



ORIGINAL PRACTICE DEVELOPMENT AND RESEARCH

A comparison of 'combined stroke units' and their benefits within Europe and the United Kingdom

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Abstract

The burden from stroke is sizable in terms of disease and healthcare costs, with expenditure growing. Outcomes in the United Kingdom continue to compare poorly internationally, with long lengths of inpatient stay and high levels of disability/mortality. Research shows that meeting the needs of stroke patients is easier in combined acute and rehabilitation settings, such as combined stroke units. This qualitative study aims to provide organisations, commissioners, stroke teams/services and individual practitioners with insight into examples of best practice.

Data was collected from combined stroke units excelling in meeting patient needs in the UK, Germany, Sweden and Norway during visits lasting one to two days. Analysis of this data highlights that a combined stroke unit label is not important, with early intervention and rehabilitation key to recovery. Additionally, nursing to patient ratio within the UK stroke units is far lower than in Europe. In order to facilitate best practice, this needs reviewing, as reduced staffing levels hinder patient rehabilitation. This study also found that stroke professionals need to share responsibilities between professional groups, as the priority should always be the patient's needs, aspirations and goals.

Future research should focus on comparing stroke unit structures and whether benefits in stroke care are dependent on having dedicated stroke wards and effective models of care.

Keywords: Combined stroke unit, multidisciplinary stroke care, rehabilitation, Europe, UK

Introduction

The burden from stroke in developed countries is sizeable, in terms of disease and healthcare costs, with expenditures continuing to grow (Moon et al., 2003). In response, stroke services within the United Kingdom (UK) are undergoing significant changes, having to meet strict national targets, known as Vital Signs (Department of Health, 2010d). These aim to challenge the standards, performance and availability of services, within acute and primary care trusts (PCTs). This study focuses on the targets relating to stroke care (Department of Health, 2010d). In England, Vital Signs and the National Stroke Sentinel Audit (Royal College of Physicians, 2009), show that stroke services have improved nationally over the past decade but considerable variation remains in service provision and practice. Also, outcomes compare poorly at the European level despite services being

among the most expensive, with unnecessarily long lengths of stay and high levels of avoidable disability and mortality (Leal et al., 2006; Weir et al. 2001; Darzi, 2007).

In addition to Vital Sign statistics, the UK Department of Health also supports the government with improving the health and well being of the population by modernising and improving standards, formulating strategy and policy, and promoting legislation and regulation, including stroke-specific documents (Department of Health, 2005, 2007a, 2007b).

According to the Stroke Unit Trialists' Collaboration (2007), stroke units have several basic characteristics:

- Being a dedicated unit with specially trained staff
- Providing multidisciplinary team care
- Having procedures for diagnostic evaluation, acute monitoring, treatment, early mobilisation and a strong focus on rehabilitation

(Langhorne et al., 2002)

Currently stroke units within the UK can be divided into three categories, as stated within the National Stroke Sentinel Audit:

- Acute Stroke Units – an intensive model of care with continuous monitoring, high nursing-to-patient ratios, accepting patients acutely and discharging or transferring them, generally within seven days
- Rehabilitation Stroke Units – accepting patients after a delay of two days or more after their stroke event; focusing on rehabilitation
- Combined stroke units – accepting patients acutely but then providing rehabilitation for at least several weeks, where necessary

(Hoffman et al., 2009)

To explore examples of best practice, a Florence Nightingale Foundation Travel Scholarship has been undertaken, visiting excellent units labeled as combined stroke units in the UK (Royal College of Physicians, 2009) and sites across Europe, based on their ability to meet national targets and the research undertaken relating to stroke rehabilitation. A review of statistics relating to stroke outcome across Europe showed the Scandinavian region excelling. The Florence Nightingale Foundation exists to support nurses and midwives, providing inspiration and scholarships in healthcare that enable them to study at home and abroad. This promotes innovation in practice, extending knowledge and enabling these professionals to meet changing needs and improve patient care. 'The Travel Scholarship provides an opportunity to study practice elsewhere in the UK and/or abroad to benefit and enhance patient care at home. It is available to all British and Commonwealth nurses and midwives registered with the Nursing and Midwifery Council who work in the UK, with the area of study being connected to the applicant's field of practice' (Florence Nightingale Foundation, 2012).

Organised, directed stroke management, including rehabilitation, leads to a more rapid recovery of function and shorter length of stay without increased multidisciplinary team input (Goven et al., 2007; Bernhardt et al., 2008). Meeting the acute and rehabilitation needs of stroke patients is easier in a combined acute and rehabilitation setting, (Langhorne et al., 2005, as cited in Bernhardt et al., 2008) such as that provided on combined stroke units, with early mobilisation shown to reduce all bed-associated complications (Indredavik et al., 1999; Karla et al., 2007). However, researchers are unable to explain fully why combined stroke units or stroke units in general improve patient outcomes. This may be due to better diagnostic procedures, better nursing care, earlier mobilisation, prevention of complications, or more effective rehabilitation procedures (Cochrane Review, 2009).

