Hyper Acute Neurology Unit (HANU) Evaluation

Final Report

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# Hyper Acute Neurology Unit (HANU) Evaluation

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Executive Summary

The Hyper-Acute Neurology Unit (HANU) is a new model for managing acute neurology hospital inpatients and Emergency Department (ED) attendees. UCLPartners (UCLP) Academic Health Science Network (AHSN) was commissioned by the London Neuroscience Strategic Clinical Network (SCN) to undertake an evaluation of a series of pilots of acute neurology services in London where recent service delivery changes have been introduced, in order to evaluate whether the introduction of the Hyper Acute Neurology Unit (HANU) model could contribute to a more responsive and clinical effective service for patients who attend the ED or are admitted with a neurological condition.

This project aimed to describe the common presenting problems and diagnoses of patients attending London ED with an acute neurological problem; explore the components that facilitate patient flow and effective care including medical records and appropriate referrals; and preliminarily evaluate whether HANU models achieve better outcomes for patients with a neurological presentation. This report sets out the quantitative and qualitative analysis of the impact and operational processes of the HANU pilot in two hospital sites and maps the care pathway for acute neurology patients across three areas (see Figure 1):

![Figure 1. Report outline.](image)

Models

Based on the available data from two hospital sites a number of preliminary findings are presented below.

There were two different models of acute neurology implemented during the pilot. The HANU model piloted at King’s College Hospital consisted of two devoted HANU Specialist Registrars (SpRs) during the day, with support from the on call stroke SpR at night. Patients were seen within four hours of their arrival. If patients did not require admission they would be discharged directly from ED and follow up appointments could be made in the HANU clinics in the MAC (Medical Assessment Centre, daily acute review clinics). Patients that required admission would be admitted to one of the two acute medical wards. The HANU model
piloted at University College London Hospital (UCLH), included a neurology SpR and consultant who were on call during the day, with support from the on call stroke SpR at night. The HANU team took referrals directly after triage from ED. Patients were typically seen within 30 minutes from the time of referral while still in ED. Patients that required admission would be admitted, either under the care of a neurology consultant or a medical consultant on AMU. There was also capacity within the HANU service to rapidly follow up patients as outpatients using a dedicated room in Ambulatory Care.

Key Findings

King’s College London Hospital ED data:

- There were 3695 neurology presentations in ED in the three months prior to HANU and 3624 neurology presentations during the three month HANU pilot.
- In the ED there was an increase in neurology input for headache (23.5%) and epilepsy (21.9%) patients’ post-HANU, compared to neurology input prior to HANU, 13.7% and 8.0% respectively.
- For inpatients admissions neurology input was significantly higher post-HANU for both headache (22.6%) and epilepsy (15.4%) patients, compared to input prior to HANU, 10.4% and 3.3% respectively.
- Fewer Parkinson’s disease patients than anticipated were captured in the ED data, however all identified cases of Parkinson’s disease patients that were seen had presented as a consequence of falls resulting in injury.
- Post-HANU there was a 100% increase (5.5% to 11.2%) in epilepsy patients who were referred to the neurology outpatient department.
- Few readmissions were observed to the ED among the headache, epilepsy and Parkinson’s disease patients during the HANU period.

King’s College London Hospital HANU data:

- The HANU team saw 232 referrals (6.4% of the ED presentations), during the 3 month pilot period.
- The majority (88.0%) of HANU’s referrals were during the hours of 9am-5pm Monday to Friday.
- There were 38 different presenting problems and 106 different primary neurological diagnoses recorded by the HANU team.
- Epilepsy/seizures (26%) and headaches (24%) were the most common neurological disorders assessed. While, Parkinson’s disease was rarely reported as a primary diagnosis (2%) though more often as a secondary diagnosis (11%).
- HANU only patients had the lowest average Length of Stay (LOS) (2.4 days) when compared to joint care patients (MAU and HANU) (6 days), MAU only patients (7 days), and tertiary neurology patients (17.7 days).
UCLH Hospital ED data:

- The ED saw 261 neurology referrals in the two months prior to HANU and 191 neurology referrals during the two month HANU pilot. This data appears to be an underrepresentation of actual referrals due to the high percentage (74.0%) of missing data for patients’ primary diagnosis and compared to the number of referrals seen at King’s.
- There were fewer readmissions (in a 30 day period) for headaches (13.9% vs 3.8%) and epilepsy (6.1% vs 0%) patients’ post-HANU.
- During the implementation of HANU no neurology patients were discharged from ED without further follow up and a greater proportion of patients were referred as an outpatient or transferred to another health care provider post-HANU.

UCLH HANU data:

- The HANU team saw 356 referrals during the two month pilot period.
- On average the HANU team were able to respond to a request to see patients within 26 minutes.
- The majority of referrals came directly from ED (31.5%) or other wards within the hospital (30.6%).
- Headaches (25.8%) and seizures (21.8%) were the most commonly reported neurological diagnoses. Parkinson’s disease represented only 1.2% of patients during the HANU pilot.

Qualitative feedback:

- Quicker access to a neurology specialist and an increased involvement and ‘named cared’ of patients by neurologists.
- Rapid diagnosis and discharge with early consultant input, reducing the potential for inappropriate admissions.
- Increased neurological support in ED and the availability of rapid discharge services (MAC and ambulatory care) resulted in fewer admissions to the medical wards.
- An increase in workload for neurology staff particularly at the SpR level.
- Insufficient resources were available for the pilot period in terms of junior and administrative support.
- The majority of patients were seen by HANU during daytime hours, identifying an important implication for staffing timetables.
Conclusions

Based on a review of the outcomes, the different models of delivery and the qualitative data available for the evaluation of two HANU pilots, the following conclusions are made:

1. A seven day consultant led acute neurology service may improve the patient experience of care by providing timely diagnosis and a more appropriate management plan.

2. Common conditions such as headache and epilepsy clearly benefit from early involvement of neurology consultants and trainees. Patients with a first suspected seizure or with ongoing seizures need to be referred into specialist pathways as a matter of course as outlined by National Institute for Health and Care Excellence (NICE) guidelines. This study suggests that dedicated neurological input can facilitate this.

3. Early neurology input may be beneficial by identifying uncommon or complex disorders that are not recognised by non-neurological specialists particularly at the time of acute presentation and may therefore reduce the need for unnecessary tests to establish a rapid diagnosis.

4. The data also suggests that the model may be associated with a reduction in re-admission rates, in particular for headaches and epilepsy patients.

5. The findings from the study also suggest that the model may have additional benefits arising from rapid follow up in outpatient clinics which might further reduce ED visits and unplanned hospital admissions.

6. The HANU model has demonstrated potential benefit on important elements of the care pathway (ED and MAU/AMU) but substantial further impact on patients with neurological long term conditions will need more proactive primary and community support to avoid unscheduled emergency care (e.g. the development of an integrated care approach to falls prevention in the community for patients with PD). This suggest that HANU may be most effective if integrated with a substantial re-design of the pathways for patients with long-term neurological conditions. (Note - additional work by the London Neuroscience SCN and UCLPartners has shown that urinary tract infection is the main precipitant of A and E and hospital admission in patients with Multiple Sclerosis. A specialist multidisciplinary approach working with patients and careers should be established to improve point of care testing, rapid diagnosis and early treatment of infection for patients at home).

Recommendations

Based on a review of the outcomes, the different models of delivery and the qualitative data available for the evaluation of two HANU pilots, the following recommendations are made:
1. The development and further evaluation of the HANU model should be undertaken as part of a wider restructuring of the integrated care pathways for patients with long-term neurological conditions.

2. The following factors should be considered in the implementation and development for the HANU model as part of an integrated pathway:
   a. Service level design and development of pathways for patients with neurological long term conditions including primary and secondary care health services and social care services. Consideration should be given to whether or not the pathways should be built around single disorders (e.g. headaches, seizures multiple sclerosis and Parkinson’s disease) or groups of disorders (for example multiple sclerosis and Parkinson’s disease) which share common elements of care.
   b. Staff engagement at all levels prior to service re-design and introduction of the new service. Clinical directors, GP lead and social care managers as well as patients and careers should also be involved in the design of the new services.
   c. Implementation should be phased and consideration be given to building pathways initially around a single disorder in the first instance (e.g. multiple sclerosis or headaches).
   d. Patients should be referred into appropriate follow-up and specialist pathways as a matter of course as outlined by National Institute for Health and Care Excellence (NICE) guidelines. This will promote increased adherence to the NICE guidelines (e.g. after a first suspected seizure)
   e. The units in this evaluation were based in large regional neuroscience centres. The challenges (particularly around staffing) of providing HANU services on a seven-day basis in district general settings will be different and will require evaluation of other possible solutions including working across pathways such as alignment with acute stroke management and tele-health models.

3. The components of the new services should involve:
   a. A comprehensive assessment of patient need including the need for joint neurological, general medical and social care working which results in a collaboratively developed, written and/or digital care plan
   b. A stepped-care approach to patient care where the least intrusive most effective interventions are provided first (e.g. a consultant outpatient appointment or a specialist nurse lead community clinic) but with a built in self-correcting mechanism so that if more intensive care is needed, patients can be stepped up to such care.
c. Routine outcome monitoring using disease appropriate measures (this provides a basis for the self-correcting mechanism). This should also include patient experience and patient activation measures.

d. Adaptable levels of care which are also appropriate for high need patients. This includes complex care packages which can be delivered by multi-disciplinary teams and which link in with community based services with the aim of preventing inappropriate ED attendances and inpatient admissions.

4. These developments should be subject to further piloting and a formal evaluation which should:

   a) Design and pilot new pathways of care as set out above.

   b) Evaluate the impact on clinical outcomes for people being managed by the new models compared to existing pathways in a series of feasibility studies and then in large multi-centre studies. This should also include metrics of patient experience and patient activation.

   c) Evaluate the performance of the models in terms of clinical and cost-effectiveness and access to care.

If adopted these recommendations will place the SCN in a central role in the re-structuring of care for people with neurological long term conditions, significantly improve quality of life and providing more cost-effective care.
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<td>A&amp;E</td>
<td>Accident and Emergency</td>
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<td>AHSN</td>
<td>Academic Health Science Network</td>
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<td>AMU</td>
<td>Acute Medical Unit</td>
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<td>CT</td>
<td>CAT scan</td>
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<td>ED</td>
<td>Emergency Department</td>
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<td>EEG</td>
<td>Electroencephalogram</td>
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<td>HANU</td>
<td>Hyper Acute Neurology Unit</td>
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<td>HASU</td>
<td>Hyper Acute Stroke Unit</td>
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<td>ICD-10</td>
<td>International Classification of Diseases – version 10</td>
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<td>ITU</td>
<td>Intensive Therapy Unit</td>
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<td>KCL</td>
<td>King’s College London</td>
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<td>LOS</td>
<td>Length of stay</td>
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<td>MAC</td>
<td>Medical Assessment Centre</td>
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<td>MAU</td>
<td>Medical Assessment Unit</td>
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<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<tr>
<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>NR</td>
<td>Not recorded</td>
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<tr>
<td>OPD</td>
<td>Outpatient department</td>
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<tr>
<td>SCN</td>
<td>Strategic Clinical Network</td>
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<tr>
<td>SHO</td>
<td>Senior house officer</td>
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<tr>
<td>SpR</td>
<td>Specialist registrar</td>
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<tr>
<td>UCLH</td>
<td>University College London Hospital</td>
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<td>UCLP</td>
<td>University College London Partners</td>
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1 Introduction

1.1 Context of the Report

Over four million people in England are living with a neurological condition. While the NHS invested £3.3 billion in neurological services in 2012-13, there are still substantial inconsistencies in the services patients with neurological conditions receive. Sixty four percent of neurological admissions to a hospital are on an emergency basis and more than half of the neurological program budget is spent on unplanned admissions (2012-13). For example, emergency admissions for epilepsy alone cost the NHS £70 million per year. A recent parliamentary report found that 88% of patients with a neurological condition do not have a written care plan.

The term “acute neurology” refers to the neurological care a patient receives on entering the health system via emergency or urgent care routes. Patients may be previously undiagnosed (new acute conditions) or have an existing condition that has suddenly deteriorated or a co-morbidity has initiated the need for emergency attendance. 464,000 patients received inpatient neurological care in England in 2013/14. Most patients with an acute neurologic illness are not primarily managed by neurological specialists but by general physicians, care of the elderly physicians, or ITU staff with or without advice through consultative visits or by telephone support from specialist regional centres.

The longstanding neurological service structure has resulted in access to neurological expertise based on a consultancy model with most activity managed in outpatients with few neurologists involved in acute admissions. In addition, this is compounded by unresponsive access to important diagnostic tests e.g., MRI. An organisational audit conducted by the London Neuroscience Strategic Clinical Network (SCN) in 2014 found that within the provision of neurological services in London there were no hospitals where patients with a primary neurological diagnosis are systematically admitted under a neurology specialist. Evidence from other emergency models developed in the UK indicates that admissions, length of stay and diagnostic error can be reduced with early access to a specialist opinion which improves patient outcomes and supports best use of NHS resources.

The SCN sought to implement new models of care for patients with a neurological emergency. With the cooperation of hospital sites the SCN proposed to develop and evaluate new services that aimed to provide neurology patients with timely access to neurological opinion, investigation and treatment. It was the intention that for patients with a primary neurological diagnosis, the main responsibility and primary neurological input in care at admission in ED should sit with the neurologist. Their proposal aimed to evaluate new acute models of working, as a means of defining the additional benefit that can be expected following the implementation of agreed quality standards.
This report was commissioned by the London Neuroscience SCN and presents the evaluation of Hyper Acute Neurology Unit (HANU) models operating in two London hospitals. This report includes:

- A description of the HANU approach.
- An outline of the pilot models/pathways.
- Quantitative data supplied by the hospitals, including both routinely collected ED and inpatient data and HANU specific data relating to understanding the pathway for acute neurology patients.
- Analysis of qualitative interviews in order to evaluate both process and outcome related components of HANU.
- Conclusions and recommendations for the future development of HANU models are presented.

1.2 Aims and Objectives of the Evaluation

The aim of this project was to evaluate a new model of care for patients presenting at a hospital with acute neurological conditions. The primary objectives are outlined below.

1. Evaluate the impact on care and clinical outcomes for people being managed by the new models compared to existing pathways.
2. Evaluate the performance of the models in terms of effectiveness and efficacy in the use of NHS resources, and access to care.
3. Recommend where new models might be further developed, to provide opportunities for joint working, across provider trusts and within the broader context of care.
4. Provide recommendations of shared learning for other acute providers wanting to carry out similar pathway changes.

1.3 Recruiting Hospital Sites

The SCN invited expressions of interests from hospitals to participate in this evaluation. Initially, seven hospitals expressed interest to the SCN in providing a HANU service and for participating in the evaluation aspect. Through consultations with the SCN the Project Team felt that four hospitals would provide a sufficient number to meet the funding, scope, objectives and timeframe for a pilot study. Six hospitals submitted proposals to the SCN and were considered based on pre-defined criteria including: possesses available resources to implement a HANU according to quality standards (see Appendix 1), ability to meet timeline requirements, ability to provide sufficient data for analysis and measurement of explicit outcomes, and site recruitment to be signed off by the relevant Manager/Clinical director prior to the commencement date. Following the initial recruitment phase, four hospital sites were selected by the SCN based on their ability to meet the outlined criteria.
Prior to the implementation of the HANU models, extensive consultations were held with key staff at each hospital and observations of the current services were conducted in order to provide a full description of the current and proposed services in each site against the key standards developed by the SCN. All sites were committed to implementing an intervention and felt able to deliver the components required for the evaluation.

During the pilot period one of the pilot sites withdrew from the evaluation due to staffing issues. Due to the late stage in the evaluation it was not feasible to recruit a new hospital into the pilot. Furthermore, during consultations it became apparent that the Royal Free Hospital NHS Foundation Trust, who introduced a functioning acute seven day neurology service in 2014, were already meeting many of the standards outlined by the SCN and were unable to introduce a specific change during the evaluation period that warranted evaluation. The Royal Free Hospital NHS Foundation Trust provided specific information concerning the structure and process of their acute neurology service and this is included in Appendix 2. Separate to this evaluation, Imperial College Healthcare and St George’s Healthcare implemented acute neurology units which are described in Appendix 3 and 4. The two hospital sites discussed in the main body of this report are King’s College Hospital NHS Foundation Trust and University College London Hospital (UCLH) NHS Foundation Trust.

2 Methods

This project has three components:

a. A description of the pathways and operation of the HANU models against key standards (i.e., in terms of structure and process);

b. An exploration and analysis of the quantitative data available on the operation and outcome of the HANU models.

c. An analysis of qualitative data from semi-structured interviews with staff and patients involved in the HANU model.

Together each component will provide evidence to inform the possible implementation of the new models of HANU based on their performance against the standards developed by SCN, looking at quality, safety and efficiency.

2.1 Mapping the Pathways

The first step was to map the current acute neurology pathway before implementation of the HANU service. As an initial benchmark the neurology leads at each hospital mapped their former services and intended changes against the standards for HANU set out by the SCN (see Appendix 1). Additionally, observations were conducted at the two hospital sites both before and after the implementation of the HANU models. The observations again mapped the current pathways in the units and aimed to familiarise the project staff with the hospital and
neurology setting and facilitate working relationships between the project staff and HANU staff. Finally, qualitative data, described in detail below (section 2.3), provided further information on the acute neurology pathway pre- and post-HANU.

2.2 Integrating Hospital Data

Prior to the commencement of the models the Project Team developed a dataset template based on available knowledge regarding routinely collected hospital data and the key outcomes for the pilot. Each hospital identified the appropriate contact for collating the data and liaising with the Project Team for accessing data. It was anticipated that baseline data would be available from July to September 2015. Following the implementation of the HANU model in early October 2015, baseline data was compared with follow up data from October to December 2015. King’s College Hospital were able to provide comparison data for the specified period above. UCLH experienced a delay in commencing the HANU model and started in early November, with baseline data available from September to October 2015 and follow up data available from November to December 2015.

While data was collected on the overall presentation of all neurological disorders, the Project Team proposed that data collection should focus the detailed evaluation of the new model on specifically three ‘marker’ presentations/disorders. Adopting such a focus was intended to facilitate good quality data collection and provide representative samples of the activity and impact of the new services. The presentations/disorders were headaches, seizures and Parkinson’s disease (PD). These were chosen since headache and seizures are two of the most common reasons for emergency presentation and PD is one of the most common long term neurological conditions affecting at least 130,000 people in the United Kingdom (UK).³

The HANU models were evaluated against selected standards developed by the SCN. The list below outlines the standards covering key structural, process and outcome variables, with the full list provided in Appendix 5. The particular set of standards were determined by the ability of each site to reliably collect and facilitate access to routinely collected data in order to ensure consistent reporting.

- The number of people attending the Emergency Department (ED) with an acute neurological problem
- The number of people attending ED with target problems (i.e., seizures, headaches, and Parkinson’s disease)
- Demographics for the target sample
- Time taken to receive a neurological assessment
- Initial neurological diagnosis
- Use of and access to diagnostic services (CT, MRI, EEG, and lumbar punctures) and outcomes of diagnostic services
- Amendments to the initial diagnosis
• Readmission rates for people presenting with an acute neurological problem where available
• Action
  ▪ Admission – where
  ▪ Discharge – where
  ▪ Care plan - Y/N

In order to capture this information, ED, acute medical unit (AMU)/inpatient and HANU datasets required integration and linking using de-identified patient codes. Where possible both descriptive and comparative data were presented. However, the quality and reliability of the routinely collected hospital data varied across departments and sites.

2.3 Qualitative Interviews with Staff and Patients

Qualitative interviews were conducted with three samples of participants:
1. patients with an acute neurological problem;
2. non-neurology staff; and
3. both junior and senior neurologists.

