Practitioner	4	-	£ -	4.00	£ 131,750	4.00	£ 131,750	4.00	£ 131,750	4.00	£ 131,750
	Coordinator & Support	3	-	£ -	0.50	£ 14,450	0.50	£ 14,450	0.50	£ 14,450	0.50	£ 14,450
Total Workforce Costs			89.17	£ 4,024,151	117.24	£ 6,538,723	90.90	£ 5,106,325	101.67	£ 5,771,578	87.40	£ 4,828,956

					£ 40,000		£ 40,000		£ 40,000		£ 40,000
Total Travel Costs					£ 40,000		£ 40,000		£ 40,000		£ 40,000
Total Cost			£ 4,024,152		£ 6,578,723		£ 5,146,325		£ 5,811,578		£ 4,868,956
Welsh Gov APH Funding					£ 320,000		£ 320,000		£ 320,000		£ 320,000
Total Cost less funding			£ 4,024,152		£ 6,258,723		£ 4,826,325		£ 5,491,578		£ 4,548,956
Difference from Current State					-£ 2,234,571		-£ 802,173		-£ 1,467,426		-£ 524,804

Revenue Costs

Summary	Current State	Interim State 1	Interim State 2	Future State 1	Future State 2
Nursing	£ 2,368,713	£ 3,036,027	£ 2,182,632	£ 2,484,356	£ 2,182,632
CNS	£ 103,101	£ 373,399	£ 254,358	£ 373,399	£ 254,358
Medical	£ 940,712	£ 1,261,190	£ 837,312	£ 1,261,190	£ 837,312
Pharmacy	£ -	£ 157,042	£ 157,042	£ 157,042	£ 157,042
Therapies	£ 611,625	£ 1,326,347	£ 1,290,262	£ 1,110,872	£ 1,012,893
ESD	£ -	£ 384,719	£ 384,719	£ 384,719	£ 384,719
Travel Costs		£ 40,000	£ 40,000	£ 40,000	£ 40,000
Total Cost	£ 4,024,151	£ 6,578,723	£ 5,146,325	£ 5,811,578	£ 4,868,956

Capital Costs	Consultants / CNS IT	Laptops etc				£ 10,000		£ 6,000		£ 10,000		£ 6,000
	ESD Team IT	Laptops etc				£ 18,000		£ 18,000		£ 18,000		£ 18,000
	ESD Other Equipment					£ 10,000		£ 10,000		£ 10,000		£ 10,000
Total Non Pay						£ 38,000		£ 34,000		£ 38,000		£ 34,000

ANNUAL PLAN BUSINESS CASE TEMPLATE

PART 1 – PROJECT ASSURANCE SUMMARY

A. KEY PROJECT INFORMATION

Name of Project	Comprehensive Regional Stroke Centre (CRSC)
PMO Reference No	
Project Lead	ARCH Regional Service Planning Manager
Delivery Unit/Corporate Department	Morriston
Name of Programme Board	ARCH Regional Stroke Board
Name of Programme Board Chair	Director of Therapies & Health Science, HDdUHB
Date of Programme Board Approval	

B. BUSINESS CASE SCRUTINY

Date Case Received for Scrutiny	Click or tap to enter a date.
Is the case included within the Health Board's Annual Plan?	
Has funding been identified (Revenue & Capital)?	
If the case requires the sign-up of other parties, has this been provided?	
Does the case contain a realistic benefits realisation plan?	
Does the case contain a realistic workforce plan?	
Has the case received financial clearance?	
Date Case Released from Scrutiny	Click or tap to enter a date.

C. BUSINESS CASE APPROVAL DECISION

Date of Approval	Click or tap to enter a date.
Business Case Assurance Group Decision	Choose an item.

Annual Plan 21-22 Programmes of Work (select one)	
☐	Cancer
☐	COVID-19 response, including vaccination and testing
☐	Maternity, Children, and Young People
☐	Mental Health and Learning Disabilities
☐	Planned Care,
☐	Quality and Safety
☒	Urgent and Emergency Care
☐	Workforce

Please restate the agreed GMOs		
GOALS (what are we trying to do)	METHOD (how are we going to do it)	OUTCOME (what will it deliver)
Improve outcomes for people who have suffered a stroke and achieve the minimum standards for stroke services.	Establish a South West Wales Regional CRSC using a phased implementation plan designed to support workforce recruitment and development.	Provide hyper acute stroke services that meet the Royal College of Physicians (RCP) and National Institute for Clinical Excellence (NICE) standards of best practice. Provide high quality hyper acute stroke care for SBUHB and Carmarthenshire HDdUHB residents through the provision of stroke specialist care 24/7 • Prompt and optimal intervention – thrombolysis and mechanical thrombectomy • Availability of specialist stroke staff 24/7 with fully functioning 7 day services • Admitted to the CRSC bed within 4 hours of arrival to hospital • Faster Brain Imaging • Therapies assessment within 24 hours and an assessment by all therapies within 72 hours. • Once the CRSC is set up, it will support areas of the Tranche 2 Business case, e.g., Telemedicine links from the Remote Care Units within HDdUHB to the CRSC in Morriston to allow for 24/7 support for all patients where admission to Morriston is prohibited due to distance and time to reach the CRSC, and timely step down to acute stroke beds or early supported discharge where appropriate.

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PART 2 – EXECUTIVE SUMMARY

Introduction

This paper sets out the case for establishing a Comprehensive Regional Stroke Centre (CRSC) at Morriston Hospital, to include specialist imaging, thrombolysis, and thrombectomy assessment and referral, and dedicated Hyper Acute Stroke Beds.

Establishing a CRSC is the first step in redeveloping the South West Wales regional stroke pathway. Further developments will be subject to separate business case(s).

The Case for Change

Stroke is the fourth leading cause of death in Wales, and it can have a significant long-term impact on survivors, but with the right support, there is an improvement in patient outcomes, and people can make a good recovery.

Currently, the South West Wales region is not achieving any of its Key Performance Indicators – stroke victims (~1,006 people annually) are not getting the right support. This is affecting health outcomes in the region.

Vision/ Goal

- Provide a hyper-acute stroke service for Swansea Bay University Health Board (SBUHB) and Carmarthenshire Hywel Dda University Health Board (HDdUHB) patients;
- Implement the recommendations from the Royal College of Physicians and NICE guidelines for CRSCs
- Ensure that services provide an excellent patient experience, including improved access, clinical outcomes, and reduced mortality and disability.

Comprehensive Regional Stroke Centre Proposal

- A ring-fenced stroke ward within Morriston Hospital.
- 16 bedded CRSC (Regional) and 8 Acute Stroke Unit (ASU) (Swansea Bay only) beds.
- Through a phased approach will lead to an additional 70 staff (medicine, nursing, therapies, and radiology).
- Deliver an effective service 24/7

Cost

Implementation is Phased over three years. The CRSC will require an additional investment of:

	Year 1 (2023/24) £m	Year 2 (2024/25) £m	Year 3 (2025/26) £m
Swansea Bay	£2.6	£3.6	£2.3
Hywel Dda	£0	£0	£2.0
Total	£2.6	£3.6	£4.4

Benefits/Outcomes

- Improved KPI performance during Years 1 and 2
- Meeting KPIs from Year 3
- Setting the platform for future improved health outcomes and post-stroke quality of life, reduced disability, and mortality as a result of achieving KPIs, as well as efficiency benefits from improved health outcomes, such as reduction in bed days resulting from faster recovery from stroke

Recommendation

Swansea Bay UHB and Hywel Dda UHB should support the business case and invest in stroke.

PART 3 – BUSINESS CASE DETAIL

1. INTRODUCTION

A stroke is a serious life-threatening medical condition that occurs when the blood supply to part of the brain is cut off by a blood clot or bleeding from a blood vessel. Strokes are a medical emergency, and urgent treatment is essential. The sooner a person receives treatment for a stroke, the better the chance of recovery. Stroke strikes suddenly and can result in a devastating range of disabilities or death. It is one of the most significant public health issues of our time, with a profound and growing impact on society, our economy, individuals, and families.

This Business Case outlines the resources required to design and implement a Comprehensive Regional Stroke Centre (CRSC) for the South West Wales Region in order to achieve a better outcome for patients.

The Business Case highlights the significant investment required in all areas of the stroke workforce and describes how this could be implemented over three years, given the workforce challenges and associated costs to create a CRSC.

This Business Case relates only to the CRSC element of re-designed stroke services across the South West Wales Region. Parallel planning to re-design the rest of the stroke pathway from step down acute care through rehabilitation (including early supported discharge) and life after stroke support will be required and will result in additional business cases. The CRSC will only succeed if the entire stroke pathway is redesigned, aligned, and invested.

This ARCH Regional Stroke Programme – CRSC Business Case has been developed in collaboration between SBUHB and HDdUHB. Contributors include clinical and managerial staff as well as representatives from Finance, Workforce, Wales Delivery Unit, Welsh Ambulance Services Trust, and Voluntary Organisations.