With the exception of where a decision has been made to provide palliative care (Indredavik, 2009), it is rare that patients cannot benefit from rehabilitation, with it being generally more beneficial than setting up a thrombolysis service (Royal College of Physicians, 2009), which, due to an extensive exclusion criteria (Wahlgren et al., 2008), can only benefit a small percentage of stroke patients.

This study therefore aimed to provide organisations, commissioners, stroke teams and services, as well as individual practitioners, with insight into examples of best practice. Best practice has been described as the 'use of the best available evidence with one's own clinical expertise and patient values and preferences to improve outcomes for individuals, groups, communities and systems' (Melynk and Fineout-Overholt, 2010, p 575). The study aimed to achieve this by considering each country's healthcare philosophy, financial workings and community responsibilities for long-term conditions, as well as the priority given to stroke care at local and national level, with account taken of the human resources and service provisions required for effective patient management and staff utilisation. For the purpose of this study and to maintain confidentiality the sites are labeled Sites A through H, with A – E referring to UK sites and F – H to those in Europe (see Table 1).

Services available at Site A in England, for example, already deliver an acute stroke service with rapidly improving results for Vital Signs statistics in 2010/11 (Department of Health, 2010b). However, for this site to become a centre of excellence it is important to focus not only on these existing acute aspects of care, but to consider the increasing evidence supporting the benefits of combined stroke units in providing a complete stroke pathway (Indredavik et al., 1999; Foley et al., 2006; Griffin et al., 2010). At this point it is important to note that there may be an element of bias (although unintentional) within this study as the author is currently employed at Site A as a stroke specialist nurse.

Method

Preparation

- Use of the National Stroke Sentinel Audit and Vital Sign statistics (Department of Health, 2010d) to identify high-performing combined stroke units within the UK
- Through statistical data analysis identify European countries excelling with stroke care
- Identify renowned combined stroke units within these countries through journal articles
- Phone interviews with the UK sites, using key questions exploring the structure of the stroke unit, method of admission and performance with Vital Signs statistics, to determine the most useful sites to visit
- Contact with sites via email, either with lead medic or nurse specialist in this field, using similar key questions as the UK phone interviews
- Background research on the health services within each country, with priority given to stroke and local demographics

The visits

- One or two day visits to all sites
- Meetings with unit leads, both nursing and medical
- Discussion with therapy teams
- Where appropriate, meeting with voluntary organisations
- Use of key questions to gain a more detailed insight into the structure of the stroke unit and method of admission, services available to the patient group and multidisciplinary team structure, with a journal of key events kept and observation of practice. (For more detailed information relating to the questions asked please contact the author directly)

The above background research, phone interviews and site visits allowed for an in-depth and accurate comparison of examples of best practice at each site. For ease of reading, the discussion section has been divided into subsections, focusing first on the UK sites, then on the European sites.

However, as a comparative piece, reference has been made to all sites where appropriate in order to compare and contrast the available services.

Table 1: Overview of findings

Table 1									
Country	UK					Germany	Norway	Sweden	
Financial Structure	Public (private not applicable to stroke management)					Private	Public	Public	
Site	A	B	C	D	E	F	H	G	
Population	1.3 million	1 million	550,000	1 million (local) 7 million (out of hours, as is a regional trauma centre)	550,000	300,000	630,000	700,000	
Number of stroke patients seen in a year	700-800	Not available at the time of the visit	700-800	800-900	600-700	1,000	Not available at the time of the visit	Not available at the time of the visit	
Average length of stay (LoS)	12 days	29 days	22-23 days	Combined LoS with rehab of 21 days	Combined LoS 21 days	ASU 8-12 days Combined LoS minor strokes: 4 weeks Severe strokes: 3> months	Not known at the time of the visit	8-12 days	
Unit type	Acute	Combined	Combined	Acute	Acute	Combined	Combined	Acute	
No. of beds	Total	28	23	28	20	56	264	15-17	48
	Acute	28	5	Not split	12 hyper acute	24-28	21	15-17	48
	Rehab	0	18	Not split	8 step down beds	28	117	15-17	48
SITE	A	B	C	D	E	F	G	H	
Bed flex	x	x	x	x	x	x	✓	x	
Directly admit	✓	✓	✓	✓	✓	✓	✓	✓	
7 day therapy service	6 Day	x	x	x	x	✓	x	6 Day	
ESD	x	✓	✓	✓	x	x	✓	✓	
Community services	Limited	Limited	Limited	Limited	Limited	x	✓	✓	
Further rehabilitation	✓	✓	✓	✓	✓	✓	✓	✓	
Stroke specific	✓	✓	✓	✓	✓	✓	x	x	

