Review of North Mersey Hyper Acute Stroke Services

Full Business Case

6/23/2022

Version 1.2

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1 Foreword

As clinical leaders our aim is to deliver the best possible healthcare for our patients. People's health needs are changing and under the current way we have arranged our NHS, we are not always able to deliver care to the standards we would like. We believe we need to change our models of healthcare delivery now, so we can be in a position to provide high quality care in the long term.

To fully meet people's needs, we need a system capable of delivering the right kind of healthcare, in the right setting. When people do need hospital care, we believe that were necessary centralising key services is important, so that patients have access to the best possible care.

The North Mersey Stroke services have reviewed their current services and have developed a plan to transform its hospital services with an aim to: -

- Provide the best stroke service in the country
- Have all patients receive the right care in the right place first time
- Have a service that is sustainable clinically and financially
- Improve patient outcomes
- Give patients the best possible experience.

In our plans we have based our transformation on the following principles: -

- Services will be delivered by teams of specialist professionals whose skill will meet the needs of patients
- Services will be delivered by a sustainable workforce
- Services will meet clinical standards and best practice
- Variations in quality and standards of care will be eliminated.
- Services will be centralised whenever clinically necessary and local whenever possible.

To achieve our plans will require a significant amount of change to the stroke services of North Mersey but these are essential if we are going to deliver a better service that are sustainable.

Our plans are incorporated within this business case. This case explains why change is necessary and what we are proposing change in the future. The change to the way we deliver services is required to improve patient outcomes and experience. We have throughout this case used clinical evidence and standards to shape our proposed new model of stroke care. The case has been developed by our clinical teams from the North Mersey Stroke Services who are fully committed to securing a better future for their services.

2 Executive Summary

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. 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 sets out a proposal for an integrated model of care and the future configuration for hyper-acute stroke services for the populations of Liverpool, Sefton, Knowsley and West Lancashire.

This document provides a comprehensive representation of the case for change, a clinical vision, a proposed model of care, the process by which options were identified and appraised and it sets out a preferred option for the future delivery of these services. The BC contains detailed modelling to evidence the impact of the proposal on a range of factors, including activity, workforce, finance, capital and estates.

While there have been some significant improvements in stroke prevention, treatment and patient outcomes since the 2007 National Stroke Strategy, major challenges remain across the whole stroke pathway locally. A number of Acute Stroke Units do not meet national guidelines and there are gaps and unwarranted variation across the stroke care pathway.

Transforming stroke care is a priority within the NHS Long Term Plan.

The plan points to strong evidence that hyper acute interventions such as brain scanning, and thrombolysis are best delivered as part of a networked 24/7 service. The plan supports centralised hyper-acute stroke care delivered by a smaller number of well-equipped and staffed hospitals, based upon clear evidence of the greatest improvements in adopting this model of care. This would see a reduction in the number of stroke-receiving units, and an increase in the number of patients receiving high-quality specialist care, meeting seven-day standards for stroke care, which meet national clinical guidelines.

In addition, mechanical thrombectomy and clot-busting treatment (thrombolysis) can significantly reduce the severity of disability caused by a stroke. Reconfiguring stroke services into specialist centres would improve the use of thrombolysis and further roll out mechanical thrombectomy. This model of care would ensure 90 percent of stroke patients receive care on a specialist stroke unit and that all patients who could benefit from thrombolysis receive it. This combination of specialist stroke care, thrombolysis and thrombectomy would result in the NHS having the best performance in Europe for people with stroke. The North Mersey health and care system is committed to transforming hyper-acute stroke services to deliver the best possible outcomes and experience for our population.

The North Mersey Stroke Plan is part of the Cheshire and Merseyside Health and Care Partnership cardiovascular disease (CVD) programme.

The current providers of inpatient stroke services for North Mersey are Liverpool University Hospitals NHS FT, which delivers stroke services across two sites at the Royal Liverpool and

Aintree Hospitals, and Southport & Ormskirk Hospitals NHS Trust (Southport & Formby District and General Hospital). Tertiary neuroscience services are provided by The Walton Centre NHS Foundation Trust, which delivers regional thrombectomy services across most of the Cheshire & Merseyside footprint.

The current provision of both acute and rehabilitation/support services across Liverpool, Knowsley and Sefton is subject to significant variation in pathways, clinical standards and health outcomes. This proposal seeks to addresses this variation, to ensure that the whole North Mersey population would have access to a gold standard, integrated, whole pathway service.

The BC sets out a preferred option for a single North Mersey comprehensive stroke centre, co-located with A&E and with direct access to specialist scanners in order to maximise the number of patients who can receive thrombectomy and thrombolysis. The proposal would see all North Mersey patients receive their care at the Liverpool University Hospitals Aintree site from a hyper- acute stroke centre, co-located with acute neurological and stroke thrombectomy services provided by the Walton Centre.

After the initial 72 hours of stroke care, patients would continue to be managed at an acute stroke unit, if not suitable for discharge. Medically stable patients requiring further in-patient rehabilitation or complex discharge planning would be transferred to a local rehabilitation unit for in-patient rehabilitation or discharged from hospital with support from uniformly delivered, gold standard, early supported discharge services, to optimise their recovery in their own homes. This model of post-acute stroke care responds to the needs and preferences of patients, carers and families, who have told us that they want to receive as much care as practicable close to home.

The process to identify and appraise options, set out in detail in this document, has been robust and inclusive, involving clinicians, patients and partners from across the North Mersey footprint.

Following appraisal of a long list, a short list of seven options have been modelled in detail and evaluated using comprehensive criteria and scoring of the impact of each option on health outcomes, patient experience, deliverability, strategic alignment, clinical standards, clinical sustainability and value for money.

The BC details how patients, public and key stakeholders have been engaged and involved in shaping the proposal. The document also sets out the formal public consultation process, led by commissioners, the feedback from the public consultation and the mitigations that will be put in place.

The proposals for the future delivery of hyper-acute stroke care for the North Mersey population have been formed with strong consensus amongst clinicians, providers and commissioners. The health and care system are aligned to these proposals, driven by our shared ambition to improve health outcomes for our population.

This chapter provides an introduction to the North Mersey Stroke services and describes the background, purpose and scope of this pre-consultation business case.

2.1 National Context and Challenges

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:

- Stroke is the leading cause of disability and the fourth largest cause of death in the UK.
- 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.
- There are 80,000 stroke admissions in England each year and over 1 million stroke survivors, half of whom have a disability resulting from their stroke.
- 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.
- Nearly half of stroke survivors feel 'abandoned' after leaving hospital (Stroke Association, 2017).
- 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 **(ref 1);** such effects can be predicted to increase hospital re-admission and un-planned care risks **(ref 2).**

While there have been some significant improvements in stroke prevention, treatment and patient outcomes since the 2007 National Stroke Strategy, major challenges remain across the whole stroke pathway within Cheshire & Merseyside. Poorer services risk increased mortality and leave stroke survivors with significant disability. A number of Acute Stroke Units do not meet national guidelines and there are gaps and unwarranted variation across the stroke care pathway. Challenges include:

- **Ongoing rehabilitation and care:** Too many stroke survivors leave hospital with inadequate rehabilitation and ongoing care in place leading to onward disabilities (mental and/ or physical), driving onward (avoidable) health and social care costs.

- **Urgent & emergency care:** Efforts to reconfigure acute stroke services have been slow and patchy and there has been a failure to roll-out of effective new treatments such as mechanical Thrombectomy.

- **Preventing avoidable stroke:** Too many people are living with undiagnosed or poorly managed cardiovascular risk factors such as raised blood pressure and cholesterol and atrial fibrillation (AF), leaving them at high risk of stroke.

- **Workforce:** Workforce challenges exist across the pathway with too few nurses, consultants and therapists, as well as a lack of stroke awareness, to ensure all patients get the treatment and support they need. A common lack of clinical

psychology/neuropsychology input into community stroke care and stroke rehabilitation support also exists, across Cheshire and Merseyside, counter to national guidelines (Royal College of Physicians, 2016).

- **System Leadership:** A lack of joined-up commissioning and provision across whole health care systems is preventing the delivery and embedding of consistent improvements in the stroke pathway.

Transforming stroke care is a priority within the NHS Long Term Plan. The plan points to strong evidence that hyper acute interventions such as brain scanning, and thrombolysis are best delivered as part of a networked 24/7 service. The plan supports centralised hyper-acute stroke care delivered by a smaller number of well-equipped and staffed hospitals, based upon evidence of the greatest improvements in adopting this model of care. This would see a reduction in the number of stroke-receiving units, and an increase in the number of patients receiving high-quality specialist care, meeting seven-day standards for stroke care which meet national clinical guidelines.

In addition, mechanical thrombectomy and clot-busting treatment (thrombolysis) can significantly reduce the severity of disability caused by a stroke. Reconfiguring stroke services into specialist centres would improve the use of thrombolysis and further roll out mechanical thrombectomy. This model of care would ensure 90 percent of stroke patients receive care on a specialist stroke unit and that all patients who could benefit from thrombolysis (about 20 percent) receive it. This combination of specialist stroke care, thrombolysis and thrombectomy would result in the NHS having the best performance in Europe for people with stroke.

The Long-Term Plan also proposes higher intensity care models for stroke rehabilitation in the community, delivered in partnership with voluntary organisations including the Stroke Association, to support improved outcomes to six months and beyond.

2.2 North Mersey Stroke Review Background

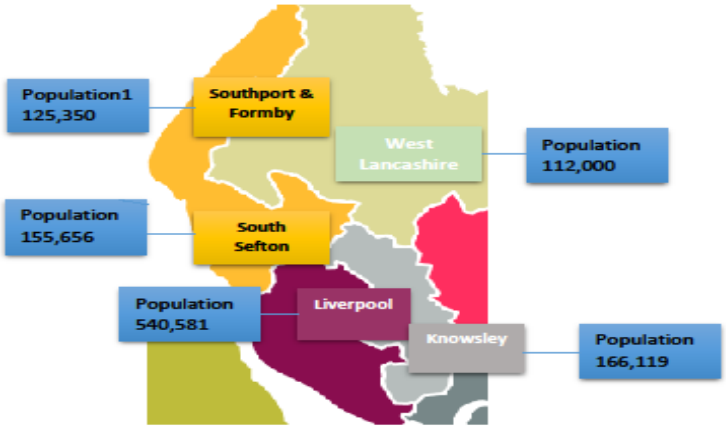
The Northwest Coast Strategic Clinical Network (NWC SCN) team (now the Cheshire and Mersey Integrated Stroke Delivery Network, C & M ISDN), were engaged to develop the Stroke Case for Change with the involvement and engagement of clinical leads and stakeholders across Cheshire and Merseyside. This work was commissioned by the Cheshire and Merseyside Healthcare Partnership as a part of the CVD Programme (2018) and was completed in May 2019. This was in response to concerns about performance and sustainability of some stroke units across the patch.

The case for change set out a clinical vision for the development of Stroke services for Cheshire and Merseyside including North Mersey reflecting national guidance and best practice. It also recognised that further clinical engagement was required to develop the new clinical model for the future. Liverpool Clinical Commissioning Group are the lead commissioner for stroke services and using the work already complete by C &M ISDN have taken responsibility to develop this Business Case for North Mersey services.

In October 2019 the Royal Liverpool University Hospitals NHS Trust and Aintree University Hospital NHS Trust merged to form Liverpool University Hospitals NHS Foundation Trust.

2.3 **Stroke in North Mersey**

The four North Mersey Clinical Commissioning Groups: – NHS Knowsley CCG, NHS Liverpool CCG, NHS Southport & Formby CCG and NHS South Sefton CCG, have a long history of collaboration, with the majority of services they commission provided by the same NHS Trusts for their combined registered population.



North Mersey is one of the most deprived areas of the country, with more than 4 out of 10 residents living in the 10% most deprived neighbourhoods in England. Deprivation is strongly associated with poor health outcomes from childhood through to old age. People in North Mersey live shorter lives than the national average and spend a greater proportion of their life living with disability and poor health. Despite the best efforts of the health and care system, health outcomes for the population are not improving and the inequalities gap is widening. Partners across commissioning and provision are committed to greater collaboration, including joining-up commissioning to address the huge challenges we face.

The infographics below provide a clear overview of the health needs of our populations.


Knowsley
Cheshire & Merseyside Health & Care Partnership
If Knowsley was a village of just 100 people...
42
Children are overweight or obese by year 6
17
Adults suffer from depression
11
5-16 year olds have a MH disorder
31
Will die from cancer
69
Adults are over-weight or obese
3
Adults under 40 have Type 2 diabetes
59
people are living with a long term condition
12
Will die from heart disease
22
Are smokers
81
Is the average age that women will live to
26
People take less than 30 mins exercise a week
77
Is the average age that men will live to
7
People are over 75
Statistics from PHE are for the Knowsley Local Authority area, pop: 147,000


Liverpool
Cheshire & Merseyside Health & Care Partnership
If Liverpool was a village of just 100 people...
38
Children are overweight or obese by year 6
19
Adults suffer from depression
10
5-16 year olds have a MH disorder
30
Will die from cancer
64
Adults are over-weight or obese
4
Adults under 40 have Type 2 diabetes
55
people are living with a long term condition
11
Will die from heart disease
22
Are smokers
80
Is the average age that women will live to
25
People take less than 30 mins exercise a week
76
Is the average age that men will live to
6
People are over 75
Statistics from PHE are for the Liverpool Local Authority area, pop: 467,000


Sefton
Cheshire & Merseyside Health & Care Partnership
If Sefton was a village of just 100 people...
34
Children are overweight or obese by year 6
20
Adults suffer from depression
9
5-16 year olds have a MH disorder
29
Will die from cancer
68
Adults are over-weight or obese
3
Adults under 40 have Type 2 diabetes
60
people are living with a long term condition
10
Will die from heart disease
16
Are smokers
82
Is the average age that women will live to
32
People take less than 30 mins exercise a week
78
Is the average age that men will live to
10
People are over 75
Statistics from PHE are for the Sefton Local Authority area, pop: 177,000

North Mersey includes acute hospital sites at Aintree, Royal Liverpool, Broadgreen and Southport and Ormskirk.

North Mersey has a growing and ageing population. Over the next ten years plus, the largest population increase is predicted in people aged 65 and over. Southport has a particularly elderly population of around 21% of their residents are aged over 65 years old. Liverpool's over 65 population is 14%.

Research shows that atrial fibrillation increases the risk of stroke by a factor of 5 and data suggests that in North Mersey 77% of all patients with atrial fibrillation have been diagnosed. Nationally this figure is 70%.

In North Mersey there were 1372 patients diagnosed with Stroke between April 2018 and March 2019, 1477, in 2019 to 2020. In 2018 to 2019 Stroke prevalence across North Mersey is 0.18% compared to a national average of 0.12%.

Unhealthy lifestyle behaviours such as smoking, and obesity increase the risk of avoidable disease and disability such as stroke.

Smoking: despite a decline in the number of people smoking, smoking remains the main cause of preventable disease in the UK, accountable for 1 in 6 deaths in England. Mortality rates due to smoking are three times higher in the most deprived areas than in the most affluent areas. Smoking has decreased nationally from 18.4% in 2013 to 14.4% in 2018.

Obesity: obesity is a major cause of many diseases including stroke, on average, obesity deprives people of an extra nine years of life. Obesity is a serious and growing problem.

Over the next five years in North Mersey the number of people living with major health problems is projected to increase significantly.

2.4 Current Stroke services in North Mersey

The current providers of inpatient stroke services in North Mersey are the Liverpool University Hospitals NHS Foundation Trust located at: -

- Royal Liverpool hospital site - Hyper Acute Stroke Unit (HASU) and Acute Stroke Unit (ASU)
- Broadgreen Hospital site - Rehabilitation
- Aintree Hospital site - HASU and ASU

Southport and Ormskirk Hospital Trust located at: -

- Southport & Formby District and General Hospital - HASU and ASU

The number of strokes recorded in the last three years for all three sites is as follows: -

		University Hospital Aintree	Royal Liverpool University Hospital	Southport and Formby District General	Total
2019/20	Number of patients (72h cohort) (Team Centred)	524	556	397	1477
2018/19	Number of patients (72h cohort) (Team Centred)	502	570	300	1372
2017/18	Number of patients (72h cohort) (Team Centred)	444	653	343	1440

Source: SSNAP 2017/18, 2018/19 and 2019/20

North Mersey hospital sites offer the following stroke services: -

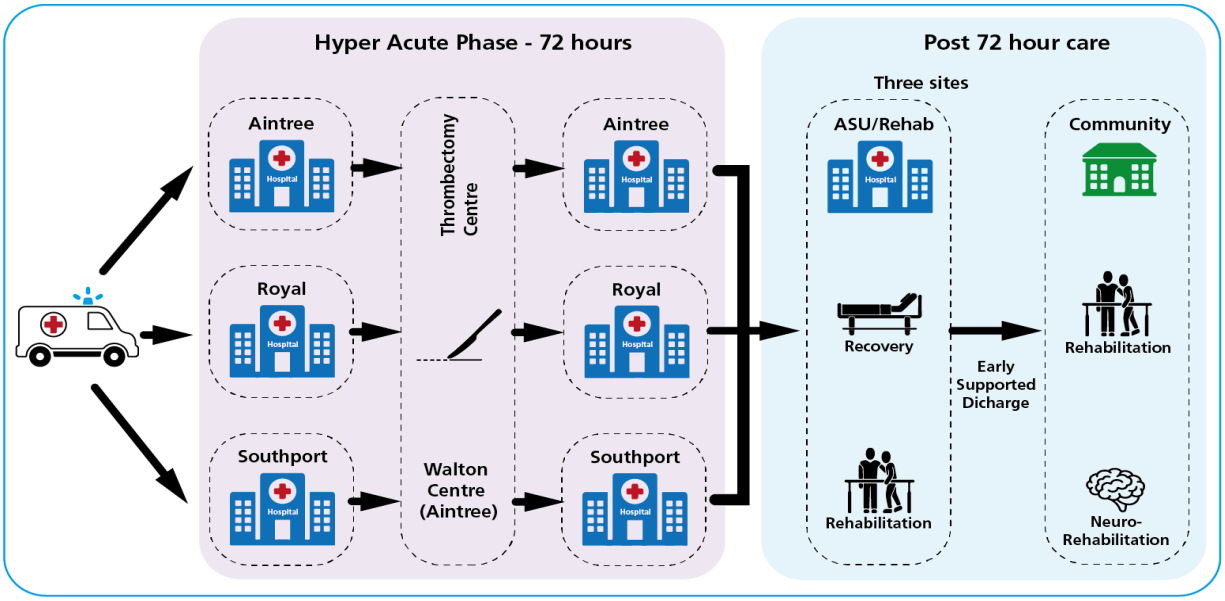
- Hyper Acute Stroke and Acute Stroke Services
- Hospital Rehabilitation
- Outpatient services

Current North Mersey Bed Model: -

North Mersey Stroke Service – Current Bed Model					
Bed Numbers	Aintree	Royal	Southport	Broadgreen	Total
< 72 hours	4	7	3		14
> 72 hours	29	7	19		55
Rehab				21	21
Total	33	14	22	21	90

There are currently **90** beds dedicated to stroke services and 14 are exclusively for the first 72 hours of critical care spread across the three sites.

Current North Mersey Stroke Services Configuration



There were in the region of 7,200 patients in 2018-19 and 7,800 patients in 2019-20 per annum who present to any of the three hospital A&E departments with suspected stroke symptoms. They can be classed into three categories: -

- Stroke patients – diagnosed as stroke patients and treated accordingly (circa 1,500 patients 2018-19 & 19-20)
- TIA – a transient ischemic attack (TIA) is like a stroke, producing similar symptoms, but usually lasting only a few minutes and causing no permanent damage (circa 2,200 patients 2018-19 and 1,900 in 19-20)
- Mimics - diagnosing stroke is not always straightforward. Stroke mimics such as Todd's paresis or hemiplegic migraine account for a significant amount of possible stroke hospital attendances (circa 3,500 patients 2018-19 and 4100 in 2019-20)

All three services provide thrombolysis to patients as part of the Hyper Acute phase of care as the delivery of this treatment is time critical. If mechanical thrombectomy is required this requires a transfer to The Walton Centre for this specialist procedure, there are only 24 accredited centres in the UK to perform this treatment.

Thrombolysis, also called fibrinolytic therapy, is the breakdown of blood clots formed in blood vessels, using medication. This restores the blood flow to the brain and prevents any further damage.

Thrombolysis is most effective if started as soon as possible after the stroke occurs and certainly within 4.5 hours. It's not generally recommended if more than 4.5 hours have passed, as it's not clear how beneficial it is when used after this time.

Before thrombolysis can be used, it's very important that a brain scan is done to confirm a diagnosis of an ischaemic stroke. This is because the medicine can make the bleeding that occurs in hemorrhagic strokes worse.

The percentage of patients receiving thrombolysis at each site is as follows: -

		University Hospital Aintree	Royal Liverpool University Hospital	Southport and Formby District General
2019/20	Percentage of all stroke patients given thrombolysis (Team Centred)	47 (8.9%)	46 (8.2%)	28 (7%)
2018/19	Percentage of all stroke patients given thrombolysis (Team Centred)	49 (9.4%)	47 (8.5%)	32 (9.7%)
2017/18	Percentage of all stroke patients given thrombolysis (Team Centred)	41 (8.5%)	76 (10.8%)	42 (11.4%)

Mechanical Thrombectomy

A small number of severe ischaemic strokes can be treated by an emergency procedure called a thrombectomy. This removes blood clots and helps restore blood flow to the brain. Thrombectomy is only effective at treating ischaemic strokes caused by a blood clot in a large artery in the brain.

It's most effective when started as soon as possible after a stroke. The procedure involves inserting a catheter into an artery, often in the groin. A small device is passed through the catheter into the artery in the brain. The blood clot can then be removed using the device, or through suction. The procedure can be done under local or general anesthetic.

Tertiary neuroscience services are provided by The Walton Centre NHS Foundation Trust which delivers regional thrombectomy services across most of the Cheshire & Merseyside footprint. The Walton Centre does not house a Hyperacute Stroke Unit, but pathways exist to transfer eligible patients for thrombectomy. This is a time critical procedure that currently requires patients from Southport and the Royal Liverpool to be transferred to the Aintree site. The Walton Centre provides thrombectomy 24 hours per day, 7 days per week.

The number of patients receiving thrombectomy in North Mersey is summarised below: -

Thrombectomy Activity				
	2017/18	**2018/19**	**2019/ 20**	**2020/21**
Aintree	1	4	9	28
Royal	5	6	7	13
Southport	3	3	5	8
Total	**9**	**13**	**21**	**49**

This activity is significantly short of the targets set in the NHS LTP (10% of stroke patients =147) and reflects the difficulties in accessing a HASU in a timely manner.

2.5 Scope and purpose of the Full Business Case

The purpose of this FBC is to detail the case for change for North Mersey Stroke Acute Services, describe the options appraisal process undertaken by Liverpool CCG, and to set out the preferred option and outcome of the public consultation.

The scope of this BC is the acute stroke services that are currently provided by the two North Mersey hospitals and the impact on any co-dependent services i.e., mechanical thrombectomy and diagnostic imaging.

This service review is focused primarily on where best to deliver services effectively across the North Mersey footprint. This review considers any investment that is required to provide a safe service that is consistent and sustainable. This review will also consider the organisational form of the North Mersey Stroke Services.