The aim of the interviews were to capture the impact of the HANU model on staff and patients’ experiences. Interviews were conducted after at least one month following the implementation of the HANU model; November 2015 in King’s College Hospital and December and January 2015 in UCLH. Participation in interviews was entirely voluntary. The interviews took approximately 20 minutes and were audio recorded. Audio recordings were subsequently transcribed (in a de-identifiable manner at an individual level) for the purpose of analysis, before being destroyed. Interviews were conducted in a private office or space in hospital sites. The interviews were facilitated by Dr Bianca Reveruzzi.

Guided by the findings of the baseline quantitative data, a set of questions were developed by the Project Team aimed at capturing the process of and challenges in delivering HANU services. Interviews were conducted using a script of pre-defined open-ended questions (see Appendix 6). Follow up questions were asked by the interviewer where appropriate in order to provide clarification and/or further detail.

3 Description of the Pathway in each Service

Development of the acute neurology pathway in each service were guided by the 24 standards outlined by the SCN (Appendix 1). In order to evaluate the implementation of these changes the Research Team reviewed the proposed changes made by the neurology leads at each hospital, provided a description of each service in terms of staffing, processes and infrastructure and conducted formal observations to discern and report on the changes.
3.1 Mapping the Proposed Changes against the Standards

Prior to the implementation of the HANU models, both sites completed a checklist describing how the proposed models were expected to comply with the acute neurology standards outlined by the SCN. Tables 1 and 2 outline the proposed changes based on how the HANU services were expected to meet the SCN standards. The full outline of these proposals against the 24 standards are presented in Appendices 7 and 8.

3.1.1 King’s College Hospital

King’s College Hospital proposed two key changes to their current acute neurology service in order to offer a HANU. The first change targeted patients presenting at ED, in order to provide those requiring a specialist neurological assessment within four hours of their arrival. This improvement in service involved amending the current neurology timetable to ensure that a neurology or stroke SpR could be available to support the medical team, with some support provided by the medical juniors. It was agreed that the SpRs would work within the two medical wards and would be the first port of call for patients identified in ED as requiring neurology input. In addition, the patient would also receive an assessment from a neurology consultant, where one was required.

The second major change was aimed at meeting the 11th standard for HANU’s outlined by the SCN which advises that appropriately trained staff should be available 24 hours a day, seven day per week, to assess patients with acute neurological problems. The amendments to the neurology timetable made as part of the pilot enabled neurology staff to be available 24 hours a day, seven day per week, who would be the initial contact for neurology referrals in the two medical assessment units (MAU). The neurology and stroke SpRs would continue to be supported by the medical team, physiotherapy, specialist nurses and neurology consultants.

Table 1. King’s College Hospital proposed HANU changes

<table>
<thead>
<tr>
<th>Standard</th>
<th>How will the model meet the standard?</th>
<th>Suggested changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Adults presenting in the Emergency Department identified as requiring a specialist neurological assessment by an appropriately trained neurology specialist - assessed within 4 hours of arrival.</td>
<td>They will be seen by neurology / stroke SpR or specialist nurse.</td>
<td>SpR to support medical team. Will still rely on juniors from medical team. Will work within 2 wards. SpR will be the initial contact, will identify patients and will admit them to the ward. The consultant will then see them. HANU timetable completed.</td>
</tr>
<tr>
<td>11. 24/7 availability of appropriately trained staff, competent to assess patients with acute neurological problems (Consultants, junior doctors, specialist nurses, AHPs).</td>
<td>Medical and neurology staff available 24/7. Physiotherapy available 7/week. Specialist nurses not available 24/7 but available weekdays at present.</td>
<td>SpR to support medical team. Will still rely on juniors from medical team. Will work within 2 wards. SpR will be the initial contact – will identify patients and will admit them to the ward. The consultant will then see them. HANU new timetable already done.</td>
</tr>
</tbody>
</table>
3.1.2 University College London Hospital

UCLH proposed two key changes to their current acute neurology service in order to offer a HANU. The first change targeted patients presenting at ED, in order to provide specialist neurological assessments within four hours of their arrival. UCLH set a target of seeing patients in ED within 30 minutes of their referral which involved scheduling three neurology and stroke SpRs to cover acute neurology referrals 24 hours a day, seven days per week, with support provided by neurology consultants. By utilising existing resources, UCLH also proposed to locate acute neurology admissions in the six HASU beds. The Ambulatory Care unit situated on AMU, was suggested as an appropriate space to assess of patients not requiring admission. These changes aimed to meet standards 2 and 15 outlined by the SCN.

Table 2. University College London Hospital proposed HANU changes

<table>
<thead>
<tr>
<th>Standard</th>
<th>How will the model meet the standard?</th>
<th>Suggested changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Adults presenting in the Emergency Department identified as requiring a specialist neurological assessment by an appropriately trained neurology specialist - assessed within 4 hours of arrival.</td>
<td>Currently from the time of referral, 76% of all neurology referrals are reviewed by a neurology consultant or neurology SpR within 2 hours and 96% within 24 hours. We would expect further improvements to meet this standard with the development of a HANU as only 12% of referrals are made on the day of admission.</td>
<td>As part of the change 3 SpR will cover acute neurology 7 days a week with support. The consultant will come around twice daily. HANU would link to HASU.</td>
</tr>
<tr>
<td>15. Demonstration of neurological unit characterised by: a. Dedicated geographical location and a dedicated staffing infrastructure – medical, nursing and therapy. b. Within an existing clinical facility e.g. an AMU c. On a distributed basis.</td>
<td>a. Dedicated neurology unit co-located with HASU at UCLH staffed by existing HASU neurology trained team. b. Existing ambulatory unit on AMU will enable assessment of patients not requiring admission. c Outreach neurology service to patients deemed more appropriate to remain under other subspecialties with neurological problems such as transplant patients or the frail elderly.</td>
<td>Trying to get 6 inpatient beds in HASU.</td>
</tr>
</tbody>
</table>

3.2 King’s College Hospital Service Description by Staff

3.2.1 Pre-HANU: Referral Based Neurology Service

Historically, the neurology service offered to acute patients at King’s College Hospital operated as a referral based service for inpatients. Under the pre-HANU pathway, a patient would arrive at ED, be seen by the medical team and if required would be admitted under the medical team. The medical team would very rarely admit acute patients directly to neurology. If the medical team felt that neurology advice was needed they would phone the on call SpR (one person carrying a bleep or phone). The neurology SpR would aim to see that patient
within 24 hours. The patient would be reviewed by the SpR and sometimes discussed with a neurology Consultant. However, if the patient needed to be seen by a consultant they could wait up to an additional 24 hours for this assessment. Consequently, tests could take longer to occur as the decisions around requesting tests may take 48 hours to be agreed.

3.2.2 Post-HANU: Direct Referrals to Neurology Specialist

The HANU model piloted at King’s College Hospital consisted of two devoted HANU SpRs during the day, with support from the on call stroke SpR at night. The team developed criteria for all acute neurology patients who were HANU appropriate and were referred directly to the HANU SpR using the dedicated phone. Appendix 7 outlines the HANU pathway, in which referrals should ideally come directly from ED. Patients were seen within four hours and often quicker during the day time. If patients did not require admission they would be discharged directly from ED and follow up appointments could be made in the HANU clinics in the MAC (Medical Assessment Centre, daily acute review clinics).

Patients that required admission were admitted to one of the two acute medical wards. The care for those patients was a collaborative approach with care provided by a neurology consultant, HANU SpRs, medical juniors with support provided by the physiotherapist, occupational therapist and social worker. Investigations were prioritised from these group of patients which enabled 24-hour access to EEG, MRI and blood tests. The SpRs participated in the daily AMU board rounds where all patients are discussed. Neurology patients that were not appropriate for HANU, may be admitted to other departments within the hospital such as the Intense Care Unit (ITU) or under Neurosurgical or General Medical teams. In such cases, patient care defaulted back to general medicine, with the neurology service providing input as required.

Feedback provided by a neurology consultant below highlighted the problems arising from a lack of continuity that the (referral based) original pathway had on patients’ care and how continuity was achieved with the HANU model:

“There’s a risk associated with... if [SpR 1] sees a patient on day one and asks for some tests to be done, they might take two days to be sent back. By that point [SpR 1] is in a clinic that afternoon, so then they speak to a new on call SpR 2. SpR 2 doesn’t really know what to make of the tests results and has never met the patient, he/she may end up saying to the medic “speak to [SpR 1] as you’re likely to get a better answer.” Then there’s another delay until the next day when [SpR 1] can provide an opinion. Otherwise, you have the risk of a neurologist making a clinical decision about a patient that they’ve never met which is intrinsically a bit risky, you don’t have the ‘feel’ for how worried somebody was... So at the moment the HANU has the same SpRs on for each week, so we only have a different person on at the weekends and out of hours. The consultants really like that because it means that they speak to [the same two SpR] every day and they can get a good working relationship with that patient.
Whereas with the old system, due to manpower constraints that you have different SpRs on every day. It’s not ideal. Either the SpRs have to constantly review the patient to try and make safe decisions, which is very inefficient, or there is this risk that you are going on written information which is not ideal. So HANU does improve that.”

3.3 University College London Hospital Service Description by Staff

3.3.1 Pre-HANU: Referral Based Neurology Service

Since January 2013, UCLH provided a consultation service to acute neurology presentations, between 9am-5pm, in which a SpR would assess patients who had already been through triage in ED. Referrals would come from the medical teams for ward based patients and Ambulatory Care. Out of hours and on the weekends the same service would continue with a rudimentary SpR cover and an on call consultant available if needed. Patients would have been seen by a neurologist within two hours. Management of the patients would remain under the medical teams. In addition, the SpR would also have two clinics, one on Monday morning and one on Friday afternoon that would take them away from the consultation service.

3.3.2 Post-HANU: Direct Referrals to Neurology Specialist

With the introduction of HANU at UCLH, a neurology SpR and consultant were on call during the day from 9am-10pm. On the weekend there was a dedicated neurology SpR between the hours of 8:30am and 9pm who would be primarily on call for the HANU service with a consultant directly in the hospital. Overnight the Hyper Acute Stroke Service (HASU) SpR covered the HANU service, in conjunction with a consultant on call. In order to meet the objectives of the pilot phase, two SpRs and nine consultants shared the HANU rota.

The pathways for the HANU at UCLH is outlined in Appendix 8. The main difference with the earlier service was that the HANU team took referrals directly after triage from ED. This process allowed the SpR and consultant to assess, diagnose and often rapidly discharge patients directly from ED and consequently avoid unnecessary admissions. If eligible, the HANU team would aim to see patients within 30 minutes from the time of referral while still in ED. Patients that required admission would be admitted, either under the care of a neurology consultant or a medical consultant on AMU. As the service became known the HANU team also began to receive referrals directly from GP’s, which would have previously gone to the Queen’s Square SpR to manage. In addition, the team attended the daily AMU ward meetings where all the patients in the acute medical unit would be discussed. There was also capacity within the HANU service to follow patients up using a dedicated room in Ambulatory Care. This process allowed the HANU team to follow up and monitor urgent outpatients with rapid access, particularly to imaging including MRI. During the pilot period the twice weekly clinics were cancelled to provide better capacity for the HANU. For neurology patients admitted in other hospital wards such as ITU, General Medicine and
Neurosurgery, the HANU SpR and consultant offered a consultation service as per the previous model.

As the number of referrals increased dramatically with the implementation of HANU, the benefits were felt throughout the hospital for acute neurology patients, particularly in ED and Ambulatory Care. A consultant nurse in Ambulatory Care described the benefits of this change in practice:

“From an Ambulatory Care perspective, the consultant or the SpR will see patients in Ambulatory Care who have been referred to us with primary neurology. Due to their capacity they haven’t always taken direct referrals so we have had to see patients first but (following HANU implementation) for the majority of the time they’ve seen patients directly and they’ve just used one of our rooms. For us it seems that the patients are seeing the right person at the right time and I also think that we’re doing less MRI scans than we were previously. When it was a consultation service rather than them directly seeing patients we would get a lot of people saying “get an MRI and we will see them after the MRI.” Now that they’re seeing them we are getting a lot less urgent MRI’s requested. They are requesting scans that used to be seen as urgent, within seven days. So from an Ambulatory Care perspective it has been really helpful and I think it has worked very well.”

3.4 Service Observation
Observations of the two HANU models operating in King’s College Hospital and UCLH took place on two separate days. Notes were taken during the observation regarding the process and infrastructure relating to each service. A summary of the observations are provided below and when compared with the descriptions of the proposed pathways, allow insight into the logistics of integrating a new service in the hospital setting.

3.4.1 King’s College Hospital
The HANU service at King’s College hospital was based in the two acute medical wards. There were no beds in MAU specifically designated to HANU, however during the observation period two HANU patients occupied bed space at any one time and this ranged between one and five patients at a time. While it was intended that referrals would come directly from ED, take up of this was low and often referrals began in MAU. On the day of the observations the neurology SpR were able to conduct assessments within four hours, which could previously have taken up to 24 hours. At 10am the neurology consultant also visited the ward to see patients where necessary. Even when neurologists had not taken ‘ownership’ of the patients there appeared to be a shift in the culture, with acute medical staff seeking advice from the neurologists in person or via the phone, particularly for patients with complex presentations. The neurology SpR explained that previously that relationship did not exist, however since the introduction of HANU both medical and neurology staff regularly contact each other for input. An important aspect of the new service was the ability for neurology specialists to
arrange quick follow up appointments with people as outpatients. The MAC was utilised as a daily acute review clinics, where the neurology SpR were able to see and monitor patients in the outpatient setting usually within a week if needed.

3.4.2 University College London Hospital

The HANU model at UCLH involved one dedicated neurology SpR and one neurology consultant during the day seven days a week, one neurology SpR during the evenings and one stroke SpR overnight. Operating 24 hours a day 7 days per week, the HANU team did not have any junior support which increased both the SpR and consultants workload. With the introduction of HANU, neurology began to have a presence at the morning AMU ward meeting, where a number of specialties (i.e. Geriatrician, Cardiologist and Dietician) also attend to discuss all the patients on the ward. Observation of this meeting revealed that there were very few neurological patients on the AMU ward for neurologists to provide input. During the observation, referrals predominantly from ED, were regular and consistent. The SpR described a daily fluctuation in referrals, sometimes up to 50, with up to 250 calls per week.

Prior to the HANU service, if patients in ED had a non-emergency neurological problem they would be discharged and sent to a GP who would provide a referral to see a neurologist. A typical appointment waiting time was six to eight weeks. Where scans and follow up appointments were required, patients could be waiting an additional 6 weeks each time. During the HANU pilot, patients presenting at ED were seen by a neurologist on average within 30 minutes and could be admitted to AMU or discharged with a referral directly to the neurologist which could be followed up on the same day. Ambulatory Care was used to facilitate these urgent follow up appointments, where tests could be conducted immediately, allowing patients to be managed within a day. While neurology had an increased presence and management of patients in ED and Ambulatory Care the impact on AMU was less notable, with only 10 patients reported to be under the direct care of a neurologist in AMU in the previous six weeks. On the day of the observation, there were no patients directly under the care of HANU on AMU, however the team provided advice for patients in whom a neurological disorder was a probable secondary diagnosis. This finding suggest that an increase in neurological resources in the ED may reduce the need for inappropriate admissions.
3.5 Summary

Table 3. Summary of the HANU models implemented by pilot sites

<table>
<thead>
<tr>
<th></th>
<th>KCH</th>
<th>UCLH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staffing</strong></td>
<td>2 neurology SpRs on HANU timetable during the day and stroke (HASU) SpR covering HANU during the evening. Support provided by consultants and medical juniors. The consultant made daily visits to see patients in MAU.</td>
<td>1 neurology SpR and one consultant were on call during the days, with support provided by the stroke (HASU) SpR at night.</td>
</tr>
<tr>
<td><strong>Operating hours</strong></td>
<td>24/7.</td>
<td>24/7.</td>
</tr>
<tr>
<td><strong>Interface with ED</strong></td>
<td>HANU SpRs were available on a dedicated phone as the first port of call for acute neurology referrals from ED. The HANU SpRs saw patients from ED within four hours of their arrival.</td>
<td>HANU SpR received referrals directly from ED and saw patients in ED within 30 minutes of their arrival, enabling rapid assessment and discharge from ED.</td>
</tr>
<tr>
<td><strong>Geographic location</strong></td>
<td>HANU was present within the two acute medical wards and was the initial contact for acute neurology referrals. It did not work logistically to have designated HANU beds on MAU.</td>
<td>UCLH initially discussed converting 6 HASU beds to HANU beds, due to capacity this was not feasible. Overall, inpatients requiring primary neurology input was low and inpatients remained located in AMU, with impact felt by AMU.</td>
</tr>
<tr>
<td><strong>Outpatient management</strong></td>
<td>For patients not requiring admission the MAC was used as a follow up clinic for daily acute reviews.</td>
<td>Ambulatory Care was utilised to assess patients not requiring admissions. One room in Ambulatory Care was assigned to HANU for assessments during the pilot period.</td>
</tr>
<tr>
<td><strong>Challenges</strong></td>
<td>Few referrals were received directly from ED, and instead continued to go through MAU. This was the case despite efforts from HANU and medical staff visiting ED to promote the service.</td>
<td>The resources were insufficient for the volume of referrals. There was no dedicated HANU space as proposed, however for the pilot period this was manageable.</td>
</tr>
</tbody>
</table>

4 Quantitative Findings

A key aim of the evaluation was to compare patients’ assessment, planning and outcomes before and after the introduction of the HANU model using routinely collected data and where available HANU specific data. The HANU models were also evaluated against selected standards developed by the SCN. Appendix 5 outlines the requested dataset aimed at capturing key structural, process and outcome variables. King’s College London Hospital implemented the HANU model from October to December 2015, with comparative baseline data available from the ED and admission datasets for July to September 2015 and follow up data available for October to December 2015. The HANU team at King’s collected data for all of the patients they assessed during the intervention period (October to December 2015) and is presented below. UCLH implemented the HANU model from November to December 2015, with comparative baseline data available from the ED dataset for September to October 2015.
and follow up data available for November to December 2015. The HANU team also collected
data during the intervention period which is presented below.

While hospital data provides an indication of the prevalence of and pathways into care for
neurological presentations the data should be interpreted with caution. Data was requested
for all neurological ED attendances and inpatient admissions in the two hospital sites,
however each hospital and department within the hospital used different systems for data
collection and therefore aligning the data required collaboration between the departments.
This collaboration was not always effective or efficient. For example, King’s
provides an example of this collaboration, whereby neurology inpatient admission data had
to be extracted manually using information from the corresponding ED dataset. While the
initial data requests were designed to meet the objectives of the evaluation limitations in
hospital databases meant that information was not always available within the current data
reporting systems.

4.1 Hospital Contacts (ED and inpatient admissions) with Acute Neurology

Table 4 outlines the pathway for neurology presentations in the ED pre- and post-HANU at
King’s and UCLH. King’s also provides an example of the neurology pathway for patients
admitted to inpatient wards from the ED. The number of ED attendances, hospital admissions
and discharges from ED are presented. The ED in King’s College London Hospital saw 3695
neurology presentations in the three months prior to HANU and 3624 neurology
presentations during the three month HANU pilot. Neurology presentations were categorized
using a combination of relevant triage complaints (e.g. headache, falls and fits) and primary
neurological diagnoses based on ICD-10 codes. When compared to inpatient admissions,
significantly more patients diagnosed with headaches, epilepsy and Parkinson’s disease were
discharged directly from the ED. Using inpatient data systems patients admitted to a ward at
King’s with a primary neurological diagnosis based on ICD-10 coding were captured (see Table 4). In UCLH the ED saw 261 neurology referrals in the two months prior to HANU and 191
neurology referrals during the two month HANU pilot. Patients’ primary diagnoses was not
available in 74% of the data provided and therefore limits the accuracy and interpretation of
this data.