Services available	Thrombolysis	✓	✓	✓	✓	✓	✓	✓	✓
	24/7	✓	✓	Only recently	✓	✓	✓	✓	✓
	% thrombolysed	7%	Not available at the time of the visit	10%	14%	Not available at the time of the visit	12.5%	12-15%	Not available at the time of the visit
	National % thrombolysed	3.8% (Royal College of Physicians, 2010)					8.5%	9%	7%
	Neuro/neurosurgical	On site	Another centre within the trust	Neurology on site Neuro-surgery refer to regional centre	On site	Refer to regional centre	Another centre within the group	On site	On site
TIA	Location	Out patient clinic within the hospital	Community service	Outpatient clinic within the hospital	Community service	Outpatient clinic within the hospital	All admitted to unit	Outpatient clinic within the hospital	All admitted to unit
	7 day service	✓	N/A	x	x	x	✓	✓	✓

Discussion of the UK sites

Healthcare in the UK is offered by the NHS, which is built on principles established in the 1940s and offers a comprehensive service to improve physical and mental health, free at the point of access, and based on need, not ability to pay (Department of Health, 2004), providing an often 'acute-driven' style of care (Ringelstein et al., 2011). Funding is almost exclusively from national taxation, a healthcare system known as the Beveridge Model (Reid, 2009). Many other countries use insurance-based schemes but these make only a minimal, though growing, contribution within the UK (Rivett, 2010).

All the UK sites visited were located within NHS acute trusts, with bed capacity at all the selected UK sites ranging from 20 to 28. It is worth noting that services have large, ethnically and socially diverse populations to serve, both in the UK and Europe (Rees and Butt, 2004). Additionally, as a result of aging populations, there is increased susceptibility to stroke disease (Christensen et al., 2009). With no 'flexibility' in bed numbers, there is no ability to increase capacity at times of high demand, which would assist in managing the latest national requirement (Department of Health, 2010c), of maintaining single-sex bed bays (Quinn et al., 2012). All sites provide direct admission services, with patients frequently being assessed at the point of access, often the Accident and Emergency department (A&E), by a stroke physician or stroke specialist nurse. As patients' gender is unpredictable, the maintenance of single-sex facilities is difficult and seems inappropriate. In 2007, Aitken discussed the potential discrimination that can occur if patients are subject to ward placement based on the availability of gender-specific beds – for example a male stroke patient being unable to transfer to a stroke unit because no male bed was available for him. Aitken's work is not supported by recent Department of Health (2010b) policy, even though it aims to ensure patient privacy and dignity. Capacity remains above 95% across most of the country, with bed occupancy and patient throughput also increasing significantly over the past 20 years (Royal College of Nursing, 2009). This suggests the need for stroke-specific intervention provided by a multidisciplinary team

specialising in stroke management, is of greater importance (Table 2) than maintaining a single-sex environment, as starting stroke-specific rehabilitation early offers better outcomes (Miller et al., 2010), fewer co-morbidities (Ringelstein et al., 2007) and shorter length of stay (Bernhardt et al., 2010). Solutions for maintaining patient privacy and dignity have been witnessed when visiting Sites F, G and H; the provision either of hard partitions to pull between bed spaces or single-room accommodation with adequate monitoring, as at Site H. However, anecdotal evidence from staff opinion at these sites is that service users rate prompt access to specialist care more highly than single-sex facilities, and those who have been managed within a mixed environment rarely complain.

Table 2: Multidisciplinary team breakdown of UK sites

Table 2										
	Site A		Site B		Site C		Site D		Site E	
	Staffing levels and hours worked		Staffing levels and hours worked		Staffing levels and hours worked		Staffing levels and hours worked		Staffing levels and hours worked	
Nurses and healthcare assistants	Early shift (time)	07.30 - 15.30 with 5+4	Early shift (time)	07.00 - 15.00 with 4+4	Early shift (time)	07.00 - 14.50 with 5+3	Early shift (time)	08.00 - 20.30 8 members of staff until 16.00 then reduced to 7	Early shift (time)	07.00-13.00 4 nurses+4 HCAs+1 co-ordinator
	Late shift (time)	12.30 - 20.30 with 4+3	Late shift (time)	11.30 - 19.30 with 3+2	Late shift (time)	13.15 - 21.15 with 4+2	Late shift (time)		Late shift (time)	12.30-21.00 3 nurses+3 HCAs
	Night shift (time)	19.30 - 08.00 with 3+2	Night shift (time)	19.00 - 07.30 with 3+1	Night shift (time)	20.45 - 07.30 with 3+1	Night shift (time)	20.00 - 08.00	Night shift (time)	20.30-07.30 2 nurses+2 HCAs
Stroke specialist nurse	08.00 - 16.00 2x Band* 7 making 1 whole-time equivalent 3x Band 6 making 2 whole-time equivalents		None		08.00-18.00 Monday to Friday 1x Band 7 1x Band 6		None		1 who is a consultant stroke nurse	
Stroke consultant	4		1x elderly care physician 2x acute medical physicians		1x elderly care consultant		7x consultants		3	