The BC recognises the importance of a standardised end to end clinical pathway for stroke patients; however, community rehabilitation and thrombectomy services are not part of the BC but will be referenced through this document as part of the work running alongside the acute hospital work due to their critical interdependencies.

2.6 Alignment with Local NHS plans

There are a number of strategic programmes being implemented in North Mersey that are inter-dependent with the stroke programme:

Royal Liverpool and Aintree Merger into Liverpool University Foundation Trust - The merger of the two acute trusts took place in October 2019. The business case described a vision for clinical services that comprises single service, city-wide delivery in several key areas including stroke alongside trauma and orthopaedics, emergency general surgery and haemato-oncology. Development of a single service, city-wide inpatient stroke service was a key component of the Patient Benefits Case for merger.

One Liverpool Plan – Liverpool's Integrated Care Partnership set out its proposal for One Liverpool, an integrated, place-based strategic plan for the city. This strategy builds upon the Healthy Liverpool Blueprint which set out ambitions to develop a single-service, city-wide acute model for stroke services**. (Ref 4)**

Sefton Health and Care Transformation Programme – Sefton Health and Care Transformation Programme has been established as a Partnership to develop 'place-based'

care across Sefton, integrating acute, community, mental health, social care and primary care services around the needs of the local population. The potential impact of some of the emerging scenarios for the stroke pathway may impact upon emergency and urgent care activity at Aintree which is considered in the proposed model of care. **(Ref 5)**

West Lancashire has developed their strategy "Building for the Future" and "are committed to improving the health and well-being of people living in West Lancashire". **(Ref 6)**

The Acute Sustainability workstream, as part of the Sefton Health & Care Transformation Programme is focusing on developing sustainable solutions for acute and specialist care for the population of Southport & Formby. Stroke is a priority within this work given the age profile of the local population and the need to be able to access "first class" hyperacute care underpinned by supportive rehabilitation. There have been concerns expressed on the sustainability of stroke services at Southport due to the consultant workforce challenge; this poses a significant risk to Southport patients and the potential knock-on impact to other services. **(Ref 7)**

Thrombectomy – The NHS Long Term Plan aims to expand mechanical thrombectomy treatments from 1% to 10% of stroke patients, which will allow 1,600 more people to be independent after their stroke each year. During 2019 the plan committed to working with Royal Colleges to pilot a new programme for hospital consultants to be trained to offer mechanical thrombectomy.

NHS England Specialised Commissioning Team is working closely with the Walton Centre to develop these services. This is one of the work programmes in the North Mersey Stroke Board that will enable better outcomes for patients and aligns with the redesign of acute services. The current thrombectomy pathway is included in **appendix 1.**

The C&M Health and Care Partnership – Highlighted stroke services across Merseyside and the wider region as a high priority and commissioned the Transformation Unit via the C & M CVD Board to conduct a review of services, including North Mersey services. This resulted in an "Outline Service Change Proposal". This work was the catalyst and foundation to the production of this PCBC. **(Ref 7)**

Stroke services features as a priority in the Joint Strategic Need Assessment of Liverpool, Sefton and Knowsley.

Commissioners

- There are five Clinical Commissioning Groups (CCGs) and NHS England NHSE Specialist commissioners (Medical Thrombectomy) that commission stroke services or related services (Medical Thrombectomy). The CCGs are: -
- NHS Liverpool CCG
- NHS South Sefton CCG
- NHS Southport and Formby CCG
- NHS West Lancashire CCG
- NHS Knowsley CCG

Cheshire and Mersey Integrated Care Board

Community Rehabilitation

The current provision of both acute and rehabilitation services across Liverpool, Knowsley and Sefton is subject to significant variation in pathways, clinical standards and health outcomes. his programme is not within the scope of this business case, but as a key dependency it is essential that a comprehensive single rehabilitation pathway is established alongside the proposal for a North Mersey Hyper Acute Service.

2.7 Alignment with Getting it Right First Time (GIRFT)

Getting It Right First Time (GIRFT) is a national programme designed to improve the treatment and care of patients through in-depth review of services, benchmarking, and presenting a data-driven evidence base to support change.

Stroke GIRFT Programme National Specialty Report (April 2022) has a number of recommendations to improve best practice, the table below highlights some of those recommendations and how they are supported with the proposed North Mersey Stroke Model;

GIRFT (STROKE)	North Mersey Stroke
Implement the National Optimal Stroke Imaging Pathway, including: • working towards 24/7 access to imaging • aligning with NICE guidance for TIA • reducing unwarranted variation in poor access to MRI • improving brain imaging within one hour of arrival for all patients with stroke • reducing duplication of MRI and CT within 24 hours of arrival; • ensuring 24/7 access to CT angiogram and CT perfusion; and • incorporating guidance from Sir Mike Richards' diagnostic imaging review	By Centralising stroke care and achieving the economies of scale this entails we will robustly and sustainably deliver increased access to advanced imaging around the clock including improved and more equitable access to CT, CTA and MRI imaging.
Reduce door to intervention times for all stroke subtypes.	The North Mersey model will concentrate expertise at the Aintree site allowing stroke patients to rapidly access the right level of clinical review, investigation and intervention including rapid access to thrombolysis and thrombectomy.
Ensure access to highly specialised stroke units for patients with stroke in <4 hours and for >90% of their stay.	The North Mersey Stroke Assessment centre model will ensure that patients are directly reviewed in a specialised stroke unit bypassing ED and AMU where appropriate to ensure the right care at the right time first time. The bed modelling done and safeguards to ensure effective flow should ensure all patients spend >90% of their stay in a stroke unit environment.
Ensure equitable and timely access to services that reduce the risk of complications following stroke, including: • reduce time to swallow screen,	By concentrating MDT experience at the Aintree site we will ensure rapid and sustainable access to these services with input from all aspects of the MDT.

with or without speech and language team (SLT) assessment, and review relationship with the use of antibiotics in the first seven days; • deliver definitive feeding solutions for those patients with prolonged dysphagia; • avoid health inequity in access to multidisciplinary care across the days of the week; • reduce falls risk and subsequent harm from falls; and • implement stroke-specific VTE assessment and ensure treatment / intervention.	
Improve access to and time to thrombectomy intervention. Aiming for 8% of all patients with stroke accessing thrombectomy by 2025.	This is a key aim of the North Mersey Transformation. By centralising stroke care at a site co-located with Thrombectomy services we will ensure rapid access to this treatment when indicated, while the advanced imaging being implemented at Aintree will enable it to be offered to a broader group of patients.
Transform delivery of care and efficiency of workforce by incorporation of digital technology	The North Mersey Service will use virtual working to support the non-acute sites around the clock as needed and to support NWAS with pre-hospital on scene patient reviews where needed to ensure patients get the right care in the right place.
Ensure daily MDT patient goal setting (including social care support to facilitate discharge planning). Stroke survivors and those that support them must be involved in goal-setting and discharge	All North Mersey services will integrate structured MDT rounds into their practice.

3 Clinical Case for Change

This chapter describes why change is necessary. It describes the North Mersey Stroke Service current level of standards and clinical outcomes and how the current configuration of services is not always delivering the best clinical outcomes and patient experience. The case for change shows that services need to be reconfigured to improve quality of care and for services to be clinically sustainable.

3.1 National and Local context

The NHS Long Term Plan highlights that stroke is the fourth single leading cause of death in the UK and the single largest cause of complex disability. Stroke mortality has halved in last two decades. However, without further action due to changing demographics the number of people living with a stroke will increase by almost half, and the number of stroke survivors living with a disability will increase by one third by 2035.

The plan supports centralised HASU care delivered by a smaller number of well-equipped and staffed hospitals that are networked 24/7 and can also provide thrombolysis and mechanical thrombectomy. This will increase the number of patients that receive high quality specialist care, improve clinical outcomes and the service sustainability.

The long-term plan clearly states that within the next five years all stroke units will need to meet the NHS seven-day standards for stroke care and the National Clinical Guidelines for stroke.

It stated that Integrated Stroke Delivery Networks would be established by April 2020 to reconfigure stroke services into specialist centres that will improve the use of thrombolysis and further roll out the use of mechanical thrombectomy. This would ensure that 90% of stroke patients receive care on a specialist stroke unit and that all patients that can benefit from thrombolysis (20%) receive it. Expanding mechanical thrombectomy - from 1% to 10% of all stroke patients nationally would enable an extra 1,600 patients to live independently. The combination of the specialist units, thrombolysis and thrombectomy would result in the NHS having the best outcomes for stroke patients in Europe.

NHS Long Term Plan milestones for stroke care in the acute sector: -

- In 2019 the NHS will, working with the Royal Colleges, pilot a new credentialing programme for hospital consultants to be trained to offer mechanical thrombectomy.
- By 2022 the NHS will deliver a tenfold increase in the proportion of patients who receive Thrombectomy after stroke.
- By 2025 we will have amongst the best performance in Europe for delivering thrombolysis to all patients who could benefit.

The onset of the Covid-19 pandemic in March 2020 has inevitably impacted on the achievement of these intentions within planned timescales. This is also the case for the progression of the North Mersey hyper-acute stroke proposal. The programme was paused between March and July 2020. The emergence of a second wave of COVID did not lead to a further pause but progress has been slower due to the pressure on providers and clinicians.

In reviewing best practice, the greatest improvements in outcomes have been seen in areas that have adopted a similar model of care to the one proposed in this PCBC.

A research paper based on the Manchester and London configurations was published in the BMJ in January 2019 called "*Impact and sustainability of centralising acute stroke services in English and metropolitan areas: retrospective analysis of hospital episode statistics and stroke national audit data".* This research concluded that Manchester had a significant decline 1.8% in mortality in patients treated at a hyper stroke acute unit, indicating 69 fewer deaths per year. The number of patients treated in the unit also increased from 39% in 2010-12 to 86% in 2015/16. Furthermore, in both Manchester and London hospitals length of stay reduced, in London more than 90% of patients were treated in the hyper acute stroke unit.

Conclusions from the research: - Centralised Models of acute stroke care, in which all stroke patients receive hyperacute care, can reduce mortality and length of hospital stay and improve provision of evidence, based clinical interventions. Effects can be sustained over time. **(Ref 8)**

SNNAP have completed research that advises that the optimal size of a stroke unit is at least 600 strokes per year. Units of this size achieve economies of scale and are therefore more likely to be sustainable. Currently, none of the three units in North Mersey have a patient population larger than 600. **(Ref 9)**

3.2 The Clinical Case for Change for North Mersey

There is now a wealth of evidence that the way hospital stroke services are organised can have a major impact on outcomes for stroke **(Ref 10)**. Sentinal Stroke National Audit Programme (SNNAP) 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.

Current North Mersey stroke services have a number of key challenges in meeting the stroke clinical standards (SSNAP) that impacts upon patient care. The clinical standards require/recognise: -

- That the most important care for people with any form of stroke is prompt admission to a Hyper Acute Stroke Unit (HASU). In North Mersey none of the three HASU admit patients to the clinical standard of 90% of patients within 4 hours; current performance is 38% based on 2019/20 data.
- That a stroke unit undertakes adequate volumes of activity to maintain clinical quality, outcomes and a sustainable unit; In North Mersey none of the three HASU's achieved the minimum recommended number of 600 strokes per annum (Based on SSNAP data).
- That 90% of stroke patients should remain on a stroke unit for 90% of their care to ensure continued specialist care. In North Mersey only 73% of patients achieve this standard in 2019/20
- That HASUs enable patients to have rapid access to the right skills and equipment and be treated 24/7 on a dedicated unit, staffed by specialist, multi-disciplinary teams; In North Mersey there are insufficient number of stroke consultants and other specialist staff to ensure that consultants assess 95% of patients within 24 hours; the current performance is 81% based on 2019/20 data.
- That following a brain scan, suitable patients should have thrombolysis as soon as possible and within 1hour on arriving at hospital. In North Mersey thrombolysis is provided to 7.2% in 2019/20 of patients and the target in the NHS LTP is 20% by 2025.
- Therapy services; including Occupational therapy, Physiotherapy and Speech and Language Therapy (SALT) are currently not delivering the recommended amount of

therapy support and the service is falling short particularly in SALT. The relatively small size of the teams in the individual Trusts can leave teams vulnerable to the impact of annual leave, sickness, and maternity leave. Posts can be spread across a variety of clinical areas due to only part time positions available in specialist areas. These factors can make recruitment, retention and resilience difficult. Vacancies that cannot be filled creating gaps in service delivery, impacting upon quality of patient and staff experience.

- That patients are transferred home as soon as possible with early supported discharge. In North Mersey there are 5 commissioner areas that have varying levels of early supported discharge that impacts the three units' current hospital length of stay. The variation is from 18 to 20 bed days based on 2019/20 data.
- That following a brain scan; suitable patients have a mechanical thrombectomy as soon as possible and within 5 hours of arriving at hospital. In North Mersey mechanical thrombectomy was provided to 1.4% of patients in 2019/20, the NHS LTP target is set at 10% by 2022.
- That ideally designated Thrombectomy Centres are co-located or networked with HASUs. In Cheshire and Merseyside, the Walton Centre is the designated Thrombectomy Centre which is located on the Aintree site. Patients from the Royal Liverpool, Southport and the rest of Cheshire and Merseyside are required to transport patients by ambulance which is difficult to achieve within the 4.5 hour window.
- If hyper acute patients cannot access a specialist stroke unit, they become a medical outlier elsewhere in the hospital, time is taken for them to access a stroke bed impacting upon the quality of intervention on the clinical pathway. Delays happen as patients do not have access to the right people at the right time.

North Mersey stroke providers do not meet all the current quality standards of SSNAP (which measures whether services are delivering quality standards) and will be required to achieve additional standards to thrombolysis and thrombectomy as defined in the NHS LTP in the future.

The provider performance against SSNAP standards is shown below for October to December 2021

Routinely Admitting Teams		Number of patients		Overall Performance				Team Centred Data										
Trust	Team Name	Admit	Disch	SSNAP Level	CA	AC	Combined KI Level	D1 Scan	D2 SU	D3 Thrm	D4 Spec Asst	D5 OT	D6 PT	D7 SALT	D8 MDT	D9 Std Disch	D10 Disch Proc	TC KI Level
Liverpool University Hospitals NHS Foundation Trust	Royal Liverpool University Hospital	139	142	C	A	A	C	C	E	E↓	C	A↑	B	D↓	C	C↓	A	C
Liverpool University Hospitals NHS Foundation Trust	University Hospital Aintree	116	119	C	A	A	C	B↑	E	C↑	B↑	C↓	C↓	E↓↓	C	B	A	C
Southport and Ormskirk Hospital NHS Trust	Southport and Formby District General	85	85	C↑	A	A↑	C↑	B	E	D	C	B↑	B↑↑	E	C↓	C↓	A	C↑

3.2.1 Clinical Activity

Only the Royal Liverpool Hospital has previously treated more than 600 stroke patients up to 2017/18, however, this is now no longer the case. Overall, in Cheshire and Merseyside in the last seven years there has been a cumulative increase of 0.65% in stroke patients see **appendix 2**.

For Strokes in North Mersey, there has been a cumulative growth of 0.6% between 2013/14 and 2019/20 as seen in the table below: -

Strokes in North Mersey each year – SNNAP data				
Year	**Aintree**	**Royal Liverpool**	**Southport**	**Total**
2013-2014	421	633	362	1,416
2014-2015	495	604	370	1,469
2015-2016	476	633	339	1,448
2016-2017	452	625	361	1,438
2017-2018	446	650	343	1,439
2018-2019	502	570	300	1,372
2019- 2020	524	556	397	1,477

3.3 Workforce Challenge

Workforce is a key limiting factor in delivering and providing services 24 hours, 7 days a week. This is particularly relevant for stroke consultants as in North Mersey the number of stroke consultants is 54% under the recommended level (ref Meeting the Future Consultant Workforce Challenge: stroke Medicine – British Association of Stroke Physicians July 2019). In North Mersey there are currently 10.5 WTE consultants in post (although 3 of these posts are filled by locums); to meet the required standards in the existing configuration of services, an additional 10 WTE consultants would need to be recruited.

There are particular concerns for the Southport site that operates with only 1 substantive consultant.

There is also a shortage of skilled staff including speech and language therapists, clinical psychologists, stroke nurses and occupational therapists, to meet current and future demand. There is a national shortage in all of these professions, creating difficulties in recruitment. The most recent SSNAP Data shows that 40% of all stroke consultant posts across the country are vacant.

3.4 Length of Stay

Discharging people from hospital and into rehabilitation is crucial in delivering high quality care and better outcomes. It is also expensive to keep people in hospital if they can be safely cared for elsewhere. In North Mersey the average length of stay varies across the three sites from 17 days to 22 days (based on 2018/19 data) and 18 days to 20 days (based on 2019/20 data), the national average is 18.4 days (SSNAP 2018/19 data) and 15 days (SSNAP 2019/20). Demand and capacity modelling has also identified a lack of beds in the current configuration of 3 HASU and 5 acute rehabilitation beds.

3.5 Organisational Form

The geographical proximity of the current three North Mersey stroke services and a good level of collaboration facilitated by the Trusts, CCGs' and the ISDN have enabled the teams to work closely and develop this business case. However, organisational boundaries still exist that in many ways still challenge collaborative working, mainly due to different policies, processes and financial and contractual arrangements. To enable the three services to operate effectively in the future and operate in a network will require a different model.

To ensure that the patients in North Mersey receive an equitable and sustainable service that manages all risks across the geographical patch will require an even more integrated approach.

3.6 Conclusion

The immediate challenges facing stroke services in North Mersey mean that patients and carers are experiencing: -

- Poorer health outcomes
- Poorer long-term quality of life
- Increased likelihood of admission to residential or nursing home
- Poorer patient experience
- Unsustainable services

These challenges will only increase as demand for services grow. The case for change is overwhelming and services need to change as quickly as possible.

4 Clinical Vision for the Future

This chapter will describe the overall vision and the ambition for stroke services setting out the new clinical pathways.

4.1 Clinical Vision for Stroke Services

The North Mersey vision for the whole stroke pathway is to prevent ill health, provide outstanding urgent and acute care and consistently provided, integrated community care closer to home.

For Hospital acute stroke services in North Mersey, the ambition is to deliver high quality, clinically sustainable and accessible services 24 hours a day, 7 days per week. The objectives to be achieved are:

- Improve earlier access to specialised hyper acute stroke care and ensure patients receive 90% of care on a stroke unit
- 24 hours 7 day a week access to treatments like thrombolysis and mechanical thrombectomy
- Reduce mortality for stroke patients (more people will live)
- Reduce the impact of disability to stroke survivors
- Improve quality of life by patients being able to return home rather than receive care in a residential or nursing home
- Fulfil the best practice recommendations as set out in the National Stroke Strategy 2007 (**Ref 11)** and the NHS Long Term Plan
- The service to achieve to achieve an overall A grade for SSNAP performance
- That patients will be able to return home earlier from hospital with Early Supported Discharge package
- The service will be fully integrated across Hype-acute, Acute and hospital rehabilitation

The Benefits Realisation Plan at **appendix 4** quantifies, with timescales, the extent of the improvements expected.

4.2 Hospital Acute Care

This business case is primarily focused on acute hospital care; however, it is recognised that to improve the quality of the service requires improvements in the provision of mechanical thrombectomy and community rehabilitation (including Early Supported Discharge). In North Mersey both these services are being reviewed with an ambition to improve access and overall quality of service at the same time as improving acute care.

4.3 Urgent Stroke services

The National Stroke Strategy 2007 and the most recent 2016 edition provide guidance on recommended best practice. This is also supported by the NHS Long Term Plan and recent research undertaken on the redesign services in Manchester and London **(Ref 8)**.

It shows that if stroke patients receive specialist assessment and intervention in the hyperacute phase (the first 72 hours after a stroke) this reduces mortality and improves long term outcomes. To achieve this hyperacute stroke services need to provide high quality rapid access to specialist stroke physicians and diagnostics that results in interventions taking place as quickly as possible.

A meta-analysis of stroke studies showed that treatment with thrombolysis had an average increase in survival of about 10% for patients treated within 3 hours. Treatment within 3 hours resulted in good outcomes for 32.9% versus 23.1% who did not receive treatment (**Ref 12**). Centralised hyperacute stroke services have also reduced mortality rates (between 1.6% and 2.8%) and the length of hospital stay (-1.4 and 2 days) (**Ref 13)**.

Centralised HASUs have also been proven to be more sustainable in the longer term due to consolidation of specialist clinicians, rather than specialist staff spread thinly over a number of smaller units.

The North Mersey vision is to create a Comprehensive Stroke Centre that takes patients directly from ambulances and will deliver the following to provide the best outcomes **(Ref 14 & 15)**: -

- Access 24 hours 7 days a week
- Rapid and accurate diagnosis (CT perfusion and MRI imaging)
- Clinical expertise 7 days per week
- Direct access to CSC (100% on arrival)
- Treat a minimum of 600 patients per year
- Provide thrombolysis to **95%** of patients who require the treatment
- Co-located with a designated thrombectomy centre
- First 72 hours of care provided on the CSC
- Access to a full MDT to SSNAP standards
- Step down of post 72-hour care to a hospital close to home or home if clinically fit
- Imaging within 1 hour and arrival to needle (thrombolysis) within 30 minutes
- All patients will have seen a stroke consultant, stroke nurse and therapist within 24 hours
- Thrombectomy within 5 hours for 10% of patients
- Consistent Early Supported discharge to Community Rehabilitation

4.4 Mechanical Thrombectomy

Patients requiring a mechanical thrombectomy will be assessed in the Comprehensive Stroke Centre, which would be integrated and co-located on the same site with thrombectomy services. The service is available to patients 24 hours 7 days per week.

4.5 Community Rehabilitation

Rehabilitation has been recognised by both patients and clinicians as just as important as acute care if the very best outcomes are to be achieved for patients. The National Stroke Service Model published in May 2021 describes an integrated care pathway for patients at all stages of the stroke pathway**.** Patients should have access to full rehabilitation support including occupational therapy, physiotherapy and speech and language therapies, psychology and emotional wellbeing, social work, orthotics, orthoptics and wheelchair services, spasticity clinics, vocational support and support family and carers, available for as long as clinically indicated. Life after stroke services, including social groups and peer support; exercise, health and fitness; and family and carer support are part of the model. The model describes holistic reviews at 6 months, 12 months and annually thereafter, with the option of re-referral into the integrated team if needed.

Although this business case focus is on the acute hospital care, the North Mersey Stroke Board has identified rehabilitation as a priority and new services will align with the hospital care. In order to support the development of a programme of work with a focus on developing Integrated Community Stroke Teams in North Mersey, a separate Clinical Reference Group has been established in February 2021. This CRG will report to the North Mersey Stroke Board. A gap analysis of current services, staffing and referral criteria across Cheshire and Mersey was completed June- August 2021 with the data being refreshed during the same period in 2022. A paper describing the gaps and inequalities in Integrated Community Stroke provision has been produced. Following the papers ratification at the Cheshire and Mersey Stroke Board in September 2021, it has been circulated amongst clinical teams as well as being presented to the Transformation Board for the newly forming Integrated Care Board and the Cheshire and Mersey Joint Commissioning Group. The paper and the recommendations within it have been accepted by both the ICB and the JCG as a piece of work that should be part of the programme for Cheshire and Mersey. Work is yet to commence.