The ARCH Regional Stroke Programme is taking place against a background of nationally managed strategic change in Stroke in Wales. Historically, ARCH has participated in the national programme and coordinated discussions regionally about HASU (now renamed as CRSC) services to address the challenges; this was paused in 2020 due to the COVID Pandemic.

Both clinical and managerial colleagues from within the stroke services in SBUHB and HDdUHB believe this is a once in a generation opportunity to develop a comprehensive, world class regional stroke service for South West Wales.

South West Wales Region catchment area covers all SBUHB, including those residents currently treated for stroke at Princess of Wales, HDdUHB Carmarthenshire residents, Powys Ystrad area. It must be noted that should the catchment area be changed in the future to support patients in additional HDdUHB areas, Cwm Taf Morgannwg University Health Board (CTMUHB) or wider Powys Teaching Health Board (PTHB), this will require a review of resources and investment, including capital investment.

SCOPE

To allow work to commence on developing CRSC in Morriston while at the same time developing a wider Stroke programme business plan, the ARCH Regional Stroke programme will deliver in two parallel running tranches.

This Business Case (Tranche 1) sets out how the health boards will move from the current provision to a Regional CRSC that will be balanced for demand and activity while being clinically, financially effective, and efficient. This will be genuinely Prudent Healthcare.

An additional Business Case (Tranche 2) will follow, which will support the remainder of the regional stroke pathways, and this will be critical to ensuring CRSC delivers the predicted benefits.

Tranche 1 Scope

CRSC Optimal Patient Pathway

- CRSC Morriston (future sized for HDdUHB patients)
- Optimal Imaging Stroke Pathway
- Thrombolysis
- Conveyance to Thrombectomy Centre
- Admission to CRSC into a Hyper Acute Stroke Bed
- Phasing of HDdUHB patients admitted to the CRSC
- Public and staff consultation

Tranche 2 Scope

Pre Hospital Optimal Patient Pathway

- Pre-acute stroke services – believed stroke (process and conveyance)

Acute Stroke Service outside the CRSC Optimal Patient Pathway

- A&E (and direct access to CRSC)
- Acute Stroke Services (including Acute Stroke Units) in HDdUHB and SBUHB
- Remote Care Units within HDdUHB

Stroke Recovery and Rehabilitation Optimal Patient Pathway

- Rehabilitation, including early supported discharge and life after stroke services

Integrated Community Stroke Service Optimal Patient Pathway

- Admitted to Integrated Community Stroke
- Long Term Follow up and life after stroke

New Technology across all pathways

Appendix A - Optimal Patient Pathway, supplied by the National Programme

2. STRATEGIC CONTEXT

Stroke is the fourth leading cause of death in Wales, and it can have a significant long-term impact on survivors. Currently, almost 70,000 stroke survivors live in Wales, and an estimated 7,400 people experience a stroke each year. Stroke can change lives instantly, but with the right support, people can make a good recovery.

The NHS Wales Health Collaborative Executive Group is the responsible governance group for the Stroke Implementation Group (SIG) and the National Stroke Programme Board (NSPB). NSPB provides oversight of the National Stroke Programme and works in partnership with the regional stroke programmes to improve the stroke pathway and develop a programme of work to scope out and develop CRSCs.

The Welsh Government's strategic direction is for Regional CRSCs to be established across Wales and the stroke end to end pathway to be reviewed to meet required standards of care and create efficiencies. The national plan is for a CRSC to be situated in the South West Wales Region. This should cover all SBUHB and HDdUHB Carmarthenshire residents. The work programme established within the Region has identified Morriston Hospital as the most appropriate site for the CRSC. As the Clinical Plan in HDdUHB progresses, with the build of a new emergency care hospital, flows for hyper-acute stroke care may change.

3. THE CASE FOR CHANGE

Stroke services across SBUHB and HDdUHB are under immense demand pressures, with challenges of admitting patients to the stroke unit within 4 hours and assessment by a stroke physician within 24 hours of admission.

UK

- Stroke is the leading cause of disability and UKs the fourth largest cause of death.
- Stroke costs the UK economy £26 billion per year, including £3.2bn cost to NHS, £5.2bn to social care, and £15.8bn in informal care. This is forecast to rise to between £61bn and £91bn by 2035. The cost of someone having a stroke over a year is over £45,000.
- By 2035, the number of strokes will increase by almost half and the number of stroke survivors by a third.
- Half of stroke survivors are living with four or more co-morbidities.
- A broad pattern of psychological difficulties can also be expected to affect recovery and disability following stroke, with high rates of anxiety, depression, and cognitive impairment being well established as common effects affecting function and recovery post-stroke; such effects can be predicted to increase hospital re-admission and un-planned care risks.

Wales

Incidence Stroke in Wales is:

- 7th out of 25 developed countries.
- Stroke Disability-adjusted life years (DALYs) is 20th out of 25 developed countries.
- Sentinel Stroke National Audit Programme (SSNAP) Scores A-E (and deteriorating) Mean = D.
- Current cost to NHS Wales £220 million a year

Achieving a Sustainable Level, an A SSNAP score across Wales, would mean:

- 5% reduction in 90-day mortality
- 85 deaths per year avoided

- 33,901 bed days saved – across the whole pathway
- Cost saving to NHS Wales £13.56 million a year

The Stroke Association estimates that by 2025, the cost to the Welsh economy from Stroke will be £1.63 billion.

3.1 UNDERSTANDING THE CURRENT SERVICE

Stroke patients are currently admitted to stroke wards in Morriston, Glangwili, Prince Philip, Withybush, and Bronglais Hospitals. The assumed catchment area for the Morriston CRSC is the whole of SBUHB, the Carmarthenshire area within HDdUHB and Ystrad area within PTHB.

From December 2021 to November 2022 (SBUHB and Carmarthenshire area within HDdUHB):

- 973 patients were admitted to Morriston, Prince Philip, and Glangwili after having suffered a stroke
- An additional 33 patients (SBUHB residents) were admitted to the Princess of Wales Hospital.
- There were a total of 1,006 stroke patients admitted.

Pre-Covid, in 2019, 1012 stroke patients were admitted.

Approximately the same number of stroke mimics present as stroke patients, with circa 36% of the stroke-mimics (~364) admitted to a stroke unit.

The combined number of stroke and stroke mimic patients admitted to the stroke wards from December 2021 to November 2022 was approximately 1,368.

The current SBUHB stroke pathway is delivered over two sites:

- 24 bed Acute Stroke Unit (ASU) in Morriston; these beds are not ring-fenced, and the ward always has a cohort of medical patients occupying around 8 beds.
- 28 bed stroke only rehabilitation ward in Neath Port Talbot; Ward B

The current HDdUHB inpatient stroke pathway for Carmarthenshire residents is provided over two sites:

- 9 ASU beds (5 in Prince Philip and 4 in Glangwili), 4.4 beds of which are used for the 1st 72 hours.
- 35 post rehabilitation (19 in Prince Philip and 16 in Glangwili)

3.2 PROBLEMS WITH THE CURRENT SYSTEM

Across both health boards, there is pressure on emergency care for all patients, not just stroke. Stroke patients are admitted through A&E, where there are delays in triage, assessment, scanning, and reporting, door to needle time, lack of specialist assessment out of hours or no 24/7 cover, and non-specialist delivered care. The services are under immense demand pressures, and it is challenging for the organisations to ensure admission to a stroke unit within 4 hours. The current service is not able to meet these targets.

The lack of ring fenced stroke beds and all wards having beds used by other medical patients provides a challenge to the staff working in those areas; the pressures of broader unscheduled care demand limit stroke bed availability. This impacts the provision of specialist 24 hour stroke care and can lead to delays in admission to the ward, which can negatively impact the Key Performance Indicators (KPIs).

The current workforce model is less than efficient and not staffed to recommended staffing levels. The current stroke pathways are unsustainable. Appendix E looks at each workforce element in detail, identifies the required staffing for the CRSC model, and maps this against the current staffing establishment.

There is a strong evidence base that providing enhanced specialist staffing levels for stroke patients will improve compliance with the existing KPIs. The efficiency and effectiveness of the whole stroke pathway are essential to ensure flow through the CRSC so that individuals can access specialist care immediately, but it is also necessary to maximise outcomes and improve the quality of life for all stroke survivors.