Table 2					
	Site A	Site B	Site C	Site D	Site E
	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked
Physiotherapist	08.30 - 16.30 1x Band 7 2x Band 6 1x Band 5	09.00 - 17.00 Monday to Friday 1x Band 7 1x Band 6 1x Band 5	08.00 - 16.30 4x whole-time equivalents	Monday to Friday 07.30 - 16.00 weekdays only 1x Band 7 1x Band 6 1x Band 4	At acute site: 2x static Band 6 1x rotational Band 6 1x rotational Band 5 At rehab site: 2x static Band 6 1x static Band 5
Occupational therapist	08.30 - 16.30 1x Band 7 1x Band 6 1x Band 5	09.00 - 17.00 Monday to Friday 1x Band 7	08.00 - 16.30 1x Band 7 2x Band 6 1x Band 5	Monday to Friday 07.30 - 16.00 weekdays only 1x Band 7 2x Band 6	At acute site: 1x static Band 6 1x rotational Band 6 1x rotational Band 5 At rehab site: 1x static Band 6 1x rotational Band 6 1x static Band 5
Therapy assistant	08.30 - 16.30 1x Band 4 1x Band 2	09.00 - 17.00 Monday to Friday 1x whole-time equivalent	1x physiotherapy assistant 1x occupational assistant	None	At acute site: 1.2 whole-time equivalent At rehab site: 3x static
Speech and language therapist	08.30 - 16.30 1x Band 6	1x whole time equivalent	3x varied Bands	Not known	At acute site: A team of 10 At rehab site: 1x SLT
Dietician	08.00 - 16.00 1x Band 6 08.30 - 16.30 1x Band 5	1x whole-time equivalent	1x part time	1x Band 5	Unknown
SLT and dietetic assistant	08.30 - 16.30 1x Band 4	None	None	None	Unknown
Social worker	None	None	Social services provide a central service	None	None

Table 2					
	Site A	Site B	Site C	Site D	Site E
	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked	Staffing levels and hours worked
Counselor	None	None	None	None	None
Psychologist	None	None	1x for 3.5 days per week	None	None

* The term 'Band' in the UK relates to the pay band of nurses with the minimum band for a registered nurse being Band 5. An increasing pay band represents increased seniority.

In addition to direct admissions, a continuous thrombolysis service is provided, with the annual percentage of patients thrombolysed across the UK sites ranging from 7 to 14%, while the national average is only 3.8% (Intercollegiate Stroke Working Party, 2010). This average compares poorly to Sweden's 7%, Germany's 8.5% and Norway's 9% (based on information provided by the sites visited). Site B increases its catchment area outside core hours, demonstrating that it is not necessary to be a large institution to manage such a responsibility (being the smallest hospital within its trust). Site D, in response to a dense population and the frequency and number of stroke patients admitted from outside the local PCT, has developed an effective repatriation system to local stroke units, which occurs normally 48 to 72 hours after admission. Following the combined National Institute of Neurological Disorders trials rt-PA Stroke Study Group (1995), extensive exclusion criteria for the use of tissue plasminogen activator (tPA) treatment was devised. Coupled with a lack of public awareness, even after the UK's national F.A.S.T campaign (Department of Health, 2009), (which Norway intends to implement in a similar way), means patients either present outside the licensed time frame or have attributes that exclude them from thrombolysis.

The focus therefore has to be on reducing the 'door-to-needle' time for those who do meet the criteria. At Site A, patients arrive in A&E with the stroke team already present. Following initial assessment and history taking, transfer to radiology for a computed tomography (CT) brain scan is of the highest priority, unlike Site D, B and C, whose CT scanners are located within or very close to A&E. Site A and E have more remote locations, potentially impacting on door-to-needle time and degree of patient recovery. Site E's solution is an algorithm, whereby potential thrombolysis patients present directly at radiology, enabling quicker assessment and scanning, reducing door-to-needle time. Site A, in comparison, transfers patients to radiology following initial assessment in A&E so that acuity and co-morbidities can be checked first. The bolus tPA is given and infusion commenced in radiology, again reducing door-to-needle time. These different approaches at Site A and E are achieving a similar goal but, due to potential bias, it is not appropriate to make arguments for and against these methods due to the author's longstanding involvement with Site A.

Once the infusion has begun, Site A and C transfer patients to a high-dependency unit. In the case of Site A, this is a neurology specific unit (Sites A and D are the only UK sites in this study with access to onsite neurology). Future plans for Sites A and C are for direct transfer to the stroke units, where

staffing levels and equipment will be appropriate to facilitate this, maintaining a level two provision (i.e. similar to that in a high-dependency setting) with early start of the stroke-specific pathway.