4.6 Prevention

Although the focus of this business case is on hospital acute care of stroke, it is acknowledged that the prevention of stroke is a key priority for North Mersey. The vision is to make every contact count and ensure that every part of the health system views prevention as part of their business. The aim is to support people so they can improve their lifestyles and therefore improve health outcomes. Clinicians have identified the following factors as crucial to improving stroke prevention: -

- Reduction in smoking rates
- Improvements in diabetes detection and care
- Better identification and management of high blood pressure and atrial fibrillation
- More widespread use of statins
- Initiatives to address obesity and increase physical activity

Several initiatives are beginning to have an impact on primary and secondary prevention of stroke and other non-communicable diseases. These include: -

4.6.1 Cheshire & Merseyside

The Health Care Partnership is the lead sustainability and transformation partnership in the North Region for the Public Health England CVD Prevention Programme. The Prevention Board has overseen the introduction of blood pressure testing guidelines for use outside general practice; training for non-clinical community partners to test blood pressures in community settings; training for community pharmacists; embedding Making Every Contact Count within provider organisations; working with the Academic Health Science Network to promote adoption of atrial fibrillation testing devices in general practice and elsewhere. An easy to use and information rich, public and professional facing Happy Hearts website has been set up. **(Ref 16)**

The National Diabetes Prevention Programme (Healthier You) is now available to all people across Cheshire and Merseyside who are at risk of developing diabetes, defined as those with an HbA1c reading of 42-47 mmol/mol or have previously been diagnosed with gestational

diabetes. This is a nine-month programme of support to lose weight, make healthier food choices and increase activity. Sessions are delivered virtually or face to face in groups across community settings. (**Ref 17)**

The NHS Digital Weight Management Programme offers a 12-week digital support programme via their smartphone or computer, for adults living with obesity (BMI of 30+ kg/m2-adjusted appropriately for ethnicity) plus either diabetes, or hypertension, or both, to help manage their weight and improve their health. Patients are referred by their GP practice and offered one of three levels of intervention.

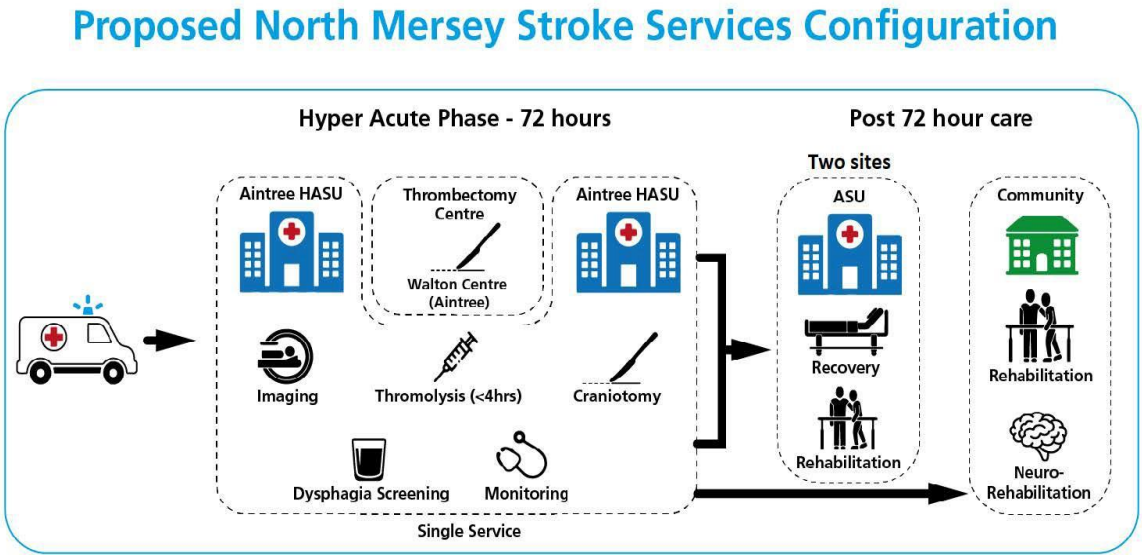
4.6.2 **Local**

Local partners (PSS, Stroke Association and Liverpool Diabetes Partnership) maximised delivery of opportunistic blood pressure and atrial fibrillation testing in work and other community settings; GPs check pulses of over-65s attending for any reason to identify and treat atrial fibrillation; increased use of newer anti-coagulant drugs (historically Liverpool has a low performance on this); medicines management reviews of people on atrial fibrillation register to encourage uptake of anticoagulation; work with practices who are 'outliers' in identification and management of atrial fibrillation to increase performance in this area; commissioned Stroke Association to do holistic post-stroke reviews – this increased uptake of the reviews from a baseline of 19% to 75% in 2018/19, identifying 1,672 unmet needs, 77 of which related to management of atrial fibrillation and blood pressure and a further 53 to medication issues.

5 Proposed Model of Care

This section will describe the proposed model of care and will describe with evidence the impact the proposals will have on the safety, effectiveness and experience of care.

The Stroke service configuration in the new proposed model is illustrated below: -

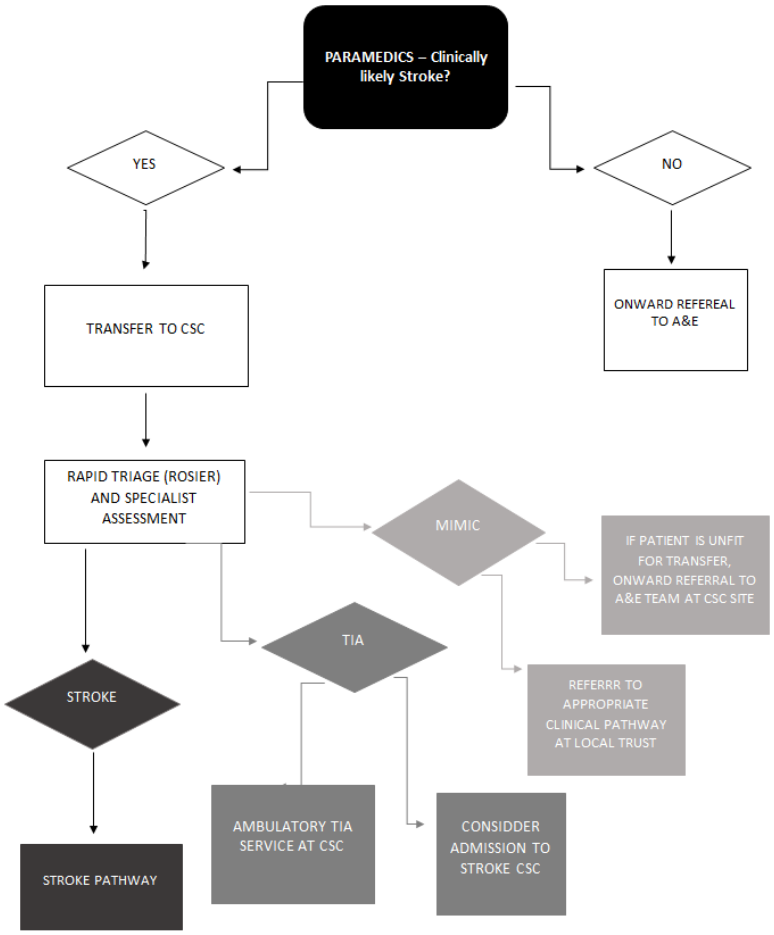


A Comprehensive Stroke Centre is where a hospital meets the standard to treat the most complex stroke cases. This would include:

- Availability of advanced imaging techniques, including MRI, MRA, CTA, CT and CTP
- Availability of personnel trained in vascular neurology, neurosurgery and endovascular procedures
- 24/7 access to thrombolysis and thrombectomy
- 24/7 availability of personnel, imaging, operating room and endovascular facilities
- ICU/neuroscience ICU facilities and capabilities
- Experience and expertise treating patients with large ischemic strokes, intracerebral haemorrhage and subarachnoid haemorrhage

Acute stroke patients (FAST + patients ref) would be taken by ambulance or referred by GP directly to a new comprehensive stroke centre co-located with acute neurosurgical and stroke thrombectomy services based on the Aintree Hospital site, which is co-located with the Walton Centre, the regional provider of the thrombectomy service. This will be the North Mersey Comprehensive Stroke Centre (CSC).

The Acute stroke patients proposed pathway: -



To enable thrombolysis to be administered quickly the ambulance or GP will notify the CSC that the patient is in transit.

The Royal Liverpool and Southport sites would no longer provide the first 72 hours of care (hyper acute phase of treatment) as this would all be centralised on the Aintree site. However, Southport and Broadgreen sites would provide post 72-hour care that would enable patients to be closer to home for their rehabilitation phase of treatment. The Royal Liverpool would also not provide any post 72-hour care, there would be no inpatient stroke care provided on this site. However, it is recognised that patients in other specialities may have strokes and support will be required from stroke clinicians.

5.1 Urgent Care in the Comprehensive Stroke Centre

The Comprehensive Stroke Centre (CSC) would review all acute (<72 hours from onset) stroke patients. Rather than admission via the Emergency Department all strokes/suspected strokes will be admitted via a separate stroke assessment centre. There will be four monitored trolley spaces. Patients will be rapidly assessed by a stroke nurse 24/7 and stroke consultant 8-8pm supported by a junior doctor team. Urgent investigations CT head, CTA/CT perfusion if required will be organised in the dedicated CT scanner. For confirmed strokes any emergency treatment such as thrombolysis or thrombectomy will be organised.

There will be four ambulatory rooms for suspected TIA patients seen by a consultant seven days per week. Investigations and treatments will be organised in a one stop shop.

There will be a 24 hour reception and the unit will be staffed by a senior nurse at Band 6.

Patients deemed not to have had a stroke and to need other specialist care would be referred to another appropriate clinical pathway, facilitated by co-location with ED and AMAU. All other patients would move on through the stroke pathway.

There would be 7 days a week on site consultant presence to support the hyper acute work; 8am to 8pm, 7 days a week to meet the requirements of 7-day standards. This would be supported by 7-day therapies support, made possible by the pooling of clinical resources. At all other times the hyperacute service would be supported by a middle grade doctor on site, with support from an on-call consultant available over the telephone or via telemedicine video link.

The Aintree site will benefit from co-location and collaborative working with Walton Centre colleagues to develop a new 19 bedded CSC that includes an ambulatory facility, full therapy rooms that are located close to the current A&E, Radiology services and Thrombectomy centre. The current Aintree HASU and ASU will become the post 72-hour care centre with 35 beds.

5.2 Thrombectomy and Thrombolysis

The centre would benefit from direct access to specialist scanners in order to maximise the number of patients who are able to receive thrombectomy and thrombolysis. These treatments significantly reduce disability and death and are cost effective for stroke patients. Co-location with the Thrombectomy service, within the Walton Centre, would significantly increase the number of patients that are able to access thrombectomy within the appropriate time window and would also significantly reduce the time to treatment for thrombectomy, which is crucial as outcomes are better the sooner this treatment is delivered.

The Walton Centre is currently offering a 24-hour thrombectomy service, 7 days per week.

Good Practice Example: Mechanical thrombectomy for large vessel occlusion stroke

University Hospitals of North Midlands NHS Trust has implemented a pathway to offer mechanical thrombectomy to treat large vessel occlusive strokes in suitable people. After implementing the pathway 94% of people with severe strokes due to large vessel occlusion, who received mechanical thrombectomy, were discharged to their own homes rather than to a nursing home; 23% were discharged home within 1 week. Before implementing the treatment pathway, when only intravenous tissue alteplase was used, 70% of patients were discharged to inpatient rehabilitation, with significant annual costs. There has been £0.8 million savings from a reduction in the length of stay in hospital and £1.6 million savings from a reduction in social care costs. **(Ref 18 & 19)**

5.3 Acute Stroke Care

After the initial 72 hours of stroke care patients from the North Mersey catchment area would continue to be managed at an acute stroke unit, where possible close to their home if they are not suitable for discharge. The acute stroke units are essentially wards with access to acute stroke medical and nursing care as well as rehabilitation space and expertise.

The following sites will have the following number of post 72-hour care beds: -

Aintree - 35 beds (mixture ASU and Rehabilitation)

Southport - 15 beds (mixture ASU and Rehabilitation)

Broadgreen - 23 beds (Rehabilitation)

The units will provide **(Ref 20)**: -

- Specialist nursing staff trained in urgent management of people with stroke
- Stroke specialist rehabilitation staff
- Access to diagnostics, imaging and cardiology investigations
- Access to tertiary services for neurosurgery and vascular surgery
- Consultant reviews 5 days a week
- Senior advice available from CSC via telemedicine out of hours
- Medical cover (junior doctor) 24/7
- Consultant Nurse support at Broadgreen

In the patient engagement events with post stroke survivors, they stated that patients would be prepared to travel further for specialist and hyperacute care but would want to be closer to home for their acute or rehabilitation treatment.

Aintree and Broadgreen sites are part of Liverpool University Hospitals and so repatriation should be easy to achieve. Repatriation from the CSC to Southport will be made possible by an agreement under the collaborative network model.

5.4 Post-Acute Care

Medically stable patients that require further in-patient rehabilitation or complex discharge planning would be transferred to a rehabilitation unit for in-patient rehab. It is expected that up to 50% of patients would be discharged from hospital with support from the ESD (Early Supported discharge) team, supporting patients to optimise their recovery in their own homes.

5.5 Early Supported Discharge Team

In order for the above model to be effective, it is essential that an effective and uniformly delivered ESD service is embedded across North Mersey. This would ensure that discharges from inpatient beds happened in a timely manner and ensure a reduced length of stay.

In January 2020 a new national service specification was published for early supported discharge and community care following a stroke. The North Mersey CCGs have compared their currently commissioned services with this specification the ISDN has completed a gap analysis. There are significant differences both when compared with the national specification and between the CCG areas. The North Mersey CCGs incorporated their intentions to develop a consistent, gold standard stroke rehabilitation service in 2021/22 commissioning plans.

5.6 Psychological Care

Stroke survivors are often challenged by a broad pattern of psychological difficulties, which can impact on recovery following stroke; with high rates of anxiety, depression and cognitive impairment being well established as common effects affecting function and recovery post-

stroke **(Ref 1);** and such effects can be predicted to increase hospital re-admission and un-planned care risks **(Ref 2).**

RCP guidance indicates the need for clinical psychology input to support an optimal rehabilitation model of care, across stages of care (including ward-based care) and new National Stroke Programme rehabilitation guidance recommends, even more strongly, that clinical psychology input must be a core consideration in routine MDT rehabilitation (also providing service design and workforce planning guidance in this).

Accordingly access to clinical psychology across all stages of rehabilitation is necessary to be embedded in North Mersey service redesign; with access to lower-level emotional support as part of the Stroke Association offer also being seen to be of value to support best outcomes.

5.7 Post in-patient care: Life After Stroke Support

All patients would be able to access Stroke Association support, including conducting 6-month reviews. Patients are currently offered 6 weeks, 6 months and 12 months follow up hospital appointments. Such periodic follow ups (up to and including at 12 months post-stroke) have been demonstrated to be of value in providing necessary touch points to identify ongoing support needs, requiring support planning; recognising, for example, that ongoing psychological and social effects can progress and exacerbate ongoing disability, if not identified and intervention/ support not offered. Access to such follow up reviews should continue to be made available, with the possibility made more accessible by the provision of telephone and video consultations also. Access to follow up support (including access to ongoing emotional support and formal psychological care, where such need is raised) and should also continue to be made available.

5.8 End of Life Care

For those patients who require palliative care there would be agreed pathways to optimise care, designed with the palliative care teams of the 3 adult acute hospital trusts across North Mersey and with community services.

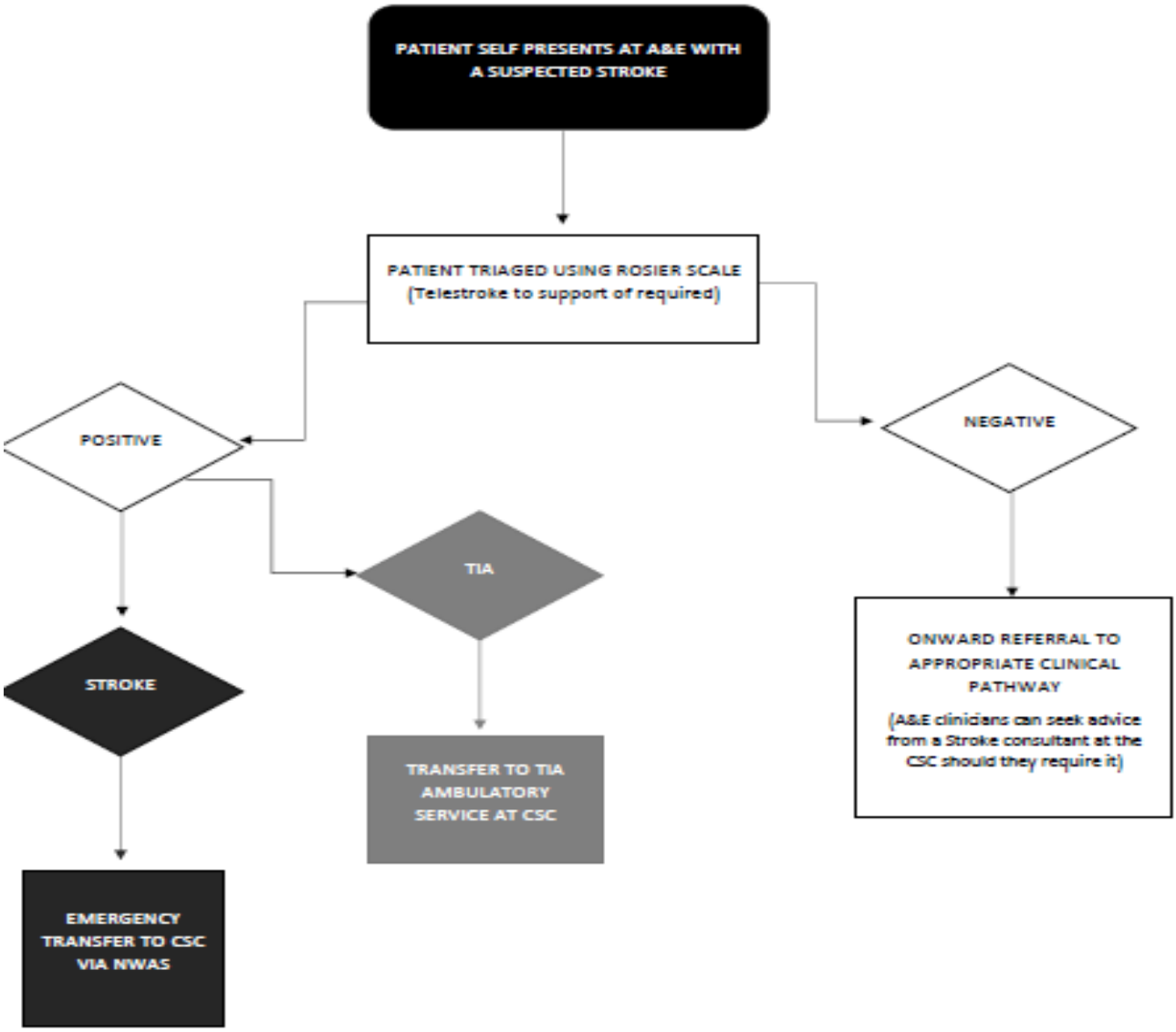
5.9 Treatment in a non-CSC Hospital

Patients self-presenting to surrounding A&Es (Southport and Royal Liverpool) would be reviewed, with an on-site stroke specialist nurse, before being transferred to the Comprehensive Stroke Centre, if required.

Some patients who are brought to hospital with suspected strokes have not actually had a stroke. This includes patients with mimic symptoms, TIAs and some that require neurology input. In the new model of care the clinicians at non-CSC hospitals (Southport and the Royal Liverpool sites) would be able to link with the CSC by telemedicine. If the patient needs the care of the CSC they will transferred immediately, if they require any other care this will be delivered from the receiving hospital site.

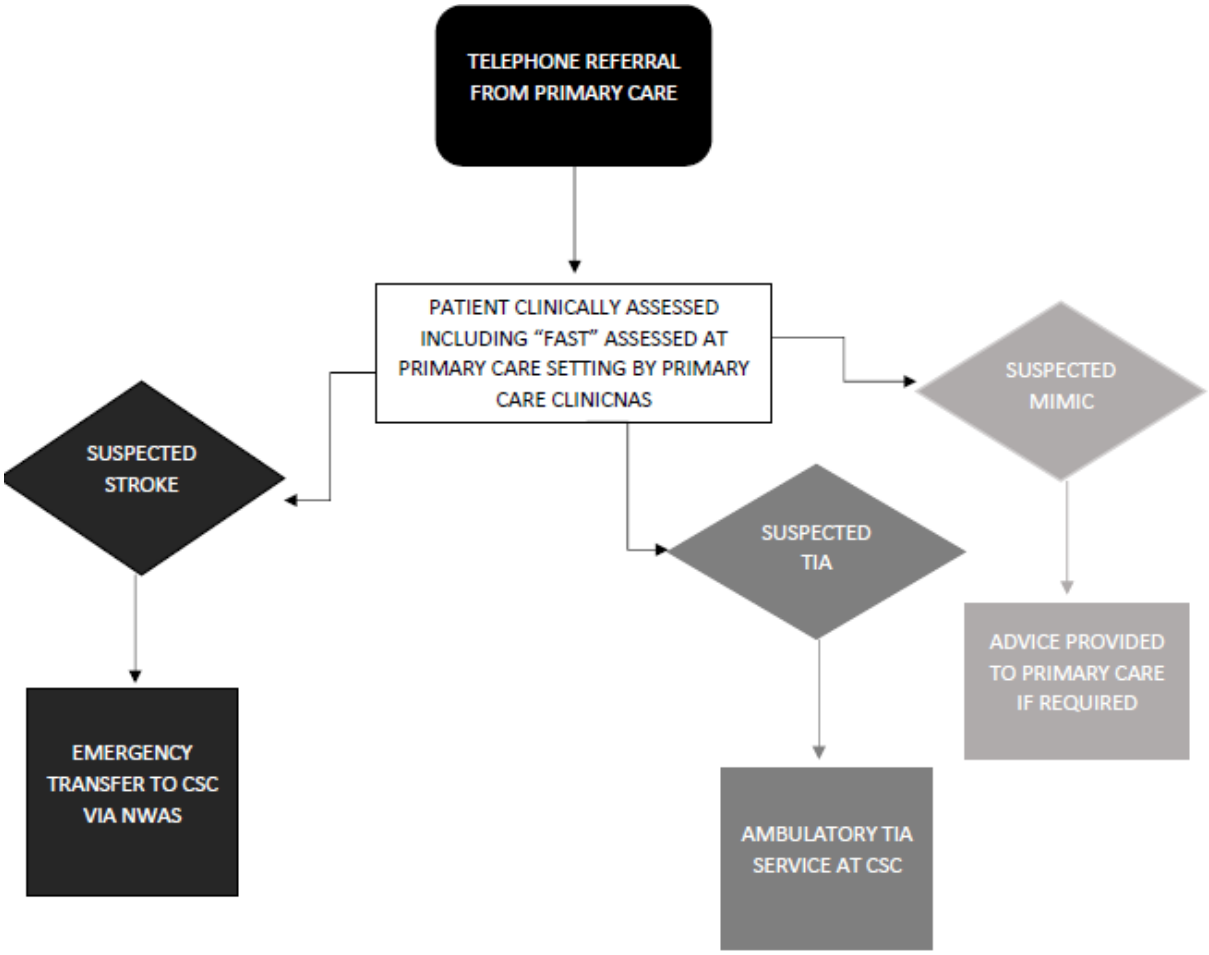
It is expected that the majority of TIA patients identified by paramedics would go directly to the CSC for assessment and treatment if required.