The table below shows pre-Covid and current performance against targets for the Key Performance Indicators (KPIs). No targets are currently being met.
Appendix C – Baseline Figures and Forecasted Trajectories

		2019 Pre COVID	Current Service Dec 21 - Nov 22
Admitted to Stroke Unit within 4 hours of arrival to hospital	SB	53.00%	10.90%
	HDd Prince Philip	73.30%	22.20%
	HDd Glangwili	57.60%	18.90%
Swallow screen within 4 hrs	SB	79.30%	76.30%
	HDd Prince Philip	97.10%	92.60%
	HDd Glangwili	92.90%	93.60%
CT Scanned within 1 hour	SB	51.20%	38.50%
	HDd Prince Philip	80.50%	84.60%
	HDd Glangwili	75.20%	74.60%
% stroke patients to receive Thrombolysis	SB	23.50%	19.00%
	HDd Prince Philip	14.50%	5.90%
	HDd Glangwili	15.80%	12.20%
% stroke patients to receive Thrombectomy	SB	0.20%	0.50%
	HDd Prince Philip	0.50%	0.00%
	HDd Glangwili	0.50%	0.00%
Therapist Assessment <=24 hours	SB	96.70%	91.40%
	HDd Prince Philip	84.50%	69.10%
	HDd Glangwili	78.20%	82.90%

SSNAP is a major national healthcare quality improvement programme. SSNAP measures the quality and organisation of stroke care in the NHS and is the single source of stroke data in England, Wales, and Northern Ireland. SSNAP measures the

processes of care (clinical audit) provided to stroke patients and the structure of stroke services (organisational audit) against evidence based standards, including the 2016 National Clinical Guideline for Stroke. SSNAP also covers the whole stroke pathway whilst in a hospital setting, not just the 1st 72 hours spent in a CRSC. The scores are calculated by taking the average KPIs across the whole pathway.

The average KPI scores are taken from each area and then given a grade of A to E (A being the highest). Appendix B, Simplified Technical Information – SSNAP Key Indicators, details how these scores are calculated

The following table highlights the most recent SSNAP Team Centred scores.

Hospital	Results for Jan – Mar 2019	Results for Apr - Jun 2019	Results for Jul – Sept 2019	Results for Oct - Dec 2019	COVID	Results for Oct - Dec 2021	Results for Jan – Mar 2022	Results for Apr - Jun 2022	Results for Jul – Sept 2022
Morrison	B	B	B	B		D	D	D	D
Prince Philip	D	C	C	C		B	D	D	D
Glangwili	D	B	C	D		C	C	D	C

4. VISION AND GOALS

4.1 ESTABLISH A CRSC MODEL

Achieve Minimum Clinical Standards for Stroke Services across South West Wales

The Vision/ Goal is to:

- Provide a hyper-acute stroke service for SBUHB and Carmarthenshire HDdUHB patients;
- Implement the recommendations from the RCP and NICE guidelines in relation to CRSCs
- Ensure that services provide an excellent patient experience, including improved access, clinical outcomes, and reduced mortality and disability.

As a South West region, we have already agreed via the ARCH Regional Stroke Programme on a service specification for a CRSC based on the RCP guidance – see Appendix D for Minimum standards and volumes for CRSCs and ASUs. Key Minimum clinical, workforce, and infrastructure standards are outlined below

- 1 hour, 4 hour, 24 hour and 72 hour KPIs
- 24/7 Radiology
- Thrombolysis and Thrombectomy
- Access to neurosurgery and vascular surgery
- Access to a full multidisciplinary therapy team, including Occupational Therapy, Speech and Language Therapy, Physiotherapy, Dietetics, Psychology
- Twice daily consultant ward round; 24/7 on call
- 24/7 Stroke Specialist Nurse or ACP cover
- 2.9 WTE Nurse per bed

4.2 MECHANICAL THROMBECTOMY

SBUHB and HDdUHB have contracts with North Bristol NHS Trust to provide mechanical thrombectomy services from 08.00-18.00, 7 days a week. This is a complex pathway; less than 1% of stroke sufferers currently benefit from this service. There are ongoing discussions within Wales about developing a more local pathway.

The vision is to provide a South Wales approach to mechanical thrombectomy, with the aim of 10% of stroke survivors receiving this intervention. In order to support this, a Regional CRSC with an optimal stroke imaging pathway is required (the optimal stroke imaging pathway element is a path of the CRSC Business Case).

5. CRSC REGIONAL MODELLING

To understand the future bed requirements for a regional CRSC, extensive demand modelling has been carried out by the Delivery Unit, using Lightfoot, SSNAP, and Planning and Environment Decisions Wales (PEDW) data from 2013-2022.

To commence the initial bed modelling, certain assumptions were required to be made by the clinical teams using data from existing HASUs in England. The following details the assumptions agreed to date:

- Stroke Team will meet the patient on arrival to provide immediate assessment and diagnosis 24/7
- Immediate access to CT scan
- Immediate access to Thrombolysis (if appropriate)
- Direct access to CRSC
- CRSC will link with the All- Wales Thrombectomy pathway (currently Bristol)
- Max 24 hour waiting time for MRI scan, Doppler, Holter monitoring, Vascular and Cardiology review
- Robust pathways and SOPs for Stroke Mimics
- 36% of stroke mimics will require admission to a CRSC bed
- All strokes to have a 3 day length of stay and 36% mimics to have a 1 day length of stay in a CRSC bed
- Bed occupancy rate has been set at 85%
- SBUHB and HDdUHB Carmarthenshire residents
- The 24 beds will be ring fenced for stroke ward, CRSC = 16, ASU (SBUHB only) = 8

The bed modelling does not include seasonal variations and patterns of arrival, but for more accurate modelling in relation to this, a more detailed discrete event simulation modelling would need to be developed. However, modelling stroke patients provides a robust analysis of the stroke data and information on potential demands and bed requirements.

The footprint of the existing ward is 24 beds; it is proposed that the region would have 16 CRSC and SBUHB 8 ASU beds initially, designating the whole ward to ring-fenced hyper-acute and acute stroke care.

6. DESCRIPTION OF MAIN OPTIONS

Given the significant investment and workforce recruitment required to appropriately staff levels for a CRSC, there are 3 options proposed.

6.1 OPTION 1 – STATUS QUO/DO NOTHING OR DO MINIMUM

Status Quo/Do Nothing or Do Minimum

6.2 OPTION 2 – CRSC IMPLEMENTATION BIG BANG

Introduce the CRSC model. To be fully operational from day 1

The CRSC model is based on the service specification agreed by the ARCH Regional Stroke Programme. This specification aligns with the RCP guidance on establishing a CRSC.

Full implementation of the 16 bedded CRSC and 8 ASU beds meeting all staffing requirements, including recruiting additional staffing across medicine, nursing, therapies and radiology.

6.3 OPTION 3 – CRSC IMPLEMENTATION PHASED

A phased implementation of the Regional CRSC model over a 3 year period;

Year 1

- Dedicated 6 CRSC beds,
- Start to increase clinical, nursing, therapy, and radiology staffing to recommended numbers
- Extended opening hours within radiology
- Recruitment of 2 stroke consultants and 3 ANPs

Year 2

- Increase to 12 CRSC beds
- All SBUHB residents to be admitted to the CRSC if required, including the Margam cohort that currently is admitted to Princess of Wales
- Continue to increase clinical, nursing, therapy, and radiology staffing to recommended numbers
- Recruitment of 3 additional stroke consultants and 2 ANPs
- Dedicated consultant and ANP 24/7 rotas for stroke

Year 3

- Increase to 16 CRSC beds
- Carmarthenshire HDdUHB to be admitted to the CRSC
- Increase all staffing groups to meet recommended staffing levels

A complete workforce breakdown and costs can be found in Appendix C.

6.4 SUMMARY ANALYSIS OF MAIN OPTIONS

	OPTIONS		
Requirements	1	2	3
Welsh Government's strategic direction is for Regional CRSCs to be set up across Wales.	x	✓	✓
Provide stroke services that meet the Royal College of Physicians (RCP) and National Institute for Clinical Excellence (NICE) standards of best practice.	x	✓	✓
Provide high quality hyper-acute stroke care for SBUHB and Carmarthenshire HDdUHB residents through the provision of stroke specialist care 24/7.	x	✓	✓
Prompt and optimal intervention – thrombolysis and mechanical thrombectomy.	x	✓	✓
Availability of specialist stroke staff 24/7 with fully functioning 7 day services.	x	✓	✓
Admitted to the CRSC bed within 4 hours of arrival to hospital Faster Brain Scan Imaging.	x	✓	✓
Therapies assessment with 24 hours and an assessment by all therapies within 72 hours.	x	✓	✓
Achieving an A SSNAP score.	x	✓	✓
Ensure that services provide an excellent patient experience, including improved access, clinical outcomes, and reduced mortality and disability.	x	✓	✓
Ensure equity across the region for patients within appropriate travelling distance.	x	✓	✓
Establish and implement a fair and transparent decision-making process.	x	✓	✓
Deliverability			
Workforce / Recruitment	x	x	✓
Estates	x	✓	✓
Risk Management	x	x	✓
Cost	x	x	✓
Dependency Alignment	x	x	✓

Key:

✓	Fully meets the requirements
?	Partially meets the requirements
x	Does not meet the requirements

6.5 SELECTION OF THE PREFERRED OPTION

Option 1 can't be taken forward as it does nothing. Option 1 is therefore rejected as it does not meet the expected standards and ambitions for the service.