With not all patients being suitable for thrombolysis, routine admissions also occur. Most common is admission directly to the stroke unit from A&E. In the case of Sites A, C and E, the stroke specialist nurse assesses the patients, accepting them on behalf of the stroke service, often only liaising with the stroke physician in complex cases where diagnosis is unclear. Site D, however, has a senior nurse who takes referrals from A&E and other ward areas and often reviews these patients with a stroke physician – something Site B also plans to develop. Both approaches appear effective in reviewing, assessing and accepting patients, when taking into account the Vital Signs statistics on the percentage of patients spending 90% of their hospital stay on the stroke units and also the percentage transferred directly to the stroke units from point of admission, i.e. A&E (Department of Health, 2010d). The stroke specialist nurse approach could potentially overlook patients who have had stroke events, due to the ad hoc development and diversity of the role, internationally and in the UK, as well as the arbitrary use of the title, which may imply clinical expertise that cannot be verified (Barton et al., 2012). However, with a wide knowledge base, years of experience and appropriate training for the role, the risk is much the same as that of stroke physicians (Kothari et al., 1995). This is supported by the statistical data of Vital Signs 2010/11 for Site A (Department of Health, 2010d). In the case of Sites D and B, it appears wasteful of resources for two members of the team to undertake this role.

Once a patient has been admitted to the ward, all sites view early rehabilitation as an equal priority to medical intervention from day one. The therapists offer a wide range of rehabilitation techniques, shown in Tables 3 and 4, with only slight differences in multidisciplinary team structure in Europe. The physiotherapist and occupational therapist roles are amalgamated in Germany, while the speech and language therapist is split into ‘swallow therapist’ and ‘speech therapist’, and Site H currently has no occupational therapy service.

Table 3: Physiotherapy techniques employed across all sites

Table 3								
	Site A	Site B	Site C	Site D	Site E	Site F	Site H	Site G
Functional electrical stimulation	✓	✓	✓	✓	✓	x	x	x
Normal movement	✓	✓	✓	x	✓	x	✓	x
Carr and Shepherd	✓	x	x	x	✓	x	x	x
Constraint induced movement	✓	x	x	✓	x	x	x	x
Sensory re-education	✓	x	x	✓	x	x	x	x
Muscle training technique	✓	x	x	x	x	x	x	x

Table 3								
	Site B	Site C	Site D	Site E	Site F	Site H	Site G	Site A
Core control (Pilates)	✓	✓	✓	x	x	x	x	x
Gym-ball techniques	✓	✓	✓	x	x	✓	x	x
Stair assessment	✓	✓	✓	✓	✓	✓	✓	✓
Car transfer assessment	✓	✓	✓	x	x	✓	x	x
Cardiovascular work	✓	✓	✓	✓	✓	✓	✓	✓
Limb activation	x	x	x	✓	x	x	x	x
Visual scanning	✓	✓	✓	✓	✓	✓	✓	✓
Positioning and seating	✓	✓	✓	✓	✓	✓	✓	✓
Movement science	✓	x	x	✓	✓	x	x	x
Bilateral training	✓	x	x	✓	✓	x	x	x
Water aerobics	x	x	x	x	x	✓	x	x
'Timed-up and go'	x	x	x	x	x	x	x	✓
Bobath	✓	✓	x	x	✓	✓	x	x
Kinaesthetic	x	x	x	x	x	✓	x	x
10m walk test	x	x	x	x	x	x	x	✓
Basal stimulation	x	x	x	x	x	✓	x	x
LIN	x	x	x	x	x	✓	x	x
Walirnehmung (Sonderegger)	x	x	x	x	x	✓	x	x
Modified motor assessment scale	✓	x	x	x	x	x	x	✓
Berg balance	✓	x	x	x	x	x	x	✓

Table 4: Occupational therapy techniques employed across all sites

Table 4								
	Site A	Site B	Site C	Site D	Site E	Site F	Site H	Site G
Brain tree training	x	x	x	x	✓	x	N/A	✓
C-Level assessment	✓	x	x	x	x	x	N/A	✓
Weekend/day leave	x	✓	✓	x	✓	x	N/A	x
Self-medicating	x	x	✓	x	✓	x	N/A	x
Wii Fit	x	✓	✓	x	✓	x	N/A	x
Gardening	x	✓	✓	x	x	x	N/A	x
Car skills	x	x	x	x	x	✓	N/A	x
Kitchen assessment	✓	✓	✓	✓	✓	✓	N/A	✓
Washing and dressing assessment	✓	✓	✓	✓	✓	✓	N/A	✓
Home/access visit	✓	✓	✓	x	✓	x	N/A	✓
Pet therapy	✓	✓	x	x	✓	x	N/A	x
Mini mental state	✓	✓	✓	✓	✓	x	N/A	x
Equipment assessment	✓	✓	✓	✓	✓	✓	N/A	✓
Strategy training	x	x	x	✓	x	x	N/A	x
Orthosis	✓	x	x	x	✓	x	N/A	x
Splinting	✓	✓	✓	✓	✓	✓	N/A	✓
Computer session	x	x	x	x	x	✓	N/A	x
Music therapy	x	x	x	x	x	✓	N/A	x
ADL taxonomy	x	x	x	x	x	x	N/A	✓