The pathway for headache patients is outlined in Table 5. Headache patients were categorised
using ICD-10 coding. While numbers are limited, the King’s ED and inpatient data shows a
decrease in headache diagnoses and an increase in neurology specialist input post-HANU. For
patients discharged directly from the ED there is evidence of fewer readmissions (over 3
months) for the same diagnosis post-HANU. These results provide an early indication of the
possible impact of HANU in the hospital setting, where early neurology input may result in
more appropriate diagnoses and referral. Data from the ED at UCLH provides an indication of
correct signposting to defined headache pathways. Similar patterns were found for epilepsy
patients (see Table 6). The anticipated inclusion of patients presenting with Parkinson’s
disease as a marker disorder for the evaluation, and given the prevalence of Parkinson’s disease in the UK, it was surprising that so few patients presented with an ICD-10 diagnoses for Parkinson’s disease in the ED at both hospitals. All Parkinson’s disease presentations in the King’s ED were related to falls.

In addition to the level of missing data, the hospital data has a number of further limitations. It is evident from the discrepancies between the number of patients presenting with neurology concerns in the ED and those who are referred to inpatient departments that the primary diagnoses given in the ED may be inaccurate. Furthermore, the majority of patients were not under the direct care of a neurologist, according to the data reported, and the data does not provide any information on the outcomes for these patients. The data recording systems only capture the specialist who first sees the patient or the specialist who takes over management of the patient and therefore we do not know whether a neurologist had input if they do not fit this category (i.e. as a consultation service or in a joint care approach). Therefore, the current data may underrepresent the number of patients seen by a neurologist and the number of patients with a neurological condition who required neurology input.
Table 4. Neurological hospital attendances (ED and inpatient) in King’s (over 3 months) and UCLH (over 2 months).

<table>
<thead>
<tr>
<th>Site</th>
<th>Period</th>
<th>Department</th>
<th>Neurology attendances</th>
<th>Admissions</th>
<th>Headaches</th>
<th>Epilepsy</th>
<th>Parkinson's</th>
<th>Discharge</th>
<th>Headaches</th>
<th>Epilepsy</th>
<th>Parkinson's</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>King’s</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>ED</td>
<td></td>
<td>3695</td>
<td>1171 (31.7)</td>
<td>51 (4.4)</td>
<td>75 (6.4)</td>
<td>15 (1.3)</td>
<td>2502 (67.7)</td>
<td>233 (9.3)</td>
<td>127 (5.1)</td>
<td>10 (0.4)</td>
</tr>
<tr>
<td>Post</td>
<td>ED</td>
<td></td>
<td>3624</td>
<td>1147 (31.6)</td>
<td>34 (3.0)</td>
<td>73 (6.4)</td>
<td>18 (1.6)</td>
<td>2463 (67.9)</td>
<td>258 (10.5)</td>
<td>125 (5.1)</td>
<td>1 (100.0)</td>
</tr>
<tr>
<td>Pre</td>
<td>Inpatient</td>
<td>3695</td>
<td>445</td>
<td>77 (17.3)</td>
<td>61 (13.7)</td>
<td>2 (0.4)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Post</td>
<td>Inpatient</td>
<td>3624</td>
<td>397</td>
<td>62 (15.6)</td>
<td>65 (16.4)</td>
<td>1 (100.0)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>UCLH*</td>
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<tr>
<td>Pre</td>
<td>ED</td>
<td></td>
<td>2110</td>
<td>805 (38.2)</td>
<td>36 (4.5)</td>
<td>33 (4.1)</td>
<td>2 (0.2)</td>
<td>1305 (61.8)</td>
<td>5 (0.4)</td>
<td>4 (0.3)</td>
<td>0</td>
</tr>
<tr>
<td>Post</td>
<td>ED</td>
<td></td>
<td>1785</td>
<td>558 (31.3)</td>
<td>26 (4.7)</td>
<td>35 (6.3)</td>
<td>1 (0.2)</td>
<td>1227 (67.9)</td>
<td>1 (0.1)</td>
<td>1 (0.1)</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. n (%). Pre-HANU data was available from King’s for July-September 2015 (3 months) and post-HANU for October-December 2015 (3 months). Pre-HANU data was available from UCLH for September-October 2015 (2 months) and post-HANU for November-December 2015 (2 months). *74% missing data for primary diagnoses in UCLH ED. The inpatient admissions sample at King’s refers to all admissions where the patient is present in the corresponding ED dataset. ICD-10 codes and presenting problems were used to categorise disorders. Patients presenting with a primary diagnosis related to stroke were removed from the data.
Table 5. Headache presentations in pilot sites pre- and post-HANU.

<table>
<thead>
<tr>
<th>Site</th>
<th>Period</th>
<th>Department</th>
<th>Neurology admissions</th>
<th>Headache presentations</th>
<th>Specialist</th>
<th>Ward</th>
<th>Mean LOS</th>
<th>Discharge outcome</th>
<th>Readmission</th>
<th>Neurology discharges</th>
<th>Headache presentations</th>
<th>Discharge outcome</th>
<th>Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>King's</td>
<td>Pre</td>
<td>ED</td>
<td>1171</td>
<td>51 (4.4)</td>
<td>Neuro 7 (13.7) Other 39 (76.5) NR 5 (9.8)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same diagnosis 1 (1.9)</td>
<td>2502</td>
<td>233 (9.3)</td>
<td>Follow up with GP 107 (45.9) Other outpatient referral 4 (1.7) Other outpatient referral 3 (1.3) Left prior to treatment 3 (1.3) Discharged without follow up 116 (49.8)</td>
<td>Same diagnosis 11 (4.7) Different diagnosis 1 (0.4)</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>ED</td>
<td>1147</td>
<td>34 (3.0)</td>
<td>Neuro 8 (23.5) Other 24 (70.6) NR 2 (5.9)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>2463</td>
<td>258 (10.5)</td>
<td>Follow up with GP 102 (39.5) Other outpatient referral 5 (1.9) Other outpatient referral 1 (0.4) Left prior to treatment 2 (0.7) Discharged without follow up 116 (57.4)</td>
<td>Same diagnosis 4 (1.6) Different diagnosis 1 (0.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inpatient</td>
<td>1207</td>
<td>77 (6.4)</td>
<td>Neuro 8 (10.4) Other 69 (89.6)</td>
<td>NA</td>
<td>1.5 (0-8) days</td>
<td>Residence 75 (97.4) Other NHS provider 1 (1.3) Died 1 (1.3) Same diagnosis 3 (3.9)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inpatient</td>
<td>1232</td>
<td>62 (5.0)</td>
<td>Neuro 14 (22.6) Other 48 (77.4)</td>
<td>NA</td>
<td>2.5 (0-35) days</td>
<td>Residence 61 (98.4) Non-NHS hospice 1 (1.6) Same diagnosis 1 (1.6)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>UCLH*</td>
<td>Pre</td>
<td>ED</td>
<td>805</td>
<td>36 (4.5)</td>
<td>Neuro 2 (5.6) Other 34 (94.4) AMU 10 (27.8) HASU 2 (5.6) Other 24 (66.7)</td>
<td>0.8 (0-5) days</td>
<td>NA</td>
<td>Same diagnosis 5 (13.9) Different diagnosis 1 (2.8)</td>
<td>1305</td>
<td>5 (0.4)</td>
<td>Follow up with GP 1 (20.0) Outpatient referral 2 (40.0) Left prior to treatment 2 (40.0)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>ED</td>
<td>558</td>
<td>26 (4.7)</td>
<td>Neuro 1 (3.8) Other 25 (96.2) AMU 7 (26.9) Other 19 (73.1)</td>
<td>0.6 (0-2) days</td>
<td>NA</td>
<td>Same diagnosis 1 (3.8) Different diagnosis 4 (15.4)</td>
<td>1227</td>
<td>1 (0.1)</td>
<td>Follow up with GP 1 (100.0)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Note. n (%). Pre-HANU data was available from King’s for July-September 2015 (3 months) and post-HANU for October-December 2015 (3 months). Pre-HANU data was available from UCLH for September-October 2015 (2 months) and post-HANU for November-December 2015 (2 months). *74% missing data for primary diagnoses in UCLH ED.
Table 6. Epilepsy presentations in pilot sites pre- and post-HANU.

<table>
<thead>
<tr>
<th>Site</th>
<th>Site</th>
<th>Period</th>
<th>Department</th>
<th>Neurology admissions</th>
<th>Epilepsy presentations</th>
<th>Specialist</th>
<th>Ward</th>
<th>Mean LOS</th>
<th>Discharge outcome</th>
<th>Readmission</th>
<th>Neurology discharges</th>
<th>Epilepsy presentations</th>
<th>Discharge outcome</th>
<th>Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>King’s</td>
<td>Pre</td>
<td>ED</td>
<td>1171</td>
<td>75 (6.4)</td>
<td>Neuro 6 (8.0) Other 63 (84.0) NR 10 (13.3)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same diagnosis 8 (10.7)</td>
<td>2502</td>
<td>127 (5.1)</td>
<td>Follow up with GP 38 (29.9)</td>
<td>Neuro outpatient referral 7 (5.5)</td>
<td>Other outpatient referral 6 (4.7)</td>
</tr>
<tr>
<td>Post</td>
<td>ED</td>
<td>1147</td>
<td>73 (6.4)</td>
<td>Neuro 16 (21.9) Other 49 (67.1) NR 8 (10.9)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same diagnosis 12 (16.4)</td>
<td>2463</td>
<td>125 (5.1)</td>
<td>Follow up with GP 25 (20.0)</td>
<td>Neuro outpatient referral 14 (11.2)</td>
<td>Other outpatient referral 5 (4.0)</td>
<td>Left prior to treatment 2 (1.6)</td>
</tr>
<tr>
<td>Pre</td>
<td>Inpatient</td>
<td>1207</td>
<td>61 (13.7)</td>
<td>Neuro 2 (3.3) Other 59 (96.7)</td>
<td>NA</td>
<td>6 (0-120) days</td>
<td>Residence 57 (93.4) Other NHS provider 2 (3.3) Died 2 (3.3)</td>
<td>Same diagnosis 2 (3.3)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>Inpatient</td>
<td>1232</td>
<td>65 (16.4)</td>
<td>Neuro 10 (15.4) Other 55 (84.6)</td>
<td>NA</td>
<td>2.3 (0-37) days</td>
<td>Residence 63 (96.9) NHS nursing home 2 (3.1)</td>
<td>Same diagnosis 9 (13.8)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>ED</td>
<td>805</td>
<td>33 (4.1)</td>
<td>Neuro 1 (3.0) Other 32 (96.9) AMU 19 (57.6) HASU 1 (3.0) Other 13 (39.4)</td>
<td>1.1 (0-8) days</td>
<td>NA</td>
<td>Same diagnosis 2 (6.1) Different diagnosis 10 (30.3)</td>
<td>1305</td>
<td>4 (25.0)</td>
<td>Follow up with GP 4 (100.0)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>ED</td>
<td>558</td>
<td>35 (6.3)</td>
<td>Neuro 3 (8.6) Other 32 (91.4) AMU 19 (54.3) HASU 2 (5.7) Other 14 (40.0)</td>
<td>1.4 (0-7) days</td>
<td>NA</td>
<td>Different diagnosis 4 (11.4)</td>
<td>1227</td>
<td>1 (16.7)</td>
<td>Outpatient referral 1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. n (%). Pre-HANU data was available from King’s for July-September 2015 (3 months) and post-HANU for October-December 2015 (3 months). Pre-HANU data was available from UCLH for September-October 2015 (2 months) and post-HANU for November-December 2015 (2 months). *74% missing data for primary diagnoses in UCLH ED.
Table 7. Parkinson’s disease presentations in pilot sites pre- and post-HANU.

<table>
<thead>
<tr>
<th>Site</th>
<th>Period</th>
<th>Department</th>
<th>Neurology admissions</th>
<th>Parkinson’s presentations</th>
<th>Specialist</th>
<th>Ward</th>
<th>Mean LOS</th>
<th>Discharge outcome</th>
<th>Readmission</th>
<th>Neurology discharges</th>
<th>Parkinson’s presentations</th>
<th>Discharge outcome</th>
<th>Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>King’s</td>
<td>Pre</td>
<td>ED (presented as falls)</td>
<td>1171</td>
<td>15 (1.3)</td>
<td>Neuro 0 Other 9 (60.0) NR 6 (40.0)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same diagnosis 1 (6.7)</td>
<td>2502</td>
<td>10 (0.4)</td>
<td>Follow up with GP 3 (30.0) Other outpatient referral 1 (10.0) Discharged without follow up 5 (50.0)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>ED (presented as falls)</td>
<td>1147</td>
<td>18 (1.6)</td>
<td>Neuro 1 (5.6) Other 10 (55.6) NR 7 (38.9)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Same diagnosis 3 (16.7)</td>
<td>2463</td>
<td>1</td>
<td>Discharged without follow up 1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Pre</td>
<td>Inpatient</td>
<td>1207</td>
<td>2 (0.4)</td>
<td>Neuro 0 Other 2 (100.0)</td>
<td>NA</td>
<td>19.7 (9-21) days</td>
<td>Residence 1 (50.0) Died 1 (50.0)</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>Inpatient</td>
<td>1232</td>
<td>1</td>
<td>Other 1</td>
<td>NA</td>
<td>9 days</td>
<td>Residence 1</td>
<td>0</td>
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<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>UCLH*</td>
<td>Pre</td>
<td>ED</td>
<td>805</td>
<td>2 (0.2)</td>
<td>Neuro 0 Other 2 (100.0)</td>
<td>AMU 1 (50.0) Other 1 (50.0)</td>
<td>9 (3-15) days</td>
<td>NA</td>
<td>0</td>
<td>1305</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>ED</td>
<td>558</td>
<td>1 (0.2)</td>
<td>Other 1</td>
<td>HASU 1</td>
<td>11 days</td>
<td>NA</td>
<td>0</td>
<td>1227</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note. n (%). Pre-HANU data was available from King’s for July-September 2015 (3 months) and post-HANU for October-December 2015 (3 months). Pre-HANU data was available from UCLH for September-October 2015 (2 months) and post-HANU for November-December 2015 (2 months). *74% missing data for primary diagnoses in UCLH ED.
4.2 HANU specific data

4.2.1 King’s College Hospital HANU team

The HANU team at King’s College Hospital collected data for the patients they assessed during the implementation period from October to December 2015, no comparison data is available. In total 232 recorded patients were seen by the HANU team during the pilot period. Out of the 164 available cases, 88.4% (145) of patients were seen between the hours of 9am and 5pm from Monday to Friday. The average LOS for HANU patients was 4.9 days, ranging from 1 to 55 days. There were 38 different presenting complaints recorded by the HANU team (see Figure 2) and 106 different primary diagnoses, highlighting the complexities of presentations seen by neurologists. Figure 3 presents the percentage of key primary diagnoses assessed by the HANU team.

Figure 2. Percentage of presenting complaints seen by HANU (total = 232).
Patients presenting with a primary diagnosis of epilepsy/seizures (26.0%) and headaches (24.0%) were the most common neurological disorders assessed by the HANU team. The occurrence of Parkinson’s disease was found to be relatively low as a primary diagnosis (2.0%), however was more likely to present as a secondary diagnosis (11.0%) (Figure 4).

The results showed that the management of patients care within HANU was predominately under direct care of the HANU registrar with neurology consultant input (28.0%). There were however a number of patients within HANU receiving primary care from the medical team within the MAU, with daily input provided by the HANU team (25.0%). Figure 5 presents the distribution of management for HANU patients, including the 1.3% of patients that were later identified as being HANU appropriate, however were not referred to HANU.
The diagnostic data, as shown in Figure 6, reveals few tests undertaken for HANU patients, with CT scans recorded for 10.3% of patients and CT and MRI scans recorded for 5.5% of patients, suggesting that early neurology input may have limited inappropriate testing. When analysing the referral outcome for HANU patients, more than half of patients (56.3%) received neurological follow up either in the HANU clinic or in the neurology outpatient department (see Figure 7).
4.2.1.1 HANU only patients

There were 64 recorded patients under direct care of the HANU team during the evaluation. Of these 64 patients, 29.7% had a presenting complaint of a headache and 31.3% had a presenting complaint relating to seizures. All patients presenting with seizures within this sample had a primary diagnosis relating to epilepsy. A primary diagnosis of headache or migraine was reported for 20.3% of patients and no patients presented with a primary diagnosis of Parkinson’s disease. Patients underwent various diagnostic tests as inpatients: CT (10.9%), MRI (9.4%) and EEG (1.6%). The average LOS for this group of patients was 2.4 days (ranging from 1 to 16 days). The typical outcomes for patients were referral to the HANU clinic (35.9%) or neurology outpatient department (35.9%).

There were 3 patients identified as being HANU appropriate who were not seen by the HANU team. Two of these patients had a primary diagnosis relating to migraines and the third patient had a primary diagnosis of transverse myelitis.

4.2.1.2 MAU/HANU joint care patients

There were 58 recorded patients with neurological issues were under the care of the MAU team with daily input from the HANU team. Of these 58 patients, 17.2% had a presenting complaint of a headache and 43.1% had a presenting complaint relating to seizures. Patients presenting with seizures within this sample were more likely to present with co-morbidities. There were no patients with a presenting complaint or primary diagnosis of Parkinson’s disease. Patients underwent various diagnostic tests as inpatients: CT (12.1%), MRI (12.1%) and NCS (1.7%). The average LOS for this group of patients was 6 days (ranging from 1 to 53 days). The typical outcomes for patients were referral to the HANU clinic (24.1%) or neurology outpatient department (41.4%).

Figure 7. Referral outcome for HANU patients (total = 224).
4.2.1.3 MAU only patients

There were 46 patients initially referred to HANU, however after an initial assessment the patients were placed under the direct care of the MAU team without further input from HANU. Of these 46 patients, 13.0% had a presenting complaint of a headache and 19.6% had a presenting complaint relating to seizures. While only 2.0% (1 patient) had a primary diagnosis of a tension-type headache and 10.8% had a diagnosis relating to epilepsy or seizures. Among the sample, patients underwent various diagnostic tests as inpatients: CT (28.3%) and MRI (8.7%). The average LOS for this group of patients was 7 days (ranging from 1 to 55 days). Over half of these patients required no further follow up (52.2%), 1 patient (2.0%) was referred to the HANU clinic and 13.0% of patients were referred to the neurology outpatient department.

4.2.1.4 Discharged ED/MAC patients

There were 39 patients seen and discharged by the HANU team either in ED or MAC (Medical Assessment Centre). Of these 39 patients, 33.3% had a presenting complaint of a headache and 20.5% had a presenting complaint relating to seizures. When examining the primary diagnosis given in ED, 23.1% of these patients had a diagnosis of migraine and 23.1% had a diagnosis relating to epilepsy or seizures. Patients underwent various diagnostic tests as inpatients: CT (17.9%), MRI (2.5%) and EEG (2.5%). No further follow up was needed for 25.6% of patients, 38.5% were referred to the HANU clinic and 23.1% of patients were referred to the neurology outpatient department.

4.2.1.5 Other neurology patients

There were 7 patients seen by the HANU team in the tertiary neurology department. Of these 7 patients, 3 patients (42.9%) had a presenting complaint and primary neurological diagnosis relating to epilepsy or seizures. Among the sample, only one patient received a CT scan and MRI. The average LOS for this group of patients was 17.7 days (ranging from 3 to 40 days). There were 7 patients initially seen by the HANU team and later taken over by the stroke team. The HANU team were also involved in reviewing 5 patients prior to neurosurgery.

4.2.2 University College London Hospital HANU team

The HANU team at UCLH collected data for the patients they assessed during the implementation period from November to December 2015, no comparison data is available. The team recorded data for 356 patients. Due to the scale of referrals and resource constraints, this number does not reflect the total number of patients responded to by the HANU team. The team initially set a target of 30 minutes to begin an assessment with a patient. Based on available data for 31 patients the mean response time during the HANU pilot was 24.7 minutes.
The HANU team received the majority of their referrals directly from ED (31.5%) or other wards within the hospital (30.6%). Figure 8 outlines the mode of referrals received by the HANU team during the pilot period. Of these referrals, headaches (25.8%) were the most common primary diagnosis, followed by seizures (21.8%) (see Figure 9). Parkinson’s disease presented in only 1.2% (4) of patients.

Figure 8. Mode of referrals to HANU (percentage).