Option 2 delivers the CRSC model based on the service specification agreed upon as part of the ARCH Regional Stroke Programme. This specification aligns with the RCP guidance on establishing a CRSC.

Large levels of recruitment are required at one point to deliver this option, which would be hard and risky to deliver. Additionally, work required on the remainder of the stroke pathway will not be completed. Therefore this is not the preferred option.

Option 3 also delivers the CRSC model based on the service specification agreed upon as part of the ARCH Regional Stroke Programme. This specification aligns with the RCP guidance on establishing a CRSC.

Given the workforce challenges, associated costs, and interdependencies, a phased implementation over 3 years is the preferred option. Therefore making Option 3 the preferred option.

All options plan to use Ward F, which is currently used for stroke patients in SBUHB. The ward is 24 beds; therefore, expansion or redesign costs of the ward are not included in this plan.

7. RESOURCE IMPLICATIONS – PREFERRED OPTION 3

RESOURCE IMPLICATIONS

The following table illustrates the required staffing levels per profession for the CRSC.

	Nurse	Consultant stroke physician	Therapies	Radiology
	WTE per bed		WTE per bed	
CRSC	2.9 (80:20) registered: Unregistered 24/7 availability Minimum 8 trained Advanced nurse practitioners on a rota	24/7 availability; minimum 8 thrombolysis trained physicians on a rota	- Physiotherapist 0.73 - Occupational therapist 0.68 - Speech & language therapist 0.34 - Clinical neuro-psychologist 0.2 - Dietician 0.15 Increased staffing to allow for 7 days a week cover	Increased staffing to allow for 7 days a week cover, with longer operating times

The current Morriston ASU employs 79.62 WTE staff (this does not include radiology staff as they are unable to split what WTE is spent on ASU); in order to increase the

staffing to the recommended staffing levels for a CRSC, an additional 70.4 WTE staff are required across the clinical, nursing, therapy, and radiology workforce.

The recruitment of this additional resourcing will be spread over 3 years. Details of this are shown in Appendix C Resource implications Preferred Option 3 clinical, nursing, therapy, and radiology workforce.

8. WELSH AMBULANCE SERVICE TRUST (WAST) IMPLICATIONS- PREFERRED OPTION 3

The CRSC requires a vast change to be made to the WAST service and patient flows, and a full impact assessment will be taken place as part of the National Programme.

Conveyance

This modelling work must be undertaken before an estimate can be given for the conveyance of patients to the CRSC and repatriations; as such, this is Out of Scope for this business case; however, there is a dependency on these costs being approved at a later date.

9. FUNDING AND COMMERICAL ARRANGEMENTS

		Year 1	Year 2	Year 3 (Recurrent)
SBUHB	Additional, Staffing costs and none pay (accumulative)	£2,761K	£3,853K	£4,510K
	Reduction in CTMUHB SLA costs for stroke services	(£134K)	(£134K)	(£134K)
	Reduction in outsourcing costs	(£70K)	(£70K)	(£70K)
	SLA income from CRSC	£0K	£0K	(£2,049K)
HDdUHB	SLA costs for CRSC	£0K	£0K	£2,049K
SBUHB	Total Cost	£2,557K	£3,649K	£2,257K
HDdUHB	Total Cost	£0K	£0K	£2,049K

NB – the above does not include any additional WAST costs for conveyance to the CRSC or repatriation.

9.1 SBUHB FUNDING AND COMMERCIAL ARRANGEMENTS

The current Morriston ASU workforce costs are £4,248K (excluding radiology); in order to increase the staffing to the recommended staffing levels for a CRSC, an additional staff cost of £4,436K is required across the clinical, nursing, therapy, and radiology workforce. As well as an additional £73K non pay costs.

The proposal is that SBUHB covers the additional costs in the CRSC Business Case on top of the current funding.

Continues funding of £2,257K after year 3

A detailed summary of the financial requirements can be found in Appendix E.

9.2 HDDUHB FUNDING AND COMMERCIAL ARRANGEMENTS

The proposal is that HDdUHB does not contribute to the CRSC until Year 3, when HDdUHB patients start to be admitted.

HDdUHB is to pay £1,583 per patient admitted to the CRSC per day via an SLA and £538 per stroke mimic not admitted into the CRSC that are triaged within Morriston.

There are no financial benefits to HDdUHB due to Carmarthenshire patients attending the CRSC rather than their local ASU. There will be a bed benefit of ASU 4.4 beds and an additional benefit of approx. 192* stroke mimic patients a year not being triaged in A&E; however, the reduction would be split across two sites. These ASU beds and A&E admission reductions are not of a sufficient level to release any staffing.

*End of Year 3 - Full CRSC Service figures assume that there is a 4.75% increase in stroke patients per year

10. BENEFITS

The CRSC is only one element in the Stroke Pathway, which needs to be addressed in its entirety to measure the benefits fully. This will be covered in the Stroke Pathways Business Case (Tranche 2).

Pathways Business Case (Tranche 2)						
Benefit	Measure			Baseline Value	% Increase in order to hit Target	Forecasted Value
Providing high quality evidenced based hyper acute stroke services which will, in turn: - increase the number of patients free of disability - increase the number of patients gaining functional independence - reduce avoidable deaths	KPIs	Admitted to Stroke Unit within 4 hours of arrival to hospital	SB Morriston	10.90%	84.10%	95%
			HDd Prince Philip	22.20%	72.80%	
			HDd Glangwili	18.90%	76.10%	
		Swallow screen assessment within 4 hrs	SB Morriston	76.30%	18.70%	95%
			HDd Prince Philip	92.60%	2.40%	
			HDd Glangwili	93.60%	1.40%	
		CT Scanned within 1 hour	SB Morriston	38.50%	56.50%	95%
			HDd Prince Philip	84.60%	10.40%	
			HDd Glangwili	74.60%	20.40%	
		% stroke patients to receive thrombolysis	SB Morriston	19.00%	31.00%	50%
			HDd Prince Philip	5.90%	44.10%	
			HDd Glangwili	12.20%	37.80%	
		% stroke patients to receive thrombectomy	SB Morriston	0.50%	9.50%	10%
			HDd Prince Philip	0.00%	10.00%	
			HDd Glangwili	0.00%	10.00%	
		Stroke consultant review within 24hrs	SB Morriston	95.50%	4.50%	100%
			HDd Prince Philip	95.60%	4.40%	
			HDd Glangwili	99.50%	0.50%	
	Therapist Assessment <=24 hours	SB Morriston	91.40%	3.60%	95%	
		HDd Prince Philip	69.10%	25.90%		
		HDd Glangwili	82.90%	12.10%		
	SSNAP (has dependences on the tranche 2 business case)	SB Morriston	D		A	
		HDd Prince Philip	D			
		HDd Glangwili	C			
Cost Benefits	Increased Mechanical Thrombectomy rate associated with a potential cost saving to health and social services			£47k per patient over 5 years		£47k per patient over 5 years
	SBUHB Not sending SB residents to Princess of Wales			£134K		£134K

Appendix B Baseline Figures and Forecasted Trajectory – Covers every KPI and Forecasted Trajectory over the 3 years of the Business Case

11.IMPACT ASSESSMENT

Well-Being of Future Generations Impact

Goal	Swansea Bay	Hywel Dda
A prosperous Health Board	Yes	Yes
A resilient Health Board	Yes	Yes
A healthier Health Board	Yes	Yes
A more Equal Health Board	Yes	Yes
A Health Board of cohesive communities	N/A	N/A
A Health Board of vibrant culture and thriving Welsh language	N/A	N/A
A globally responsible Health Board	N/A	N/A

Describe how the delivery of this change will be achieved in accordance with the sustainable development principle and the five ways of working.

Principle	Comment
Long Term (add in definition)	Establishing a regional CRSC within Morriston Hospital will enhance patient outcomes.
Prevention	CRSC provides timely access to specialist care.
Integration	An evidenced based, easy to navigate stroke pathway will enable more integration between services with fewer complexities.
Collaboration	The streamlining of the stroke pathway will enhance collaboration.
Involvement	ARCH Regional Stroke Board involvement throughout the process.