Proposed pathway for treatment in a non-Comprehensive Stroke Centre Hospital:



The CSC will also accept direct GP stroke / TIA urgent referrals for an immediate see and treat service. Due to travel time for Southport patients their TIA patients will attend the local hospital for initial assessment but transfer to the CSC if they require urgent treatment.

Proposed pathway for telephone referral from Primary Care:



If a mimic does not require further hospital care, the patient will be discharged with appropriate follow up care in the local hospital. If the condition requires the support of the CSC, then the patient will be transferred accordingly.

Assumptions to the scale of transfers from hospitals have been built into capacity models (based on 2018/19 and 2019/20 data) see **appendix 6**

5.10 Research and Academia

As this transformation will create the regions (and one of the countries) largest stroke services it would present excellent opportunities to deliver high quality research.

Existing local research teams will be able to work more efficiently from a single acute receiving site to identify and recruit potential research candidates, ensuring more patients than ever are able to take part and benefit from acute stroke research.

Close links with our neighbouring neuroscience centre, rehabilitation wards, community rehabilitation services, regional specialist cardiothoracic trust, the Stroke Association and Liverpool and Lancaster Universities will also enhance the range of research studies that can be undertaken. Research opportunities are specifically seen in the fields of stroke-related psychological and quality of life research, where doctoral clinical psychology and PhD

relationships can provide potential opportunities and in hyper-acute stroke care reflecting the benefits of being co-located with the regional neuroscience centre.

The expectation is that the new North Mersey Acute Stroke Service will apply for Hyperacute Research Centre status, whilst working closely with all of the other stroke services in the region to enhance research.

5.11 Digital and Technology Innovation

Currently each acute stroke service in North Mersey has access to their own telemedicine service where consultants can be contacted virtually out of hours to assess patients when they are in A&E and may require thrombolysis. None of the telemedicine solutions have the ability to link with another system. In Spring 2019, The Clinical Network together with the CVD Board were successful in a bid for innovation funds to procure and implement a telemedicine solution with the potential to link for MDT meetings and cross site working in the future.

This upgrade of telemedicine and the software's ability to link in with other stroke Services virtually will support the proposals for North Mersey. If a suspected stroke patient presents to either Royal Liverpool or Southport site where there is no hyperacute stroke service, a consultant at the Comprehensive Stroke Centre at Aintree can assess the patient virtually using telemedicine, This assessment will dictate whether a patient will be transferred to the Comprehensive Stroke Centre or if they remain at the original presenting Trust.

The use of telemedicine is also being explored for NWAS, therefore if a paramedic is unsure of a patients diagnosis a Stroke Consultant can assess the patient virtually and decide if they should attend the Comprehensive Stroke unit or their nearest hospital.

This digital solution will ensure that all suspected stroke patients that attend a non-Comprehensive Stroke Centre will receive a consultant assessment and reduce unnecessary transfer of patients between Trusts. It will also allow the teams across the North Mersey patch to hold MDT meetings to discuss operational issues, patient pathways and general service issues.

In line with the NHS Long Term Plan, we will use advanced and innovative technology in order to ensure we maximise our consultant decision making and patient safety and ensure the highest number possible of patients are able to access the most effective treatments in a timely manner.

An example of this is the ongoing work funded through the Stroke Strategic Clinical Network, in conjunction with the Radiology Network in Cheshire and Mersey to implement artificial intelligence technology to assist clinician reviews of CT angiograms. This will help to ensure timely diagnoses of large vessel occlusion and so identify patients potentially suitable for intra-arterial thrombectomy at the Walton centre. Similarly, CT perfusion imaging will identify patients with salvageable brain tissue that may have previously been outside of the appropriate treatment time window but may now also benefit from such intervention.

5.12 Organisational Form

There are many different organisational forms that the North Mersey Stroke Service could operate under, from joint venture to single provider model. All of which have their advantages and disadvantages.

A light touch approach at this stage may deliver the desired outcomes of managing clinical risk effectively across the footprint. This could be an agreement of a networking approach, covered by a Memorandum of Understanding, appropriate Service Level Agreements and governance structure.

This could include agreement of: -

- Recruitment and retention (including joint appointments)
- Pathway agreements
- Repatriation of patients
- Management and mitigation of risks collectively

The organisational form will be developed in the first phase of implementation.

5.13 **Risks**

There are a number of risks to implementing the new stroke model of care. The risk register is set out in **appendix 7.**

6 Impact of Proposed Model of Care

This section will describe the impact that the proposed model of care will have on where clinical activity is undertaken and what changes will be required to the estate, workforce, patients travel and interdependent services.

6.1 Clinical Activity

Clinical activity volumes have been assessed using both SSNAP and Trusts HES data. The Clinical Reference Group had undertaken a number of audits to support some of the assumptions. The aim was to gain the most accurate level of clinical demand on the stroke services inpatient, A&E and clinical support services **(Appendix 6).**

The only way to ascertain the number of suspected stroke patients attending any of the three A&E departments was from stroke nurse referral records.

The table shows the level of activity for suspected stroke by site: -

A&E attendances for suspected stroke				
	Southport	**Aintree**	**Royal Liverpool**	**Total**
Attendances 2018/19	**1,380**	**3,380**	**1,923**	**6,683**
Attendances 2019/20	**1,905**	**3,464**	**2,506**	**7,875**

The above highlights that Aintree has a far higher referral rate from A&E for a stroke nurse assessment. Aintree also has a higher ratio of suspected stroke referrals compared to confirmed stroke. A&E attendances are a mixture of ambulance attendance and patient walk-ins. There is an opportunity to work more closely and train A & E departments to improve the quality of referrals for stroke patients using FAST and ROSIER tools for the accurate identification of stroke patients.

For the purposes of modelling; the following clinical activity has been used from both SSNAP and HES data and shows the summary of stroke, TIA and mimic inpatient admissions per site based on

2018/19 data: -

Summary of Stroke, TIA and Mimic Inpatient Admissions				
	Aintree	**Royal Liverpool**	**Southport**	**Total**
Strokes	547	624	350	1,521
TIA	60	92	88	240
Mimics	201	90	100	391
Admission to CSC	**808**	**806**	**538**	**2,152**

2019/20 data: -

Summary of Stroke, TIA and Mimic Inpatient Admissions				
	Aintree	Royal Liverpool	Southport	Total
Strokes	593	597	426	1,616
TIA	86	58	88	232
Mimics	201	90	100	391
Admission to CSC	880	745	614	2,239

There are assumptions to the amount of the current unmet demand built into this activity. In **appendix 6** assumptions have been made to the likely demand of Stroke, TIA and other / mimic patients excluding any other medical inliers on the stroke units/ wards. The above is assumed to the base year demand for future modelling.

A large number of suspected strokes were admitted to the three hospitals however, later confirmed not to be a stroke. Only a small number were admitted to the three stroke units as identified above. **The average length of stay (ALOS) for each of the sites was as follows based on:**

2018/19 data: -

North Mersey Stroke Services Inpatient Average Length of Stay			
Average Length of Stay	Aintree	Royal Liverpool	Southport
Stroke	22	18	16.6
TIA	2.4	3	2.2
Other	6	5.8	5.4

2019/20 data: -

North Mersey Stroke Services Inpatient Average Length of Stay			
Average Length of Stay	Aintree	Royal Liverpool	Southport
Stroke	19.4	20.2	18.6
TIA	2.2	3	6.2
Other	4.8	6.1	5.4

Note: The Royal Liverpool ALOS also includes time spent in the Rehabilitation unit at the Broadgreen site.

Southport has the lowest length of stay and this is due to: -

- Discharge process for patients who require assessment for long term nursing or residential home, this has significantly reduced the time waited for assessment.

- ESD outreach service has been introduced for Southport and Formby residents and West Lancashire since August 2019.
- Relocation to a new ward area which has much improved the environment and the ability to accept stroke patients in a timely manner and treat earlier and thereby discharge earlier.

The SNNAP national average was 18.4 in 2018/19 and 15 in 2019/20 for comparison purposes.

For all future modelling purposes, the ALOS of stroke patients is at 18.4 for Aintree, 18 for the Royal Liverpool and 16.6 for Southport. It is assumed that Aintree will be able to reduce ALOS due to a review of processes and additional nursing and therapy staffing.

All TIA patients and mimics have been modelled at 2.4 and 6 days respectively.

6.2 Impact on Bed Configuration

The clinical activity from 6.1 has been used to calculate the demand on the CSC, beds and clinical support services.

It is assumed that all emergency stroke patients and the majority of TIA patients and a proportion of mimics would attend the centralised CSC for initial assessment. It is assumed that the current large volumes of mimics being referred as suspected stroke patients would be reduced with the introduction of training to A & E teams.

There would also be a percentage of GP referrals for TIAs that would be assessed at the centre for Aintree and Royal Liverpool patients, Southport patients would be seen locally and if required redirected to the CSC.

Modelling this information into the future state identifies the required bed configuration based on 2018/19 data:-

North Mersey Stroke Service – Required Beds					
Bed Numbers	Aintree	**Royal**	**Southport**	**Broadgreen**	**Total**
< 72 hours	19	0	0	0	19
> 72 hours	35	0	15	0	50
Rehab	0	0	0	23	23
Total	54	**0**	**15**	**23**	**92**
Current Beds	33	**14**	**22**	**21**	**90**
Change in bed base	21	**-14**	**-7**	**2**	**2**

*Stroke activity has significantly increased between 2018/19 and 2019/20 data sets. Whilst it is not expected that growth at this level will be a continued trend (*Table – SSNAP activity in North Mersey over 6 years* on Page 25 shows that 2018/19 was a lower rate of strokes across north Mersey and the updated data for 2019/20 is more in line with the figures that would be expected, based on activity over the last 6 years), it's important to have a Stroke service that meets the demand of the population.

Overall, demand and capacity highlight the requirement for North Mersey to increase HASU beds by 5 and reduce ASU rehabilitation.

This will result in a CSC with 19 Hyper acute beds (an increase of 5 overall) at Aintree with a 35 bedded post 72-hour care facility. The Royal Liverpool would close 14 beds on site leaving 15 elderly medicine / neurological beds on the ward. Southport would also be required to reduce 5 (4 based on 2019/20 data) stroke beds on site, however, it is expected that two beds will remain for neurological patients (due to recent pressures this has now changed, see explanation section 5.14). Broadgreen requires an additional 2 rehabilitation beds to improve flow from the CSC and ensure patients are rehabilitated closer to home.

6.3 Estates Configuration

The stroke services estate would need to be developed to facilitate the new service model. This will require a new CSC on the Aintree site that has a Stroke A&E admission area, ambulatory area, therapy assessment & treatment rooms and a 20-bed ward.

Four potential areas where initially identified to accommodate the new CSC, two of them are located adjacent to the A & E department, close to radiology services and the Thrombectomy centre. There is also direct ambulance access to those buildings. The current occupants of these areas' will be required to move to another location on site. This will require capital investment both in creating the new CSC and relocating other services to new a location. The location of the HASU has been identified and work has commenced. The estimated capital cost of £4M is included in the financial section, this work is planned to complete in 2024. Stroke is recognised in the LUHFT integration programme as a priority.

The Broadgreen site has already increased the ward by two beds for winter pressures with the potential to maintain a 23-bed facility all year around to meet demand.

The Southport site will accommodate the 15 designated stroke beds and 2 Neurological beds in its current ward space.

An interim estates solution within the existing ward areas is required as the Stroke A&E admission area and CSC will not be complete until spring 2023. The location for wards has been identified and there is a plan in place to complete the work programme during summer 2022.

6.4 Impact on Workforce

Stroke services are composed of several different staff groups working together as a multidisciplinary team to deliver care to stroke patients. Stroke is a consultant led service supported by medical staff, nursing, physiotherapy, occupational therapy; speech and language therapy, dieticians, orthoptics and clinical psychologists. The baseline whole time equivalent workforce numbers in post for stroke service in each site is shown in **appendix 3**.

The workforce model required has been modelled (Appendix 14 – Option C3) using Royal College of Physicians guidelines as is summarised as follows: -

North Mersey Stroke Services Workforce Gaps – using RCP Guidelines					
Staff Type	**2018/19 WTE**	**2019/20 WTE**	**Required WTE**	**2018/19 Gap WTE**	**2019/20 Gap WTE**

Medical	10.0	10.0	14.0	-4.0	-4.0
Nursing	158.3	161.57	174.6	-16.3	-13.03
Therapy	57.8	56.5	69.2	-11.4	-12.7
Management and administration	14.7	14.7	14.7	0.0	0.0
Grand Total	**240.8**	**242.87**	**272.5**	**-31.7**	**-29.63**

For the purposes of the PCBC the above table was developed to get an understanding of the staffing requirement for the NM Stroke Model, using the RCP guidelines there would be staffing gaps of nearly 30 WTE's in all aspects of the multidisciplinary team.

The Clinical Reference Group considered all the identified gaps in all the staff groups and concluded that recruitment would be difficult due to national shortages. Therefore, the professional leads reviewed the staffing models and using RCP guidelines and their professional judgement developed an alternative staffing model. This would include developing new roles at assistant level to support the qualified grades to create a North Mersey Staffing Model that would complement the service configuration. The service still aspires to achieve RCP staffing standards in the future when staff supply meets demand.

The service would aspire to recruitment to all 14 consultant posts but recognise the difficult in achieving this aim. Therefore, a target of 12 consultants with the support of a mix of staff grades and nurse consultants has been agreed in the first phase of recruitment. The staff grade and associate physician posts would be new posts in the structure and would reduce the need for need for consultants from 14 posts to 12. Although these posts cannot fully replace the consultant role, they can provide vital support and skill working alongside consultants. There are further opportunities to develop Advanced Practitioner roles to support the new configuration of services.

A full review of nurse staffing has enabled the clinicians to agree a different skill mix of qualified and unqualified that has created a more realistic nursing model for recruitment purposes. There are currently new Band 4 Nursing roles being developed in LUHFT that would potentially fit this model of care. This in turn would increase the overall staff numbers which would improve patient care.

The Therapy teams conducted a similar review that again has resulted in a skill mix change that would enhance staff numbers and thereby the quality of care.

The full staff analysis using North Mersey staffing standards are included in **appendix 3**

The use of North Mersey staffing standards results in much improved staffing numbers that would be realistic to achieve and would improve patient care.

Since the original PCBC was written and approved a substantial amount of time has passed, therefore there was a requirement to review the staffing requirements and include what would be required for Stroke Assessment that was omitted from the PCBC.

A workforce plan has been developed to support the recruitment and retention taking into consideration the requirements and sustainability of each site, and preference form outputs, this can be found in **appendix 3**

The workforce plan looked at the requirements outlined in PCBC and those that have been submitted in recent months using the North Mersey Staffing Standards, to highlight any changes. This table compares the workforce requirements set out within the PCBC and the requirements identified in the FBC, some of the differences are noted below;

- Orthoptists where classed as band 5 in the PCBC however they are now band 7 (included in other column)
- Pharmacy was down as creating a cost efficiency of £107,000 however in a recent review this is an additional cost £201,200
- Junior Doctors not included in PCBC (included in other column)
- The new Stroke Assessment Area was not costed for revenue in the PCBC.

Staff type	PCBC Total WTE	2022 Review WTE	Difference WTE
Medical	13.0	14	1.0
Nursing	169.2	218.76	49.5
Therapy	66.4	70.32	3.9
Management and Administration	14.7	22.69	8.0
Pharmacy	0.0	3.24	3.2
Other	4.0	24.00	20.0
Grand Total	**262.4**	**325.77**	**62.4**

The above table show the biggest WTE difference since the development of the PCBC is in nursing, the below table show how the nursing requirements has increased across the 3 sites;

	AUH	BGH	S&0
Total Required PCBC	112.13	34.56	22.54
Total Required FBC	134.62	40.72	43.42
Difference	**22.49**	**6.16**	**20.88**

The increase at AUH is mainly due to the exclusion of the staffing requirements for the Stroke Assessment Centre in the PCBC, these have now been identified and can be seen in the table below;

Staff Type	
1x SHO (mon- Fri 5pm - 9am)(Weekends 24hr)	3.75
1x Registrar (mon- Fri 5pm - 9am)(Weekends 24hr)	3.75
Total	7.5
Nursing	
Band 7	1.00
Band 6	5.05
Band 5	15.31
Band 3	5.04
Band 2	0.00
Total	26.40
Admin & Management	
Band 2 - Receptionist 24/7 365 days	5.04
Band 2 - Clinic Clerk 7 days	1.65
Band 2 - Ward Clerk Mon- Stroke Assessment	1.00
Band 2 - Ward Clerk Mon- Fri HASU	1.00
Band 5 - Office Manager	1.00
Total	9.69
Total	43.59

See section 5.14, for more information on the changes in workforce requirements for S&O

Preference form Process

Staff across the existing stroke teams (Aintree, Royal and Broadgreen) were asked to complete a preference form and were asked to indicate their preference to either remain with the Stroke service (which could in turn result in a move in site to Aintree) or remain on their existing site. For Therapy staff, an additional question was asked in relation to a willingness to rotate across the sites, which their roles allow for. This exercise was a temperature check to understand employee views on site location, it does not replace formal staff consultation.

The outcome of the preference form process was as anticipated; overall, staff wished to remain on the site they are currently working at, with the exception of four Registered Nurses from Ward 2y who expressed a preference to remain with the Stroke service and as such, would move to Aintree site. Staff from Broadgreen and Royal sites were actively encouraged to visit the Aintree site to increase the interest in roles within Stroke services at Aintree.

An agreed set of principles for location changes were produced which recognises the value of retaining experienced teams together to deliver safe and effective services. Stroke services will continue to be provided on 2 of the 3 sites (Aintree and Broadgreen) and therefore, it is anticipated that staff preferences from those sites would be accommodated. Equally, the existing Ward 2y on Royal site (which currently provides both Stroke and Elderly medicine) is due to double in size and becomes an Elderly medicine ward only, therefore, it is anticipated that this ward will also be able to accommodate staff preferences who wish to remain on the Royal site.

Recruitment has commenced across Nursing, Medical, Admin and Therapy staff groups, informed by the workforce plan, the recruitment requirements following the completion of the preference form process can be seen in the table below;

Staff Type	AUH WTE Funded	AUH WTE in Post	AUH NMStands	Recruiment Req WTE	Recruitment Req inc Pref results
Consultant	4	4	13	9	6.5
Band 8b - Nurse consultant	0	0	0	0	0
Band 7- ANP	0	2	3	1	0
Specailist Doctor	0	0	1	1	1
STR	0	0	1	1	1
F2	0	0	1	1	1
Total	**4**	**6**	**19**	**13**	**9.5**
Nursing					
Band 8a - Team leader	0	0	1	1	1
Band 7- SNC	6	6	15.32	9.32	2.32
Band 7 Speacialist Nurse	1	1	1	0	0
Band 6 - SNC	0	0	0	0	-1
Band 7- Ward Manager	1	1	2	1	1
Band 6 - Deputy Ward Manager	7.57	6.45	16.3	9.85	9.85
Band - 5	20.35	17.76	38.19	20.43	18.43
Band - 3	13.18	12.61	23.51	10.9	10.9
Band - 2 HCA	7.91	7.57	10.9	3.33	-0.67
Total	**57.01**	**52.39**	**108.22**	**55.83**	**41.83**
Admin					
Band 4 - SSNAP	1	1	2	1	0
Band 4 - Sec	2	2	6	4	4
Band 2 - Clerk	1	1	3	2	2
Total	**4**	**4**	**11**	**7**	6
AHP					
Band 7-PT	1.64	1.64	2.64	1	1
Band 6-PT	2	2	5	3	3
Band 5 PT	2	2	4	2	2
Band 7 OT	1.2	1.2	2.2	1	1
Band 6 OT	3	3	4	1	1
Band 5 OT	2	2	4.2	2.2	2.2
Band 7 SLT	1	1	1.7	0.7	0.7
Band 6 SLT	1.5	1.5	2.5	1	1
Band 5 SLT	0.5	0.5	1.5	1	1
Band 4 AP / PAM(S&O)	1.3	1.3	2.3	1	1
band 7 Diet	0	0	1	1	1
band 3 (PAM S&O)	3.6	3.6	8	4.4	4.4
Band 6 Diet	1	1	1.6	0.6	0.6
band3 diet	0	0	0	0	0
Band 2 PAM's	0	0	0	0	0
Band 8a	0	0	0	0	0
Total	**20.74**	**20.74**	**40.64**	**19.9**	**19.9**
Other					
Clinical Psycologist	0	0	0.7	0.7	0.7
Orthoptists	0	0	1.8	1.8	1.8
Total	**0**	**0**	**2.5**	**2.5**	**2.5**
Grand Total	**85.75**	**83.13**	**181.36**	**98.23**	**79.73**

6.5 Implication to Patient Travel Times

This section describes the impact of the preferred option on travel times.

The first part of this section covers ambulance journey times and is applicable to the whole patient population.

The second part covers public transport and car travel. Because of the way that local public transport planning is organised, it has not been possible to model the public transport and car travel implications in the same way across the whole of Knowsley, Liverpool, Sefton and West Lancashire. Therefore, this information only covers Liverpool City Region residents.

It's important to stress that the majority of patients travel to hospital by ambulance following a stroke, and therefore public transport and/or car travel implications of the preferred option would be most likely to impact on patients and visitors. Equally, where this did mean an increased journey compared to current arrangements, in most cases this would only be for the first 72-hours of care – at this point patients would either be discharged to continue their recovery at home or transferred to Broadgreen or Southport if this was closer to home than Aintree.

Ambulance journeys to hospital

Using Northwest Ambulance Service (NWAS) data from previous ambulance transfers, the tables below show the postcode areas that would be likely to see an increase of more than ten minutes (rounded up or down to the nearest minute) because patients would be taken to the Comprehensive Stroke Centre at Aintree Hospital, rather than the Royal Liverpool or Southport hospitals. These times are averages, and will depend on the exact addresses, and road conditions on the day, so they're only meant to give a rough indication of the change.

Liverpool postcodes which would see an increase of more than ten minutes journey time if patients were taken to Aintree rather than the Royal:

Postcode	**Journey time to the Royal Liverpool Hospital**	**Journey time to Aintree Hospital**
L1	9 minutes	20 minutes
L3	8 minutes	20 minutes
L7	9 minutes	19 minutes
L8	11 minutes	27 minutes

West Lancashire and Southport & Formby postcodes which would see an increase of more than ten minutes journey time if patients were taken to Aintree rather than Southport Hospital:

Postcode	**Journey time to Southport Hospital**	**Journey time to Aintree Hospital**
L40	20 minutes	32 minutes
PR4	26 minutes	39 minutes
PR8	9 minutes	36 minutes
PR9	13 minutes	44 minutes

Some other areas would also see increases – or decreases – in journey times, however we have only highlighted those where the change would mean an increase of more than ten minutes. Although patients are currently more likely to be taken to a hospital closer to where they live, ambulance crews make decisions based on a number of different factors – there aren't set rules about which hospitals people in each area are taken to.

It is important to set into context that any increase in travel times would be offset against the benefits of the new clinical model, which would see suspected stroke patients received directly into a stroke assessment unit which would enable quicker access to diagnostics and the right care.

Travel by public transport and car (Liverpool City Region residents)

Using the postcodes from stroke and TIA patients from 2018/19, travel times have been mapped to current hospital sites and then to the new proposed Comprehensive stroke centre

at Aintree. This information shows the difference in travelling times for these cohorts of patients.