Table 4								
	Site A	Site B	Site C	Site D	Site E	Site F	Site H	Site G
Nine hole peg test	✓	x	x	x	✓	x	N/A	✓
'Gripit'	x	x	x	x	x	x	N/A	✓
Arm and leg status	x	x	x	x	x	x	N/A	✓
Montreal Cognitive Assessment	x	x	x	x	x	x	N/A	✓

Therapists across the UK and European sites not only work individually with patients but also in conjunction with other disciplines, and make use of group sessions. Sites A, E and C encourage relatives to attend sessions, using an inclusive approach, providing insight into patient progress and offering relatives the knowledge required to continue motivation between therapy sessions (Pellerin et al., 2011). As part of the NICE guidance on stroke (Stroke Quality Standards, 2010), key markers of high-quality, cost-effective care have been identified, including the provision of 45-minute therapy sessions with all disciplines required, five days per week. Although these standards are not requirements or targets, the care system is obliged to have regard to them in planning and delivering services, as part of a general duty to secure continuous improvement in quality. All of the UK sites aim to meet this marker. In addition to this, Site A provides a service close to the NHS Improvement Programme (2008), prerequisite, offering a full service on weekdays and one therapist on a rota system (physiotherapist or occupational therapist) at weekends.

Stroke unit success, whether the unit is combined, acute or rehabilitation, is largely the result of effective multidisciplinary team communication (Miller et al., 2010), which works in a similar way across all the sites. Apart from Site A, integrated note systems are used at all; Sites H and G employ a predominantly paperless system, allowing patient information to be accessed throughout the hospital. Multidisciplinary team meetings (minimum weekly) discuss patient progress and goal formation at all except Site D. At Site G it is considered such an important element that two full team meetings and two additional meetings without the physicians present occur each week. At Site D, team discussion is no less significant but due to quick patient turnaround, goal setting in this format is inefficient. Therefore, twice daily 'board' meetings occur, providing a visual aid and source of reference throughout the day, updated in real time. Sites A, E, F and H hold similar daily meetings, with Site H focusing on those patients admitted within the previous 24 hours. This provides an opportunity for prioritising the day's activities, aiding bed management and patient flow. One way in which healthcare providers address patient flow in the UK and most of Europe is via community hospital beds. The UK sites labeled as combined stroke units within the National Stroke Sentinel Audit (2009) continue to make use of these facilities, especially stroke and neurology specific. The only site that did not refer on was Site F, which manages the whole stroke pathway internally, therefore possibly maintaining better continuity throughout.

Not all patients require further inpatient rehabilitation, especially across Europe, with a large proportion discharged directly home. In the author's opinion, Norway and Sweden, unlike the UK, appear to have established, comprehensive community services, which provide multidisciplinary team care that is generic but appears nonetheless very effective. This is especially the case with a stroke-specific early supported discharge team providing initial input for up to six weeks at Site H and four weeks at Site G, instilling good standards for continued rehabilitation. This is supported by

the UK Department of Health (2011). Such discharge teams in the UK are a relatively new concept and not implemented nationwide at present (Royal College of Physicians, 2009), with the Department of Health (2011) stating their establishment is patchy, variable and inconsistent across the country. Of those visited, Sites B, C and D provide an early supported discharge service, although each has a different structure, staffing level and way of approaching the challenge. The discharge team working with Site D consists of physiotherapists and occupational therapists, which seems limited, especially considering the evidence supporting comprehensive multidisciplinary team working (Sulch et al., 2000). The trust-employed early supported discharge team supporting Site B consists of a stroke specialist nurse, speech and language therapist, dietician, physiotherapists and occupational therapists. The service at Site C is available for up to 21 days, and the discharge team has representation at the unit's twice-weekly multidisciplinary team meeting, meaning it is aware of patient progress, facilitating decisions as to who is ready for input, and building rapport with patients prior to discharge, so easing transition.

There is, however, one unique feature of stroke services within the UK: referral to a local community stroke coordinator that provides follow-up at six weeks post discharge. As required by the National Collaborating Centre for Chronic Conditions (2008), additional six-monthly and yearly review is also being worked towards. This service's availability continues to be a 'postcode lottery', with only Sites E and A having access to it. To bridge this gap, the Stroke Association, the United Kingdom's only stroke-specific charity, provides a family and carer support service at Sites B and C, offering practical advice and emotional support to patients, families and carers, as well as working closely with the sites involved (Stroke Association, 2010).