Figure 9. Percentage of primary diagnoses referred to HANU.

4.3 Summary
The resource constraints at each site limited the extent and completeness of recorded data. Consequently, for UCLH in particular, the number of patients referred to the HANU team is under-represented in the available data. However, a combination of datasets have been used in an attempt to provide a more accurate indication of outcomes relating to the HANU models.
The ED in King’s College London Hospital saw 3695 neurology presentations in the three months prior to HANU and 3624 neurology presentations during the three month HANU pilot. The results showed an increase in neurology input for headache (23.5%) and epilepsy (21.9%) patients’ post-HANU, compared to neurology input prior to HANU, 13.7% and 8.0% respectively. This finding was supported by inpatient admission data which showed that neurology input was significantly higher post-HANU for both headache (22.6%) and epilepsy (15.4%) patients, compared to input prior to HANU, 10.4% and 3.3% respectively. The data revealed that while there were few Parkinson’s disease patients represented in the ED data, in all cases Parkinson’s disease presented secondary to falls resulting in an injury. There were very few readmissions in ED among the target group.

During the pilot the HANU team at King’s College hospital saw 232 referrals, only 6.4% of the ED presentations. The majority (88.0%) of HANU’s referrals were during the hours of 9am-5pm Monday to Friday. The results highlighted the complexities of the presentations seen by neurologists, whereby there were 38 different presenting complaints and 106 different primary diagnoses recorded by the HANU team. Epilepsy/seizures (26%) and headaches (24%) were the most common neurological disorders assessed. While, Parkinson’s disease was rarely reported as a primary diagnosis (2%) and more often a secondary diagnosis (11%). Following an initial assessment by HANU, 28% of patients remained under the direct care of the HANU registrar with neurology consultant input. A quarter of patients received joint care from the medical team within the MAU, with daily input provided by the HANU team. HANU only patients had the lowest average LOS (2.4 days) when compared to joint care patients (MAU and HANU) (6 days), MAU only patients (7 days), and tertiary neurology patients (17.7 days).

The HANU team at UCLH saw 356 patients during the two month pilot period. On average the HANU team were able to respond to patients within 26 minutes. The majority of referrals came directly from ED (31.5%) or other wards within the hospital (30.6%). Similar to the patient group reported by King’s College Hospital, headaches (25.8%) and seizures (21.8%) were the most commonly reported neurological diagnoses. While, Parkinson’s disease presented in only 1.2% of patients. Using comparative ED data pre- and post-HANU, there was a reduction in the number of patients who re-attended ED within 30 days for the same condition. Specifically, there were fewer readmissions relating to headaches (13.9% vs 3.8%) and epilepsy (6.1% vs 0%) post-HANU.

While both hospital sites reported few acute presentations with a primary diagnosis of Parkinson’s disease, a recent report found that patients with Parkinson’s disease are more likely to be admitted as an emergency admission than for planned medical procedures (72% v. 28% respectively). The primary reasons for emergency admissions among Parkinson’s patients are typically related to pneumonia (13.5%), physical deterioration (9.4%), urinary tract infection (9.2%) and hip fractures (4.3%). Parkinson’s patients are up to twice as likely
to be admitted for these conditions compared to the average patient. Consequently, the current data may not have accurately reflected this group of patients.

5 Qualitative Findings

In order to support the quantitative data, qualitative interviews were conducted with three samples of participants: patients with an acute neurological problem (n=2), non-neurology staff (n=4), and both junior and senior neurologists (n=6).

Using thematic analysis, verbatim quotations from the interviews were coded according to six identified themes, including:

- Service delivery
- Experience for staff
- Access to and management of a neurologist
- Patient outcomes
- Follow up and discharge process
- Capacity and constraints

The results of each theme are discussed in detail, integrating both neurology and non-neurology staff experience of the HANU models. A full transcript of quotes are provided in Appendix 9. The patient qualitative findings in the form of vignettes are presented in Appendix 10.

5.1 Service Delivery

From a service delivery perspective staff from both hospital sites reported improved service delivery for acute neurology patients in ED, particularly noting the HANU models ability to provide more rapid diagnosis and discharge, allow early consultant input, and reduce the potential for inappropriate admissions.

- “Our initial data suggests that we are seeing a lot more patients... they have been seen more rapidly and have a rapid diagnosis and discharge plan by a senior decision maker at the point of contact with the hospital.” (Neurology Consultant)

- “Definitely, I think they [ED] must see less patients, there’s no doubt about it because after triage rather than referring to ED they’re coming straight to HANU... inevitably that will have the benefit of a reduction in the patients journey by not having to go through various seniority levels in ED and then medical consultants and then seeing a neurologist after admission.” (Neurology Consultant)
• “With HANU you are getting a senior lead decision maker with experience in neurology seeing you within hours of you coming to hospital, which can otherwise take days. That has a number of advantages, often you can filter out initially if it is a neurological problem or not. Often patients don’t need to be admitted... Often in the past we would arrive and patients may have had a scan but not the right scan and we would have to send another request which could take days. So everything was much quicker and more efficient.” (Neurology SpR)

Epilepsy and headache patients were two groups where HANU was thought to make a notable difference in the quality of service provided. Both SpR and consultant neurologists reported that with the HANU model these disorders could be accurately identified early, ensuring that patients formally received the appropriate pathway and care management.

• “The first seizure clinic is grossly overused for inappropriate patients so HANU should help with that in the sense of if you have urgent assessment you know whether or not it is a first seizure and you can do a lot of the work through clinic and the people that turn up there actually need to be seen there.” (Neurology Consultant)

• “For the people with migraine, we’ve treated acutely and got them out quickly. The people with non-migraine headaches, which were thought to be migraines but weren’t, we’ve made the diagnosis and treated them appropriately. So it may not be a large number but the clinical benefit of those non-migraine patients seeing us has been huge because it’s not been three days of morphine before seeing someone to take a history.” (Neurology SpR)

5.2 Experience for Staff

It was widely agreed that there was an increase in workload for neurology staff particularly at the SpR level. Without additional resources, during the pilot period SpR’s were responsible for coordinating all aspects of patients’ care including administrative responsibilities. While the HANU services were not as demanding at a consultant level, there was a considerable level of commitment above their normal work responsibilities that consultants offered in goodwill as part of the pilot. It emerged through both the quantitative and qualitative data that the majority of patients were seen by HANU during daytime hours, identifying an important implication for staffing timetables as one neurology consultant highlighted the significant cost implications of operating a 24 hour per day, seven day a week service.

• “Without a doubt. There was a massive increase in demand with very little change in infrastructure... that is only a trial issue. I think the HANU service is great in itself but if it were to continue we would need far better infrastructure. As a registrar I had
inpatients in AMU, while also seeing any patient coming through A&E, all the other consultations required for patients under medical teams on the tower, all of AMBI care and taking phone calls without any SHO or medical support. We would need at least another SHO and possibly a registrar to help. Most of the workload would be 9-5, rather than on the weekends and overnight.” (Neurology SpR)

- “At a registrar level without some creative accounting of moving around registrars for the pilot we don’t really have enough registrars to offer this level of input in the fullness of time we will have to ask for at least one further registrar to run this permanently. I think that for the future HANU model we will need to think about getting some devoted juniors. It will become increasingly problematic if we are relying on registrars to do SHO level work constantly, which I think we are probably doing a bit at the moment. Out of hours is the main vulnerable area. We only have one registrar and it has not be possible to increase that substantially because of changes to banding. We’ve had to try and do what we can. To run a seven day a week, day/night model we would probably have to get more than one registrar and there may even be a banding change. So I think there would be a significant cost implication.” (Neurology Consultant)

Staff also reported on the impact of HANU on staff in other departments such as AMU/MAU and ED. The impact on the medical wards and ED varied depending on the hospital sites and the models implemented. While at UCLH the HANU model had a large impact on staff in ED due to the volume of referrals that HANU saw directly and were able to discharge from ED quickly, the impact of HANU in ED at King’s College Hospital was minor. While the HANU teams maintained a consistent presence on the medical wards and took over the management of patients where suitable, the small number of HANU appropriate inpatients meant that the impact on staff in AMU/MAU was less evident for both sites.

- “I think there has been an impact on staff in MAU. I’m not sure about the consultants, but certainly some of the consultants are enthused to have us around. For the juniors they have really been receptive because they get teaching for free. At the consultant level it has been a [mixed] reaction to “it is very interesting to see you take a headache history” to “I am not quite sure why you are here.” Both of those [viewpoints] have been overtly stated. Overall, for the patients within that area it has made a difference because they leave with a diagnosis rather than a syndrome.” (Neurology SpR)

- “In terms of staffing probably not because the junior doctors would have looked after those patients anyway, so I don’t think that it has made much of a difference.” (Medical Consultant)
• “The impact on ED is a little bit harder to judge and I suspect it has not much of a
difference. It’s a very big department and I think the number of direct referrals from
ED to HANU has been small enough that it could pass some consultants by completely.
We did sign to them clearly that this change was being made but I have had nurses
and doctors in ED saying “what difference has this made?” I think neurology has very
clearly been more responsive to ED when they have referred to neurology directly
because the HANU team are available.” (Medicine Consultant)

• “The benefit of co-locating the service on the consultant level has helped tremendously
by putting a face to a service. We often work in a silo and while one benefit of the new
service is the acute treatment of the patient, the other is the ability for us to network
which is a positive side effect of having it co-located.” (ED Consultant)

Feedback from staff highlighted the capacity for HANU models to provide important training
opportunities for junior staff due to the unique exposure to neurology specialists that can
be offered through this kind of joint working.

• “The exposure that it allows is very unique and has really had an impact on their
[medical juniors] level of education.” (Neurology SpR)

• “The neurologists are very happy to teach our junior doctors and I would hope that the
junior doctors that potentially assess the patient or are involved in the preliminary
investigation, then follow the patient up with the neurologist as well and get feedback
and teaching opportunity.” (ED Consultant)

5.3 Access to and direct care by a Neurologist

Staff consistently reported that following the implementation of HANU more patients with
acute neurology concerns were being rapidly managed by a neurology specialist. Staff
described the lengthy waiting times patients potentially face when services such as HANU are
not operating.

• “I think more patients are being managed in a timely fashion by a neurologist. With
the previous system they would have potentially ended up with a neurologist but there
were extra layers in between.” (ED Consultant)

• “Yes, without a doubt. Patients usually would have been seen by a GP who would have
maybe referred them to A&E and the neurology SHO would have told the GP to refer
them to neurology outpatients. That would have taken 6-8 weeks. They could have
waited 2-3 months to see somebody and in that time the problem is long gone or has been exacerbated. They may not have seen a consultant at that point either. So it has completely changed. Patients were being seen acutely, usually would have been seen within 10 or 15 minutes of them being referred.” (Neurology SpR)

Generally staff reported an increase in management of acute patients by neurologists. The HANU teams saw a greater volume of patients than the neurology services could offer with a consult service. One neurology consultant felt that the HANU team at King’s College Hospital still fell short of capturing all of the appropriate referrals due to the implementation of the new service over a short timeframe. Due to the relatively small number of inpatients admitted directly under HANU there was also indication that the impact was not widely felt in the acute medical wards. But, this may change over time.

- “Yes... undoubtedly. Much earlier and much more direction. Not liaison and not advice but clear ownership of the process. With some pretty good shared agenda that the use of inpatient space to do any form of medicine is pretty valuable.” (Medical Consultant)

- “Definitely... the numbers have at least tripled if not quadrupled in terms of the number of patients we are seeing.” (Neurology Consultant)

- “We’re probably dramatically underachieving in getting access to all of them through inertia of trying to change referral pathways in a relatively short period.” (Neurology Consultant)

- “In Ambulatory Care, yes. I would say on average they are seeing two patients a day. Previously it was a bit more ad hoc, we were making a lot more referrals for people to be seen as neurology outpatients. So we were getting a lot more opinion rather than actually seeing patients.” (Ambulatory Care Consultant Nurse)

- “As an inpatient no, I don’t think it has made a significant difference.” (Medical Consultant)

5.4 Patient Outcomes

Anecdotal evidence from staff suggested that the HANU models resulted in positive outcomes for patients, noting the ability for HANU to offer a rapid diagnosis, clear management plan and rapid follow up. Benefits to patients were described in both hospital sites and across the various departments.
• “I think patients appreciate a rapid accurate diagnosis and then a clear management plan. I think patients have benefited from that... I am not saying that the medics didn’t achieve that eventually and then refer to ourselves but it makes the whole process smoother, more accurate, more well defined, with a clearer management plan and where necessary more rapid access to specialist tertiary services.” (Neurology Consultant)

• “I think it has been positive from an Ambulatory Care perspective because I think they’re seeing the right person, they’re getting more of an idea about their problem and they’re seeing a consultant instead of a registrar. The fact that they’re seeing that person straight away creates a better experience for them.” (Ambulatory Care Consultant Nurse)

• “Yes absolutely. I have a lot of feedback from the patients who felt that they had a better experience. So they were able to access us... once they were discharged we were able to arrange very rapid follow up in Ambulatory Care. All investigations were conducted very quickly.” (Neurology SpR)

5.5 Follow Up and Discharge Process

Qualitative feedback highlighted the benefit of offering acute neurology outpatient clinics (in MAC, Ambulatory Care) that allowed the HANU teams to avoid unnecessary admissions but offer rapid follow up with patients in an outpatient setting. This approach allowed HANU teams to direct their attention more appropriately and provide a better care management plan for patients that prevents lengthy waits between appointments.

• “Yes it is much easier... we have extra provision for outpatients with the ability to see people at our medical assessment centre, we also have these hot clinics in neurology. It is much easier now with the resource that’s there for neurologists to say "I’ll see you tomorrow" or "I’ll see you in a couple of days." So the patients get followed up by the appropriate decision maker and also don’t receive follow up if it is not necessary. I suspect what we are doing is directing our attention much more appropriately.” (Medical Consultant)

• “I think more patients are discharged with a plan back to the GP now. So gone are the days were the patient might not even see a neurology service, patients were discharged by an AMU medical consultant but with a view to urgent follow up in an acute neurology clinic. Those patients now don’t require that, they have a management plan sent to their GPs which can be enacted by the GPs and if necessary the GP can refer to neurology outpatients. So I think it has prevented a lot of
unnecessary referrals to neurology outpatient and also better directed referrals to specialist services within neurology when needed.” (Neurology Consultant)

- “Now I think there would be more specific follow up. Presumably this system will identify the patients correctly who can be discharged and avoid admissions and instead be safely followed up in a timely way in clinics. The emphasis on this is appropriate and timely. A lot of the admissions in the context of neurology were previously done to facilitate safe follow up.” (ED Consultant)

5.6 Capacity and Constraints

While there was a general enthusiasm to continue offering a HANU service in both sites, the capacity to implement a sustainable model was limited with the current infrastructure. Due to the nature of the pilot, it was evident that insufficient resources were a primary constraint for hospital sites.

- “The feedback I have received from everybody MDT [multidisciplinary team], nurses, therapists, doctors are very happy with it. It has been said “why did we not do this earlier?”” (ED Consultant)

- “Interest, yes. What aspect of the model we would continue is unknown. I am personally dead interested in it but capacity is a slightly different thing. In my department there’s still question about what this means, particularly in terms of patient ownership.” (Medical Consultant)

- “There is an interest but there is no capacity with the current level of resources. All the feedback I have obtained from the other consultants and the registrars is that this is a good thing. There has been some anxiety about how it is for consultants to see patients so acutely, I would agree that that actually is a positive thing. I think in terms of resources, there would have to be some more resources into the system to make it sustainable.” (Neurology Consultant)

- “I think the two primary avenues of support that we would need above what we have more are administrative support and junior support... I think it would be better if there was a senior SpR that was a clinical decision maker who then had an SHO to support them. That would take some of the needs of having the consultant directly heavily involve, as they are having to cancel and change their activities. So if you had a senior decision making SpR, with SHO support, with close neurology consultant cover, with some administrative support the system could potentially continue.” (Neurology Consultant)
• “In terms of the drawbacks of the system, patients in A&E would always take precedence and the more complicated patients in ITU or haematology who would have a primary team and just need a consult, would often wait much longer for us to see them than before... they could be waiting a day when in the past we could see them in a couple of hours. They are often more complicated and require more time but the fact is that acute patients keep coming through the door and they are prioritised. I think those patients that require consult were disadvantaged but it was only a problem of infrastructure.” (Neurology SpR)

• “Without a dedicated neurology registrar in A&E, referrals from triage are inappropriate. The referrals were often completely unfiltered and that defeats the idea of a speciality. There isn’t any other medical specialties that see unfiltered referrals in such a way.” (Neurology SpR)

5.7 Summary

Senior and junior staff from both hospital sites described the impact of HANU on service delivery for neurology, the acute medical wards and the ED. The HANU structure allowed neurologists to provide rapid diagnosis and discharge with early consultant input, reducing the potential for inappropriate admissions. This outcome was particularly evident for patients with seizures and epilepsy who with early intervention were provided with appropriate pathways and care management. Staff consistently reported an increase in workload for neurology staff particularly at the SpR level. While the HANU services weren’t as demanding at a consultant level, there was a considerable level of commitment above their normal work responsibilities that consultants offered in goodwill as part of the pilot. The majority of patients were seen by HANU during daytime hours, identifying an important implication for staffing timetables as one neurology consultant highlighted the significant cost implications of operating a 24 hour per day, seven day a week service. There was less notable impact on staff in the ED and acute medical wards (AMU/MAU).

Feedback from staff supported the impact of HANU on providing patients with acute neurology concerns rapid access to a neurology specialist and a clear improvement and management of patients by neurologists. This impact was less evident among the acute medical teams due to the low number of inpatients in the acute medical wards who required primary neurology management. Consequently, the anecdotal evidence from staff suggested positive outcomes for patients due to the ability for HANU to offer a rapid diagnosis, clear management plan and rapid follow up.
A primary barrier reported by staff was the lack of resources available for the pilot that would be required to offer a sustainable acute neurology service. Working within the available infrastructure staff, particularly at the SpR level, were responsible for undertaking both junior and administrative responsibilities which created a burden on their time, particularly for services taking patients directly for the ED.

6 Summary of Findings

The ED in King’s College London Hospital saw 3695 neurology presentations in the three months prior to HANU and 3624 neurology presentations during the three month HANU pilot. The results showed an increase in neurology input for headache (23.5%) and epilepsy (21.9%) patients’ post-HANU, compared to neurology input prior to HANU, 13.7% and 8.0% respectively. This finding was supported by inpatient admission data which showed that neurology input was significantly higher post-HANU for both headache (22.6%) and epilepsy (15.4%) patients, compared to input prior to HANU, 10.4% and 3.3% respectively. There were fewer than expected Parkinson’s disease patients represented in the ED data, however in all cases Parkinson’s disease presented secondary to falls resulting in an injury. There were very few readmissions in ED among the headache, epilepsy and Parkinson’s disease patients observed.

During the pilot the HANU team at King’s College hospital saw 232 referrals, 6.4% of the ED presentations. The majority (88.0%) of HANU’s referrals were during the hours of 9am-5pm Monday to Friday. The results highlighted the complexities of the presentations seen by neurologists, whereby there were 38 different presenting complaints and 106 different primary diagnoses recorded by the HANU team. Epilepsy/seizures (26%) and headaches (24%) were the most common neurological disorders assessed. While, Parkinson’s disease was rarely reported as a primary diagnosis (2%) and more often a secondary diagnosis (11%). Following an initial assessment by HANU, 28% of patients remained under the direct care of the HANU registrar with neurology consultant input. A quarter of patients received joint care from the medical team within the MAU, with daily input provided by the HANU team. HANU only patients had the lowest average Length of Stay (LOS) (2.4 days) when compared to joint care patients (MAU and HANU) (6 days), MAU only patients (7 days), and tertiary neurology patients (17.7 days).