Groups within the Health boards that will be impacted

Areas Impacted	Swansea Bay	Hywel Dda
Workforce	Yes	Yes
Digital	No (new laptops and phones only)	No
Service Improvement	Yes	Yes
Engagement and Partnerships	Yes	Yes
Finance	Yes (revenue only)	Yes (revenue only)
Communications	Yes	Yes
Data Analysis/Modelling	Yes (completed by DU)	Yes (completed by DU)
Commissioning	Yes	Yes
Stroke, Radiology, Rehab, A&E Services	Yes	Yes

12.MANAGEMENT CASE

12.1 NATIONAL STROKE PROGRAMME GOVERNANCE

National Stroke Programme Steering Board

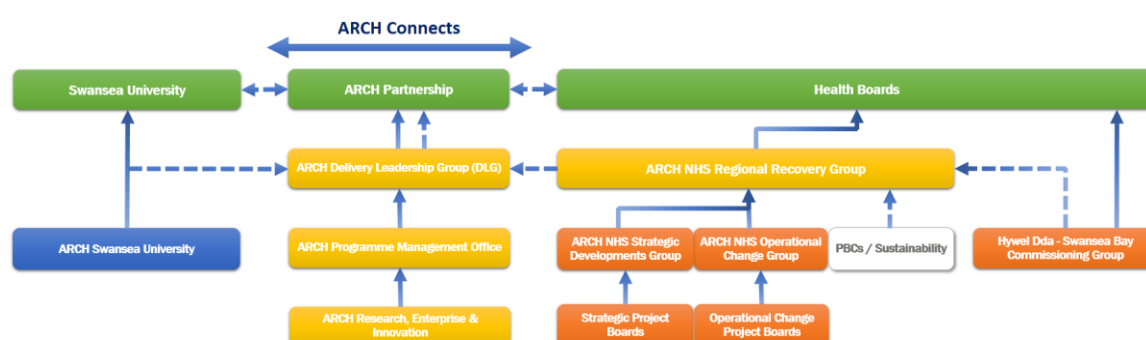
The purpose of the National Stroke Programme Steering Board is to inform, develop and agree on recommendations to all of Wales Health Boards on the future delivery of stroke services; to ensure a safe, effective, and sustainable quality service.

12.2 HEALTH BOARD GOVERNANCE

Health Board Governance Structures for Business Case Approval

Each Health Board has a local Governance Structure for approving Business Cases. After the ARCH NHS Regional Recovery Group approves, the Business Case will take these local routes. Within SBUHB, the Business Case will seek approval through the Business Case Scrutiny Panel, Business Case Assurance Group, and Management Board. Within HDdUHB, the Business Case will seek approval through the Strategic Development and Operational Delivery Committee and the Board.

12.3 ARCH GOVERNANCE



ARCH NHS Regional Recovery Group

The ARCH NHS Regional Recovery Group has been established to provide leadership for the ARCH Service Transformation Programme. The Group will have a crucial role in driving forward a range of programmes identified by partner organisations. It will bring together in one place all the programmes, which will deliver significant change in the health and care system for the ARCH region.

ARCH Regional Stroke Programme Steering Board

The purpose of the Regional Stroke Programme Steering Board is to inform, develop and agree on recommendations to SBUHB and HDdUHB Executive Teams on the future delivery of regional stroke services; to ensure a safe, effective, and sustainable quality service through the ARCH Service Transformation Board. This Steering group will oversee the development and submission of the Business Case.

12.4 PROGRAMME MANAGEMENT

ARCH currently does not have the dedicated capacity from within the existing team to support the Programme Management to develop and progress the Regional CRSC. A request has been submitted to the National Programme to fund the Stroke Programme (Tranche 1 and Tranche 2) for the next 2 year; this is also listed as an interdependency. See Appendix G ARCH Programme Management Resource Costs

The resource requested includes a Programme Manager, Project Manager, and Project Support Officer. These dedicated resources will sit under ARCH and work across the whole stroke programme.

When the milestones in relation to Business Case approval have been reached, the ARCH Stroke Programme Management Team will look to hand the Implementation Plan, Financial Plan and Risk Register to a suitable individual or team to manage the full implementation of the model.

As part of the implementation of this Regional CRSC, Senior Responsible Officers are asked to consider the options for managing this implementation process. Options may include using existing operational resources or recruiting dedicated Programme support for a fixed term. The financial implication is included in the Business Case Financial Plan.

12.5 OPERATIONAL DELIVERY PLAN

To see a summary of the operational delivery plan, see section 6.3, Option 3 – CRSC Implementation Phased.

A full delivery plan will be developed after the Business Case is approved. The Delivery Plan will include timelines for core activities and a schedule of updates. The ARCH Regional Stroke Steering Board and the ARCH Regional Recovery Group will receive the ongoing performance of the service against modelling projections. The plan is anticipated to consist of recruitment timelines, service change delivery landing points, and other key milestones.

12.6 ENGAGEMENT & COMMUNICATIONS

Engagement with the Community Health Councils (CHCs) within both health boards has started.

As there will be no change to flow for SBUHB residents, as all acute strokes are already admitted to Morriston, the Swansea CHC involvement has been minimal, although they received regular updates via the ARCH Regional Stroke Programme Steering Board. SBUHB will seek the CHC's option of whether further engagement is required once the Business Case is agreed upon.

The changes to the service within HDdUHB are considerable, and as such, Public Engagement will be required. Public engagement in HDdUHB is yet to start. However, the CHC is already aware of the proposed plan and has received regular updates via the ARCH Regional Stroke Programme Steering Board. HDdUHB is only

affected in Year 3 of the Business Case; public engagement is planned during year 1.

Stroke Association is also part of the ARCH Regional Stroke Programme; it fully supports a CRSC model as the evidence is overwhelming in enhancing patient outcomes following stroke.

The ARCH Regional Stroke Board has representation from a wide variety of clinicians, including but not limited to;

- Stroke Consultants
- Therapy Services
- Radiology Manager
- Service Managers
- Stroke Association
- Wales Delivery Unit
- Welsh Ambulance Services Trust

12.7 PROGRAMME RISKS

Programme risks will be managed via the ARCH Regional Stroke Programme Steering Board. An updated risk register will be presented at each meeting for appropriate review, discussion, and agreed mitigating action. As the programme transitions towards mobilisation, risk management will continue to be an important governance element of the new implementation structure. The ARCH Regional Recovery Group will oversee the management and transition of this process.

The five highest identified in the risk register are;

	Description of Risk	Severity (RAG)	Mitigating Actions
1.	Workforce recruitment – An additional plus 70 WTE is required across, nursing, medical, therapies, and radiology for the development of the CRSC. This is not implemented with current workforce planning, education, and commission requirements, within either health board. There is a large risk that SBUHB will be unable to recruit the required workforce.		A phased approach to implementing CRSC over 3 years should reduce but fundamentally will not mitigate the risk. Using locums, agency, temporary contacts, and overtime should help to reduce slightly reduces this risk. However, this approach would also be in contradiction to workforce planning and finance approaches within the health boards.
2.	Finance – Funding for the CRSC. There is a large funding dependency for the development of the CRSC. Therefore there is a large risk that SBUHB and HDdUHB are unable to approve the Business Case.		A phased approach to implementing CRSC over 3 years will help mitigate the costs short term.

3.	3 Neurology Consultants are to be employed 0.2WTE x 3 Neurology Consultants to be funded as part of this business case. 0.8WTE x 3 Neurology Consultants to be funded by HDdUHB Neurology dept. HDdUHB has to yet approve this funding.		Working closely with the regional Neurology programme and HDdUHB executive team
5.	Stroke Pathways Business Case (Tranche 2) - Evidence would suggest that the rehab service both community and in-patients need to be established prior to a CRSC otherwise flow is likely to be limited. This work needs to be funded and completed in parallel to realise all the benefits.		ARCH Regional Stroke Programme to cover and manage the 2 Business Cases in parallel.
4.	National Programme – Working at a different pace; therefore, changes are required to the Business Case, e.g., catchment area or changes to Minimum standards and volumes for CRSC and ASU or All Wales Rehab Guidelines		The Programme works closely with the National Programme and will be aware of changes early. This will be in conjunction with a managed Change Control process.

With the development of an ARCH CRSC Delivery Plan, a more in-depth risk register will be created. It will be managed by the implementation team and overseen by the ARCH Regional Stroke Steering Board.

12.8 PROGRAMME ASSUMPTIONS

Programme assumptions will be managed via the ARCH Regional Stroke Programme Steering Board. An updated assumptions register will be presented at each meeting for appropriate review and discussion. As the programme transitions towards mobilisation, management will continue to be an essential governance element of the new implementation structure. The ARCH Regional Recovery Group will oversee the management and transition of this process.

If the assumptions made in this Business Case are incorrect, they will become a risk to the delivery of the programme and, as such, are also reflected in the full Risk Register.

The four highest identified in the assumptions register are;

	Assumption	Details
1.	Modelling Assumptions	Covered in section 4.6
2.	Access and Transfer Services are not included in this Business Case and are Out of Scope.	Bronglais and Withybush are to act as Remote Care Units and are covered in Tranche 2.

3,	All other catchment areas not outlined in this Business Case are Out of Scope.	This includes western areas of CTMUHB.
4.	HDd public consultation / CHC sign off post Business Case sign off.	Covered in section 7.1

With the development of an ARCH CRSC Delivery Plan, a more in-depth assumptions register will be created. It will be managed by the implementation team and overseen by the ARCH Regional Stroke Steering Board.