Travel by car: Travel times to access acute stroke services are shown at appendix 8 for both current state and proposed future state. This shows that 100% of these patients can access one of the three current HASUs within 30 minutes using a vehicle during morning and evening peak traffic (7-9am and 4-7pm) i.e., this journey is likely to be quicker during non-peak hours and weekends. It also shows that the majority of patients (95% in the morning and 96% in the evening) at all three current centres can access services within 20 minutes. It is important to remember that the three services are not currently meeting the required clinical standards.

The travel times for the future state are also shown at appendix 8 and show that 100% of patients using a vehicle would access stroke services within 45 minutes. Access to the Aintree site within 30 minutes would be achievable for 87% of patients in the morning and 90% in the evening, a reduction of 13% and 10% respectively.

Currently it takes people in the most deprived parts of West Lancashire over 60 minutes to travel to Southport Hospital on public transport. Car access to Southport Hospital from Skelmersdale is around 20-30 minutes.

Some practical examples of car travel implications: People in some other areas of south Liverpool can currently travel to the Royal Liverpool Hospital in 10 – 20 minutes, but the journey to Aintree would take around 20 – 30 minutes. For Speke residents, travel times to Aintree and the Royal are broadly the same. The journey to Aintree takes around 30 - 40 minutes for Southport residents.

Travel by public transport: The travel times using public transport (bus and rail) for families visiting relatives is as follows: currently 99% of visitors can access the three HASUs within 60 minutes. In the new proposed model, over 80% of patients would access the Aintree site within 60 minutes. Almost 100% of visitors would have arrived at Aintree within 90 minutes on public transport.

Some practical examples of public transport implications: People in Toxteth can currently access stroke services at the Royal Liverpool in 20 – 30 minutes by public transport, while Aintree is a 30 – 60-minute journey. Speke residents can currently access the Royal Liverpool in 45 – 60 minutes, and Aintree in 60 – 90 minutes. Southport residents can reach Southport Hospital in 20 – 45 minutes, while Aintree is up to a 90-minute journey.

It is important to note that the majority of stroke patients receiving hyper acute care would be repatriated to a local hospital or to a care home after 72 hours.

6.6 Interdependent Services

The following services have been fully engaged in the redesign process and have supported an impact assessment of stroke redesign on their services.

6.6.1 Northwest Ambulance Services (NWAS)

The NWAS costs included in the Outline Business Case of £173k were produced without NWAS involvement. As a result, the PCBC costs were derived incorrectly and inaccurately for NWAS by using an average journey cost multiplied by the perceived increase in journeys. Due

to the high level of fixed and semi fixed costs within ambulance trusts, together with the clinical variation in acuity and resource input for each individual conveyance, the methodology of journey volume multiplied by tariff cannot be accurately applied to determine the costs associated with reconfigurations for the ambulance sector (unlike acute elective HRGs).

The sector standard ambulance costing methodology now appears in the June 2022 Full Business Case (FBC) using Optima modelling, **see appendix 9** This is a nationally recognised ambulance software algorithm that models the predicted operational impact of service changes on ambulance resource availability. It identifies the impact of reconfigurations to ensure no deterioration occurs in ambulance response performance requirements for affected localities. Optima maps the required future vehicle resource locations, predicted response times that will be achieved and identifies any negative (and positive) impact against mandated performance response requirements.

Essentially this correctly identified the totality of clinical resources required to ensure the North Mersey communities have sufficient resources to deliver the reconfiguration and maintain the 999 response requirements in all the areas impacted by proposed pathway changes.

NWAS Optima modelling has identified the additional capital and revenue costs associated with Scenario 3 as detailed in the table below:

SUMMARY

North Mersey Stroke	Hrs / day	Hrs / Week	Non-recurrent capital	Non-recurrent revenue	Recurrent costs Yr 1	Year 1 Total	Recurrent years
S3 Option	18	126	£285,303	£91,914	£445,024	£822,241	£762,898

6.6.2 **Radiology**

The major impact on the radiology service will be to the services at Aintree, it was envisaged in the PCBC that an extra 2,562 patients will attend the CSC which will require an additional 3,884 extra radiology tests which include MRI, CT and carotid Doppler this was using 2018/19 data. Based on 2019/20 data the estimated number of additional patients attending the CSC is 2,506, which will require an additional 3,906 tests. Currently there is an assumption only 10% of TIA GP referrals from Southport & Ormskirk Hospital will transfer, however, depending on the resources available at Southport site, there may be the need for all of these patients to transfer to the CSC. This would increase the total number of additional radiology tests to 4,167. See **appendix 6** for details.

The additional workload at Aintree is a result of patient transfers from Southport and Royal Liverpool and therefore an expectation of resource transfers from each of the sites. However, there is a significant risk that due to pressures on all existing services that there will be no ability to transfer staff or fully meet the required financial resources on each site. This was reflected on the PCBC risk register and will require careful management and negotiation.

Since the PCBC was written the Radiology department has undertaken a full demand and capacity review. Currently, all capacity is committed to current demand and any further work would require an expansion of space and equipment. In the PCBC an indicative financial value of an additional of £90,000 over and above transferred resources was built into the financial

model to reflect strokes share of the step cost changes. If resources do not transfer from other sites, then additional costs will be incurred. This £90,000 is far below the required funding to operationalise the move and an additional CT scanner 24/7.

Historically, the stroke service at Aintree is underfunded due to the development of stroke imaging causing increased demand without the added resource needed:

- Introduction of same day MRI slots for one stop Rapid Referral Stroke Clinic patients (2019)
- Introduction of immediate CTA arch to vertex for intracranial thrombectomy candidates (2020-21)
- Introduction of CT Brain Perfusion scanning (2021)

Imaging have reviewed the demand activity from the original business case, as well as SSNAP 2019/20 data, SSNAP 1st quarter of 2021 provided to CQC, radiology mini-audits, and 'Implementing the National Stroke Strategy-an imaging guide'. Imaging has found this will increase demand by 2,071 CTs, 434 MRIs and 1,225 Ultrasounds per annum. The Southport element is around 980 CTs, 300 MRIs and 300 Doppler US.

The current out of hours emergency work is currently covered by one CSI Radiographer on call from 20:00 – 08:00, the current workload is extremely high. There is a requirement to increase the existing on call resources to accommodate current workload. When stroke services move the increase in demand on out of hours provision will increase and put additional pressure on this service. If no additional staffing is included for the Stroke service predicted SSNAP performance is likely to lower to 36% , it is currently 64%. In order to meet this demand and additional predicted activity Imaging will require the following resources split into 2 phases. Phase 1 being the initial move in September 2022 and Phase 2 being the opening of the new entrance and CSC unit in 2024.

Phase 1	**wte**	**£**
B6	**5.40**	**275,258**
B3	**2.80**	**90,842**
B2 (Porter)	**3.15**	**95,574**
B7 Vascular Scientist	**1.20**	**64,373**
Consultant Radiologist	**1.50**	**176,162**
CT Mobile	**26 days**	**80,600**
MRI Mobile	**40 days**	**46,693**
OOH Outsourcing		**11,520**
CT Maintenance (10 year term)		**75,000**
Contrast		**21,180**

Total	**14.05**	**937,202**

The additional Radiographic staffing required would cover an additional CT scanner out of hours which can absorb the additional Royal and Southport work, plus other AED demands i.e. Vascular. This out of hours element accounts for 3.10 WTE Band 6 Radiographers. The additional CT and MRI work coming from Southport will displace routine out-patient Imaging. This could be off set using outsourced CT and MRI vans. However, most routine work now done on both sites is specialist work including cardiac and CT colons. This is due to the amount of routine scanning already outsourced to Rutherford and CDCs – who are limited in the range of complexities and specialist imaging. So, there is a risk that we will be unable to displace this work resulting in increased cancer imaging turnarounds and in-patient turnarounds. If we were to move Royal CT staff over to the AUH site as a lift & shift to support the activity moves this would result in the closure of the main Out-patient CT scanner, resulting in a complete loss of the cardiac CT service and additional in-patient activity used during FCP. Overall, this is 100 slots per week.

Phase 2 – Opening of the new CSC unit

The staffing model for the new CSC scanner is included in Phase 2 - this scanner will be operational 8am-8pm Monday-Sunday with a 24/7 on call which could additionally support Vascular and EGS on top of any additional AED demands. This would require:

Phase 2	**wte**	**£**
B6	**5.40**	**275,258**
B3	**2.80**	**90,842**
B2 (Porter)	**3.15**	**95,574**
B7 Vascular Scientist	**1.20**	**64,373**
Consultant Radiologist	**1.50**	**176,162**
MRI Mobile	**40 days**	**46,693**
OOH Outsourcing		**11,520**
CT Maintenance (10 year term)		**75,000**
Contrast		**21,180**
Total	**14.05**	**856,602**

The HASU scanner will absorb the additional CT activity from phase 1, however, as there is no additional MRI scanner the legacy Southport activity will continue to be a pressure until an additional inhouse scanner is purchased. Therefore, Imaging will require the continual outsourcing of 300 patients per annum costing £46,693 via an MRI van.

6.6.3 **Pharmacy**

The PCBC identified improved efficiencies and productivity within pharmacy resulting in an efficiency saving of -£107,000, however a more recent review indicates that the Acute Stroke Centre represents new activity at Aintree, for which additional funding would be required. It is our recommendation that a specialist centre of this nature would require an advance clinical pharmacist, supported by a pharmacy technical staff. Most junior pharmacist posts are rotational, and would not provide the consistent, specialist support required. An advanced clinical pharmacist will also be able to undertake non-medical prescribing activity.

The Acute Stroke Centre has a proposed bed-base of 19, with a length of stay of less than 72 hours. We have estimated that this will result in approximately 10 admissions and discharges per day. The majority of pharmacy input for a patient is:

- On admission - completing medicines reconciliation and initial review of the patient is estimated to take 30 minutes per patient.
- On discharge – checking and dispensing of discharge prescription, patient education and communication with ongoing care giver. An estimate of 30 minutes per patient is reasonable.

In addition, all other patients are reviewed daily and would be able support prescribing of inpatient medicines as a non-medical prescriber. The pharmacist will have additional roles as the clinical specialist for that area.

Based on these figures, to provide a service Monday to Friday 9am – 5pm would require:

- 1.6 wte Band 8a Advance Clinical Pharmacist
- 1 wte Band 5 Medicines Management Technician
- 0.2 wte Band 2 Assistant Technical Officer (allowing twice weekly stock top-ups)

The annual cost from finance of providing this service (including all on-costs) would be £185,200.

Staffing costs for Acute Stroke Centre – Weekends

The provision of a clinical pharmacy service at the weekend has been considered by the Trust, and a centrally delivered service would be preferable from a logistical perspective. However, it is unknown at this stage if the Trust will approve a weekend service. Therefore, if this is required for the Acute Stroke Centre then it could be provided as an extension to the existing Medical Admissions weekend service. This would provide cover from 9am to 1pm on Saturday and Sunday and would allow approximately 75% of the predicted workload to be undertaken.

The cost of the weekend service as described would be:

- 8 hours Band 6 Pharmacist
- 8 hours Band 5 Medicines Management Technician

The annual cost from finance of providing this service (including all on-costs) would be £30,739.20.

6.6.4 **Pathology**

The Pathology services on both the Aintree and Royal Liverpool sites are provided by Liverpool Clinical Laboratories (LCL), so the service will be the same regardless of where the blood is taken in the future.

The Southport service receives pathology from Whiston hospital, and this would need to be a transfer of resources. LCL have assessed the impact of the additional tests at Aintree and confirmed that they can absorb the workload with the transfer costs.

6.6.5 Orthoptics

Visual impairment can be one of the only problems or may be one of several disabilities caused by stroke. Stroke related visual impairment occurs in about 60% of acute stroke survivors. Currently, there is very little orthoptics input to stroke acute service nationally and locally. The Royal College of Physicians recommends that every stroke patient has a practical assessment of vision and an examination of the visual field and eye movements. Orthoptists should form part of the acute core stroke disciplinary team.

To provide an orthoptics service to North Mersey stroke service would require investment in 1.8 WTE Band 7 Orthoptists.

6.6.6 Psychology

RCP and National Stroke Programme guidance strongly recommends that clinical psychology input must be a core consideration in routine MDT rehabilitation. Indicating the need for stroke clinical psychology access to provide specialist assessment, clinical guidance, training and clinical support to staff and to provide direct patient treatments and onward care facilitation: in order to support optimal clinical rehabilitation outcomes. National Stroke Programme guidance; further provides clear recommendations on how this input into MDT care should best be provided.

2.1 WTE additional Clinical Psychologists for the North Mersey system are recommended to enable this need (then supporting provision of 1.0 Broadgreen / Royal based; 0.7 WTE Aintree based; and 0.5 Southport based), this then bringing the North Mersey system total to 2.2 WTE.

6.7 Quality Impact

The quality impact assessment was undertaken on all of the shortlisted options and is included at **appendix 18.** The assessment consistently demonstrates that the preferred option will have the positive impacts on patient care categories including: -

- Patient Safety
- Patient experience
- Clinical effectiveness
- Equitable
- Efficient

The evidence from the reconfigurations from London and Manchester who also centralised specialised hyper acute care is overwhelming in terms of: -

- Preventing people dying prematurely; reducing mortality by between 1.8% (69 lives), and 1% (96 lives) in London. This would represent in North Mersey 26 lives if achieved similar levels.
- Enhancing the life of people with long term-term conditions; the increased use of thrombolysis and thrombectomy will reduce the impact of disability on patients and allow patients to return home (rather than a nursing home) or even resume a normal life.

- Helping people to recover from episodes of ill health following injury; providing rehabilitation services that are appropriately staffed, closer to the patient's home with managed early supported discharge and community rehabilitation services.
- Ensuring that people have a positive experience of care; providing specialised care in a Comprehensive Stroke Centre with all the appropriate stroke experts and equipment and then providing recovery and rehabilitation closer to home.
- Treating and caring for people in a safe environment and protecting them from avoidable harm; providing the right people in the right place at the right time to provide specialised stroke treatment will prevent avoidable harm. Receiving thrombolysis and thrombectomy within specified time frames improves outcomes. Patients receiving a successful thrombectomy are less likely to have serious disability within the first 90 days after stroke.

The research also demonstrated that a centralised stroke centre provided financial savings of £811 per stroke patient within the first 90 days. The scale of savings for each area will be dependent on the scale of improvements based upon the before and after centralisation. The starting position and the potential for improvement amongst other factors will drive the size of the financial benefit. However, using the £811 as a guide for financial efficiencies this would represent £1.1 million for North Mersey. These financial savings would mainly be achieved in the community and social care as on average only the first 18 days of 90 days are within the acute hospital setting. However, there is an opportunity to reduce length of stay in the acute hospitals due to improved outcomes.

The Benefits Realisation plan **(appendix 4)** highlights the areas that North Mersey clinical teams have targeted for improvement and the impact on metrics that will ultimately improve patient care.

6.8 Equality Impact

The purpose of this assessment is to explore the potential positive and negative consequences of the proposal on protected characteristic groups

The whole purpose of the redesign is to improve access to specialist care for people who suffer the life-threatening condition of stroke. The assessment at **appendix 12** demonstrates that the improved access is for all people including those with protected characteristics.

6.9 Sensitivity Analysis

Growth

In assessing the likely growth of stroke services in North Mersey the following issues have been considered: -

- The major impact on the service in the future is a growing and ageing population. North Mersey and particularly in Southport has an already large elderly population
- There is also an emerging theme of younger people having strokes linked to lifestyle choices
- Prevention programmes to detect and treat those at risk of stroke

- There has been a cumulative growth of 0.6% in Strokes numbers in North Mersey in the last seven years
- Stroke numbers in North Mersey have not increased year on year, however 2019/20 data shows the highest number of recorded strokes in the last 7 years
- Risk that North Southport patients are treated at Preston.

Taking the above into consideration for the purposes of this business case a growth factor of 0.5% a year has been considered. This has been modelled in **appendix 14** using 2018/19 data and 2019/20 data

A 5-year projection at growth of 0.5% using 2018/19 data would see the inpatient admission of an extra 38 stroke patients, 6 TIAs and 10 mimics. This would require the bed base across the three sites to increase by 2 to 3 beds in total. However, 2019/20 data shows a significant increase in stroke patients across North Mersey (mainly in Southport), which when compared to 2018/19 data (shown in the table below),

Difference between 18/19 and 19/20	Aintree	Royal	Southport	Total
strokes	46	-27	76	95
TIA	26	-34	0	-8
mimics	0	0	0	0
total	72	-61	76	87

The additional 87 patients are already higher than the planned growth over 5 years based on the 18/19 data. Factoring this information into the bed modelling, this would require an additional 3-4 beds across the three sites in the next 5 years.

This would require 6 extra staff and would cost an additional £190k per annum plus non pay costs. This would only cover direct stroke costs; further costs would be incurred in clinical support services.

The new HASU development requires 19 beds at 90% capacity however plans are to build the unit big enough to expand to 23 beds. Southport's current ward allows for 22 beds and will reduce to 18 (including Neuro beds) beds leaving capacity of 4 to grow. Therefore, a 5-year growth would be consumed within the planned footprint, but further work will be required to plan for the following 5 years.

Average Length of Stay

The average length of stay (ALOS) will have a massive impact on beds and resources. The plans for centralisation and staffing should have a positive impact in reducing the ALOS to the planned 18.4 days for the centralised unit with opportunities to reduce further. This is linked to two major enablers a 24/7 thrombectomy service and a to specification ESD and Community Rehabilitation service. The impact of increasing or reducing the ALOS by 1 day is: -

- Beds increase/decrease 3.5 beds
- Staff numbers increase/decrease by 6.4 WTE

- Costs increase/decrease by £254k per annum

Annual capacity and demand reviews should be undertaken as part of annual operational planning to effectively manage the service.

6.10 Patient Stories

To illustrate the potential impact this change in service will have on patients' outcomes this section provides some patient stories looking at the before and after reconfiguration.

Angela Patient Story 1

Before

Angela a 70-year-old female had a sudden onset of loss of speech and right arm and leg paralysis at 07:30 on a Saturday morning, family rang 999 at 08:00 FAST positive, category 2 ambulance with paramedic sent arrived within 15 minutes, on scene 40 minutes transferred to local HASU travel time 20 minutes.

Pre-hospital call by paramedics, arrived Resus assessed by Stroke Nurse ROSIER positive 09:15, urgent CT Brain performed 15 minutes post arrival at ED (09:30).

Telestroke Consultant contacted (10:00), assessed patient and confirmed diagnosis of left middle cerebral artery ischaemic stroke with an NIHSS of 27 indicating a severe stroke, there were no contra-indications to thrombolysis which was commenced at 45 minutes post arrival at ED (10:00; 2 hours post event).

1 hour post thrombolysis no improvement (11:00), re-contacted and advised CT angiogram performed at 11:20 reviewed by Telestroke consultant 12:00 identified a large vessel occlusion of left middle cerebral artery advised contact Thrombectomy centre. Thrombectomy Centre accepted patient for Thrombectomy at 12:20. NWAS contacted, and category 2 paramedic ambulance arrived at 12:40, left ED at 12:50, arrived at Thrombectomy Centre 13:20, nursed in corridor as no bed available at Thrombectomy centre and patient was outside time window 13:30 (within 6 hours of event) for Thrombectomy so not performed and then awaited transfer back to local HASU arrived back at HASU at 17:00 with persistent symptoms and signs of a severe stroke.

After

Angela 70-year-old female sudden onset of loss of speech and right arm and leg paralysis at 07:30 on a Saturday morning, family rang 999 at 08:00 FAST positive, category 2 ambulance with paramedic sent arrived within 15 minutes, on scene 15 minutes transferred Comprehensive Stroke Centre 40 minutes.

Pre-hospital call by paramedics, arrived Resus assessed by Stroke Nurse ROSIER positive 09:05, urgent CT Brain performed 15 minutes post arrival at ED (09:20). Seen by Stroke Consultant in CT identified no haemorrhage, commenced thrombolysis as no contraindications at 09:20 1 hour 50 mins post event) and CT angiogram performed at same time 09:20 which confirmed large vessel occlusion of left middle cerebral artery. Patient transferred to monitored bed in HASU, Thrombolysis continued, co-located thrombectomy centre contacted and accepted patient for thrombectomy at 09:30. Patient transferred for thrombectomy at 09:45, thrombectomy commenced at 10:00, clot retrieved, transferred back to HASU at CSC at 11:00.

Patient transferred home from CSC if well enough or repatriated to local hospital for acute care and rehabilitation.

Benefits
Thrombolysis: 1 hour 50 post event versus 2 hours post event.

Thrombectomy at 2 hours 30 mins post event rather than missing thrombectomy window of 6 hours.

Single ambulance transfer to CSC compared to 2 for local HASU and thrombolysis and then further transfer for thrombectomy leading to significant delays.

Patient monitored in appropriate bed in CSC throughout acute phase including thrombolysis, thrombectomy and transfer back to co-located HASU bed from thrombectomy suite.

Therefore
Right treatment right time in right place with competent staff leading to better clinical outcome and better patient experience.

Fred Patient Story 2

Before
Fred was a previously well 41-year-old man. He was at home with his family one Saturday afternoon when he developed a sudden weakness of his left side and slurred speech. His family called an ambulance, and he was transferred to his local AED. On arrival he was immediately assessed by the stroke nurse, it was clear that Fred was having a big stroke. A CT brain scan was organised. The CT scan showed a clot in the right middle cerebral artery and with support from the consultant at home via telemedicine; Fred received thrombolysis treatment with 35 minutes. The team felt Fred would probably need thrombectomy treatment however this wasn't available at weekends.

Fred didn't improve with the thrombolysis treatment and for over a week his condition remained critical as he suffered with the effects of cerebral oedema. Fred spent many weeks' tube fed and dependant.

Against the odds Fred began to improve and started a journey of over six months of rehabilitation in hospital with support from doctors, nurses, physiotherapists, speech therapist, psychologists and occupational therapists as well as countless others.

Fred was able to return home and able to walk with further support from community teams and the stroke association. The physical and psychological effects of his stroke were profound. Longer term Fred continued to struggle with pain and seizures as a consequence of his stroke. Fred was unable to return to his job.

After
The team reflected on how life could have been different for Fred had stroke services been centralised. He may have had his thrombolysis treatment even quicker, with rapid access to specialist CT scans including CT Angiogram. He would have been able to be transferred directly for thrombectomy. His time in hospital and complications could have been reduced. His level of disability would have been less, and he may have returned to work and all his usual activities.

7 Finances

This chapter sets out the financial modelling undertaken for the preferred option, the additional costs required to implement the preferred option and the change in costs from the Pre Consultation Business Case

7.1 Financial context

The financial regime for 2022/23 sees all organisations working within a broadly fixed financial envelope, with marginal movements as part of the aligned incentive scheme to support elective recovery. This is all held under a framework led by the Integrated Care System (ICS). Previous commissioner arrangements ae in place for the first part of 2022/23 but will be ceded to the ICS during 2022/23 as part of the transition arrangements.

The regime for 2023/24 onwards has yet to be confirmed, but whatever financial framework exists in the future, there will be a requirement to transfer income across provider contracts without destabilising Trusts or services, to support the transfer of activity between organisations. It is recognised that this is not a simple process, and a detailed understanding of current and future service delivery models will be required to reach agreement of impact between collaborating Trusts.

As with the PCBC, the business case is predicated on how the proposed service model changes the costs across the system, rather than use a price tariff * volume as a predictor of fund flows. The analysis in this section has determined the changes in the cost base as the additional cost of implementing the proposed model of care. This principle is consistent with a system approach to healthcare provision.