The European comparisons

Cultural differences affect how people react to illness, respond to symptoms, seek medical care, and how they perceive the healthcare team members. All this impacts on how they respond to treatment (Quan, 2012). In addition, cultural differences affect how patients' relatives react, interact and assist with the management of their sick family member. It is therefore key to consider differences between international health services, patient diversity and the promotion of stroke prevention and follow-up rehabilitation.

Site F

Germany's healthcare system is privately funded; all workers pay approximately 8% of their income into a nonprofit insurance scheme, with employers contributing about the same proportion, in a scheme known as the Bismarck system (Reid, 2009). Since premiums are a percentage of salary, the less people earn, the less they contribute, which is known as solidarity (Busse and Riesberg, 2004). Access, coverage, and high standards of care are guaranteed for all; with little waiting for elective procedures or diagnostic investigations, see Table 6 (Commonwealth Fund, 2010). This provides an often 'intensive-care like' style of care, however this is moving towards a more complete care pathway (Ringelstein et al., 2011). For stroke patients and stroke units, services are determined by the insurance companies, and a certification criteria set out by the German Stroke Association (Nabavi et al., 2010), which stipulates the services that must be offered for sites to be labeled either primary stroke centres or comprehensive stroke centres.

Visiting Site F provided an overview of the services available at Germany's regional centres as opposed to general hospitals. The centres are solely dedicated to stroke, and to a lesser degree neurological conditions, and provide acute and rehabilitation services. Site F has 264 beds for facilities including intensive care, emergency admission and acute treatment, and offers three stages of in-hospital rehabilitation. Serving a local population of 300,000, it has on average 2,000 admissions a year, of which 1,000 are acute admissions for stroke, including transient ischaemic

attacks. As this visit was only two days, the focus was solely on the acute stroke unit, with heavy reliance on members of staff to gain more insight into the clinic as a whole.

The acute stroke unit sees on average five to six emergency admissions daily. Even with such a large turnover, it only has a modest number of beds at 21, with the remaining 117 beds mainly used for rehabilitation. Like the UK sites, there continues to be no bed flexibility, but unlike all the other sites in this study, when full capacity is reached, admissions are diverted to other hospitals. Therefore, potential thrombolysis candidates may not receive tPA, as not all local hospitals provide this service. A bed manager has recently been employed to identify rehabilitation beds earlier, aiming to reduce bed shortages, for more effective patient throughput. Before this it could take one to two days before beds became available and, with the acceptance of tertiary referrals from across Germany, demand remained high for beds.

Admission is via the single emergency room, managed solely by the acute stroke unit staff. If a patient is brought in by ambulance, the acute stroke unit is pre-alerted by phone and via a computer system known as 'Stroke Angel'. This provides the team with relevant information before the patient's arrival, initiating a cascade effect. On arrival, all patients are reviewed by a physician and if diagnosis is not stroke, then redirection to a local general hospital takes place. Following an initial National Institutes of Health Stroke Scale assessment, patients are taken to the CT scanner located next door. Those confirmed as suitable candidates for thrombolysis are directly admitted to the acute stroke unit. The corridor linking the two contains all the essential diagnostic tools needed en route, including carotid dopplers and echocardiography. The thrombolysis candidate observed during this visit, had carotid dopplers performed by the registrar en route to the acute stroke unit before tPA was administered, and the 'door to needle' time was less than 20 minutes. If patients require more invasive treatments – unlike Sites G and H, which have access to onsite neurology and neurosurgery – this clinic transfers patients to a 'sister' hospital and, due to an easy transfer process, equipment such as MRI scanners are also shared.

Once on the acute stroke unit, the health insurance companies stipulate a minimum length of stay of 72 hours, and eight to 12 days for those on the acute stroke pathway, as the German healthcare structure uses time-locked quality indicators and pathways for care (Thomas et al., 2011). As a result the acute stroke units average LOS is one to two weeks. In total, the combined average length of stay is four weeks for minor strokes and three months for more debilitating strokes. Only 1-3% of patients are discharged to care home settings, due to the German ethos of keeping people in their own homes, where families provide a large portion of support (Attias-Donfut et al., 2005).

TIA patients also have to be admitted to an acute stroke unit for at least four days, including low-risk patients, based on the ABCD2 score (Gommans et al., 2009). Since stroke risk increases within a few days of a TIA (Deutschen Gesellschaft für Neurologie, 2008) the belief is that TIA inpatients that go on to have strokes can be identified early and treated swiftly with tPA, where appropriate. Site G recently started this, in line with Swedish National Stroke Guidelines (2009), while the UK and Site H provide outpatient clinics, seeing patients within 24 hours or one week of symptoms, dependent on ABCD2 score. Scandinavian Guidelines for Norway state that all necessary investigations must take place within three days of attendance (Helsedirektoratet, 2010). Besides this, Site F also has access to stroke specialist nurses – ward-based nurses with the additional role of education facilitators, providing training to nurses within Site F and across Germany. Site H provides a similar service, while Site G has a nurse with the title of stroke specialist, whose role is more of a service development lead, producing guidelines, and improving standards.