12.9 INTERDEPENDENCIES

Programme Interdependencies will be managed via the ARCH Regional Stroke Programme Steering Board. An updated interdependencies register will be presented at each meeting for appropriate review and discussion. As the programme transitions towards mobilisation, management will continue to be an important governance element of the new implementation structure. The ARCH Regional Recovery Group will oversee the management and transition of this process

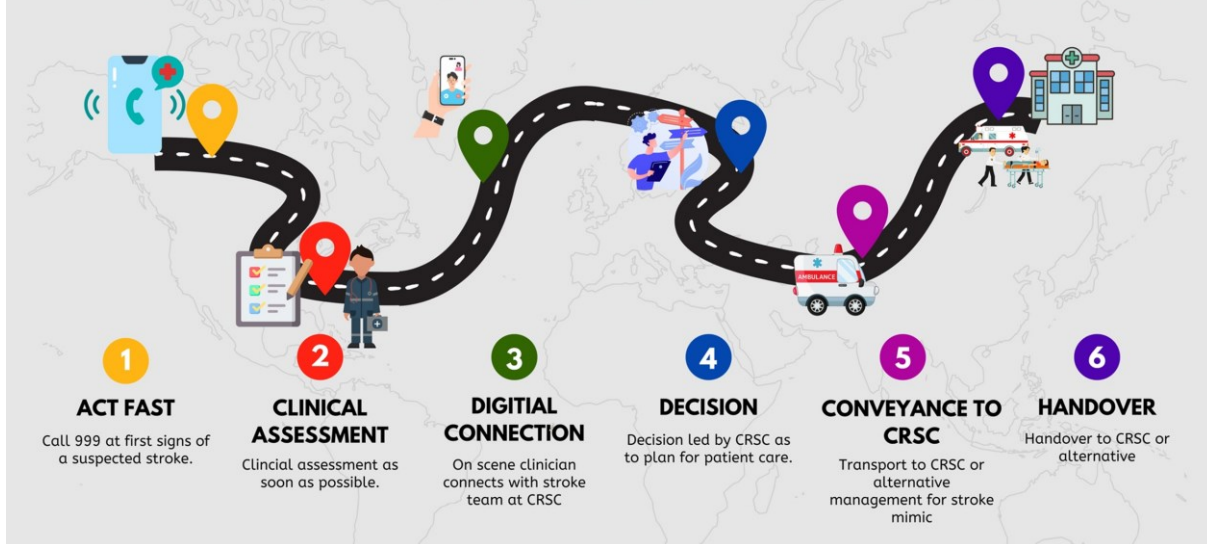
The four highest identified in the interdependencies register are;

Number	Interdependency	Description
1.	Regional Stroke Pathway Business Case	The CRSC is only one element in the Stroke Pathway; The Regional Stroke Pathways Business Case will cover the other areas and be in parallel to the CRSC development.
2.	WAST – Journey Changes	The National Programme will work with WAST to model the changes to journeys currently made and ensure resourcing and vehicles to deliver changes to offer a CRSC service.
3,	CT Scanner	There is a requirement for a new CT scanner within Morriston Hospital to support stroke and other services. This is out of scope of this business case. Capital funding in part for this has been allocated by the SBUHB charitable funds, revenue funding, and the remaining capital funding to support this is still to be sorted within SBUHB.
4.	National Programme Funding	Funding is required from the National Stroke Programme for the Programme Management of the CRSC.

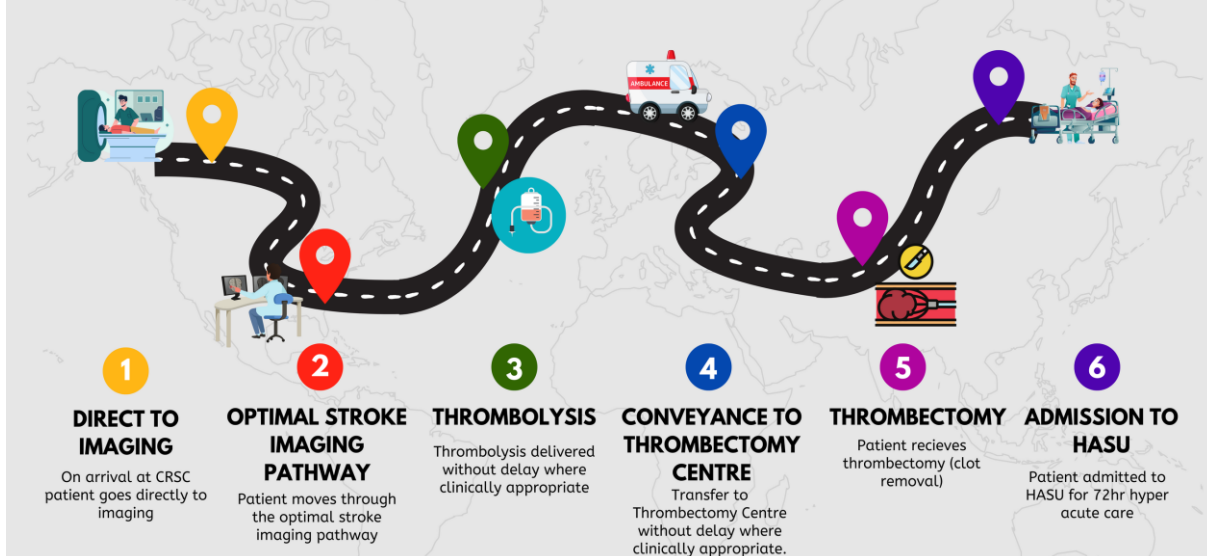
APPENDICES

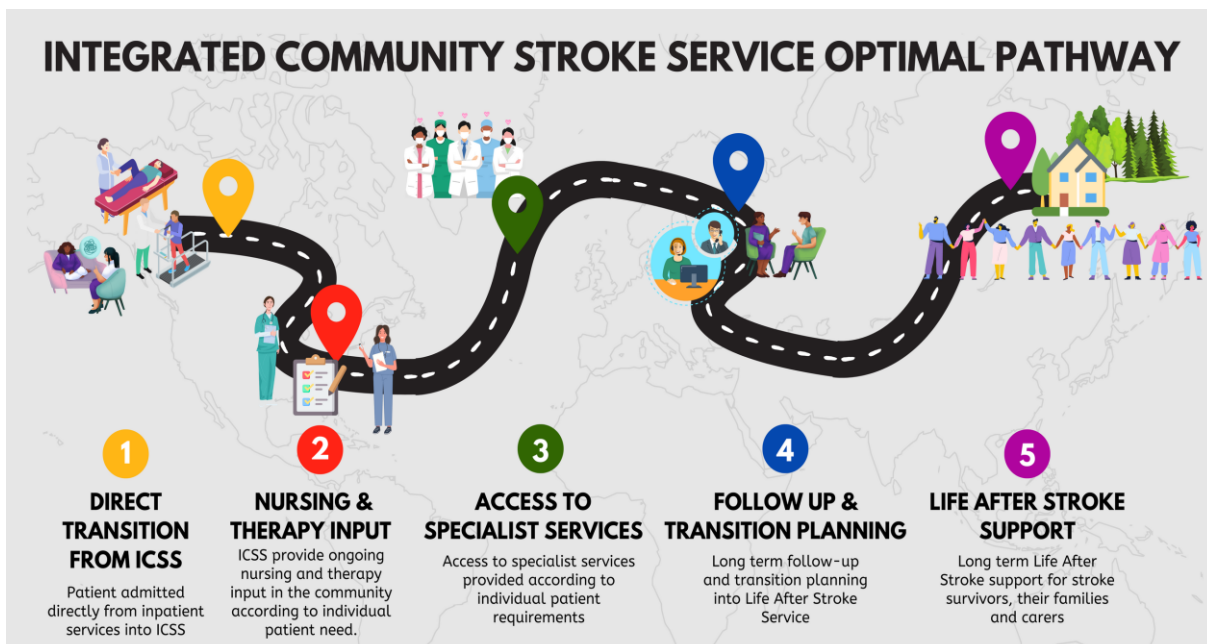
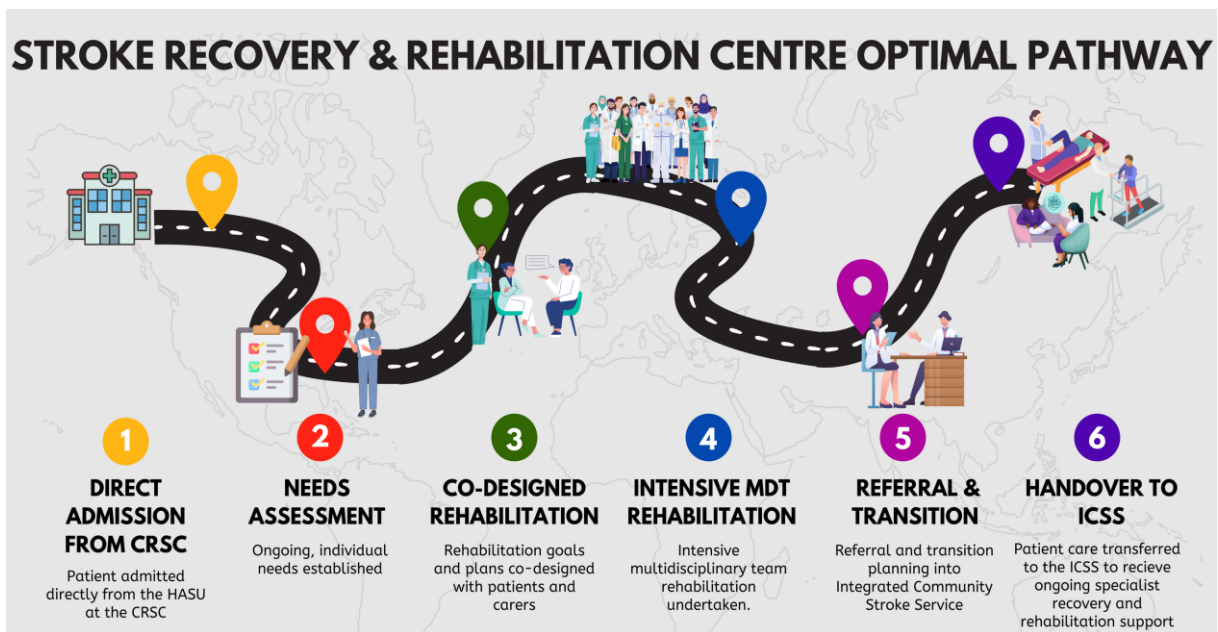
13.APPENDIX A - OPTIMAL PATIENT PATHWAY, SUPPLIED BY THE NATIONAL PROGRAMME