The HANU team at UCLH saw 356 patients during the two-month pilot period. On average the HANU team were able to respond to patients within 26 minutes. The majority of referrals came directly from ED (31.5%) or other wards within the hospital (30.6%). Similar to the patient group reported by King’s College Hospital, headaches (25.8%) and seizures (21.8%) were the most commonly reported neurological diagnoses. Parkinson’s disease presented in only 1.2% of patients during the HANU pilot. Using comparative ED data pre- and post-HANU, there was a reduction in the number of patients who re-attended ED within 30 days for the
same condition. Specifically, there were fewer readmissions relating to headaches (13.9% vs 3.8%) and epilepsy (6.1% vs 0%) post-HANU.

Senior and junior staff, from both hospital sites, described the impact of HANU on service delivery for neurology, the acute medical wards and the ED. The HANU structure allowed neurologists to provide rapid diagnosis and discharge with early consultant input, reducing the potential for inappropriate admissions. This outcome was particularly evident for patients with seizures and epilepsy who with early intervention, were provided with appropriate pathways and care management. When reviewing the two models, there is an indication that increased neurological support in ED and the availability of rapid discharge services (MAC and ambulatory care) resulted in fewer admissions to the medical wards. During observations at King’s there were on average two patients under the care of neurology in the medical ward at a time, ranging from one to five patients. While at UCLH there were only ten patients recorded under the care of a neurologist in the medical ward over a six-week period. This was consistent with the experience in morning ward meetings where the neurology staff had little to input as the patients discussed were not experiencing neurological problems. This qualitative finding suggests that increased neurological input in the ED may reduce patients being admitted to wards.

Staff consistently reported an increase in workload for neurology staff particularly at the SpR level. They also highlighted that insufficient resources were available for the pilot period in terms of junior and administrative support as the HANU team were still responsible for covering other functions (i.e. consultation service for inpatients outside the acute medical wards). While the HANU services were not as demanding at a consultant level, there was a considerable level of commitment above normal work responsibilities that consultants offered which involved seeing patients within a relatively short timeframe, while still responding to inpatient referrals and clinics. The majority of patients were seen by HANU during daytime hours, identifying an important implication for staffing timetables.

Feedback from staff supported the impact of HANU on providing patients (who present with acute neurology concerns) with rapid access to a neurology specialist and a clearly increased involvement and direct management of patients by neurologists. This impact was less evident among the acute medical teams due to the low number of inpatients in the acute medical wards who required primary neurological input. Consequently, the qualitative evidence from staff suggested positive outcomes for patients. HANU offered a rapid diagnosis, clear management plan and rapid follow up.
7 Conclusions

Based on a review of the outcomes, the different models of delivery and the qualitative data available for the evaluation of two HANU pilots, the following conclusions are made:

1. A seven day consultant led acute neurology service may improve the patient experience of care by providing timely diagnosis and a more appropriate management plan.

2. Common conditions such as headache and epilepsy clearly benefit from early involvement of neurology consultants and trainees. Patients with a first suspected seizure or with ongoing seizures need to be referred into specialist pathways as a matter of course as outlined by National Institute for Health and Care Excellence (NICE) guidelines. This study suggests that dedicated neurological input can facilitate this.

3. Early neurology input may be beneficial by identifying uncommon or complex disorders that are not recognised by non-neurological specialists particularly at the time of acute presentation and may therefore reduce the need for unnecessary tests to establish a rapid diagnosis.

4. The data also suggests that the model may be associated with a reduction in re-admission rates, in particular for headaches and epilepsy patients.

5. The findings from the study also suggest that the model may have additional benefits arising from rapid follow up in outpatient clinics which might further reduce ED visits and unplanned hospital admissions.

6. The HANU model has demonstrated potential benefit on important elements of the care pathway (ED and MAU/AMU) but substantial further impact on patients with neurological long term conditions will need more proactive primary and community support to avoid unscheduled emergency care (e.g. the development of an integrated care approach to falls prevention in the community for patients with PD). This suggest that HANU may be most effective if integrated with a substantial re-design of the pathways for patients with long-term neurological conditions. (Note - additional work by the London Neuroscience SCN and UCLPartners has shown that urinary tract infection is the main precipitant of A and E and hospital admission in patients with Multiple Sclerosis. A specialist multidisciplinary approach working with patients and careers should be established to improve point of care testing, rapid diagnosis and early treatment of infection for patients at home).

8 Recommendations

Based on a review of the outcomes, the different models of delivery and the qualitative data available for the evaluation of two HANU pilots, the following recommendations are made:
5. The development and further evaluation of the HANU model should be undertaken as part of a wider restructuring of the integrated care pathways for patients with long-term neurological conditions.

6. The following factors should be considered in the implementation and development for the HANU model as part of an integrated pathway:
   a. Service level design and development of pathways for patients with neurological long term conditions including primary and secondary care health services and social care services. Consideration should be given to whether or not the pathways should be built around single disorders (e.g. headaches, seizures multiple sclerosis and Parkinson’s disease) or groups of disorders (for example multiple sclerosis and Parkinson’s disease) which share common elements of care.
   b. Staff engagement at all levels prior to service re-design and introduction of the new service. Clinical directors, GP lead and social care managers as well as patients and careers should also be involved in the design of the new services.
   c. Implementation should be phased and consideration be given to building pathways initially around a single disorder in the first instance (e.g. multiple sclerosis or headaches).
   d. Patients should be referred into appropriate follow-up and specialist pathways as a matter of course as outlined by National Institute for Health and Care Excellence (NICE) guidelines. This will promote increased adherence to the NICE guidelines (e.g. after a first suspected seizure )
   e. The units in this evaluation were based in large regional neuroscience centres. The challenges (particularly around staffing) of providing HANU services on a seven-day basis in district general settings will be different and will require evaluation of other possible solutions including working across pathways such as alignment with acute stroke management and tele-health models.

7. The components of the new services should involve: 
   a. A comprehensive assessment of patient need including the need for joint neurological, general medical and social care working which results in a collaboratively developed, written and/or digital care plan
   b. A stepped-care approach to patient care where the least intrusive most effective interventions are provided first (e.g. a consultant outpatient appointment or a specialist nurse lead community clinic) but with a built in self-correcting mechanism so that if more intensive care is needed, patients can be stepped up to such care.
c. Routine outcome monitoring using disease appropriate measures (this provides a basis for the self-correcting mechanism). This should also include patient experience and patient activation measures.

d. Adaptable levels of care which are also appropriate for high need patients. This includes complex care packages which can be delivered by multi-disciplinary teams and which link in with community based services with the aim of preventing inappropriate ED attendances and inpatient admissions.

8. These developments should be subject to further piloting and a formal evaluation which should:

   d) Design and pilot new pathways of care as set out above.

   e) Evaluate the impact on clinical outcomes for people being managed by the new models compared to existing pathways in a series of feasibility studies and then in large multi-centre studies. This should also include metrics of patient experience and patient activation.

   f) Evaluate the performance of the models in terms of clinical and cost-effectiveness and access to care.

If adopted these recommendations will place the SCN in a central role in the restructuring of care for people with neurological long term conditions, significantly improve quality of life and providing more cost-effective care.
9 References


# Appendix 1: Standards for Hyper Acute Neurology Units

## Acute neurology workstream

### Standards for HANUs – Hyper Acute Neurology Units

Ref = references to the national strategic clinical networks’ general unplanned and planned standards document

<table>
<thead>
<tr>
<th>Standard</th>
<th>Ref</th>
<th>Measure</th>
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<tbody>
<tr>
<td>Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Patients are admitted under the care of a neurology consultant</td>
<td>New</td>
<td>% of appropriate admissions</td>
</tr>
<tr>
<td>2 Adults presenting in the Emergency Department identified as requiring a specialist neurological assessment by an appropriately trained neurology specialist - assessed within 4 hours of arrival.</td>
<td>UC1</td>
<td>% of appropriate patients assessed with 4 hrs.</td>
</tr>
<tr>
<td>3 Patients receive a multi-disciplinary assessment and treatment within 24hrs of admission to HANU. This may include a rehabilitation assessment, transfer to a Neuroscience Centre, neurosurgery or intensive care and a point of contact with the medical team involved with the on-going care of the patient</td>
<td>UC2, UC3</td>
<td>% receiving assessment within 24hrs of admission</td>
</tr>
<tr>
<td>4 Agreed protocols for the management of common neurological emergencies e.g. for status epilepticus, single seizure and acute headache</td>
<td>New</td>
<td>Protocol – review national guidelines</td>
</tr>
<tr>
<td>5 Demonstration of adoption of agreed pan-London admission criteria for patients with acute neurological emergencies. See ref 23 &amp; 24 below.</td>
<td>New</td>
<td>Review</td>
</tr>
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<td>6 Demonstration and maintenance of good medical practice including training, CPD, audit, and appropriate clinical governance.</td>
<td>UC12</td>
<td>Review</td>
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<td></td>
<td>Demonstration of formal links with existing integrated care and community neurological rehabilitation providers and inpatient rehabilitation providers.</td>
<td>New</td>
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<tr>
<td>8</td>
<td>24/7 tele access for GPs to an appropriate neurological specialist</td>
<td>NU2</td>
</tr>
<tr>
<td>9</td>
<td>Provision of appropriate protocol to transfer patients to regional neuroscience centres</td>
<td>New</td>
</tr>
<tr>
<td>10</td>
<td>Agreed protocols with supporting neurosurgery services for daily urgent review of appropriate patients and their imaging.</td>
<td>New</td>
</tr>
<tr>
<td>11</td>
<td>24/7 availability of appropriately trained staff, competent to assess patients with acute neurological problems (Consultants, junior doctors, specialist nurses, AHPs).</td>
<td>UC11</td>
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<tr>
<td>12</td>
<td>Patient care plan. All patients with acute neurological problems are discharged from a hospital setting with: documentation of the neurological examination; a management plan; and, printed information relevant to the patient’s diagnosis. Information must be shared with carers if agreed. The management plan should include:</td>
<td>UC8</td>
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<tr>
<td></td>
<td>• Summary of diagnosis</td>
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<td></td>
<td>• Investigations required/undertaken</td>
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<td></td>
<td>• Goal setting</td>
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<td></td>
<td>• Treatment</td>
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<td></td>
<td>• Symptom control or curative</td>
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<td></td>
<td>• Titration plan</td>
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<td></td>
<td>• Rehabilitation, post discharge</td>
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<tr>
<td><strong>Onward referral / follow up requirements</strong></td>
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<td><strong>Timelines for actions</strong></td>
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<tr>
<td><strong>Adverse reactions to treatment and actions required</strong></td>
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<tr>
<td><strong>Continuing care and social care</strong></td>
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<td></td>
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<tr>
<td><strong>Voluntary sector support</strong></td>
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<tr>
<td><strong>Named point of contact</strong></td>
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13. **Upon discharge from hospital, the management plan is immediately sent electronically to their named GP and other health professionals (e.g. community rehabilitation team) and when applicable social care team involved in the on-going care of the patient. Where electronic transfer is unavailable information is shared within 5 days**

14. **Trials: HANUs will provide, with support from charities and support groups, information about and opportunities for patients to enrol in clinical trials, where appropriate.**

**Infrastructure**

15. **Demonstration of neurological unit characterised by:**
   a. Dedicated geographical location and a dedicated staffing infrastructure – medical, nursing and therapy. Or
   b. Within an existing clinical facility e.g. an AMU
   c. Combination of the above

16. **Patients have rehabilitation access to and adequate staffing levels:**

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<tbody>
<tr>
<td><strong>UC9</strong></td>
<td><strong>% within 5 days</strong></td>
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<tr>
<td><strong>UC13</strong></td>
<td><strong>Review – register?</strong></td>
<td></td>
</tr>
<tr>
<td><strong>New</strong></td>
<td><strong>Review</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NU6</strong></td>
<td><strong>Review – target?</strong></td>
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</table>
- Neuro specific AHPs including physiotherapy, occupational therapy, speech and language therapy, dietetics. Availability of rehabilitation facilities e.g. access to physiotherapy gym
- Psychological interventions and neuro-psychology
- Neurology / Neuro-rehabilitation consultants

| 17 | Provision of a medical staffing structure sufficient to provide one daily ward round and one consultant review, 7 days per week and appropriate junior cover. | New | Review |
| 18 | Provision of a rapid access outpatient’s service to assess acute neurological problems. | UC7 | Review – aspire to daily service |
| 19 | Provision of a daily outreach acute assessment service for the rest of the trust | New | Review - daily |
| 20 | Availability of a radiology service responsible for 24/7 CT scanning and daily scheduled MRI
  - Demonstration of protocol for transfer to regional MRI services for out of hour imaging. | UC5 | Review – daily/24hrs. Slots pre-booked during weekend and ring fenced – includes discussion with radiologist |
| 21 | Provision of neurophysiology service – EMG & EEG | NU5 | Review – aspire to 7 days per week. |
| 22 | Provision of lumbar puncture availability 24/7
  -Agreed protocol for delivery of lumbar puncture when not feasible by in-house staff. | UC6 | 24/7 - within 24 hrs? Review |

**Admission criteria**

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<thead>
<tr>
<th>23</th>
<th>Inclusion criteria</th>
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<tbody>
<tr>
<td></td>
<td>• All patients with suspected or proven acute neurological presentation</td>
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<tr>
<td>24</td>
<td>Exclusion criteria</td>
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<td></td>
<td>• Specific co-morbidity e.g. acute myocardial infarction, requiring other specialist management or patient requires HDU or ITU</td>
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<td></td>
<td>• Frail elderly or patients with several co-morbidities who would be better managed by an appropriate physician.</td>
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## 11. Appendix 2: The Royal Free Hospital Acute Neurology Service

The Royal Free Hospital first implemented a model of hyper acute neurology in 2014.

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<thead>
<tr>
<th>I</th>
<th>What does the acute neurology service at the Royal Free currently look like?</th>
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<tbody>
<tr>
<td>C</td>
<td>The service was implemented in 2014. Firstly, we have a one in twelve rota and there are four people who work in the acute neurology service half time. In doing so these people are withdraw from their normal clinical duties and that has had an impact in our linked DGH's and in our capacity at the Royal Free, Barnet and Chase Farm hospitals. There has been a clear improvement to the cover on the ward. Patients no longer have that traditional model of care where they are waiting three or four days to be seen by a consultant, they are now seen every day... usually within four hours. There is improved day to day ward cover, patient flow, presence in emergency services and there is much more integration into the hospital... really an improvement in being known and being seen. Also being present in hospital meetings, there’s a morning report twice a week that we never use to go to but are now involved in and the other specialities are consequently learning a bit more about neurology.</td>
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<table>
<thead>
<tr>
<th>I</th>
<th>How are the referrals to acute neurology made?</th>
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<tbody>
<tr>
<td>C</td>
<td>Most referrals still go through the medical registrar and we do see them directly in casualty. We have a liaison in casualty, an A&amp;E consultant who is designated to link with neurology, who directs referrals and we have developed guidelines with them for example for headache management and epilepsy which are now being used a lot more. We also receive referrals from other wards around the hospital and there now more consultants around to see the referrals that come in from GP’s through calling the neurology SpR phone. We are also now getting more medical referrals, I think they are now involving us earlier and with a lot more patients, and we are now getting called in at night to see these patients. Neurologists will now also see patients on ITU every day.</td>
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<table>
<thead>
<tr>
<th>I</th>
<th>What level of service is offered out of hours?</th>
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<tr>
<td>C</td>
<td>The neurology SpR is in until 9pm and then we have linked in to the medical team who have a specialist interest in neurology who are now being trained more in neurology, they come on ward rounds and they attend our meetings on the medical assessment unit, so those people are around at nights. There aren’t very many referrals at all at night. We are at a disadvantage as we don’t have a linked acute stroke unit like the other major centres who have that team to link into, so we had to link in with the general physicians.</td>
</tr>
</tbody>
</table>
**I**  How is patient management coordinated under the new service?

**C**  We agreed with the medical lead that we would take ownership of the neurology patients on AMU and we have a designated area within the ward, depending on patient flow of course, but there is a bay that neurology patients tend to go to.

**I**  Can you tell me a little bit about the follow up and discharge process?

**C**  The patients are generally seen and discharged on the MAU and brought back for follow up on what we call hot slots that we have available in the general neurology clinic. We also make use of an extra room that is available in neurophysiology where the consultant can see them in more of an outpatient setting rather than bringing them back to the ward. The patient can be discharged early and brought back much quicker to ensure that the consultant is confident they are improving and have had all of the necessary tests.

**I**  Could you please describe the new electronic patient referral system that is being trialled?

**C**  We had a lot of teething problems in developing a system that we were concerned wasn’t going to be robust enough and we had problems with inputting data. The majority of inpatient referrals are now made by email. An email is sent to the neurology registrar on call, copying in the consultant. They would then see the patient or sometimes provide written advice back if it is very simple advice. In any case a written response would be made electronically and we’re using that as a way of auditing how quickly we see patients and how many patients we have seen. There’s a much more robust record of the advice given and we’re hoping to extend that to our linked DGH hospitals and also in the future for GP referrals, overseen by the consultants.

**I**  Have there been any other obstacles or barriers in implementing the new system?

**C**  There have been huge barriers to implementing this new system, lots of governance issues, lots of problems with the IT department, lots of teething problems with the system itself just as being able to record who the consultant is. Lots of trivial things have gone wrong and therefore it has taken months to implement.
12. Appendix 3: Imperial College Healthcare Trust (ICHT) Hyper Acute Neurology Unit Plan

How does Imperial already address HANU standards?
We envisage the HANU model incorporating 3 elements: (i) an inpatient unit; (ii) linked acute daily neurology clinics; (iii) efficient GP liaison service.

ICHT has acute services on 3 sites, with A&E departments at Charing Cross (CX) and St Mary’s (SM) Hospitals. We will base our inpatient HANU element at CXH which has the benefit of co-location with the HASU and the TIA service, neurosurgery and interventional neuro-radiology. We will have HANU clinics (with admitting rights to HANTU inpatient beds) at both CX and SM to support both A&E’s and the Major Trauma Centre at SMH. We already have an acute neurology attending system, GP liaison and have now an agreed expansion of acute neurology beds (Ward 10N), comprising 12 fixed neurology beds and up to an additional 11 beds available for admission between Monday-Friday. We have agreement for potential neurology overspill (ninth floor CX) to accommodate neurology outliers.

Status quo of acute neurology care at ICHNT
Attending service. There has been a weekly attending neurology service since 2011 at CX. The attending service provides: (i) daily consultant neurologist input for all neurological cases; (ii) continuity of care for inpatients; (iii) daily consultant-led ward rounds/discharge planning. Audit of this service demonstrated benefit in terms of reducing length of stay on the medical wards. At SM there is a standard model of consultant-lead daily ward consults. There is a plan to harmonise the SM and CX rotas so that both sites run an attending service.

Outpatient rapid access neurovascular TIA clinic. This daily (7 days/week) clinic sees patients with presumptive TIAs although roughly 50% of cases turn out to be non-stroke neurology, e.g. migraine, epilepsy, and cerebral tumours. Patients are investigated and provided management plans in the same day. Currently, this service attracts between 3-8 new referrals daily on weekdays.

Acute vertigo service (AVS). The Imperial Trust is the only hospital in the UK with an acute vertigo service, and is run by two neurologists with neuro-otological expertise. Our data shows emergency physicians make the incorrect diagnosis in 85% of acute vertigo cases (Cutfield, 2011). The AVS supports both Trust A&Es and the medical wards including the CX HASU, particularly since expert assessment in acute vertigo outperforms DWI MRI in the first 24 hours (Kattah et al., 2009). Similarly, 80% of Major Trauma Ward patients have vestibular dysfunction. This service currently attracts 10-12 referrals/week across both sites.