The COVID pandemic may have a long-term impact on service delivery models across a broad range of pathways, including Stroke services. It is too early to assess this with any degree of accuracy and therefore the financial consequences of the new model may be subject to change as these become clearer.

7.2 Financial analysis

Pre-Consultation Business Case (PCBC)

The PCBC assessed the costs of the preferred option to be an additional revenue investment of £2.780m at 18/19 prices in terms of increased annual revenue costs, equivalent to c£3.037m at 21/22 prices, based on the North Mersey Stroke Standard workforce requirements identified at that time. A capital requirement of £4.000m was identified for estate and infrastructure support.

Financial Impact of each option	Option 1a Do nothing	Option 1b Enhancements	Option 2a Merge A &S	Option2b Merge A & R	Option3 Merge 3 + 3 Rehab	Option4 a Merge 3 + 2 Rehab	Option 4b Merge 3 + 2 Rehab	Comment
Direct Staffing Revenue costs	0	2,500,000	2,300,000	2,300,000	1,900,000	1,800,000	1,800,000	See next slide
Junior doctors 1 SPR			58,652	58,652	58,652	58,652	58,652	
Porters			14,386	17,250	23,000	23,000	23,000	Extra patients CT/MRI/ultrasound
NWAS	0	0	120,000	54,000	175,000	175,000	95,000	
Radiology			33,300	65,700	90,000	90,000	90,000	MRI - van capacity
Create ANNP's			100,000	100,000	100,000	100,000	100,000	Pay differential
Estates for sfm / hfm	0	0	375,000	375,000	375,000	875,000	875,000	Soft and Hard FM
Orthopdists	0	58,403	58,403	58,403	58,403	58,403	58,403	Band 5 1.8
Total Revenue	**0**	**2,558,403**	**3,059,740**	**3,029,004**	**2,780,054**	**3,180,054**	**3,100,054**	
Capital costs	**0**	**80000**	**3,000,000**	**3,000,000**	**4,000,000**	**10,000,000**	**10,000,000**	

The staffing model within the PCBC driving the direct staffing requirements is outlined on the table below.

North Mersey Stroke Services - PCBC Baseline Workforce

	Baseline staffing				PCBC North Mersey Staffing Standard				Gap analysis			
Staff type	**Aintree**	**RLBUH**	**Southport**	**Total**	**Aintree**	**RLBUH**	**Southport**	**Total**	**Aintree**	**RLBUH**	**Southport**	**Total**
Consultant	4.0	4.0	2.0	10.0	12.0	0.0	0.0	12.0	8.0	-4.0	-2.0	2.0
Staff Grade				0.0	1.0			1.0	1.0	0.0	0.0	1.0
Medical	**4.0**	**4.0**	**2.0**	**10.0**	**13.0**	**0.0**	**0.0**	**13.0**	**9.0**	**-4.0**	**-2.0**	**3.0**
Ward Manager	1.0	1.4	1.0	3.4	1.0	1.0	1.0	3.0	0.0	-0.4	0.0	-0.4
Consultant Nurse	0.0	1.0	0.0	1.0	2.0	1.0	0.0	3.0	2.0	0.0	0.0	2.0
Specialist Stroke Nurses	8.0	8.3	6.0	22.3	14.0	1.7	1.7	17.3	6.0	-6.7	-4.4	-5.0
Nursing Registered	27.9	26.7	16.1	70.8	60.5	14.6	9.5	84.6	32.6	-12.1	-6.6	13.9
Nursing Unregistered	21.2	23.5	16.3	60.9	34.6	16.3	10.4	61.3	13.4	-7.1	-5.9	0.4
Nursing	**58.1**	**60.8**	**39.4**	**158.3**	**112.1**	**34.6**	**22.5**	**169.2**	**54.0**	**-26.3**	**-16.8**	**10.9**
Phsiotherapy	5.6	6.7	4.0	16.3	9.9	4.4	3.4	17.7	4.3	-2.3	-0.6	1.4
Occupational Therapist	5.8	5.3	4.0	15.1	9.6	4.3	3.3	17.3	3.8	-1.0	-0.7	2.2
Speech & Language Therapist	2.0	3.6	1.3	6.9	5.7	2.6	1.6	9.9	3.7	-1.0	0.3	3.0
Clinical Psychologist	0.1	0.0	0.0	0.1	0.7	1.0	0.5	2.2	0.6	1.0	0.5	2.0
Dietician	1.0	3.3	0.0	4.3	2.3	1.0	0.8	4.1	1.3	-2.3	0.8	-0.2
Therapy Assistant / Allied Professional	5.7	6.8	2.5	15.1	9.7	4.1	1.4	15.3	4.0	-2.7	-1.1	0.2
Therapy	**20.3**	**25.7**	**11.9**	**57.8**	**38.0**	**17.5**	**11.0**	**66.4**	**17.7**	**-8.2**	**-0.9**	**8.6**
Management	0.5	0.5	0.5	1.5	0.5	0.5	0.5	1.5	0.0	0.0	0.0	0.0
Administration	5.7	6.8	0.8	13.2	5.7	6.8	0.8	13.2	0.0	0.0	0.0	0.0
Management and Administration	**6.2**	**7.3**	**1.3**	**14.7**	**6.2**	**7.3**	**1.3**	**14.7**	**0.0**	**0.0**	**0.0**	**0.0**
Orthoptists				0.0	1.8			1.8	1.8	0.0	0.0	1.8
Grand Total	**88.5**	**97.9**	**54.5**	**240.9**	**171.1**	**59.3**	**34.8**	**265.2**	**82.5**	**-38.5**	**-19.7**	**24.3**

The Cheshire and Merseyside Integrated Care System (ICS) Exec Team reviewed the PCBC and approved revenue funding support for the proposal in 2022/23 to allow staff recruitment to proceed in advance of the go-live date. The ICS and LUHFT are working closely to understand the timing of capital requirements and inclusion of resource within overall ICS capital allocations.

Full Business Case

Since the PCBC was prepared a fundamental review of all the assumptions and workforce modelling to support the delivery of the integrated service has been undertaken, whilst maintaining the principles of the North Mersey Staffing Standard (NMSS) developed during the PCBC stage, unless specifically stated. The service still aspires to RCP standards and the National Stroke Programme, but consistent with the principles of the PCBC, accepts that due to workforce capacity constraints this will not be possible in the short term.

Direct staffing

The direct staffing requirements for the proposed model of service across North Mersey are outlined in the table below.

Staff Type	LUHFT WTE Funded	LUHFT WTE Required	S&O WTE Funded	S&O Required	Total WTE Funded	Total Required	Funding Gap WTE	Funding Gap Value
Medics								
Consultant	9.50	**13.00**	2.00	**0.00**	**11.50**	13.00	**1.50**	**195.0**
Specailist Doctor	0.00	**1.00**	0.00	**0.00**	**0.00**	1.00	**1.00**	**97.0**
Band 7 - Physician associates	0.00	**2.00**	0.00	**0.00**	**0.00**	2.00	**2.00**	**120.4**
STR	0.00	**4.75**	0.00	**0.00**	**0.00**	4.75	**4.75**	**411.8**
F2	0.00	**4.75**	0.00	**0.00**	**0.00**	4.75	**4.75**	**257.9**
Total	**9.50**	**25.50**	**2.00**	**0.00**	**11.50**	**25.50**	**14.00**	**1082.2**
Nursing								
Band 8b - Nurse consultant	1.00	**1.00**	0.00	**0.00**	**1.00**	1.00	**0.00**	**0.0**
Band 7- ANP	1.00	**3.00**	0.00	**0.00**	**1.00**	3.00	**2.00**	**120.4**
Band 8a - Team leader	3.00	**1.00**	0.00	**0.00**	**3.00**	1.00	**-2.00**	**-120.4**
Band 7- SNC	6.80	**15.32**	1.00	**1.00**	**7.80**	16.32	**8.52**	**521.4**
Band 7 Speacialist Nurse	1.00	**1.00**	0.00	**0.00**	**1.00**	1.00	**0.00**	**0.0**
Band 6 - SNC	0.00	**0.00**	5.00	**3.00**	**5.00**	3.00	**-2.00**	**-105.6**
Band 7- Ward Manager	3.00	**4.00**	1.00	**1.00**	**4.00**	5.00	**1.00**	**52.8**
Band 6	16.07	**23.99**	5.49	**5.49**	**21.56**	29.48	**7.92**	**377.8**
Band - 5	43.95	**69.50**	10.98	**10.98**	**54.93**	80.48	**25.55**	**1200.9**
Band - 4	0.00	**0.00**	2.74	**2.74**	**2.74**	2.74	**0.00**	**0.0**
Band - 3	31.94	**39.09**	0.00	**0.00**	**31.94**	39.09	**7.15**	**224.5**
Band - 2 HCA	14.30	**21.44**	19.21	**19.21**	**33.51**	40.65	**7.14**	**221.3**
Total	**122.06**	**179.34**	**45.42**	**43.42**	**167.48**	**222.76**	**55.28**	**2493.1**
Admin								
Band % - Office manager	0.00	**1.00**	0.00	**0.00**	**0.00**	1.00	**1.00**	**31.0**
Band 4 - SSNAP	2.00	**2.00**	0.00	**0.00**	**2.00**	2.00	**0.00**	**0.0**
Band 4 - Sec	6.00	**6.00**	1.00	**1.00**	**7.00**	7.00	**0.00**	**0.0**
Band 2 - Clerk	3.00	**11.69**	1.00	**1.00**	**4.00**	12.69	**8.69**	**212.0**
Total	**11.00**	**20.69**	**2.00**	**2.00**	**13.00**	**22.69**	**9.69**	**243.0**
AHP								
Band 7-PT	4.24	**4.24**	0.60	**0.60**	**4.84**	4.84	**0.00**	**0.0**
Band 6-PT	4.00	**6.00**	3.00	**3.00**	**7.00**	9.00	**2.00**	**86.0**
Band 5 PT	5.00	**5.00**	0.00	**0.00**	**5.00**	5.00	**0.00**	**0.0**
Band 7 OT	2.20	**3.20**	0.80	**0.80**	**3.00**	4.00	**1.00**	**53.3**
Band 6 OT	4.80	**5.80**	3.60	**3.60**	**8.40**	9.40	**1.00**	**43.0**
Band 5 OT	4.80	**5.80**	0.00	**0.00**	**4.80**	5.80	**1.00**	**39.6**
Band 7 SLT	2.00	**2.70**	0.60	**0.60**	**2.60**	3.30	**0.70**	**37.0**
Band 6 SLT	3.10	**3.10**	1.00	**1.00**	**4.10**	4.10	**0.00**	**0.0**
Band 5 SLT	2.50	**2.50**	0.00	**0.00**	**2.50**	2.50	**0.00**	**0.0**
Band 4 AP / PAM(S&O)	2.50	**3.50**	2.00	**2.00**	**4.50**	5.50	**1.00**	**30.7**
band 7 Diet	1.00	**2.00**	0.00	**0.00**	**1.00**	2.00	**1.00**	**52.8**
band 3 (PAM S&O)	8.70	**10.70**	0.32	**0.32**	**9.02**	11.02	**2.00**	**53.6**
Band 6 Diet	1.60	**1.60**	0.00	**0.00**	**1.60**	1.60	**0.00**	**0.0**
band3 diet	0.00	**0.00**	0.00	**0.00**	**0.00**	0.00	**0.00**	**0.0**
Band 2 PAM's	0.00	**0.00**	0.76	**0.76**	**0.76**	0.76	**0.00**	**0.0**
Band 8a	0.00	**0.70**	0.80	**0.80**	**0.80**	1.50	**0.70**	**42.1**
Total	**46.44**	**56.84**	**13.48**	**13.48**	**59.92**	**70.32**	**10.40**	**438.1**
Other								
Clinical Psycologist	0.00	**1.70**	0.00	**0.50**	**0.00**	2.20	**2.20**	**132.4**
Band 6 - Discharge planner	0.00	**2.00**	0.00	**0.50**	**0.00**	2.50	**2.50**	**61.0**
Housekeeper	0.00	**2.00**	0.00	**0.00**	**0.00**	2.00	**2.00**	**48.8**
Orthoptists	0.00	**1.80**	0.00	**0.00**	**0.00**	1.80	**1.80**	**95.0**
Total	**0.00**	**7.50**	**0.00**	**1.00**	**0.00**	**8.50**	**8.50**	**337.3**
Grand Total	**189.00**	**289.87**	**62.90**	**59.90**	**251.90**	**349.77**	**97.87**	**4593.7**

Baseline staffing numbers are broadly similar to the PCBC, with 254.16 WTE across LUHFT and Southport & Ormskirk (S&O) Hospitals associated with delivery of stroke services (240.19 WTE at PCBC stage).

The new model of service has identified a direct staffing of 349.77 WTE, an additional 97.87 WTE as a result of the change, at a cost of £4,593.7k. This compares to 24.30 WTE at PCBC stage an increase of 73.57 WTE and an additional cost impact of £2,693.7k.

The principle movements from PCBC to FBC are:

	WTE	£000	
AUH site front door assessment unit	43.59	1,938	Omitted from PCBC
Reduction in staff released from S&O	25.00	667	Only budget of 3 WTE being released on transfer of service, compared to estimated 20 WTE at PCBC stage
Other (incl skill mix changes)	4.98	89	
	73.57	2,694	

Indirect staffing and costs

Pharmacy

The Acute Stroke Centre requires an advanced clinical pharmacist who will also be able to undertake non-medical prescribing activity., supported by a pharmacy technical staff. This would cover weekdays and some weekend cover.

	Mon-Fri WTE	Saturday WTE	Sunday WTE	£000
B8A	1.60			117.0
B6		0.11	0.11	16.0
B5	1.00	0.11	0.11	62.3
B2	0.20			5.9
Total	**2.80**	**0.22**	**0.22**	**201.2**

Radiology

The transfer of stroke services will increase the radiological workload significantly as outlined within this paper. Initial costs (phase 1) are projected at £0.937m, reducing to £0.857m once the HASU opens in 2023. The table below gives a breakdown of the additional costs of the service.

Phase 1	wte	£
B6	5.4	275,258
B3	2.8	90,842
B2 (Porter)	3.15	95,574
B7 Vascular Scientist	1.2	64,373
Consultant Radiologist	1.5	176,162
CT Mobile	26 days	80,600
MRI Mobile	40 days	46,693
OOH Outsourcing		11,520
CT Maintenance (10 year term)		75,000
Contrast		21,180
Total	**14.05**	**937,202**

Phase 2	wte	£
B6	5.4	275,258
B3	2.8	90,842
B2 (Porter)	3.15	95,574
B7 Vascular Scientist	1.2	64,373
Consultant Radiologist	1.5	176,162
CT Mobile		0
MRI Mobile	40 days	46,693
OOH Outsourcing		11,520
CT Maintenance (10 year term)		75,000
Contrast		21,180
Total	**14.05**	**856,602**

NWAS

A detailed impact analysis has been undertaken by North West Ambulance Service as disclosed within the operational aspects of this case. The associated costs are:

North Mersey Stroke	Hrs / day	Hrs / Week	22/23 Non recurrent capital	22/23 Non recurrent revenue	Part Year 22/23* Recurrent costs Yr 1	22/23 Total	Total Recurrent costs FYE
S3 Option	18	126	£285,303	£91,914	£445,024	£822,241	£762,898

Other

Estates and facilities costs to support the transfer are estimated at:

	£000
Porters	37.7
Estates Soft and hard FM, including energy and capital charges	600.0
Total	**637.7**

The introduction of similar service models has demonstrated that wider savings are delivered through improved recovery and avoidance of ongoing support costs for patients. It is unlikely that any reduction in hospital bed days will result in tangible savings, given the underlying pressures that exist in the NHS at present. The Quality Impact section 7.7 highlights from previous research the potential to achieve financial savings across a 90-day pathway. Using this research information shows a potential £1.2 million saving which is more likely to be in the community and care settings and therefore not applicable for inclusion in the FBC.

Capital

Significant capital works are required to facilitate the service model on the Aintree site. The works are both estate and equipment in nature.

In terms of estate infrastructure the model requires the creation of a new CSC on the Aintree site that has a Stroke A&E admission area, ambulatory area, therapy assessment & treatment rooms and a 20-bed ward (with flexibility to move to 23 beds due to modelled increase in demand in future years).

The estate work required includes the decanting of existing services into an alternative location on site, the refurbishment of the vacated area and the preparation of the new clinical environment. In addition, the establishment of the new clinical service requires the procurement of an additional CT Scanner. The total estimated capital cost of the works is £4M.

Discussions are ongoing with the ICS regarding the funding of the capital works required and it has been agreed that CDEL cover will be provided to support the delivery of the scheme. It is currently understood that c. £2.5m CDEL cover has been agreed for 2022/23 and a further £1.5m in 2023/24. The project team are currently reviewing the programme timings to reflect the funding allocations

In addition to the CDEL cover being provided the Trust is seeking cash resource to enable the capital works. This remains a risk and requires resolution.

7.3 Financial summary

The proposed service model across North Mersey will see a step change in the care of patients with improved outcomes as identified in the case for change. The recurrent costs of delivery are shown in the table below.

Recurrent revenue impact

	FBC WTE	FBC £000		PCBC £000
Direct staffing	97.87	4,594		1,900
Pharmacy	3.24	201		0
Radiology	14.05	857		90
NWAS		763		175
Estates & Other		638		615
		7,053		**2,780**

Non-recurrent revenue impact and capital

	Capital FBC £000	Non-Recurrent Revenue FBC £000	Total £000	PCBC £000
LUHFT (AUH site)	4,000	81	4,081	4,000
NWAS	285	91	376	0
	4,285	172	4,457	4,000

8 Option Development and Appraisal

This chapter summarises the options appraisal process for this service review. It discusses the different steps of the options appraisal process and then details the governance arrangements put in place to ensure the robustness and transparency of the options appraisal process.

8.1 Options Appraisal process

The options appraisal process for this service review consisted of four discrete steps: -

- Develop and agree the options appraisal framework
- Determine the long list of options
- Appraise the options and create short lists of options
- Appraise the short list and select a preferred option

8.2 Governance Arrangements

This service review falls into the acute hospital service review within the Health Care Partnership via the Cardiovascular Disease Board and led by Liverpool CCG. The governance arrangements have been designed to reflect the stakeholder led nature of the options appraisal process.

The North Mersey Stroke Board was established to consider proposals put forward by the Clinical Reference Group and make recommendations to the Committee's in Common (CIC) and the provider Trust Boards. The chair of the Board is the Director of Strategy for Liverpool CCG. The Board has a defined membership of both clinical and non-clinical stakeholders. The terms of Reference are shown at **appendix 15.**

The Joint CIC was responsible for agreeing proposals from the Stroke Board and sharing with the Joint Governing Body of Liverpool CCG, Knowsley CCG, South Sefton CCG, Southport and Formby CCG and West Lancashire CCG for final approval.

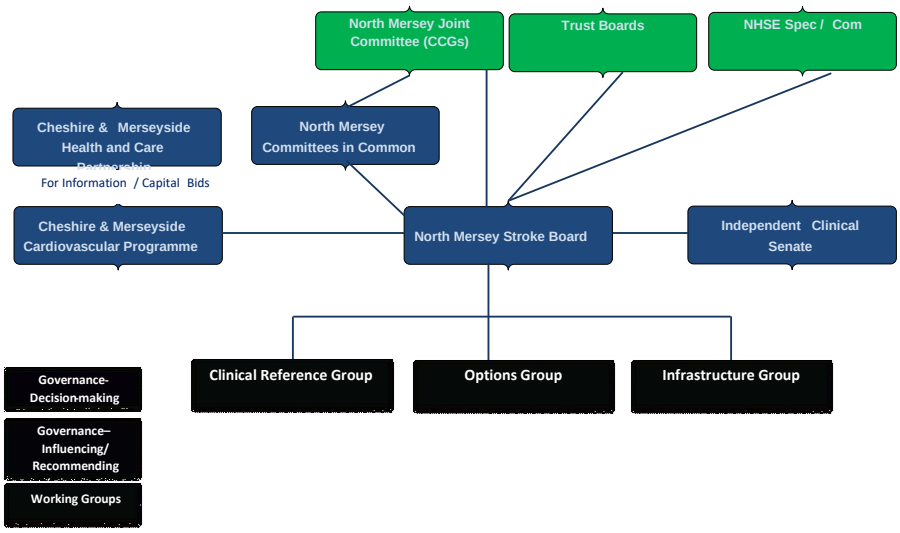
Two groups were established to support the review and selection of the preferred clinical model option: -

Options Group was an open stakeholder forum that convened at workshops held at different locations. The objective of the workshops was to gather views from across the North Mersey stroke care system on clinical models of care and the selection of a preferred model of care. The workshops scored the long list and the short list of options. These formed a recommendation for the Clinical Reference Group to consider.

The Clinical Reference Group is a clinical body with defined membership that met monthly to develop the options appraisal framework and the long list of options. It considers its feedback from the Options Group and recommended a preferred model of care option to the North Mersey Stroke Board. The CRG chair is Dr Paddy McDonald, Clinical Lead for stroke services from Southport and Ormskirk NHS Trust. The terms of Reference are shown at **appendix 16.**

The infrastructure group never formally met but information was provided to CRG by the programme lead from corporate services and clinical support services with regard to the short-listed options impact on clinical activity, demand and capacity, workforce and estates.

Governance Arrangements for North Mersey Stroke Services:



The main three working groups met regularly through the development of the preferred option**.**

Meetings of the Key Working Groups		
Date of Meeting	**Name of Meeting**	**Purpose**
31st July 2019	Workshop 1	To develop and agree the case for change
3rd September 2019	CRG 1	Develop terms of reference and programme team Agreed case for change
12th September 2019	NMSB 1	Agreed terms of reference Agreed case for change
13th September 2019	Workshop 2	Agreed option appraisal criteria Developed long list of options Agreed short list of options
1st October 2019	CRG 2	Reviewed scoring of long list Agreed short list of options Reviewed modelling information
10th October 2019	NMSB 2	Agreed short list of options Reviewed Thrombectomy action plan Reviewed ESD analysis
8th November 2019	CRG 3	Developing current sustainability plans Reviewing & modelling activity information Agreed Estates Specification
18th November 2019	CRG (away day)	Developed modelling information
27th November 2019	Workshop 3	Developed the short list options Agreed staff engagement methods Patient engagement feedback
12th December 2019	NMSB 3	Patient engagement feedback Options development
9th January 2020	NMSB 4	Presented current sustainability plans Options development
13th January 2020	CRG 4	Modelling of Options Plan the next Workshop Agree Interdependent Services
3rd February 2020	CRG 5	Activity and modelling options Plan of final workshop
12th February 2020	Workshop 4	Selected preferred option
13th February 2020	NMSB 5	Presented current sustainability Presented preferred option
15th December 2020	CRG Workshop	Review of Emergency Stroke Pathway
7th January 2021	CRG Workshop	Confirmation of Emergency Stroke Pathway

8.3 Developing the options appraisal framework

Evaluation criteria are an important component of any options appraisal process, pre- agreed criteria help assess the relative merits of options in a structured and objective way. The CRG considered a number of different appraisal criteria but consider that a “critical success factor “(CSF) framework was the most appropriate. Options would be assessed in terms of whether or how well they would meet criteria that are by definition “critical” to the success of the programme.

The CSF framework was agreed at Workshop 2 on 13/09/2019.