PRE-HOSPITAL OPTIMAL PATIENT PATHWAY



CRSC OPTIMAL PATIENT PATHWAY





14. APPENDIX B - A SIMPLIFIED TECHNICAL INFORMATION – SSNAP KEY INDICATORS

See separate PDF document

15. APPENDIX C – BASELINE FIGURES AND FORECASTED TRAJECTORIES

See separate excel document

16. APPENDIX D - MINIMUM STANDARDS AND VOLUMES FOR CRSC AND ASU

	Comprehensive Regional Stroke Centre	Acute Stroke Unit
Minimum Volume	600 patients	
Travel Times	85% within 30 minutes	
	95% within 45 minutes	
	98% within 60 minutes	
CLINICAL STANDARDS		
Admitted to hyper acute unit within 4 hours of arrival to hospital	95%	95% admission from CRSC within 24hrs of referral
Brain Imaging (CT)	95% of patients scanned within 1 hour	
Stroke specialist nurse assessment under 30 minutes	95%	
Door to needle thrombolysis	50% - 30 mins	
	90% - 45 mins	
	95% - 60 mins	
Swallow screen assessment within 4 hrs	95%	
Patients have assessment by one of PT, OT or SLT within 24hrs of admission.	95%	95% patients receiving the equivalent of at least 45 minutes, 5 days a week of PT, OT & SLT.
Patients complete therapy assessments within 72hrs of admission	95%	
100% stroke consultant review within 24hrs	100%	
Patients receiving mood and cognition screening by discharge		95%
Patients receiving a continence assessment by discharge		100%
Applicable patients receiving a joint health and social care plan on discharge		100%

WORKFORCE REQUIREMENTS		
Please note: therapy workforce recommendations are based on provision of 5-day therapy services and should be adjusted accordingly for units which are delivering 6- and 7-day services. These workforce recommendations may be subject to change in the case of any updates to the UK national clinical guidelines for stroke services.		
Consultant Stroke Physician	24/7 availability; minimum 8 thrombolysis trained physicians on rota	Consultant led ward round 5 days/week
Specialist nurses for thrombolysis/thrombectomy	24/7	
WTE per bed		
Nurse (WTE Per Bed)	2.9	1:35 (65:35) registered:

	(80:20) registered: unregistered	Unregistered
Whole time equivalent (WTE) per 5 beds		
Physiotherapist	0.73	0.84
Occupational therapist	0.68	0.81
Speech and language therapist	0.34	0.40
Clinical neuro-psychologist/ clinical psychologist	0.2	0.20
Dietician	0.15	0.15
Access to		
Clinical Psychology		X
Oral Health		X
Orthoptics		X
Orthotics		X
Social Worker	X	X
Infrastructure		
Radiology Service (Brain & Vascular Imaging)	24/7	24/7
CT +/- CTA	24/7	24/7
MRI	Extended hours	Extended hours
MRA	Extended hours	Extended hours
CTP	24/7	
Doppler Imaging	Extended hours	Extended hours
Appropriately trained staff in eligibility assessment & administering thrombolysis treatment & referral to thrombectomy	24/7	
Access to neurosurgery, interventional neuroradiology and vascular surgery for appropriate patients	24/7 for all, extended hours for vascular surgery	
Availability of Angio-suite for future development of thrombectomy locally.	Aspirational	
Repatriation/ Patient transfer: • If patient transfer is required from hyper acute to acute care services appropriate pathway protocols are in place and followed	24/7	
Access to neurosurgery, vascular surgery & endoscopy for appropriate patients	24/7	24/7
Rehab facilities (Gym/OT Kitchen)		Working hours 7/7
Access to ESD		Working hours 7/7

17. APPENDIX E – RESOURCE IMPLICATIONS - THE PREFERRED OPTION 3

The following sections look at each workforce element in detail, identify the required staffing for the CRSC /ASU model and map this against the current staffing. The

workforce has been based on the assumption that there will be 16 CRSC and 8 ASU beds. The workforce table above does not account for the 27% headroom required to cover annual leave; therefore, this has been included in the nursing and therapy staffing requirements. In addition, Occupational Therapy and Physiotherapy have added 40% to ensure they can provide a targeted 7 day service, as the figures above are recommendations for a 5 day service.

17.1 NURSING

The recommended staffing for a CRSC is 2.9 WTE/per bed with an 80:20 registered to unregistered split.

The recommended staffing for an ASU is 1.35 WTE/per bed with a 65:35 registered to unregistered split.

CRSC Staffing requirements 16 beds (including 27% headroom)	ASU Staffing requirements 8 beds (including 27% headroom)	Current staffing WTE	Staffing Gap WTE	Cost of meeting staffing requirement
35.36 WTE Registered: 8.84 WTE Unregistered	6.7 WTE Registered: 3.6 WTE Unregistered	Band 7 x 1 Band 6 x 2 Band 5 x 21.45 Band 3 x 5.45 Band 2 x 20.73	Band 5 x 31.47 Band 2 x -5.67	£1,348K
ANP 24/7 availability; minimum 8 ANP rota		Band 8a x 3	Band 8a x 5	£428K

Total cost for Nursing = **£1,776K**

17.1 MEDICAL

CRSC Staffing requirements 16 beds	ASU Staffing requirements 8 beds	Current staffing WTE	Staffing Gap	Cost of meeting staffing requirements
Consultant 24/7 availability; minimum 8 thrombolysis trained physicians on rota	Consultant led ward round 5 days/week	3 Consultants	5 Consultants. To be made up of 2 stroke consultants and 3 x 0.2WTE Neurology consultants.	£354K
2 x Physicians Associate		2 but fixed term until end of March 2023	2	£142K
2 x Specialty Training Doctor		1	1	£96K

Medical Secretary to support the new consultants		1.6	2	£61K
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Total cost for Medical = **£658K**

17.2 THERAPIES

The therapy recommendations given below are based on a 5 day service for Dietetics. Speech and Language Therapy and Psychology. The therapy provision for Occupational Therapy and Physiotherapy is based on a targeted 7 day model. This 7 day model requires a more significant proportion of registered staff to be able to carry out assessments and make decisions about discharge options whilst ensuring the appropriate flow into the stroke rehabilitation model. To ensure efficient use of support staff across therapies, 4 extra WTE generic technicians are required to provide the supported delivery of therapeutic interventions.

TOTAL Therapy Staffing deficit

	CRSC Staffing requirements 16 beds	ASU Staffing requirements 8 beds	Current staffing WTE	Staffing Gap WTE	Cost of meeting staffing requirements
Occupational Therapy	0.68 WTE per 5 beds	0.81 WTE per 5 beds	1.0 B7 1.5 B6 1.0 B5	3.0 B6 1.0 B5	£209K
Speech and Language Therapy	0.34 WTE per 5 beds	0.40 WTE per 5 beds	0.5 B7 0.6 B6 0.5 B5	2.0 B6	£110K
Physiotherapy	0.73 WTE per 5 beds	0.84 WTE per 5 beds	0.6 B7 1.7 B6 1.0 B5	1.0 B7 3.0 B6	£229K
Dietetics	0.15 WTE per 5 beds	0.15 WTE per 5 beds	0.1 B5	1.0 B7 1.0 B6	£120K
Psychology	0.20 WTE per 5 beds	0.20 WTE per 5 beds	0	1.0 8b	£74K
Generic Tech	0.80 WTE per 5 beds	0.80 WTE per 5 beds	0	4.0 B3	£220K

Total cost for Therapies = **£962K**

17.3 RADIOLOGY

Following is the minimum radiology requirement for CRSC.