What additional infrastructure and personnel do we need to setup a HANU?
1. **Beds:** We now have the requisite inpatient bed space to provide a comprehensive HANU.
2. **Personnel:** Our consultant-lead attending service enable the efficient running of the HANU. We will need three healthcare professionals (e.g. nursing background) to facilitate referrals to the HANU, coordinate the GP liaison service and to collect and process the clinical data and outcomes to provide a continuous audit of the HANU. The three coordinators will rotate between the three roles (inpatient HANTU, GP liaison service, and data processing and auditing). We anticipate being able to employ these team members as part of the Imperial Commitment to the HANU concept.
Process:

1. Adults presenting in the Emergency Department identified as having an acute neurological problem receive an assessment by an appropriately trained neurology specialist within 4 hours. These patients will be assessed usually by a neurology SpR, however, we intend to develop acute access HANU clinics that will fast track neurology patients for consultant review either the same day or within 24 hours. The ABN Acute Neurology Advisory Board forthcoming contribution to the ABN Standards for acute care, will call for the establishment of a fully integrated acute neurological service that blends the HASU and HANU services. Since neurologists are required for both types of services, the acute service will be neurologically led. We run acute neurology clinics so we have this type of clinic up and running already.

2. Patients receive a multi-disciplinary assessment and treatment within 24hrs of admission to HANU inpatient bed. This may include a rehabilitation assessment, transfer to a Neuroscience Centre, neurosurgery or intensive care and a point of contact with the medical team involved with the on-going care of the patient. As we run an attending system, with daily consultant ward rounds, we will meet this standard. There are rehab beds attached to the acute neurological provision.

3. 24/7 tele access for GPs to an appropriate neurological specialist. Our SpRs on call are available 24/7 for telephone consultation by GPs. In addition, we have a dedicated email service for GPs, which is increasingly used and valued. This is consultant-led, and is being strengthened by apportioning the responsibility for responding to email queries to the attending neurologist of the week.

4. Agreed protocols with supporting neurosurgery services for daily urgent review of appropriate patients and their imaging. We are planning a daily MDT morning handover with neuroradiology that combines HANU and HASU cases. This will fully integrate HANU with HASU and enable efficient handover of non-stroke HASU cases to the HANU.

5. Trials: HANUs will provide, with support from charities and support groups, information about and opportunities for patients to enrol in clinical trials, where appropriate. Our neurology unit has a track record of putting this into practice, for example in relation to the acute vertigo service at CXH and SMH, the traumatic brain injury (TBI) service which links in to the MTC at SMH, the MS and PD Trials Unit (CLASP), and in neurological infections (encephalitis patient recruitment to ENCEPH UK).

Infrastructure:

Ward base: Demonstration of a dedicated neurological unit characterised by a discrete geographical location and a dedicated staffing infrastructure – medical, nursing and therapy. We have 12 fixed acute neurology beds with the flexibility to expand up to 21 beds if required. At Imperial the HANU will integrate with the therapy services located on wards to facilitate the efficient management and discharge of patients.

HASU ratios used as example.

Provision of 0.73 WTE physiotherapist/5 beds
Provision of 0.68 WTE occupational therapist/5 beds
Provision of 0.68 WTE SALT/10 beds

Although the draft LNSCN standards use HASU ratios as an example, this may be an overprovision for a HANU. Intuitively, it seems likely that the therapy needs (particularly SALT) for a HANU will be less than for a HASU. The HANU beds will link with the current Planned Investigation Unit, which is established for the investigation of non-acute patients.
**HANU-linked rapid access clinic:** This is a key element of the HANU service. Using our experience gained running the daily rapid access TIA clinic, we will setup dedicated HANU-linked acute clinics at both the CX and SM sites. This clinic would be staffed with one consultant and one nurse specialist. We propose in the first instance to start with a 5 day service. Patients requiring follow up are seen in standard OP clinics.

**Neuroimaging:** A consultant lead HANU would require CT brain imaging. It is uncommon that brain MRI provides additional information above clinical assessment plus CT brain. However, MRI imaging will be made available to the HANU service at the neurology consultant’s request.

**Neurophysiology:** The HANU will have access to urgent EEG/EMG although there are few circumstances where it is clinically so urgent for neurophysiological investigations that they could not wait 24 hrs.

**Referral pathway to the HANU:**
(i) Patients that present to A&E who are not critically unwell (as these will be immediately admitted).
(ii) Non-stroke patients that attend HASU (and linked urgent acute TIA-clinics).
(iii) Patients that need acute/sub-acute review from the GP liaison service.

**Benefits of the HANU:** We endorse the fact that the most important first step in the cost-effective and safe management of patients is to obtain a correct diagnosis as soon as possible. In neurological patients, the most important diagnostic step is clinical review by a neurologist which outperforms a battery of best-guess investigations – e.g. in acute vertigo expert clinical review outperforms DWI MRI in the first 24 hours (Kattah et al., 2009). Given these data we predict that a HANU run at Imperial, where neurological patients see a neurologist early on, will have the following potential benefits:

1. **Improved diagnostic accuracy** early on compared to status quo (of medically-lead patient review and management) since non-neurologists’ diagnoses are incorrect in 50% of cases of general neurology (Moulin et al., 2003), and data from our acute vertigo service shows that the diagnostic inaccuracy of non-specialists rises to 85% for acute vertigo (Cutfield et al., 2011).
2. **Cost effective** – reduced workload on the diagnostic services. Dr Jenkins’ recent published audit in the rapid access TIA clinic shows that when the patient is reviewed by a neurologist, an MRI brain does not add any additional diagnostic accuracy (or affect management) compared to a CT brain.
3. **Reduced clinical risk** – accurate and fast diagnosis lowers clinical risk. For example, for acute vertigo, 5% of patients referred to the acute vertigo service (Cutfield et al., 2011) a peripheral vestibular problem had in fact a stroke.
4. **Rebalancing of clinical pressure points.** The integration of the HANU and the HASU (and TIA clinics) is vital since circa. 50% of HASU referrals are non-stroke neurological patients. A HANU will thus reduce the pressure on HASU services that are currently servicing acute neurology. Indeed, the upcoming ABN guidelines for acute neurology will support an integration of HASUs and HANUs.
5. **Concentration of expertise, personnel and infrastructure.** The combination of HASU and HANU models will result in costs saving through economy of scale, the sharing of infrastructure (e.g. imaging, neurosurgery) and the ability to provide adequate personnel for rotas. The concentration of referrals will enhance training and improve clinical expertise as has occurred with trauma in London where the formation of fewer (four) larger major trauma
centres has seen trauma mortality plummet by 50% in 5 years. Finally, the concentration of referrals, personnel, infrastructure and other resources provides an opportune environment for international standard clinical research (let alone audit) and hence will potentially attract investment from research funding organisation (governmental and charity) and industry.

**Referral source for HANU patients**
Dr Harri Jenkins, Dr Barry Seemungal, Dr Jenny Vaughan, Dr Nicholas Davies, Dr Jane Pritchard, Dr Sophie Molloy and Mr David Peterson.

**References:**


13. Appendix 4: St George’s Healthcare Neurology Acute Short Stay Admissions Unit (NASSAU) September to December 2015 Pilot

Background and current service configuration:

St George’s is a large tertiary hospital in South West London, with a secondary catchment area of around 1 million. All specialties are present on a single site, including tertiary neurosciences. In common with most tertiary neurosciences units, whilst we provide access to 24 hour acute neurology advice, and tertiary inpatient care, we currently do not provide acute inpatient neurology care.

At present, all acute stroke or suspected stroke is seen in the Emergency Department (ED) and managed by the acute stroke service (part of the neurology department). All non-stroke neurology in ED is seen by emergency physicians. Patients requiring admission are referred to Acute Medicine and admitted to the Acute Medical Unit (AMU). GP referrals for acute neurological problems will present directly to acute medicine within ED or to the ambulatory assessment area. Both ED and AMU have access to neurology advice, but due to lack of staff and bed capacity patients with most acute neurological disorders are not ordinarily admitted initially under the care of neurology (with exceptions for severe or complex cases). A number of patients will be reviewed by neurology on the AMU and care will then be taken over at a later stage.

Out of hours there is a neurology registrar covering both acute stroke and neurology, supported by an SHO until 10pm, after which time the SHO additionally cross covers neurosurgery.

Model:

A pilot hyperacute neurology unit was set up within the acute medical unit. This pilot was managed without additional resources. Income from patients remained with acute medicine, but all care 9am to 5pm was managed by neurology. The unit (entitled Neurology Acute Short Stay Admissions Unit, NASSAU) comprised 6 virtual beds. The aim was to have these beds collocated within a single annex within the acute medical unit.

The pilot ran for 7 days a week, 24 hours a day for a total of 14 weeks at the end of 2016. Junior Staff (1 registrar and 1 senior house officer or Physician Associate) were temporarily re-allocated from the regional tertiary neurology ward. A consultant of the week model has already been adopted on our regional unit. During the pilot, the attending consultant was additionally responsible for reviewing and managing patients on the NASSAU. Out of hours cover was provided by the acute medical team in conjunction with the neurology on call team. Weekend consultant ward rounds were conducted by the neurology consultant and registrar on call. The neurology team were supported by a pre-existing neurotherapy outlier team.
Operationally, patients were admitted from ED directly to the NASSAU by neurology or acute medicine or through the acute medicine ambulatory care clinic. Admitting “rights” were restricted to acute medical consultants and registrars and neurology consultants and registrars. It was explicit that the unit was not to be used for admission of acute stroke.

The stated purpose of the unit was to enable rapid discharge home and direct access to specialist care. It was specified at the outset that length of stay on the short stay admissions unit should not exceed 3 days. If the neurological problem required investigation or treatment for longer than this and there was no medical contra-indication, patients were transferred to the regional neurology unit, if patients needed more time in hospital for treatment of on-going non-neurological medical problems, or were awaiting care package or placement they would transfer to a medical ward. This was put in place to permit the NASSAU to work well without compromising the flow of patients though the tertiary neurology unit.

Inclusions and exclusions:

The beds were intended for the acute assessment and treatment of patients whose acute admission had been precipitated by a primary neurological problem. The patient’s neurological problem should have been deemed to necessitate inpatient admission by a consultant acute physician or a consultant neurologist. Wherever possible patients were discharged directly from the ED or ambulatory assessment unit in AMU, and thus many patients were not included in this pilot. The following patient groups were explicitly excluded as other pathways were in place:

- Stroke patients – follow hyperacute stroke pathway
- Subarachnoid haemorrhage – follow neurosurgery / ED pathway
- Patients with acute brain infections – follow clinical infection unit pathway
- Patients with Traumatic Brain Injury – follow traumatic brain injury pathway
- Elderly patients with delirium / confusional state
- Elderly patients with reduced mobility and falls
- Patients with known neurological disease (e.g. Parkinson’s disease or Alzheimer’s disease) where the PD / AD is a complicating factor but not the primary reason for admission
- Patients stepping down from from ICU with hypoxic brain injury
- Neurosurgical patients
- Patients admitted from or awaiting discharge to neurodisability or neurorehabilitation beds

Daily operation:

Patients admitted overnight to the NASSAU beds overnight were picked up as routine care. The neurology consultant ward round and review would occur first thing in the morning, and a liaison meeting with acute medicine would occur at 11pm to facilitate discharge planning, with a further handover meeting at 4:30pm for the on-call teams. All further referrals during the day were clerked initially by a registrar and then reviewed by a consultant neurologist.
Outcomes:

A total of 117 patients were recorded as admitted across the 14 week period from 14/09/2015 to 19/12/2015.

Demographics

46 male, 71 female. Median age 47 (range 19 to 93)

Source of admission to NASSAU

Emergency Department 26
Acute medical team (ambulatory clinics, GP referrals, ED reviews) 73
Unclear 19

Presenting problems (commonest, referrers asked to classify)
Seizures 34
Headache 21
Weakness / neuromuscular 16
MS 6
Other 40

Final diagnostic categories:

9 patients were inappropriate admissions for general medical or other issues.

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<thead>
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<tbody>
<tr>
<td>Seizure / LOC</td>
<td>37</td>
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<tr>
<td>Headache</td>
<td>15</td>
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<tr>
<td>Neuromuscular</td>
<td>12</td>
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<td>MS</td>
<td>9</td>
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<tr>
<td>Cognitive / Dementia</td>
<td>8</td>
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<tr>
<td>Functional</td>
<td>7</td>
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<tr>
<td>Neuro-ophthalmology</td>
<td>5</td>
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<td>Movement disorder</td>
<td>4</td>
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<tr>
<td>Vestibular</td>
<td>2</td>
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<tr>
<td>Stroke</td>
<td>1</td>
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<tr>
<td>Other Neurological</td>
<td>8</td>
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<tr>
<td>Non-neurological</td>
<td>9</td>
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<tr>
<td>Total</td>
<td>117</td>
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</table>

Outcome:

Discharged home 85
Transferred to general medicine 14
Transferred to regional neurology unit 18
Length of stay within the unit itself was not recorded for 37 patients unfortunately.

Of those recorded median length of stay was 1 day. 21 patients were discharged the same day. The operating protocol stipulated no patient would remain on the unit for more than 3 days. 5 patients stayed longer than this (2 for 4 days, 2 for 5 days and 1 for 13 days – due to bed management issues).

Time to neurological review was not recorded as all patients were reviewed by a neurologist on admission as part of the protocol.

Data on investigations was not formally analysed during this pilot.

**Summary and issues raised:**

The pilot was very positively received by colleagues in acute medicine and neurology and there was wide recognition that the model was effective at improving access to neurology advice and reducing length of stay.

We had allocated 6 beds for acute neurological patients. It was logistically very difficult to colocate the 6 beds and patients tended to be spread across the large acute medical unit. We saw significantly fewer admissions than had been anticipated on the basis of previous audits of acute neurology in our AMU. For the majority of the pilot approximately 3 patients on average were in the NASSAU beds at any one time. This may have resulted partly from reduced admissions as a consequence of the high visibility of neurology consultants on the AMU, resulting in informal advice being sought more frequently and more patients being sent home from ED / ambulatory care without being admitted. These data were not recorded and it would have been challenging to do so.

The pilot was not funded and the diversion of junior staff from the regional neurology unit had appreciable effects on the quality of care there, as well as an adverse impact on length of stay on the regional unit.

Dr Niran Nirmalananthan  
Consultant Neurologist

Dr Anthony Pereira  
Consultant Neurologist
14. Appendix 5: HANU Data Request

**Hyper Acute Neurology Unit Data**

- Unique patient ID
- Date of attendance
- Date of birth
- Gender
- Ethnicity
- Readmissions/ re-attendance
- Mode of arrival
- Time of attendance / arrival date / arrival time
- Time seen / initial assessment time / time seen for treatment
- Time referred / departure time
- Referral to (ward)
- Speciality referred to
- 2nd referral
- Time discharged
- Presenting problem / triage complaint
- Primary/working diagnosis code at A&E (e.g. neurology ICD 10 codes)
- Time spent in A&E – may need to calculate ourselves
- Time taken to receive neurological assessment
- Diagnostic services - CT/MRI/EEG/Lumbar punctures/other (list all that apply)
- Outcomes of diagnostics if available
- Diagnosis by neurologist (any amendments to initial diagnosis) / include all diagnosis codes
- Decision to admit
- Admission (when/date and where/ward)
- Length of stay
- Management plan
- Management plan shared with GP
- Referral (when and where)
- Discharge (when, how and where). Was there a discharge plan?
15. Appendix 6: Staff Interview Questions

**Overall model**

- How does the acute neurology service currently operate?
- How is the service different than before?
- What has been the impact of the new model on service delivery for:
  - Neurology
  - Emergency Department (ED)
  - Acute Medical Unit
- What has been the impact of the new model on staff in:
  - Neurology
  - ED
  - AMU (AMU)
- What resources have been needed to establish the model?

**Impact on patient care**

- Do you think patients are receiving access to neurological advice more quickly?
- Are more patients being managed by a neurologist?
- Has this led to changes in practice, better outcomes or better patient experience?
- Have you seen any change on how quickly patients are investigated, managed and discharged from hospital?

Does the new model change how patients are followed up after discharge?

**Sustainability**

- Do you think there is the capacity and interest to continue with this model?
- What issues or constraints may prevent full implementation of the model?
- Do you have any suggestions for overcoming these issues or constraints?
## King’s College Hospital proposed HANU mapped against SCN standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>How will the model meet the standard?</th>
<th>Suggested changes</th>
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</thead>
<tbody>
<tr>
<td>1. Patients are admitted under the care of a neurology consultant.</td>
<td>Patients identified as suitable for the HANU will be assessed by neurology/stroke SpR within 4 hours of presentation to hospital and admission to HANU under named neurologist.</td>
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<td>2. Adults presenting in the Emergency Department identified as requiring a specialist neurological assessment by an appropriately trained neurology specialist - assessed within 4 hours of arrival.</td>
<td>They will be seen by neurology / stroke SpR or specialist nurse.</td>
<td>SpR to support medical team. Will still rely on juniors from medical team. Will work within 2 wards. SpR will be the initial contact, will identify patients and will admit them to the ward. The consultant will then see them. HANU timetable completed.</td>
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<td>3. Patients receive a multi-disciplinary assessment and treatment within 24hrs of admission to HANU. This may include a rehabilitation assessment, transfer to a Neuroscience Centre, neurosurgery or intensive care and a point of contact with the medical team involved with the on-going care of the patient.</td>
<td>HANU will be based on AMU. Medical Team will remain involved in their care whilst on HANU. Therapists will assess them as appropriate (neurotherapy outreach team). Transfer to regional neuroscience unit can be arranged if tertiary care is required. Neurosurgery is on-site and available for support 24/7. Neuro ITU and HDU available. Neurorehab consultants available to review and transfer to n/rehab unit if appropriate.</td>
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<td>4. Agreed protocols for the management of common neurological emergencies e.g. for status epilepticus, single seizure and acute headache.</td>
<td>Pan-London guidelines that will be adopted when available.</td>
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<td>5. Demonstration of adoption of agreed pan-London admission criteria for patients with acute neurological emergencies.</td>
<td>Pan-London criteria for admissions will be adopted. No limit to the number of suitable patients other than restricting our input to one of the two acute medical units, i.e. not including outliers on medical / surgical wards.</td>
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<td>6. Demonstration and maintenance of good medical practice including training, CPD, audit, and appropriate clinical governance.</td>
<td>All staff involved will have records of appropriate training.</td>
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<td>7. Demonstration of formal links with existing integrated care and community neurological</td>
<td>Integrated services with community and inpatient neurorehab.</td>
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<td>rehabilitation providers and inpatient rehabilitation providers.</td>
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<td>8. 24/7 tele access for GPs to an appropriate neurological specialist.</td>
<td>Currently provided. Neurology / stroke SpR on-site/7 and consultant on-call 24/7.</td>
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<td>9. Provision of appropriate protocol to transfer patients to regional neuroscience centres.</td>
<td>This will be agreed prior to HANU pilot.</td>
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<td>10. Agreed protocols with supporting neurosurgery services for daily urgent review of appropriate patients and their imaging.</td>
<td>Neurosurgery support available 24/7.</td>
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<tr>
<td>11. 24/7 availability of appropriately trained staff, competent to assess patients with acute neurological problems (Consultants, junior doctors, specialist nurses, AHPs).</td>
<td>Medical and neurology staff available 24/7. Physiotherapy available 7/week. Specialist nurses not available 24/7 but available weekdays at present.</td>
<td>SpR to support medical team. Will still rely on juniors from medical team. Will work within 2 wards. SpR will be the initial contact – will identify patients and will admit them to the ward. The consultant will then see them. HANU new timetable already done. New SpR to begin in September and another at the beginning of October.</td>
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<td>12. Patient care plan. All patients with acute neurological problems are discharged from a hospital setting with: documentation of the neurological examination; a management plan; and, printed information relevant to the patient’s diagnosis. Information must be shared with carers if agreed. The management plan should include:</td>
<td>All patients leave with a summary generated from their electronic patient notes and list of medication on discharge. Those admitted to the tertiary or rehab units will have a more comprehensive sent within 2 weeks.</td>
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<tr>
<td>• Summary of diagnosis</td>
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<td>• Investigations required/undertaken</td>
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<td>• Goal setting</td>
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<td>• Treatment</td>
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<td>• Symptom control or curative</td>
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<td>• Titration plan</td>
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<td>• Rehabilitation, post discharge</td>
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<td>• Onward referral / follow up requirements</td>
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<td>• Timelines for actions</td>
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<td>• Adverse reactions to treatment and actions required</td>
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<td>• Continuing care and social care</td>
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<td>13.</td>
<td>Upon discharge from hospital, the management plan is immediately sent electronically to their named GP and other health professionals (e.g. community rehabilitation team) and when applicable social care team involved in the on-going care of the patient. Where electronic transfer is unavailable information is shared within 5 days.</td>
<td>Electronic discharge fully available for local patients. Written forms available within 5-days</td>
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<td>14.</td>
<td>Trials: HANUs will provide, with support from charities and support groups, information about and opportunities for patients to enrol in clinical trials, where appropriate.</td>
<td>Patients’ information from charities will be made available. We do have active clinical trials already and this could be expanded as appropriate</td>
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<td>15.</td>
<td>Demonstration of neurological unit characterised by: a. Dedicated geographical location and a dedicated staffing infrastructure – medical, nursing and therapy. Or b. Within an existing clinical facility e.g. an AMU c. On a distributed basis.</td>
<td>HANU will be located on one of two AMUs although not necessarily defined to specific beds. Dedicated staffing structure with neurology team and acute physicians &amp; nurses working jointly</td>
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<tr>
<td>16.</td>
<td>Patients have rehabilitation access to and adequate staffing levels: a. Neuro specific AHPs including physiotherapy, occupational therapy, speech and language therapy, dietetics. Availability of rehabilitation facilities e.g. access to physiotherapy gym b. Psychological interventions and neuro-psychology c. Neurology / Neuro-rehabilitation consultants</td>
<td>Neurophysiotherapist weekdays On-call physio at weekend Neuropsychology department – neuropsychological rehab available only in HASU and rehab units at present Neurology and neurorehab consultants available</td>
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<td>17.</td>
<td>Provision of a medical staffing structure sufficient to provide one daily ward round and one consultant review, 7 days per week and appropriate junior cover.</td>
<td>Yes.</td>
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<td>18. Provision of a rapid access outpatient’s service to assess acute neurological problems.</td>
<td>The Medical Assessment Centre will be used.</td>
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<td>19. Provision of a daily outreach acute assessment service for the rest of the trust.</td>
<td>An SpR will be available available 24/7 to provide an outreach service to the rest of the Trust.</td>
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</table>
| 20. Availability of a radiology service responsible for 24/7 CT scanning and daily scheduled MRI  
- Demonstration of protocol for transfer to regional MRI services for out of hour imaging. | 24/7 CT and MRI available on-site. |
| 21. Provision of neurophysiology service – EMG & EEG. | 24/7 EEG (on-call neurophysiology consultant and technicians). EMG available – would be done out of hours only in exceptional circumstances. |
| 22. Provision of lumbar puncture availability 24/7  
-Agreed protocol for delivery of lumbar puncture when not feasible by in-house staff. | Medical teams will do HANU LPs with support from neurology / radiology in difficult cases. |
| 23. Inclusion criteria  
- All patients with suspected or proven acute neurological presentation  
- Appropriate patient with secondary deterioration in long term neurological condition where HANU care is in the best interest of the patient. | --- |
| 24. Exclusion criteria  
- Specific co-morbidity e.g. acute myocardial infarction, requiring other specialist management or patient requires HDU or ITU  
- Frail elderly or patients with several co-morbidities who would be better managed by an appropriate physician. | --- |
King’s Hyper Acute Neurology Unit (HANU)  
(DRAFT)
Service Pilot from 5th October 2015 – 5th January