There were six CSF's

- **Patient Outcomes and Experience** – delivery of a high-quality stroke service that would improve mortality, morbidity, reduce disability and provide access and equity of service at the right time
- **Deliverability** – the practicality of the implementation including feasibility, estates and equipment and competition factors if any
- **Alignment and Strategic Fit** – alignment with strategic aims of all stakeholders and the NHS long term plan
- **Risk Execution** – ability to maintain and improve performance in terms of any regulatory, statutory requirement and clinical standards (SNNAP)
- **Clinical Sustainability** – will this improve recruitment retention, critical mass, rota sustainability, contributions to training and research
- **Value for Money** – ability to reduce duplication and waste, standardise pathways, site optimisation and cross cover.

The score was to compare to the current service provision. The scoring matrix used was as follows:

Score	Description
3	A significant improvement of the service high level of certainty – substantial evidence
2	An improvement of the service with some certainty and some evidence
1	A slight improvement of the service but lacks evidence
0	No change in service delivery
-1	Slightly worse than the current service but the case is weak and lacks significant evidence
-2	Worse than the current service but there is evidence to support
-3	Significantly worse than the current service and supported by substantial evidence

8.4 Determining the long list of options

The long list of options was developed at workshop 2 held on 13/09/2019 with careful consideration of clinical quality requirements, sustainability challenges and service co-dependencies. The CRG to ensure that every possible option could at least be consider produced 26 different clinical models. Although they at an early stage recognised weakness in some of the options that had been developed CRG agreed it would be prudent to assess all options against the agreed appraisal criteria. To develop the long list of options the CRG consider every possible permutation of service delivery on the four current sites.

The long lists of options were as follows: -

A. Do Nothing

A1 – Current configuration of services
A2 – Current configuration of services – with enhancements

B. Consolidate 3 HASU's into 2

This option consolidates 3 HASU's onto two sites: leaving one of the current HASU's untouched. Creating in total 2 HASU's with 3 post 72 hours acute and rehabilitation services.

B1 – Consolidate Aintree and Royal (on to Aintree) leave S & O. (creates CSC on Aintree)
B2 – Consolidate Aintree and Royal (onto Royal) leave S & O. (creates CSC on Royal site)
B3 – Consolidate Aintree and S & O (onto Aintree site) leave Royal Liverpool. (creates a CSC on Aintree)
B4 – Consolidate Aintree and S & O (onto S & O site) leave Royal Liverpool. (creates a CSC on S & O site)

C. Consolidate 3 HASU's into 1, creating a CSC

Merge all 3 HASU's onto one site and 2 post ASU's.

C1- One Comprehensive Stroke Centre on the Royal Liverpool site plus 2 Acute rehab
C2- One Comprehensive Stroke Centre on S & O site plus 2 Acute rehabs
C3- One Comprehensive Stroke Centre on Aintree site plus 2 Acute rehabs
C4- One Comprehensive Stroke Centre on Broadgreen site plus 2 Acute rehabs

D. Consolidate 3 HASU and ASU into 1 CSC

Merge all 3 HASU's and ASUs onto one site – total centralisation

D1- One Comprehensive Stroke Centre on Aintree site - no repatriation
D2- One Comprehensive Stroke Centre on Royal Liverpool site - no repatriation
D3- One Comprehensive Stroke Centre on S & O - no repatriation
D4 - One Comprehensive Stroke Centre on Broadgreen site - no repatriation

E. Consolidate 3 HASU into CSC and 1 other ASU

Merge all 3 HASU's and have only one other ASU

E1-One Comprehensive Stroke Centre at Aintree site and 1 other ASU at Broadgreen site
E2-One Comprehensive Stroke Centre at Royal Liverpool site and 1 other ASU at Aintree site
E3-One Comprehensive Stroke Centre at Royal Liverpool site and 1 other ASU at S & O site
E4-One Comprehensive Stroke Centre at Aintree site and 1 other ASU at S & O site
E5-One Comprehensive Stroke Centre at Broadgreen site and 1 other ASU at Aintree site
E6-One Comprehensive Stroke Centre at Broadgreen site and 1 other ASU at S & O site

F. Create comprehensive Stroke Centre on more than one site any permutation of options.
Create full CSC on any of the three sites – with full services

8.5 Determining the short list of options

The long list of options was appraised against the CSFs at a workshop on the 13/09/2019. This produced a short list of options for a full appraisal.

The workshop appraisal is shown at **appendix 17.**

The finalised short list of options shown in order of ranking: -

C3 - One Comprehensive Stroke Centre on Aintree site plus 2 Acute rehabs
E4 - One Comprehensive Stroke Centre at Aintree site and 1 other ASU at S & O site
E1 - One Comprehensive Stroke Centre at Aintree site and 1 other ASU at Broadgreen site
B3 – Consolidate Aintree and S & O (onto Aintree site) leave Royal Liverpool site (creates a CSC on Aintree)
B1 – Consolidate Aintree and Royal (on to Aintree) leave S & O (creates CSC on Aintree)
A2 – Current Configuration of services – with enhancements
A1 – Current Configuration of services

CRG reviewed the outcome from the workshop and the short-listed options on the 01/10/2019. The group agreed with the workshops findings and reported to NMSB on the 10/10/2019.

8.6 Description of short-listed options

The short-listed options have been modelled (based on activity and workforce data from 18/19) to understand the impact on clinical activity, beds, estates, workforce, quality, equity and finance this was used to inform the appraisal process.

8.6.1 Option A1 – Do nothing - current service configuration

This is the do-nothing option - all services continue to operate unchanged.

The clinical teams note the following: -

Patient Outcomes and experience

- This would not improve the patient outcomes
- This option would not fully support access to thrombolysis and thrombectomy

Deliverability

- There would be minimum impact on estates and equipment

Alignment and Strategic Fit

- This option would not meet the strategic aims of local commissioners, HCP and the NHS Long Term Plan

Risk Execution

- North Mersey stroke service would not improve performance against the clinical standards

Clinical Sustainability

- This option does not address the sustainability issues of operating three small stroke units
- None of the stroke units would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to three units would still persist. The requirement under RCP for the number of consultant posts in this option is 20.4 WTE; currently only 10 WTE in post (3 of which are locums)

- Creating a North Mersey network would help manage risks across the four sites and aid recruitment and short-term sustainability

Value for Money

- The consequence of poor outcomes would impact on length of stay, disability, extra support in the community and mortality. This option would provide no value for money

Clinicians felt that the service performance would worsen as even more difficult to recruit to sub-standard service and the longer term would see poor patient outcomes, experience and poor staff satisfaction.

8.6.2 Option A2 – Do nothing – current service configuration with enhancements

This option would address some of the deficiencies in clinical standards identified in the current service. This option would introduce enhancements to the current service on all four sites.

The following additional enhancements are incorporated into this option: -

- Increase HASU beds at Aintree site by 3 to a total of 7
- Create a dedicated stroke unit at the Royal Liverpool site on ward 2Y with 7 HASU and 7 ASU beds that are protected
- Create 2 extra HASU beds and reduce 2 ASU beds at Southport site
- Create 2 extra beds on Broadgreen site
- Invest in staffing to provide care and rehabilitation to the new bed base
- Create a North Mersey Stroke Services Network that manages all risks on all sites.

Considerations

Enhancing services on all four sites and improved staffing levels is likely to improve performance against clinical standards and thereby improve some outcomes.

However, it was noted by clinicians that: -

Patient outcomes and Experience –

- This option would not fully support access to thrombolysis and thrombectomy
- This option should improve access to HASU with increased capacity therefore proving better outcomes

Deliverability –

- There would be minimum impact on estates and equipment
- Financial investment required both Revenue and Capital

Alignment and Strategic Fit –

- This option would not meet the strategic aims of local commissioners, HCP and the NHS LTP

- Commissioner would accept this as a short-term solution

Risk Execution –

- North Mersey stroke service may improve performance against some of the clinical standards, however, it still may not fully achieve them or other standards

Clinical Sustainability –

- This option does not address the sustainability issues of operating three small stroke units. However, it is recognised that it would improve the sustainability issues in the short term
- None of the stroke units would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to three units would still persist. The requirement under RCP for the number of consultant posts in this option is 20.4 WTE; currently only 10 WTE in post (3 of which are locums)
- Creating a North Mersey network would help manage risks across the four sites and aid recruitment and short-term sustainability

Value for Money

The additional staffing costs to recruit to RCP for the new bed configuration would be £2.3M.

See **appendix 14** for the detail activity, bed and financial monitoring.

8.6.3 Option B1 – Consolidate Aintree site and Royal Liverpool site (on to Aintree site) leave S & O (creates CSC on Aintree)

This option merges the Royal Liverpool and Aintree HASU units onto the Aintree site, but Southport remains as a HASU. Acute hospital stroke services would operate at Aintree, Broadgreen and Southport.

The beds from the Royal Liverpool site would transfer to Aintree requiring an additional 7 HASU and 7 ASU on site. The current stroke unit would be unable to accommodate this number of beds, and this would require the development of a 15 bedded HASU. The beds at Southport site would be unchanged.

Considerations

This option would improve the service significantly for those patients accessing Aintree but have limited impact on Southport patients.

However, it was also noted by clinicians that: -

Patient outcomes and Experience

- This option would not fully support access to thrombolysis and thrombectomy as Southport patients would still have to transfer to Aintree for thrombectomy services
- Patient from Liverpool would have to travel further to Aintree but travel time in most cases is minimal

- This would improve access to some patients to Hyper Acute Care quicker but not all the population

Deliverability

- Requires significant investment into finding and developing the estate, it would displace some services currently on Aintree site

Alignment and Strategic Fit

- This option would not fully meet the strategic aims of local commissioners, HCP and the NHS LTP
- It would provide an improved option for part of the population of North Mersey

Risk Execution

- Only some of the clinical standards would be met for the services consolidated onto one site
- Inequitable service across North Mersey

Clinical Sustainability

- This option does not address the sustainability issues of the most fragile stroke unit at Southport. It could destabilise Southport further as staff move to the bigger centralised unit or leave the service
- Only one of the stroke units would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to two units would still be an issue. The requirement under RCP for the number of consultant posts in this option is 17 WTE; currently only 10 WTE in post (3 of which are locums).
- Creating a North Mersey network would help manage risks across the three sites and aid recruitment and short-term sustainability

Value for Money

- This would require a purpose built HASU/CSC on the Aintree site that would require a capital investment of £3M revenue
- The additional staffing costs to recruit to RCP for the new bed configuration would be £3.1M

See **appendix 14** for the detail activity, bed and financial monitoring.

8.6.4 Option B3 – Consolidate Aintree and Southport (on to Aintree site) leave Royal Liverpool HASU (creates CSC on Aintree)

This option merges the Royal Liverpool and Southport HASU units onto the Aintree site, but the Royal Liverpool remains as a HASU. Acute hospital stroke services would operate at Aintree, Broadgreen and Southport.

The beds from the Southport would transfer to Aintree requiring an additional 5 HASU on site. The current stroke unit would be unable to accommodate this number of beds, and this would

require the development of a 12 bedded HASU. The beds at the Royal Liverpool would be unchanged.

Considerations

However, it was noted by clinicians that: -

Patient Outcomes and Experience

- This option would not fully support access to thrombolysis and thrombectomy as the Royal Liverpool site would still have to transfer to Aintree and would not have direct access to HASU
- Patient from Southport would have to travel further to Aintree but travel time in most cases is not excessive
- This would improve access to some patients to Hyper Acute Care quicker but not all the population

Deliverability

- Considerable investment in estate and the ability to find buildings on site
- Recruitment of additional staff when there is a national shortage

Alignment and Strategic Fit

- This option would not fully meet the strategic aims of local commissioners, HCP and the NHS LTP

Risk Execution

- North Mersey stroke service may improve performance against the clinical standards for the Aintree site. However, this would not be true for patients on the Royal Liverpool site
- Inequitable service across North Mersey

Clinical Sustainability

- This option addresses the sustainability issues of the most fragile stroke unit at Southport. However, it could destabilise the Royal Liverpool as staff may choose to move to the bigger centralised unit or leave the service
- Only one of the stroke units would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to two units would still persist. The requirement under RCP for the number of consultant posts in this option is 17 WTE; currently only 10 WTE in post
- Creating a North Mersey network would help manage risks across the three sites and aid recruitment and short-term sustainability

Value for Money

- The additional staffing costs to recruit to RCP for the new bed configuration would be £3.0M

- This would require a purpose built HASU/CSC on the Aintree site that would require a capital investment of £3M revenue.

See **appendix 14** for the detail activity, bed and financial monitoring.

8.6.5 Option C3 – One Comprehensive Stroke Centre on Aintree Site plus 2 Acute rehabs

This option would see all three HASU's coming together to create a Comprehensive Stroke Centre on the Aintree site having a total of 19 beds plus an acute stroke ward with 35 beds. Acute stroke ward would also be located at Broadgreen site (23 beds) and Southport site (15 beds).

This option provides a centralised CSC to provide direct access to specialist urgent care and acute / rehabilitation close closer to home for patients.

Considerations

However, it was noted by clinicians that: -

Patient outcomes and Experience

- This option would fully support access to thrombolysis and thrombectomy in a timely manner and increasing numbers of patients receiving treatment thereby improve patient outcomes
- The increase travelling time for Southport patients and any south Liverpool patients would be offset by the direct access to specialist treatment that will improve outcomes
- Reduce the pressure in A&E departments due to direct access to CSC

Deliverability

- Considerable investment in estate and the ability to find buildings on site
- Recruitment of additional staff when there is a national shortage

Alignment and Strategic Fit

- This option will meet the strategic aims of local commissioners, HCP and the NHS LTP

Risk Execution

- The clinical standards would improve and therefore improve patient outcomes
- This option will meet best practice guidelines

Clinical Sustainability

- North Mersey stroke service is likely to improve performance in all aspects of clinical standards and therefore patient outcomes and experience
- This option addresses the sustainability issues of the most fragile stroke unit at Southport. However, there is still a risk of destabilising one of the ASUs
- The CSC would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff will still exist however the new service would be attractive to potential employees. The requirement under RCP for the number of

consultant posts in this option is 14 WTE; currently only 10 WTE in post. However, this is more achievable and places fewer burdens on current post holders
- Creating a North Mersey network would help manage risks across the three sites and aid recruitment and short-term sustainability

Value for Money

- This would require a purpose-built CSC on the Aintree site that would require a capital investment of £4M revenue
- The additional staffing costs to recruit to RCP for the new bed configuration would be £2.8M
- There are potential significant savings due to the reduced mortality and disability due to improved outcomes. In the acute sector this is likely to be in the length of stay.

8.6.6 Option E1 - One Comprehensive Stroke Centre at Aintree and 1 other ASU at Broadgreen

This option would merge the three HASUs into one CSC but also merge either one of the ASUs onto the Aintree site, with an additional ASU at Broadgreen site.

This option provides a centralised CSC to provide direct access to specialist urgent care and acute/ rehabilitation closer to home for some patients but not all.

However, it was noted by clinicians that: -

Patient outcomes and Experience

- This option would fully support access to thrombolysis and thrombectomy in a timely manner and increasing numbers of patients receiving treatment thereby improve patient outcomes
- The increase travelling time for Southport patients and any south Liverpool patients would be offset by the direct access to specialist treatment that will improve outcomes
- Reduce the pressure in A&E departments due to direct access to CSC
- This option will not meet the needs of all patients; in all engagement events patients have been clear that they are willing to travel for specialised care, but rehabilitation needs to be closer to home

Deliverability

- The Estate requires to build both CSC and extended ASU may be difficult to deliver both in terms of available estate and financially
- The recruitment of additional staff when there is a national shortage will be difficult. This option would have the added complication of trying to relocate staff to a central site, this has proved difficult in other redesigns locally

Alignment and Strategic Fit

- This option will meet the strategic aims of local commissioners, HCP and the NHS LTP

Risk Execution

- North Mersey stroke service is likely to improve performance in all aspects of clinical standards and therefore patient outcomes and experience

Clinical Sustainability

- This option addresses the sustainability issues of the most fragile stroke unit at Southport. However, there is still a risk of destabilising one of the ASUs.
- The CSC would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to two units would still persist but made easier if the new service is attractive to potential employees as meets standards. The requirement under RCP for the number of consultant posts in this option is 14 WTE; currently only 9 WTE in post. However, this is more achievable than any of the other options
- Creating a North Mersey network would help manage risks across the three sites and aid recruitment and short-term sustainability

Value for Money

- This would require a purpose-built CSC on the Aintree site that would require a capital investment of £10M
- The additional staffing costs to recruit to RCP for the new bed configuration would be £3.1M.

8.6.7 Option E4 - One Comprehensive Stroke Centre at Aintree and 1 other ASU at Southport

This option would merge the three HASUs into one CSC but also merge either one of the ASUs onto the Aintree site, with an additional ASU at Southport site.

This option provides a centralised CSC to provide direct access to specialist urgent care and acute/ rehabilitation closer to home for some patients but not all.

However, it was noted by clinicians that: -

Patient outcomes and Experience

- This option would fully support access to thrombolysis and thrombectomy in a timely manner and increasing numbers of patients receiving treatment thereby improve patient outcomes
- The increase travelling time for south Liverpool patients would be offset by the direct access to specialist treatment that will improve outcomes
- Reduce the pressure in A&E departments due to direct access to CSC
- This option will not meet the needs of all patients; in all engagement events patients have been clear that they are willing to travel for specialised care, but rehabilitation needs to be closer to home

Deliverability

- The Estate requires to build both CSC and extended ASU may be difficult to deliver both in terms of available estate and financially

- The recruitment of additional staff when there is a national shortage will be difficult. This option would have the added complication of trying to relocate staff to a central site, this has proved difficult in other redesigns locally

Alignment and Strategic Fit

- This option will meet the strategic aims of local commissioners, HCP and the NHS LTP

Risk Execution

- North Mersey stroke service is likely to improve performance in all aspects of clinical standards and therefore patient outcomes and experience

Clinical Sustainability

- This option addresses the sustainability issues of the most fragile stroke unit at Southport. However, there is still a risk of destabilising one of the ASUs.
- The CSC would be compliant with recommended levels of stroke patients above 600
- The difficulty in recruiting specialist staff to two units would still persist but made easier if the new service is attractive to potential employees as meets standards. The requirement under RCP for the number of consultant posts in this option is 14 WTE; currently only 9 WTE in post. However, this is more achievable than any of the other options
- Creating a North Mersey network would help manage risks across the three sites and aid recruitment and short-term sustainability

Value for Money

- This would require a purpose-built CSC on the Aintree site that would require a capital investment of £10M
- The additional staffing costs to recruit to RCP for the new bed configuration would be £3.1M.
- 9.6.7 Option E4 - One Comprehensive Stroke Centre at Aintree and 1 other ASU at S & O

8.7 Determining the preferred option

The short-listed options were modelled to determine their impact on clinical activity, beds, estate, workforce, quality, equality and finance and this was provided in summary form at the workshop on the 12/02/2020. Modelling information for each option is shown in **appendix 14.**

The short-listed options were appraised at the workshop on the 12/02/2020 using the same appraisal criteria and scoring system. The workshop recommended a preferred option of: -

C3 One Comprehensive Stroke Centre on the Aintree Site with acute rehabilitation on Aintree, Southport and Broadgreen.

The scoring was conclusive and is shown at **appendix 18.**

9 Engagement and consultation

This chapter outlines how stakeholders, patients and the public were involved in the development of potential options for hyper-acute stroke services in North Mersey, followed by an overview of the public consultation that took place around the preferred option for a Comprehensive Stroke Centre.

9.1 Stakeholder engagement

Groups engaged throughout the review include:

- Overview and Scrutiny Committees (OSCs) – the case for change was presented to Liverpool City Council's Social Care and Health Select Committee and Sefton Council's OSC during autumn 2019. Following a pause in the review due to the COVID-19 pandemic, a Joint Health Scrutiny Committee (Hyper-Acute Stroke Services) was formed in autumn 2021, made up of representatives of local authorities in Knowsley, Liverpool, Sefton and Lancashire. Over the course of a number of meetings, the joint committee was presented with the pre-consultation business case (PCBC), the consultation plan, and the consultation feedback report, and given the opportunity to ask questions of clinical staff and others, as part of the scrutiny process. The final meeting of the committee will receive this business case, at which point it will make any final recommendations.

- Joint Committees in Common – this group brought together Knowsley, Liverpool, South Sefton, and Southport and Formby clinical commissioning groups (CCGs) to discuss issues affecting North Mersey, in preparation for them being put through formal governance. The case for change and an interim report was presented to the Joint CIC of North Mersey CCGs and a further presentation took place in March 2021.

- North Mersey Joint Committee – The North Mersey Joint Committee is made up of representatives of NHS Knowsley Clinical Commissioning Group (CCG), NHS Liverpool CCG, NHS South Sefton CCG and NHS Southport & Formby CCG. It was formed so that collective commissioning decisions could be made about services used by people living across these four areas.

  During summer 2021 it was agreed that NHS West Lancashire CCG would join the Joint Committee temporarily for the purpose of decision-making around the review of North Mersey hyper-acute stroke services, as West Lancashire patients use stroke services at Southport Hospital.

- North Mersey Stroke Board (NMSB) – This is a formal monthly meeting whose membership includes senior clinicians and managers from the three acute provider Trusts, five CCGs, the Stroke Association and NHSE specialist commissioners. The Stroke Board has received reports and updates throughout the review.

- North Mersey Stroke Clinical Reference Group (CRG) –. A group of clinical experts who work in North Mersey stroke services and the Strategic Clinical Network, who

designed all workshops and provided clinical expertise to the PCBC.

- North Mersey Co-Design Workshops – Four workshops were held between July 2019 and February 2020. These workshops were open to all staff working in stroke services in North Mersey, including teams from Liverpool University Hospitals NHS Foundation Trust, Southport & Ormskirk Hospital NHS Trust, and The Walton Centre NHS Foundation Trust. Further details are provided in the following section.

9.2 North Mersey Co-Design Workshops

The workshops agreed the case for change before undertaking a process of options development, including appraising a long list and short list of options, and finally recommending a preferred clinical model.

Stakeholder mapping was undertaken prior to commencing the workshops to identify which groups of staff were involved in the delivery of stroke services. This supported the ambition for workshops to be an opportunity for co-design, and ensured relevant participation based on insights and experience of service delivery. The mapping also considered staff working in co-dependent services. Based on the mapping, staff were directly invited to participate in each workshop.

A group of stroke survivors, identified by the Stroke Association, also took part in the workshops.

After each workshop, a written briefing was produced for all staff working in stroke services, which line managers and those who attended in person were tasked with cascading across their organisations. This was supplemented through inclusion in corporate communication channels. Through this process, workshop attendees were able to keep wider teams informed of the development work but also gather their thoughts and ideas to share at the following workshops.

An overview of each workshop and how the engagement informed the options development process is as follows:

Workshop 1: July 2019

The workshop provided an opportunity to discuss the current challenges in delivering hyper-acute stroke services, share ideas about service provision and begin the process of mapping out the possibilities for future stroke care.

Colleagues joined in conversations and tabletop activities to share expertise and knowledge and debate ways on how to improve care and develop and improve stroke services.

During the workshop, participants focused on a variety of issues from current challenges, through to staffing issues and how long it would take to establish the new services models at different hospitals across the area.