- 24/7 access to CT brain imaging, including CT and CT angiography. With the capability of undertaking immediate CT brain imaging when clinically indicated
- 7 extended day MRI imaging availability (12 hours a day)

- 7 day Carotid Doppler access

In order to support these minimum requirements, additional staffing is required, detailed below.

TOTAL Radiology Staffing deficit

CRSC Staffing requirements 16 CRSC beds and 8 ASU	Staffing Gap	Cost of meeting staffing requirements
Neuro Radiologist	4	£545K
Band 7	1	£65K
Band 6	5	£274K
Band 3 (generic techs)	5	£156K

Total cost for Radiology Staff = **£1,040K**

There will be a cost saving of £70K per year within Radiology due to the removal of agency reporting costs.

Total Radiology Cost = **£970K**

18.APPENDIX F – SBUHB FINANCIAL, WORKFORCE & BENEFITS MODEL

See separate document

19.APPENDIX G – ARCH PROGRAMME MANAGEMENT RESOUCCE COSTS

See separate document

HASU Business Case Costings Swansea Bay Health Board

HASU Business Case Costings Swansea Bay Health Board				Existing		New staff								
										Cumulative Additional Cost				
Nursing			Band	WTE Total	£	WTE Total	End of Year 1	End of Year 2	Year 3 - Full HASU Service	Gross cost Salary	Year 1	Year 2	Year 3 Onwards	
	Staffing - Nursing	B7	7	1	£58,851						£60,090			
		B6	6	2	£99,737						£60,424			
		B5	5	21.45	£861,621	31.47	11.8	11.8	7.87	£48,792	£575,746	£1,151,491	£1,535,484	
		B3	3	5.45	£194,679					£31,153				
		B2	2	20.73	£752,504	-5.67	-2.13	-2.13	-1.41	£32,988	-£70,264	-£140,529	-£187,042	
		CNS	7	3	£180,270					£60,090				
		Stroke ANP (Band 7 whilst training band 8A once trained)	8a	3	£256,813	5	3	2	0	£85,604	£256,813	£428,022	£428,022	
Medical	Staffing - Medical	Consultants	consultant	3	£408,984	2.6	1.4	1.2	0	£136,328	£190,859	£354,453	£354,453	
		Physicians Associate	7	2	£142,380	2	2	0	0	£71,190	£142,380	£142,380	£142,380	
		F1		1	£58,697					£58,697				
		F2		1	£68,739					£49,099				
		IMT		2	£172,760					£86,380				
		IMT 3		2	£205,988					£102,994				
		Clin. Fellow		1	£95,840					£95,840				
		ST	ST 40% BANDING	1	£95,840	1	1	0	0	£95,840	£95,840	£95,840	£95,840	
Admin	Medical Secretary		B4	1.6	£52,446	2	1	1	0	£32,779	£32,779	£65,558	£65,558	
				71.23		38.4				£1,224,152	£2,097,215	£2,434,695		

Radiology	Staffing Radiology	B7	7			1	1			£64,691	£64,691	£64,691	£64,691
		B6	6			5	5			£54,890	£274,450	£274,450	£274,450
		B3	3			5	5			£31,153	£155,765	£155,765	£155,765
		Neuro Radiologist- consultant	consultant			4	4			£136,328	£475,312	£475,312	£475,312
							15				£970,218	£970,218	£970,218

earpaies	Psychology	8B	8B	0	£82,723	1	1			£74,299	£74,299	£74,299	£74,299
	SLT	B7	B7	0.5	£32,346					£64,691			
	SLT	B6	B6	0.6	£32,934	2	1		1	£54,890	£54,890	£54,890	£109,780
	SLT	B5	B5	0.5	£22,151					£44,302			
	Physio	B7	B7	0.6	£38,815	1	1			£64,691	£64,691	£64,691	£64,691
	Physio	B6	B6	1.7	£93,313	3	1	2		£54,890	£54,890	£164,670	£164,670
	Physio	B5	B5	1	£44,302					£44,302			
	Dietetics	B7	B7	0	£0	1	1			£64,691	£64,691	£64,691	£64,691
	Dietetics	B6	B6	0	£0	1	1			£54,890	£54,890	£54,890	£54,890
	Dietetics	B5	B5	0.1	£4,430					£44,302			
	OT	B7	B7	1	£64,691					£64,691			
	OT	B6	B6	1.5	£82,335	3	1	2		£54,890	£54,890	£164,670	£164,670
	OT	B5	B5	1	£44,302	1			1	£44,302	£0	£0	£44,302

Th	General Tech	B3	B3	0	£0	4			4	£54,890	£0	£0	£219,560
				8.5		17					£423,241	£642,801	£961,553

Non Pay	Neuro Radiologist	Laptop (specialist)*4				0					£48,000	£48,000	£48,000
	Senior staff 8a above	Laptops etc*7.6				0					£15,200	£15,200	£15,200
	Additional Non Pay					0					£10,000	£10,000	£10,000
	Total Non Pay					0					£73,200	£73,200	£73,200

	Total Cost			159.46		70.4	-	-	-	-	£2,690,811	£3,783,434	£4,439,666
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					Number of patients			Tariff Charged		Cost saving			
LTA costs													
	Margam Patients currently going to POW				66			-£2,033		-£134,178	-£134,178	-£134,178	

	Total Net Cost										£2,556,633	£3,649,256	£4,305,488
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Summary	WTE	Cost Year 3 Onwards
Nursing	30.8	£1,776,464
Medical	11	£658,231
Radiology	15	£970,218
Therapies	17	£961,553
Non Pay	0	£73,200
	73.8	£4,439,666
Saving from costs with Cwm Taff		-£134,178
Net Cost		£4,305,488

Notes

- Nursing numbers to be reviewed for a change in skill mix
- Savings from CTM Margam patients are dependent on the agreement /tolerance levels going forward from Apr 23
- Potential impact on non pay costs assessment needed

Costs Estimated - at this stage budget status unknown

											Assuming a 3% increase due to inflation	
Priority	Role	Purpose	Comments	Band	WTE	Annual Cost £	Monthly Cost £	CRSC 2023/24 £s	HB 2023/24 £s		CRSC 2024/25 £s	HB 2024/25 £s
	Programme Management											
1	ARCH Senior Programme Manager	Programme management for Regional Model	Full time	8b	1.00	83,425	6,952	£83,425	£0		£85,928	£0
1	ARCH Project Manager	Project and workstream managemnet	Full time	7	1.00	60,572	5,048	£60,572	£0		£62,389	£0
1	ARCH Project Support Officer	Co-ordination/arrangement of engagement activities / meetings	Full time	4	1.00	32,779	2,732	£32,779	£0		£33,762	£0
2	HDd Principal Programme Manager Transformation	Pathway mapping	Time to be spent on programme TBC				-	£0	£0		£0	£0
	Service Team and Leadership											
2	Service Manager HDd	Develop service model	1 days per week	8b	0.20	83,425	6,952	£16,685	£0		£17,186	£0
2	Service Manager SB	Develop service model	1 days per week	8b	0.20	83,425	6,952	£16,685	£0		£17,186	£0
2	Lead Nurse Band 8B - HDd	Develop service model, engage across Nurse workforce	1 sessions per week				-	£0	£0		£0	£0
2	Lead Nurse Band 8B - SB	Develop service model, engage across Nurse workforce	1 sessions per week				-	£0	£0		£0	£0
2	Medical Sessions - HDd	Develop service model, engage across Medical workforce	1 sessions per week				-	£0	£0		£0	£0
2	Medical Sessions - SB	Develop service model, engage across Medical workforce	1 sessions per week				-	£0	£0		£0	£0
2	Radiology sessions - SB	Develop service model, engage across Radiology workforce	1 sessions per week				-	£0	£0		£0	£0
2	Therapies Lead HDd	Develop service model, engage across Therapy services workforce	0.5 days per week				-	£0	£0		£0	£0
2	Therapies Lead SB	Develop service model, engage across Therapy services workforce	0.5 days per week				-	£0	£0		£0	£0
	Estimate Nurse/Therapist/Radiology/Medics backfill							£15,000	£150,000		£15,450	£154,500
	Corporate Services											
2	Engagement	Co-ordinate engagement activity, prepare materials					-	£20,000	£0		£0	£0
2	Digital							£0	£0		£0	£0
2	Finance							£0	£0		£0	£0
2	Workforce							£0	£0		£0	£0
2	Data Analysis / Modelling							£0	£0		£0	£0
2	Commissioning							£0	£0		£0	£0
2	Service Improvement							£0	£0		£0	£0
2	Communications							£0	£0		£0	£0
2	Estimate Contribution to Corporate Service		Senior management, workforce, digital, finance, commissioning, communications, service improvement support					£0	£100,000		£0	£103,000
	TOTAL COSTS							£245,146	£250,000		£231,900	£257,500