Patient presents at ED with non-stroke acute neurological complaint or non-infective acute change in known neurological diagnosis

Refer to HANU registrar:
Wifi x37739 [0830-1730]
Wifi x36534 [1730-0830]

HANU registrar assessment of

If not suitable for HANU, HANU registrar to liaise with medical

Medical take juniors involved in clerking patients

HANU registrar confirms plan for patient

Discharge from ED
Possibly with follow up in rapid access HANU clinic

Admit to HANU (on AMU) under Neurologist

Patient presents at ED with other medical concern that requires specialist input

Refer to medical registrar: Bleep 101

HANU registrar assessment of

If referral is accepted - add patient to the electronic medical take list with indication of HANU or Acute Medicine patient

If not suitable for HANU, HANU registrar to liaise with medical

Medical take juniors involved in clerking patients

HANU registrar confirms plan for patient

Admit to AMU under Acute Medicine Physician

Discharge from ED
Possibly with follow up in rapid access MAC
HANU Inclusion criteria

- Patients who may require admission to hospital
- Acute presentation of a NEW primary neurological symptoms (ie Headache or Seizure)
- Acute deterioration of long standing neurological disease [MS, PD, MG etc]

HANU Exclusion criteria

- Patients with significant sepsis as the primary presenting complaint with a background neurological disease. This patient group should be referred to the medical on call team
- Patients admitted to other wards, including ITU, will not be part of the HANU but can be referred to neurology for an opinion via EPR as occurs currently.
- Patients with other significant co-morbidities, e.g. frail elderly, renal failure, MI, disseminated malignancy etc., should be admitted under the more appropriate specialist team.
- Severe sepsis including suspected meningitis will be admitted under the medical team
- Acute vascular presentations should be discussed with stroke or neurosurgery team
- Patients who can be discharged from ED (i.e. those patients suitable for the first Seizure pathway or those who would otherwise be referred to an outpatient clinic)
### University College London Hospital proposed HANU mapped against SCN standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>How will the model meet the standard?</th>
<th>Suggested changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patients are admitted under the care of a neurology consultant.</td>
<td>All neurology referrals from GPs and A and E to be assessed by HANU with view to potential admission under HANU</td>
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<tr>
<td>2. Adults presenting in the Emergency Department identified as requiring a specialist neurological assessment by an appropriately trained neurology specialist - assessed within 4 hours of arrival.</td>
<td>Currently from the time of referral, 76% of all neurology referrals are reviewed by a neurology consultant or neurology SpR within 2 hours and 96% within 24 hours. We would expect further improvements to meet this standard with the development of a HANU as only 12% of referrals are made on the day of admission. As part of the change 3 SpR will cover acute neurology 7 days a week with support. The consultant will come around twice daily. HANU would link to HASU.</td>
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<td>3. Patients receive a multi-disciplinary assessment and treatment within 24hrs of admission to HANU. This may include a rehabilitation assessment, transfer to a Neuroscience Centre, neurosurgery or intensive care and a point of contact with the medical team involved with the on-going care of the patient.</td>
<td>HANU patients would have access to neurology therapy and nursing services as the proposed HANU will be co-located with current HASU on level 7 at UCLH. Rapid transfer to Queen Square is given highest priority at bed meetings when required and medical teams are available.</td>
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<tr>
<td>4. Agreed protocols for the management of common neurological emergencies e.g. for status epilepticus, single seizure and acute headache.</td>
<td>These protocols currently exist within NHNN and can be developed and harmonised with the other HANUs</td>
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<tr>
<td>5. Demonstration of adoption of agreed pan-London admission criteria for patients with acute neurological emergencies.</td>
<td>This will be adopted.</td>
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<td>6. Demonstration and maintenance of good medical practice including training, CPD, audit, and appropriate clinical governance.</td>
<td>Regular audit, CPD and training are a part of the current UCLH general neurology service and will be extended to the HANU. Data from audits at UCLH has been presented at NHNN Governance Days and this will continue with the HANU.</td>
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<td><strong>7. Demonstration of formal links with existing integrated care and community neurological rehabilitation providers and inpatient rehabilitation providers.</strong></td>
<td>The development of improved inpatient and community rehabilitation services at UCLH/NHNN for the current HASU will be integrated with HANU.</td>
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<tr>
<td><strong>8. 24/7 tele access for GPs to an appropriate neurological specialist.</strong></td>
<td>Access 24/7 to a Neurology SpR is currently available and will be an intrinsic part of the development of HANU</td>
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<tr>
<td><strong>9. Provision of appropriate protocol to transfer patients to regional neuroscience centres.</strong></td>
<td>A protocol currently is in place for the transfer of appropriate patients who require greater than 48 hours neurological care at NHNN. This process gives priority to UCLH to NHNN transfer.</td>
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<tr>
<td><strong>10. Agreed protocols with supporting neurosurgery services for daily urgent review of appropriate patients and their imaging.</strong></td>
<td>On call neurosurgery at NHNN is currently available and will continue.</td>
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<tr>
<td><strong>11. 24/7 availability of appropriately trained staff, competent to assess patients with acute neurological problems (Consultants, junior doctors, specialist nurses, AHPs).</strong></td>
<td>Neurology consultants cover 7/7 during working hours with on-call cover out of hours. At least one SpR and one SHO available to HANU service 24/7 as part of a larger junior team from current HASU/general neurology. Nurses and AHPs will also be a part of the HASU/HANU team.</td>
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<td><strong>12. Patient care plan. All patients with acute neurological problems are discharged from a hospital setting with: documentation of the neurological examination; a management plan; and, printed information relevant to the patient’s diagnosis. Information must be shared with carers if agreed. The management plan should include:</strong></td>
<td>These targets are currently in place as a part of the HASU service and will be extended to HANU.</td>
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- Continuing care and social care
- Voluntary sector support
- Named point of contact

13. Upon discharge from hospital, the management plan is immediately sent electronically to their named GP and other health professionals (e.g. community rehabilitation team) and when applicable social care team involved in the on-going care of the patient. Where electronic transfer is unavailable information is shared within 5 days. This will be made available to relevant teams.

14. Trials: HANUs will provide, with support from charities and support groups, information about and opportunities for patients to enrol in clinical trials, where appropriate. This will be made available to patients.

15. Demonstration of neurological unit characterised by:
   - Dedicated geographical location and a dedicated staffing infrastructure – medical, nursing and therapy. Or
   - Within an existing clinical facility e.g. an AMU
   - On a distributed basis.
   - Dedicated neurology unit co-located with HASU at UCLH staffed by existing HASU neurology trained team.
   - Existing ambulatory unit on MAU will enable assessment of patients not requiring admission
   - Outreach neurology service to patients deemed more appropriate to remain under other subspecialties with neurological problems such as transplant patients or the frail elderly.

16. Patients have rehabilitation access to and adequate staffing levels:
   - Neuro specific AHPs including physiotherapy, occupational therapy, speech and language therapy, dietetics. Availability of rehabilitation facilities e.g. access to physiotherapy gym
   - Psychological interventions and neuro-psychology
   - Neurology / Neuro-rehabilitation consultants.
   - The HANU will be co-located with HASU and services will be shared. Access to specialist neurorehabilitation assessment at NHNN is currently available

17. Provision of a medical staffing structure sufficient to provide one daily ward round and one consultant review, 7 days per week and appropriate junior cover. This target will be met with HANU. Currently funded model already provides dedicated Neurology SpR during working hours and daily Neurology consultant review.

Trying to get 6 inpatient beds in HASU.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>18.</td>
<td>Provision of a rapid access outpatient’s service to assess acute neurological problems.</td>
<td>Daily “rapid access neurological attack” (RANA) clinic will review all acute cases with access to outpatients clinics at NHNN.</td>
</tr>
<tr>
<td>19.</td>
<td>Provision of a daily outreach acute assessment service for the rest of the trust.</td>
<td>Outreach neurology service to patients deemed more appropriate to remain under other subspecialties with neurological problems such as transplant patients or the frail elderly.</td>
</tr>
<tr>
<td>20.</td>
<td>Availability of a radiology service responsible for 24/7 CT scanning and daily scheduled MRI - Demonstration of protocol for transfer to regional MRI services for out of hour imaging.</td>
<td>Funding is already in place for 2-3 daily MRIs in the RANA clinic as well as provision of transfer of MRI slots from Acute Medicine for pre-existing slots. CT available currently 24/7 with neuroradiology reporting. Transfer to NHNN out of hours if urgent MRI required.</td>
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<tr>
<td>21.</td>
<td>Provision of neurophysiology service – EMG &amp; EEG.</td>
<td>24/7 access to neurophysiology is currently available within the service.</td>
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<tr>
<td>22.</td>
<td>Provision of lumbar puncture availability 24/7 -Agreed protocol for delivery of lumbar puncture when not feasible by in-house staff.</td>
<td>Lumbar puncture availability 24/7 in place currently with access to radiologically guided service.</td>
</tr>
</tbody>
</table>
| 23. | Inclusion criteria                                                                                                                                                                                          | • All patients with suspected or proven acute neurological presentation  
  • Appropriate patient with secondary deterioration in long term neurological condition where HANU care is in the best interest of the patient. |
| 24. | Exclusion criteria                                                                                                                                                                                           | • Specific co-morbidity e.g. acute myocardial infarction, requiring other specialist management or patient requires HDU or ITU  
  • Frail elderly or patients with several co-morbidities who would be better managed by an appropriate physician.  
  • 1. Patients are admitted under the care of a neurology consultant. |
|    | This standard is agreed.                                                                                                                                                                                  | This standard is agreed.                                                                                                                                                                                |
PATHWAY FOR HYPERACUTE NEUROLOGY AT UCLH

- Patient referred by GP to AECU/Medical take with acute non-stroke neurology. (Ambulatory Consultant 9am-6pm weekdays, DMR out of hours). Outcomes:
  1) Advice only (HANS SpR not contacted)
  2) Ambulatory Neurology slot booked by AECU
  3) ED admission for HANS SpR to review within 30 minutes of referral

- Patient sent in by LAS or walk-in with acute non-stroke neurology
  (Emergency department) HANS SpR to review within 30 minutes of referral

- Patient with acute or chronic non-stroke neurology within UCLH in patients,
  HANS SpR to review within 24 hours.

Low probability of Primary Neurological Diagnosis

- Referred to appropriate non-neurology team/discharge

Primary Non-neurological Diagnosis

Discussion with HANS SpR

- High probability of primary (non-stroke) neurological diagnosis
  HANS team review and diagnosis

Primary Neurological Diagnosis

Acute Neurology pathway: (patient under care of Acute Neurology team)

- Suitable for Ambulatory Care/Outpatients?
  - YES: HANS team manages patient in ambulatory care or outpatients.
  - NO: Fit for discharge within 48 hrs?
    - YES: HANS team manages patient on AMU for 48 hours
    - NO: Transfer to NHNN acute
**Inclusion Criteria**

**Group 1** patients suitable for HANS. The list below is not exhaustive and every patient’s case should be taken on its own merits and, if need be, discussed between the AMU/ED and HANS consultants with regard to most appropriate team to be admitted under. This may need review during the patient's stay.

1) Headache.

2) Primary seizure disorder—For patients where a single seizure has been caused by alcohol/drug withdrawal, advice should be given by the HANS team regarding seizure control, and subsequent medical management should be under the AMU team. If these patients continue to have seizures then further discussion should take place to determine most appropriate team to continue care.

3) Functional disorders.

4) Focal neurological symptoms, such as tingling, numbness and weakness, felt not to be caused by stroke/TIA.

5) Disorders of consciousness not caused by recreational drugs/alcohol or systemic disorders eg. sepsis.

6) Patients with infective meningitis and encephalitis will continue to be admitted under the Infectious Disease team.

**Exclusion Criteria**

**Group 2**

MS or PD patient with systemic eg. sepsis, or social eg. failure of care needs at home deterioration

**Group 3**

Patients with chronic neurological injury who decompensate due to systemic or social deterioration. eg. patient with dementia or chronic brain injury.

**Other Exclusion Criteria**

- Stroke patients—HASU pathway
- Subarachnoid haemorrhage—neurosurgery pathway
- Patients with acute brain infection—ID pathway
- Patients with Traumatic Brain Injury—neurosurgery pathway
- Elderly patients with delirium/confusional state
- Elderly patients with reduced mobility and falls
- Patients discharged from ICU with hypoxic-ischaemic encephalopathy
- Neurosurgical patients
## 18. Appendix 9: Staff Qualitative Feedback

<table>
<thead>
<tr>
<th>Staff member</th>
<th>Quote</th>
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<tr>
<td><strong>Service delivery</strong></td>
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<tr>
<td>Neurology SpR</td>
<td>“I think that the main impact was having a neurology review much earlier... as soon as the patient arrives through the door in A&amp;E.”</td>
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<tr>
<td>Neurology SpR</td>
<td>“I think service delivery has completely changed it in a good way. With HANU you are getting a senior lead decision maker with experience in neurology seeing you within hours of you coming to hospital, which can otherwise take days. That has a number of advantages, often you can filter out initially if it is a neurological problem or not. Often patients don’t need to be admitted. For example if we thought that the seizures weren’t real seizures we could realise that from observing, the patient would then only need to be admitted if it was necessary. We would know the specific imaging that was needed and we would be able to book them in for an MRI slot on the day. Everything would be done much quicker and the actual imaging that would be needed would be the exact one. Often in the past we would arrive and patients may have had a scan but not the right scan and we would have to send another request which could take days. So everything was much quicker and more efficient. If they needed a lumbar puncture we would do one and we far more experience doing them, so they would be more successful and we would know exactly what we were looking for. I think the bottom line is that if you had a friend or a family member with a neurological problem, you would want them to have this kind of service. You would want them to be seen by a neurologist rather than an A&amp;E SHO or a medical SPR.”</td>
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<tr>
<td>Neurology Consultant</td>
<td>“The first seizure clinic is grossly overused for inappropriate patients so HANU should help with that in the sense of if you have urgent assessment you know whether or not it is a first seizure and you can do a lot of the work through clinic and the people that turn up there actually need to be seen there.”</td>
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<tr>
<td>Neurology Consultant</td>
<td>“Our initial data suggests that we are seeing a lot more patients. We may have seen between 10 and 15 referrals a week prior to the implementation of HANU, now we are seeing between 55 and 60 patients a week and they have been seen more rapidly and have a rapid diagnosis and discharge plan by a senior decision maker at the point of contact with the hospital. Subjectively that made a dramatic improvement in the quality of service we gave to our acute neurology patients and extended that to out of hours. What is interesting is that with all of the anxieties about ownership of patients this has only occasionally became apparent for a few patients... because we are seeing patients rapidly and discharging them and have access to an Ambulatory Care setting most of those patients are seen and discharged. So at any one time on AMU we may have ownership of between 1 and 3 patients but they’re rapidly discharged as well. We have had a couple of patients that have been admitted for longer stays and ownership has been brought into question which has required one to one conversation with the medical consultants but that has been the vast minority of the patients.”</td>
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</table>
| Neurology SpR       | “The two patient groups it has made a difference for are people with epilepsy and people with headache. If a patient has had a first seizure and that’s already been told on the phone the usual pathway is to discharge the patient, get them to a first fit clinic and take it from there and that’s reasonable if it is actually the first seizure. But my anecdotal experience of these patients is that a lot of them have focal seizures, which are quite clear when you speak to them. In a small number of people that we have seen we are able to start to diagnose their history and start them on treatment without a scan or EEG because it’s not required, we know what they have. We get the scan done and EEG can be done if it is required. So those people are leaving with a diagnosis and treatment plan within the same
timescale that they would have previously just got a referral to a first fit clinic... and they’ve had counselling about seizures, safety advice, the side effects of drugs, which drugs are and aren’t right for them. The other group is headache. For the people with migraine, we’ve treated acutely and got them out quickly. The people with non-migraine headaches, which were thought to be migraines but weren’t, we’ve made the diagnosis and treated them appropriately. So it may not be a large number but the clinical benefit of those non-migraine patients seeing us has been huge because it’s not been three days of morphine before seeing someone to take a history.”