Key feedback obtained from the workshop included:

- More access to thrombectomy treatment is required.
- Community Rehabilitation, including Early Supported Discharge (ESD), is an integral part of a good stroke service and there is a need to develop these services alongside acute services.
- If we don't work together as a North Mersey Stroke Service, we are doing our patients a dis-service and will fail to make stroke outcomes better.
- New ways of delivering stroke services have been introduced across other parts of the country through the creation of comprehensive stroke units (hubs) in a central location with a link to local acute trusts (spoke) which have delivered significant improvement in outcomes for patients.
- There was a strong view across clinicians, commissioners, support services and patients, that stroke care could and should be improved. There was also a strong commitment to making consistently high-quality care available for all stroke patients, regardless of where they live, or are treated.

As a result:

- The case for change was validated.
- Opportunities were identified which informed the options appraisal and a long list of potential options were developed for what the new service could look like.

Workshop 2: September 2019

The session was used to score a number of potential options for how stroke services in North Mersey could be delivered in the future. It was a complex task but proved useful, as the session generated lots of important feedback which needed to be considered.

Key feedback obtained from the workshop included:

- Potential solutions have all been captured accurately and the process being undertaken is considered thorough.
- More detail, including looking at the estates and workforce implications, is required to understand impact and feasibility.
- Detailed exploration of the impact of potential solutions on co-dependent services is needed.
- Further exploration of improvement opportunities from an expanded patient perspective should be considered.

As a result:

- Further engagement sessions were delivered with stroke survivors and their families alongside the Stroke Association to capture feedback from direct users of the services to help inform the development process.
- Project leads from co-dependent service considered as critically linked to the delivery of stroke care we appointed into the project team to offer further specialist advice and input into the development of the PCBC.

Workshop 3: November 2019

The event brought together clinicians from the three acute trusts delivering stroke services across North Mersey, commissioners, stroke patients and representatives from the Stroke Association to discuss the various proposals that had been suggested for how services could be delivered.

Feedback from engagement sessions with stroke survivors and their families was shared, alongside how it applied to the review and the options development work. The discussions centred on the pros and cons for each of the service model recommendations and encouraged teams to consider which would deliver the best experience and care for stroke patients and their relatives.

Key feedback obtained from the workshop included:

- Patients and representatives highlighted that they felt that the immediate aftercare following discharge could be greatly improved. There was strong support for bringing local stroke services together in a single location; however some concerns were raised around distance to travel and the ability for emergency teams to get the patient to hospital in time.
- Some also highlighted issues around the lack of consistent support for family and friends.
- The group agreed to shortlist 5 clinical models of care that would be modelled for the impact on patients, quality, workforce, finance, activity and estate.

As a result:

- A steering group (MDT) from the three organisations was established to explore how the system can work closer together as the model for the future is developed.

Workshop 4: February 2020

During the session, attendees discussed and scored the shortlisted options for the proposal for the future stroke service model.

Key feedback obtained from the workshop included:

- There is a strong preference for the option of centralising hyper acute stroke services from the current three sites onto the Aintree site.
- Acute stroke care and rehabilitation would need to be provided by Aintree Hospital, Broadgreen Hospital and Southport Hospital.

As a result:

- Feedback was considered by the CRG and used to develop this PCBC.

The financial implications of the shortlisted options are set out in appendix 14. The summary includes costs from the changes in workforce using RCP standards plus the impact of new building and NWAS running costs. It also provides an estimated cost of the capital build for each of the options. This analysis shows that the preferred option C3 is the second most cost effective to A2 “Do nothing with enhancements”. This was a like for like comparison used for scoring the appraisal.

9.3 Pre-consultation engagement with stroke survivors and families/carers

During autumn 2019, commissioners worked with the Stroke Association to visit a number of local groups for stroke survivors, to talk about the review and gather feedback from those with experience of hospital stroke services. A full report is attached as appendix 20, however an overview of the findings is as follows:

- A majority of both stroke patients and their carers were in favour of bringing stroke services together in one single location. They could see the benefit of developing a 'centre of excellence' staffed by specialists and providing a comprehensive range of support services at one centralised location.

- However, there was both concern and some scepticism from stroke survivors and their carers that such a centre could operate without substantial changes being made to the current structure relating to admissions and post stroke support services. Much of the criticism about the treatment of stroke patients was about getting to the hospital in the first place and what happened immediately after being discharged in terms of quality, quantity and a range of support services.

- The families of stroke patients made the point that any centralised centre must have good communication/transport links and adequate car parking facilities.

- Stroke patients and their families viewed the treatment of stroke survivors as a process that should move smoothly from one phase to the next. The current treatment of stroke patients does not achieve that objective for all patients. Whilst the engagement was originally designed to get specific feedback about the potential for centralising hospital stroke services, the conversations ranged over a much broader set of issues. Respondents wanted to talk about their experiences of stroke care and life after stroke, which highlighted opportunities for improvements across several areas. Some stroke patients experienced delays in getting to hospital once stroke symptoms were confirmed and others complained about the lack of aftercare and support after leaving hospital. These shortcomings can have long lasting impacts.

- The experience of stroke survivors and their families was not defined by their hospital care alone. The review should also consider how these wider issues impact on patient outcomes, including rehabilitation support, and how they plan to be addressed.

- There are a minority of stroke patients who disagree with the concept of centralisation, favouring instead the existing provision of the three providers of stroke services. They were concerned about the elimination of stroke services close to home and doubted that ability of a centralised unit to cope with the volume of demand, particularly at a time of financial constraints and staffing shortages. They favoured increased investment in existing provision.

9.4 How engagement informed options development

The development of the preferred option and the PCBC was clinically-driven by the CRG and the workshops. The workshops also had strong and consistent attendance from stroke survivors. The outcomes from these events informed the engagement with NMSB and Joint CIC. So fundamentally, the clinicians and patients didn't just inform the development of the preferred option, but actually co-designed the option.

Engagement with stroke survivors provided an opportunity to test the case for change, and gather views from people who had lived experience of local stroke service. Headlines from the engagement report were presented to the third stroke workshop on 27 November 2019 and have influenced not only the options development process but also the awareness of areas to consider and where further insights and potential mitigation may be required. These areas were explored further during the formal consultation process.

The principle of realigning hospital services based on an integrated city-wide approach, has been part of ongoing discussions with local communities across North Mersey over the last few years under the umbrella of the Healthy Liverpool Programme, the One Liverpool Plan, the Shaping Sefton Plan and Liverpool University Hospitals NHS Foundation Trust's Integration Programme.

Priorities around hospital treatment have been a recurring theme across engagement activities delivered within recent years, and people have consistently ranked being offered the same, high standard of treatment regardless of where treatment takes place as their priority, very closely followed by being seen by the right staff who are experts in the treatment/management of their condition. Short travel time for one off appointment such as surgery has been the least important priority. However, wanting to travel as little as possible has been highlighted to patients and local communities on several occasions. The recent trauma and orthopaedics consultation identified willingness to travel for the majority of participants as a maximum of 45 minutes for an elective admission.

The consensus generally from system-wide engagement has been that having the highest standard of treatment and being seen by the best staff for their health care needs is more important to people than the location of treatment. However, generally people do want care as close to home as possible. This has been shown as especially important for the elderly, those with multiple/long term conditions and those without transport.

Collectively, the existing system feedback and the feedback obtained from those with lived experience of stroke services highlighted the importance of an integrated end to end pathway for stroke patients; which has been referred to throughout this document. The North Mersey Stroke Board is focussed on the three key work streams of Acute Care, Thrombectomy services and Community Rehabilitation.

9.5 Wider Cheshire and Merseyside engagement

The North Mersey Stroke Board and the CRG membership includes the Cheshire & Merseyside Integrated Stroke Delivery Network (ISDN) lead, and the Clinical Network Manager, who throughout the development of the PCBC advised on the work undertaken both locally and nationally to ensure the North Mersey plans are aligned.

A meeting with the lead clinician at St Helens and Knowsley Teaching Hospitals NHS Trust took place on 3rd February 2020, to discuss North Mersey plans and lessons learnt from the Mid Mersey merger of stroke services. The North Mersey plans have also been presented to the North West Strategic Clinical Networks (SCN) Stroke Leaders meeting held on 18th February 2020.

Clinical commissioning groups will be abolished at the end of June 2022, when their current responsibilities will transfer to Integrated Care Boards (ICBs). As the review will still be ongoing at this point, final decision-making will rest with the Cheshire and Merseyside Integrated Care Board (ICB), which will be established on 1 July 2022. In preparation for this, the consultation findings were presented to the Cheshire and Merseyside Joint Committee of CCGs during May 2022, and an update was given to the Shadow ICB for Cheshire and Merseyside on 9 June 2022. The ICB will be asked to approve the final business case at its meeting on 4 August 2022. In addition, as the proposal also impacts patients in West Lancashire, it will be put to the ICB for Lancashire and South Cumbria on 27 July 2022.

9.6 Staff engagement

Structured staff engagement plans for Liverpool University Hospitals NHS FT, Southport and Ormskirk NHS Trust and The Walton Centre NHS FT were developed to ensure that communication and engagement remained a strong focus throughout the project.

This approach provided staff with an opportunity to receive information and updates, and further contribute to shaping and influencing plans for the future. The intention is to continue workshop events through the process of development and approval of a full business case.

9.7 Public consultation

In autumn 2021, a plan for a 12-week public consultation on hyper-acute stroke services was approved by the North Mersey Joint Committee, before being presented to the Joint OSC which had been formed to scrutinise the proposals.

Public consultation began on 22 November 2021, running until 14 February 2022. It presented a preferred option for the creation of a single Comprehensive Stroke Centre on the Aintree University Hospital site, which would receive all patients believed to have had a stroke.

The process was led by NHS Liverpool CCG, working alongside communications and engagement teams from the five CCGs and three trusts involved in the review.

A full report into the public consultation is available as appendix 20, but this section provides a summary of the activity and findings.

A range of methods were used to engage people during the consultation, including:

- An online questionnaire seeking views and feedback about the proposal, with paper copies and alternative languages/formats available on request.
- A dedicated phoneline, so that people could provide feedback over the phone.

- A virtual event hosted by stroke clinicians, which included an opportunity for people to take part in small focus-group discussions.
- Attendance at external groups and events, including those led by the Stroke Association

A range of assets and materials were produced to support the consultation, including: an overview booklet (also available in summary and Easy Read versions); standard presentations for use at events and meetings; video content; website graphics and content; and social media content. These materials were compiled into a toolkit for stakeholders and partner organisations, including local NHS organisations, the Stroke Association, local authorities, housing associations, Healthwatch and local voluntary and community sector organisations.

Liverpool University Hospitals and Southport and Ormskirk Hospital wrote to patients who had used stroke services during the previous two years (Oct 2019 – Oct 2021), to highlight the consultation and encourage people to share their views.

In total, 580 people completed (in full or in part) the questionnaire, and 55 people participated in online or phone qualitative engagement sessions. Therefore, In total, more than 630 people, took part in the consultation.

Again, the report in appendix 20 provides a full overview of the feedback, but key findings include:

- 44% (255) of respondents agreed that bringing staff from different hospitals together to create a Comprehensive Stroke Centre at Aintree University Hospital was the best plan for improving the care people receive in the first 72 hours after having a stroke. 32% (183) said no, 13% (77) said partly, and 11% (65) were not sure.

- Similar themes appeared to those which arose during 2019 engagement with stroke survivors and their families. Most were in favour of bringing stroke services together and could see the benefit of providing a comprehensive range of support services at one location. However, there were concerns about admissions and post-stroke support services.

- Some staff who responded to the questionnaire expressed concerned about there being enough staff with the right skills. Others were concerned about specialist stroke staff being taken from Southport Hospital and the Royal Liverpool.

- 47% of respondents felt the proposal could be improved or partly improved. These respondents were in favour of improving existing services and facilities as opposed to creating a completely new Comprehensive Stroke Centre at Aintree.

- Ambulance availability, travel times, and impact of visitors were raised as issues.

- 52% of people said they would be happy to be treated at a hospital that was further away from the one they might be treated at now if it meant they would be getting the best care –40% indicated that they would not be happy with this arrangement. Younger people were more supportive of the idea of travelling greater distances to get the best care.

9.8 Follow-up from public consultation

The public consultation report and key findings will be published with an update on the final decision-making process.

The feedback received indicates a number of areas for potential development/action, including:

- It was clear from feedback that there remains concern that any increase in ambulance journey times could have a negative impact on patient outcomes, even if it means patients being taken to a hospital that is better equipped to diagnose and treat quickly. Further announcements about the implementation of the change, and any supporting patient materials developed for the new service, should continue to emphasise the clinical benefits of being taken to the Comprehensive Stroke Centre, even if this means a slightly longer journey.

- Concerns were raised about the potential impact of increased journey times on some visitors. This could be further explored through additional patient experience work, once the service is implemented, to understand the true impact of the change for visitors, and if any further mitigations need to be considered.

- Opportunities for providing further views and feedback should be set out in patient materials, which should also contain information about local travel and transport options. In addition, materials should clearly explain the process for transferring patients to Broadgreen or Southport Hospitals after 72-hrs, where this is closer to the patient's home.

- There has been ongoing staff engagement around the stroke review, however some staff used the consultation to highlight concerns. Opportunities for staff to raise issues and provide input should continue to be promoted.

- More generally, further work is needed to ensure that people from across our diverse communities are encouraged to take part in consultation and engagement.

10 Clinical Senate Review

This section will discuss the review undertaken by the clinical senate and the feedback provided.

Liverpool CCG (on behalf of Knowsley CCG, South Sefton CCG, Southport & Formby CCG and West Lancashire CCG) commissioned the NW Clinical Senate to undertake an independent clinical review, in line with the NHS England & Improvement stage 2 assurance process of proposed models of care for the future delivery of stroke services in the North Mersey area.

The review was held on 26th and 27th April 2021.

The review considered the future provision of hyper acute and acute stroke care across the North Mersey Area. This included the case for change, preferred model and decision-making process.

The panel fully support the direction of travel and agree the preferred option will benefit patients and services; additional evidence is required to enable the review team to provide the clinical assurance required. The evidence will be provided as the work progresses and the full business case is written.

Additional information is required on the following areas:

- Clinical governance arrangements
- Recruitment and retention plan
- IT and digital plans
- Funding of Early Supported Discharge across all CCGs.

*11 **Programme Management***

This section will discuss the programme governance and implementation.

Project Governance

The current governance arrangements would be maintained to manage the implementation. This will be multi-disciplinary approach using the North Mersey Stroke Board and the LUHFT Stroke Integration Project Team as the drivers.

The North Mersey Stroke Board is a Partnership Board having senior leadership representation from the three Trusts, the Board is created to have overall oversight of the Stroke Programme and portfolio of projects, assure the outputs of the programme are delivered, address any programme risks and issues.

The leadership will ensure the programme develops a robust proposal for system wide models of end-to-end care and form making recommendations to the Joint Committee and Committee in Common, CCG Governing Bodies and respective Trust Boards.

The Project Team with the support of operational managers from S&O NHS Trust and LUHFT with additional support from the LUHFT Integration Team (PMO) will provide the necessary programme support through the life cycle of the project. The clinicians' involvement will continue in the implementation phase as set out in the staff engagement plan.

The Stroke Integration Project Team is authorised by the North Mersey Stroke Board and will report to the LUHFT Specialist Medicine meeting and through appropriate Southport and Ormskirk NHS Trust forum.

12 Summary of key changes from PCBC to FBC

This section highlights some key changes since the development of the PCBC

12.1 S&O Amendments to Proposed Model

Inpatient Rehabilitation for Stroke

Southport and Ormskirk NHS Trust stroke ward nurse staffing establishment has been calculated utilising the North Mersey Stroke and Royal College of Physician published ratios in conjunction with a practical review of the estate and care needs of the patient group using professional judgement. The Trust undertakes a staffing establishment review every 6 months using the safe care nursing tool and therefore the establishment for the ward has undergone scrutiny several times previously. The reduction of hyper-acute strokes resulting in a reduction of three beds does not enable the staffing establishment to be reduced, as the reduction is too small and based on the bed base alone would pose significant risk to patient safety, outcomes, and experience.

To provide scrutiny and critical analysis of the stroke nurse ward staffing establishment, a point prevalence task has been urgently undertaken. The considerations that informed the establishment were founded based upon the enhanced care needs of patients on the stroke ward demonstrating a significantly higher than average care requirement to fulfil activities of daily living. This point prevalence has demonstrated and confirmed the increased support requirements of the cohort of patients with 16 patients assessed with 12 meeting the '1B' criteria, 3 patients meeting 1A and 1 patient requiring constant 1:1 enhanced care (supervision). The frailty and age profile of the patients further challenges the support and care needs as well as making recovery and rehabilitation slower and more complex. The age range of the patients is from 44 to 88, however on removing the two patients age 44 and 45, the average of the remaining patients is 81 years. On reviewing the opportunities and provisions of care prior to admission most patients lived at home a relatively independent life, many with family or care support in place. However, the opportunity to rehabilitate and recover functionally post-stroke has indicated that only 1 of the 16 patients is anticipated to return home unsupported, every other patient is requiring care to be put in place, a placement to be arranged providing 24hour care, or they are identified as at end of life. This further supports and demonstrates the requirement for the staffing model in place and following the review of the information provided at point prevalence and clinically critically reviewing this, there is no opportunity to reduce this establishment and deliver safe and high-quality care, maintaining good patient and staff experience.

Stroke Specialist Nurses

The number of specialist nurses has also been increased from the outline PCBC within the Southport and Ormskirk model to reflect the high number of suspected stroke patients who self-present directly to the Emergency Department. Specialist nurse cover will be available in the revised model to support this cohort of patients in the event the patients cannot be safely transported across to the HASU within the required timescales. This is to mitigate the potential clinical risks due to the current operational pressures in NWAS and the extended travel time from Southport to Aintree. This will continue to be monitored going forward and if this risk reduces there may be an opportunity to adjust the specialist nurse cover at Southport.

There is a requirement to review the specialist nurse job descriptions for the Southport and Ormskirk nurses, recognising the current difference in banding when compared to other trusts in Cheshire and Merseyside. The job description review will enable rotational roles across the North Mersey Network.

Summary

In conclusion there has been some variance against the initial PCBC bed base, workforce and subsequent financial data. Clinical and operational assurance provided demonstrates that it is reflective of Southport and Ormskirk's current position to deliver safe and high-quality care, maintaining good patient and staff experience. The Trusts current staffing cost is required due to the small reduction in the bed base compared to the PCBC.

There will be no additionality or recruitment required. Workforce sustainability is progressing as a Network to ensure adequate staffing and skills at the correct renumeration within the stroke clinical workforce.

12.2 Stroke Assessment

The Stroke Assessment / ED assessment area staffing requirements were omitted from the PCBC, the staffing requirements for this can be seen in **section 6.4** and the cost implications of this can be seen in more detail in **section 7.2**

12.3 Radiology

The PCBC had allocated £90k to radiology for the increased scanning requirements, however on review the financial requirements is substantially more, for more detail on this see **section 6.6.2**

12.4 Pharmacy

The PCBC highlighted an efficiency saving of £107,000 on review of this and considering the requirements to ensure patents flow is adequately supported this now has a cost implication, for more information see **section 6.6.3**

12.5 NWAS

The PCBC set out the total costs for NWAS to be £175,00 per annum, having reviewed the requirements NWAS have provided updated costs for substantially more, for more information on this see s**ection 6.6.1** and **Appendix 9**

12.6 Bed Numbers

As mentioned withing the S&O amendments to proposed model the bed numbers discussed in the PCBC for S&O differ from what the ask is now, for reasonings see **section 12.1.** For continuity throughout the FBC the bed numbers discussed are what was originally modelled within the FBC, whilst there is acknowledgment and support to not decrease the bed numbers at S&O as previously suggested in the PCBC due to recent pressures, its is envisaged this we be reviewed every 6 months

13 References

Ref 1 Stroke Association 2013; Lesniak, 2008

Ref 2 Williams, 2005; Pohiasvaara et al, 2001

Ref 3 Royal College of Physicians 2016

Ref 4 One Liverpool

https://www.liverpoolccg.nhs.uk/about-us/publications/one-liverpool-2019-2024/

Ref 5 Sefton Care and Transformation Programme – Shaping Sefton

https://www.southseftonccg.nhs.uk/what-we-do/our-5-year-strategy/

Ref 6 West Lancashire – Building for the Future

https://www.westlancashireccg.nhs.uk/building-for-the-future/

Ref 7 Acute Sustainability Programme – Cheshire and Merseyside Health Care Partnership

https://www.cheshireandmerseysidepartnership.co.uk/our-work/delivering-care-more-efficiently/acute-sustainability

Ref 8 was ref 6 National stroke strategy 2007 page 23

Ref 8 Impact and sustainability of centralised acute stroke services in English Metropolitan areas: retrospective analysis of hospital episode statistics and stroke national audit

Ref 9 Recommended by SNNAP and also in research "Feasibility of a hyper-acute stroke unit model of care across England: a modelling analysis"

Michael Allen1,

Kerry Pearn1,

Emma Villeneuve1,

Thomas Monks2,

Ken Stein1,

Martin James3

https://bmjopen.bmj.com/content/7/12/e018143

Ref 10 Stroke Services: Configurations Decision Support Guide, Tony Rudd and Nighat Hussain, 2015

Ref 11 National Stroke Strategy 2007

Ref 12 Emberston et al (2014) Lancet. https://doi/10.1016/S0140-6736(14)60584-5

Ref 13 Morris et al (2014) impact on centralising acute stroke services in English metropolitan areas on mortality and length of stay: difference-in-difference analysis BMJ2014;349: g4757

Ref 14 Standards for providing safe acute ischaemic stroke and thrombectomy services P White et al (September 2015)

Ref 15 National Clinical guidelines for stroke, Intercollegiate Stroke Working Party

Ref 16 https//www.happy-hearts.co.uk

Ref 17 2016 National Clinical Guidelines for Stroke

Ref 18 Page 15 of this document sets out the case study:

https://www.nice.org.uk/Media/Default/About/what-we-do/Into-practice/measuring-uptake/NICE-Impact-stroke.pdf

Ref 19 Wider context of Long-Term Plan and Specialised Services

https://www.england.nhs.uk/wp-content/uploads/2018/09/spotlight-on-specialised-services.pdf

14 Appendices

Please see attached zipped file for the below appendices

14.1 **Appendix 1 – Service Pathway**
14.2 **Appendix 2 Cheshire and Merseyside Stroke numbers 2013-2020**
14.3 **Appendix 3 – Workforce Plan and Financial Modelling**
14.4 **Appendix 4 Benefits Realisation Plan**
14.5 **Appendix 5 Integrated Stroke Team Model**
14.6 **Appendix 6 Clinical Activity Assumptions**
14.7 **Appendix 7– Risk Register**
14.8 **Appendix 8 - Travel times**
14.9 **Appendix 9 – NWAS Optima Report**
14.10 **Appendix 10 - Northwest Ambulance Service increase in activity (Based on 18/19 Activity data**
14.11 **Appendix 11 Quality Impact Assessment**
14.12 **Appendix 12 Equality Impact Assessment**
14.13 **Appendix 13 Sensitivity Analysis**
14.14 **Appendix 14 Model data**
14.15 **Appendix 15 North Mersey Stroke Board Terms of Reference**
14.16 **Appendix 16 Clinical Reference Group Terms of Reference**
14.17 **Appendix 17 Long List of Options Appraisal**
14.18 **Appendix 18 Shortlist Scoring for Preferred Option**
14.19 **Appendix 19 North Mersey Staffing Standard**
14.20 **Appendix 20 Final Report Stroke Public Consultation**
14.21 **Appendix 21 Public Consultation Mitigations**