<table>
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<tr>
<th><strong>Neurology Consultant</strong></th>
<th>“I presume the AMU workload has decreased because these patient groups would have been under their care. So we have taken some of their workload away from them.”</th>
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<tr>
<td><strong>Impact on staff</strong></td>
<td>“It has increased workload somewhat at a consultant level... I think that people have felt that it has made the on call busier but probably not unmanageably so. At a registrar level without some creative accounting of moving around registrars for the pilot we don’t really have enough registrars to offer this level of input in the fullness of time we will have to ask for at least one further registrar to run this permanently. We’re adding basically a whole new role, so I think we would need a small increase in registrar numbers. At an SHO [juniors] in hours it is probably helping SHO’s rather than hindering them. I suspect that because the [registrars] are helping rationalise their workload and in fact doing some of it for them because they know more about the situation they know what does need to be done and what doesn’t need to be done, they’re much quicker at getting things like lumbar punctures done. I think that for the future HANU model we will need to think about getting some devoted juniors. It will become increasingly problematic if we are relying on registrars to do SHO level work constantly, which I think we are probably doing a bit at the moment. Out of hours is the main vulnerable area. We only have one registrar and it has not be possible to increase that substantially because of changes to banding. We’ve had to try and do what we can. To run a seven day a week, day/night model we would probably have to get more than one registrar and there may even be a banding change. So I think there would be a significant cost implication.”</td>
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<tr>
<td><strong>Neurology SpR</strong></td>
<td>“In the day time it is fine. Sometimes it is very busy, often it is not very busy and sometimes you think there is work around that should be coming your way that isn’t. At nights it can fluctuate a lot. The people that get hammered are the people that are on call Saturday and Sunday during the day time. For instance, there has been one weekend that I worked Saturday and I was very busy, I think I saw seven or eight patients during the six hours I was in and I can’t really imagine doing that if I was doing stroke at the same time... that is the most vulnerable period. A&amp;E attendances on the weekend can’t really be predicted.”</td>
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<tr>
<td><strong>Neurology Consultant</strong></td>
<td>“I think it has been very difficult for the registrar, he has been incredibly busy. He often has to complete administrative duties such as doing discharge summaries and drug charts. He is always on the phone. So it has been quite stressful. Having said that another surprise that has come out of this study is that most of that increased activity has been between 9am and 6pm. Some of it is between 6pm and 10pm, but not very much. We’ve been involved in a very minor way after 10pm. Our fear was that that was because patients weren’t being referred to us, there may be an element of that, but I think overall that acute neurology doesn’t come in out of hours. That will heavily influence how we potentially staff a subsequent service. We will definitely put a lot more resources in from 9am to 6pm, then we would overnight, because all the activity appears to be during the working day.”</td>
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<td><strong>Neurology SpR</strong></td>
<td>“Without a doubt. There was a massive increase in demand with very little change in infrastructure... that is only a trial issue. I think the HANU service is great in itself but if it were to continue we would need far better infrastructure. As a registrar I had inpatients in AMU, while also seeing any patient coming through A&amp;E, all the other consultations required for patients under medical teams on the tower, all of AMBI care and taking phone calls without any SHO or medical support. We would need at least another SHO and possibly a registrar to help. Most of the workload would be 9-5, rather than on the weekends and overnight.”</td>
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<tr>
<td>Interviewee</td>
<td>Statement</td>
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<tr>
<td>Neurology SpR</td>
<td>“I think there has been an impact on staff in MAU. I’m not sure about the consultants, but certainly some of the consultants are enthused to have us around. For the juniors they have really been receptive because they get teaching for free... we can explain the localisation and what we’re thinking about and we can assist them with difficult lumbar punctures if they need us to. I think the therapists particularly have found it very useful to have neurologists around who can actually assess the deficit and tell them whether it is complex or not. So I think therapy staff have genuinely enjoyed having us around and on one occasion have asked us to see somebody who they weren’t quite sure about. At the consultant level it has been a [mixed] reaction to “it is very interesting to see you take a headache history” to “I am not quite sure why you are here.” Both of those [viewpoints] have been overtly stated. Overall, for the patients within that area it has made a difference because they leave with a diagnosis rather than a syndrome.”</td>
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<tr>
<td>Medical Consultant</td>
<td>“In terms of staffing probably not because the junior doctors would have looked after those patients anyway, so I don’t think that it has made much of a difference.”</td>
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<tr>
<td>Medical Consultant</td>
<td>“The impact on ED is a little bit harder to judge and I suspect it has not much of a difference. It’s a very big department and I think the number of direct referrals from ED to HANU has been small enough that it could pass some consultants by completely. Some of that might reflect the skill we’ve had, if they refer to the medical registrar first it can be passed onto the HANU registrar straight away, so ED may not have noticed some of the changes. We did sign to them clearly that this change was being made but I have had nurses and doctors in ED saying “what difference has this made?” I think neurology has very clearly been more responsive to ED when they have referred to neurology directly because the HANU team are available.”</td>
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<tr>
<td>ED Consultant</td>
<td>“The benefit of collocating the service on the consultant level has helped tremendously by putting a face to a service. We often work in a silo and while one benefit of the new service is the acute treatment of the patient, the other is the ability for us to network which is a positive side effect of having it collocated.”</td>
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<tr>
<td>Neurology, SpR</td>
<td>“The exposure that it allows is very unique and has really had an impact on their [medical juniors] level of education.”</td>
</tr>
<tr>
<td>Medical Consultant</td>
<td>“The neurological decision making is fascinating. We will discuss the same case and you just get two completely different approaches... you weren’t going to get that before HANU. It is just fascinating for both the consultants and juniors to listen to someone describe something that we think is quite simple... even the management of thunderclap headache where we might make a diagnosis the neurologist may say “hey wait a minute, there’s more to it than that.” Now the juniors are seeing critical thinking. I am not at this stage implying better or worse just another view. Now for training that is phenomenal and if you tie that to bedside or corridor or medical ward discussions where you have this different input then it starts becoming this fascinating training process. You start to see horizontal hierarchy around patient care. You start to acute neurologists and physicians being challenged by each other all focusing on clinical care for patients and the education that comes out to the other members of the board round is fascinating. If I was a junior and someone said that I had a choice of two jobs, one on a HANU and one without a HANU, I would just hands down go to the HANU because I know that I am going to get interaction with a neurologist that I wouldn’t get.”</td>
</tr>
<tr>
<td>ED Consultant</td>
<td>“Another benefit is that the neurologists are very happy to teach our junior doctors and I would hope that the junior doctors that potentially assess the patient or are involved in the preliminary investigation, then follow the patient up with the neurologist as well and get feedback and teaching opportunity.”</td>
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<tr>
<td>Access to a neurologist</td>
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<tr>
<td>ED Consultant</td>
<td>“I think more patients are being managed in a timely fashion by a neurologist. With the previous system they would have potentially ended up with a neurologist but there were extra layers in between.”</td>
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<tr>
<td>Neurology SpR</td>
<td>“Yes, without a doubt. Patients usually would have been seen by a GP who would have maybe referred them to A&amp;E and the neurology SHO would have told the GP to refer them to neurology outpatients. That would have taken 6-8 weeks. They could have waited 2-3 months to see somebody and in that time the problem is long gone or has...”</td>
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</table>
been exacerbated. They may not have seen a consultant at that point either. So it has completely changed. Patients were being seen acutely, usually would have been seen within 10 or 15 minutes of them being referred.”

<table>
<thead>
<tr>
<th>Neurology Consultant</th>
<th>“There is a wait of probably 3 to 4 months for a neurology outpatient appointment. We can now see them a lot sooner, whenever we have an acute follow up appointment available.”</th>
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<tbody>
<tr>
<td>Ownership by a neurologist</td>
<td>“Compared to before we’re probably dramatically underachieving in getting access to all of them through inertia of trying to change referral pathways in a relatively short period”</td>
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<tr>
<td>Medical Consultant</td>
<td>“Yes… undoubtedly. Much earlier and much more direction. Not liaison and not advice but clear ownership of the process. With some pretty good shared agenda that the use of inpatient space to do any form of medicine is pretty valuable. So if we can do more of this in outpatients or Ambulatory Care we will do that… really breaking down the need for inpatient care. We’ve got access to MAC which are very hot clinics but also neurologists have hot clinics. So the slight extra provision of clinic space with the ability to do stuff you would normally have done in an inpatient setting. It has been terrific.”</td>
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<tr>
<td>Neurology Consultant</td>
<td>“Definitely… the numbers have at least tripled if not quadrupled in terms of the number of patients we are seeing.”</td>
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<tr>
<td>Medical Consultant</td>
<td>“As an inpatient no, I don’t think it has made a significant difference.”</td>
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<tr>
<td>Ambulatory Care Consultant Nurse</td>
<td>“In Ambulatory Care, yes. I would say on average they’re seeing two patients a day. Previously it was a bit more ad hoc, we were making a lot more referrals for people to be seen as neurology outpatients. So we were getting a lot more opinion rather than actually seeing patients.”</td>
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<tr>
<td>Patient outcomes</td>
<td>“Yes, patient experience I suspect is certainly better than it was before if they were under the medical team as I suspect they get more input. Outcomes, you’d hope should be better. We’ve had several at least good cases where the diagnosis would have not be reached at all or would have been significantly delayed, so appropriate management is now put in early. We’re hoping patients that need to be in the hospital are appropriately investigated when they’re here and patients that don’t are also appropriately allowed home. Because there is harm on both sides… I suspect that we are getting things right quicker and length of stay is down.”</td>
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<tr>
<td>Neurology Consultant</td>
<td>“I think patients appreciate a rapid accurate diagnosis and then a clear management plan. I think patients have benefited from that… I am not saying that the medics didn’t achieve that eventually and then refer to ourselves but it makes the whole process smoother, more accurate, more well defined, with a clearer management plan and where necessary more rapid access to specialist tertiary services.”</td>
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<tr>
<td>Ambulatory Care Consultant Nurse</td>
<td>“I think it has been positive from an Ambulatory Care perspective because I think they’re seeing the right person, they’re getting more of an idea about their problem and they’re seeing a consultant instead of a registrar. The fact that they’re seeing that person straight away creates a better experience for them.”</td>
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<tr>
<td>Neurology SpR</td>
<td>“Yes absolutely. I have a lot of feedback from the patients who felt that they had a better experience. So they were able to access us… once they were discharged we were able to arrange very rapid follow up in Ambulatory Care. All investigations were conducted very quickly.”</td>
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<tr>
<td>Neurology, SpR</td>
<td>“Some patients were very appreciative of the service and I received an email from a patient who was very grateful. She was seen by a neurology registrar in A&amp;E and she thought that the experience was very positive. Many patients liked being seen by a neurologist as they had more experience to go further in depth than an A&amp;E junior would have.”</td>
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<tr>
<td>Follow up and discharge process</td>
<td>“Yes it is much easier… we have extra provision for outpatients with the ability to see people at our medical assessment centre, we also have these hot clinics in neurology. It is much easier now with the resource that’s there for neurologists to say “I’ll see you”</td>
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tomorrow” or “I'll see you in a couple of days.” We’ve got a really responsive department at diagnostic imaging as well who I think understand when the neurologist who say “if you do this as an outpatient the urgency isn’t less than if they’re an inpatient but I can follow this person up in 2 or 3 days in MAC,” and that requires an incredible degree of trust between departments. So the patients get followed up by the appropriate decision maker and also don’t receive follow up if it is not necessary. I suspect what we are doing is directing our attention much more appropriately.”

Neurology SpR

“Yes, a lot of patients were discharged and managed as outpatients in Ambulatory Care. There were many patients in which if we weren’t involved initially they would have required long term admissions. I can think of one patient with non-epileptic attacks who was known to another hospital, we saw him immediately in A&E and were able to speak to his consultants at the other hospital while he was in A&E, assess him and discharge him at that point. I think if he were to be admitted and from his previous experiences at his usual hospital, his admissions could last months.”

Neurology SpR

“The good thing about the HANU clinic is that it offers us the flexibility to order tests and bring the people back early rather than waiting three months to discuss a test result with them.”

Neurology Consultant

“I think more patients are discharged with a plan back to the GP now. So gone are the days were the patient might not even see a neurology service, patients were discharged by an AMU medical consultant but with a view to urgent follow up in an acute neurology clinic. Those patients now don’t require that, they have a management plan sent to their GPs which can be enacted by the GPs and if necessary the GP can refer to neurology outpatients. So I think it has prevented a lot of unnecessary referrals to neurology outpatient and also better directed referrals to specialist services within neurology when needed.”

ED Consultant

“Now I think there would be more specific follow up. Presumably this system will identify the patients correctly who can be discharged and avoid admissions and instead be safely followed up in a timely way in clinics. The emphasis on this is appropriate and timely. A lot of the admissions in the context of neurology were previously done to facilitate safe follow up.”

Capacity and Constraints

Neurology Consultant

“There’s quite a lot of enthusiasm. The medics are quite enthusiastic at a senior level, at a consultant lead level. The neurologists have been very positive, somewhat surprising to me, people have been quite keen. Even people that felt a bit grumpy to start with are quite positive, because it is nice to see acute patients. They haven’t built up a backlog of disgruntlement, they’ve got acute neurological problems so it’s back to that clinical assessment of an acute neurology patient. So they’re quite enthusiastic about it and like having the registrars on for the week and medicine like having them on the wards.”

Neurology SpR

“At a registrar level there is enthusiasm. Everybody wants to do it. Everybody understands that it is necessary and that it is good for patient care. The anxiety comes down to people who have not done a lot of medicine, have to suddenly see people who have got medical problems. The more senior registrars who have done a lot of medicine are quite okay with it and the people who are more junior are just anxious.”

Medical Consultant

“Interest, yes. What aspect of the model we would continue is unknown. I am personally dead interested in it but capacity is a slightly different thing. In my department there’s still question about what this means, particularly in terms of patient ownership.”

Neurology Consultant

“There is an interest but there is no capacity with the current level of resources. All the feedback I have obtained from the other consultants and the registrars is that this is a good thing. There has been some anxiety about how it is for consultants to see patients so acutely, I would agree that that actually is a positive thing. I think in terms of resources, there would have to be some more resources into the system to make it sustainable.”

Medical Consultant

“For AMU I am not sure about the benefits, I don’t think it has added anything on top of the consult service that was operating before but for Ambulatory Care there has definitely been a benefit.”
| **ED Consultant** | “The feedback I have received from everybody MDT [multidisciplinary team], nurses, therapists, doctors are very happy with it. It has been said “why did we not do this earlier?”” |
| **Neurology SpR** | “I think A&E very much so, they really valued our input and I think the medical teams did. Some of the older consultants seemed threatened by the idea. They felt that they were going to lose their skills by seeing less neurology. But a lot of younger consultants who had sub-specialties such as geriatrics were very comfortable. There was a mixed response but overall patients benefited from this. In terms of capacity it would need to change. I was staying many hours beyond my work hours. We needed more infrastructure. There was lot of bureaucracy... from the point of view of the patient who would be discharged much sooner, be seen in Ambulatory Care and then be able to leave. But all of them would require a discharge letter, maybe another referral letter, maybe an outpatient investigation... many bureaucratic forms that were required and therefore we would need more of an administrative role to help and junior support that could do lumbar punctures for example. Some days we were seeing as many patients as the medical take and they would have seven times more infrastructure.” |
| **Medical Consultant** | “The challenge we had at implementation, my department would have liked for this not to have happened if there was a free choice in it. There were a group of us that saw things very clearly as an opportunity to improve patient care. It’s fascinating that a complex environment and difficult time like the NHS are in at the moment how quickly the barriers can come up regarding innovation and so the implementation of it has been difficult.” |
| **Neurology Consultant** | “I think the two primary avenues of support that we would need above what we have more are administrative support and junior support... I think it would be better if there was a senior SPR that was a clinical decision maker who then had an SHO to support them. That would take some of the needs of having the consultant directly heavily involve, as they are having to cancel and change their activities. So if you had a senior decision making SPR, with SHO support, with close neurology consultant cover, with some administrative support the system could potentially continue.” |
| **Medical Consultant** | “I think the issue has been that there has been a different consultant every week, who often have different ideas about how the service should operate. I think that has been a challenge.” |
| **Neurology SpR** | “In terms of the drawbacks of the system, patients in A&E would always take precedence and the more complicated patients in ITU or haematology who would have a primary team and just need a consult, would often wait much longer for us to see them than before... they could be waiting a day when in the past we could see them in a couple of hours. They are often more complicated and require more time but the fact is that acute patients keep coming through the door and they are prioritised. I think those patients that require consult were disadvantaged but it was only a problem of infrastructure.” |
| **Neurology SpR** | “Without a dedicated neurology registrar in A&E, referrals from triage are inappropriate. The referrals were often completely unfiltered and that defeats the idea of a speciality. There isn’t any other medical specialties that see unfiltered referrals in such a way.” |
Appendix 10: Patient Vignettes

Patient Vignette 1

Gender: F  Age: 31

The patient arrived at A&E in an ambulance after experiencing what she described as a seizure while at home in the presence of her friends. The patient gave a 3-4 month history in which she described almost weekly seizures and 3 previous attendances to ED, one of which was two days prior.

The patient was admitted to the acute medical unit and following an assessment by the medical staff she was placed under the care of a neurology SpR in HANU (collocated in AMU). This was the first occasion she has presented for this problem and been seen by a neurologist. The patient was admitted overnight and assessed by a neurologist. The patient underwent a neurology assessment in which it was reported that she had symptoms of loss of awareness, collapsing, confusion, short episode of jerking, and tongue biting. An MRI was conducted (results were okay) and appointments were made for the patient to return one week later to have an EEG conducted and follow up with a neurologist in the HANU clinic. The patient was sent home with a one week supply of medication.

Can you tell me something about your recent/current attendance at the hospital and particularly the time when you were seen by a neurologist? Had a seizure and a friend called the ambulance to take me to hospital.

• What was the problem that you went to the hospital with? Seizure.
• Which part of the hospital did you go to? A&E and was admitted to AMU overnight.
• Is this the first time you have presented at this hospital for this problem? No 3 times prior.
• Who did you see and what examinations/tests did you have? Can’t remember.

How did it feel?

• Did you experience any problems in getting help? No.
• Do you remember seeing a neurologist? Yes.
  o What did you get from seeing the neurologist? Assessment by a neurologist, vision was checked.
  o What did they tell you about your problems? They want me to come back in a week because I have had a few seizures now. They asked if it was in the family. Can’t remember anything else.
Were you given any advice about medication? Yes, gave me medication to try over the next week.

Were you referred to another service? Come back to have more tests done in a week.

Do you feel that access to health care has improved compared to previous times when you have been to hospital? It’s been the same.

Did you feel that input from a neurologist:

a) improved your understanding of the problem. Yes, I was given more detail than in the past.

b) led to timely and appropriate management. Yes.

c) improved your experience of being in hospital. Yes.

d) improved the arrangements for appropriate follow up. Yes very good with allowing me to come back to have the tests done instead of waiting around.

Patient Vignette

Gender: M  Age: 72

The patient has a diagnosis of Parkinson’s disease and fell over while at home. It took him 20 minutes to reach his emergency pager to call his nurse, who then phoned an ambulance and he was taken straight to this hospital. The patient received an assessment by HANU SpR when he arrived on Saturday. The patient’s current length of stay was 2 days.

Can you tell me something about your recent/current attendance at the hospital and particularly the time when you were seen by a neurologist? Had a seizure and a friend called the ambulance to take me to hospital.

What was the problem that you went to the hospital with? Parkinson’s disease. Had a fall.

Which part of the hospital did you go to? AMU, currently 48 hours.

Is this the first time you have presented at this hospital for this problem? Yes.

Who did you see and what examinations/tests did you have? Saw medical doctors and neurologists. They did tests and scans but I don’t remember what.

How did it feel?

Did you experience any problems in getting help? None whatsoever, they’ve been here when I need.

Do you remember seeing a neurologist? Yes.

What did you get from seeing the neurologist? They did an assessment and testing but I don’t remember what.

What did they tell you about your problems? Yes they’ve been good. Nothing new to tell.
o Were you given any advice about medication? *Staying on the same medication, no new information.*

c. Were you referred to another service? Not yet.

• Do you feel that access to health care has improved compared to previous times when you have been to hospital? *It’s been very good.*

• Did you feel that input from a neurologist:
  • a) improved your understanding of the problem. *Same, nothing new.*
  • b) led to timely and appropriate management. *Yes, very quick, no complaints.*
  • c) improved your experience of being in hospital. Yes.
  • d) improved the arrangements for appropriate follow up. *No, not yet.*