Table 5: Site F multidisciplinary team breakdown

Table 5				
Profession	Staffing levels and hours worked		Comments	
Nurses and healthcare assistants <i>Germany does not have healthcare assistants</i>	Early shift (time)	06.00-14.00 6 nurses	Nurse : patient ratio	1:3.5
	Late shift (time)	13.30-22.00 6 nurses		1:3.5
	Night shift (time)	21.30-06.30 4 nurses		1:5.25
Stroke specialist nurse	3		Role very different to what we call a SSN in the UK. They are ward-based nurses with additional role of training nurses at the clinic and from other hospitals across Germany. Spending 75% of their time on the ward and 25% as education facilitators	
Stroke consultant	5		Doctors work in two teams: 4 working 07.45-16.15 and 1 working 12.30-21.30. (Weekdays only – the duty doctor manages the ASU at weekends and bank holidays)	
Rehabilitation therapist	4 dedicated to the acute stroke unit (ASU) and 70 for the whole of the clinic		There are 70 rehabilitation therapists (a combined physio and occupational therapist role) throughout the clinic	
Therapy assistant	None		Germany does not have therapy assistants	
Speech and language therapist	1 dedicated to the ASU and 6 for the whole of the clinic		There are two therapists dealing with the aspects that only the Speech and language therapist deals with in the UK. Only the swallow therapists are able to swallow-screen patients; not even the speech and language therapists can do this	
Swallow therapist	1 dedicated to the ASU and 18 for the whole of the clinic			
Dietician	1		-	
SLT and dietetic assistant	None		Germany has no SLT or dietetic assistants	
Social worker	A team of social workers provide a Service to the whole of the clinic not just the ASU		-	
Counsellor	None		The counseling service is provided mainly by the psychologists and social services	
Psychologist	4 for the whole of the clinic not just ASU		-	
Massage and swimming therapists	40 for the whole of the clinic not just ASU		-	

Rehabilitation again is continuous, but unique in that patients are generally assessed by all the multidisciplinary team (see Table 5) on admission and out of bed in this period, receiving 30-minute sessions each day thereafter of all therapy required, pre-booked to enable more effective use of time and ensure sessions are not interrupted or missed due to investigations. The insurance companies dictate when patients progress on their pathway, with the physician undertaking a scoring system to identify the level of rehabilitation required. Following discharge, outpatient rehabilitation is provided where needed. With no time constraints, whole-day sessions are offered, for extensive programmes or just individual therapy. In contrast, there are no primary care services and community groups are limited to an independently run local communication group.

Table 6: Length of wait (days) for relevant investigations and interventions

Table 6																
Investigations/interventions	Site A		Site B		Site C		Site D		Site E		Site F		Site H		Site G	
	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)	No. of scanners (if applicable)	Length of wait (in days)
CT scan	3	1-2	1	Variable	2	90% in A&E	2	≤ 1	2	95% ≤ 1	1	Arrival	3	≤ 0	2	≤ 2hrs
MRI scan	1	1-10	1	1-2	2	2-3	<	5-6	2	1-2	0	3-4	2	≤ 0	2	Unknown
Carotid Doppler	N/A	1-2	N/A	0	N/A	≤ 2	N/A	≤ 1	N/A	≤ 0	N/A	Arrival	N/A	≤ 0	N/A	Unknown
Echo	N/A	1-5	N/A	≥ 14	N/A	≥ 7	N/A	≤ 1	N/A	≤ 0	N/A	≤ 0	N/A	≤ 0	N/A	Unknown
24/48-hour tape	N/A	1-5	N/A	≥ 14	N/A	≥ 7	N/A	≥ 3	N/A	-	N/A	≤ 0	N/A	≤ 0	N/A	-

Table 6																
	Site A		Site B		Site C		Site D		Site E		Site F		Site H		Site G	
Vascular team review	N/A	0-1	N/A	0-1	N/A	1	N/A	0-1	N/A	1-2	N/A	Unknown	N/A	Unknown	N/A	≤ 0
Vascular team intervention	N/A	≤ 7	N/A	≤ 7	N/A	≥ 7	N/A	≥ 7	N/A	≤ 5	N/A	≤ 7	N/A	≤ 14	N/A	≤ 14
PEG (or equivalent) insertion	N/A	7-14	N/A	≥ 14	N/A	Unknown	N/A	≥ 7	N/A	7-14	N/A	< 3	N/A	≥ 7	N/A	≤ 7

Site H

In Norway healthcare provision is similar to the UK, and thus provides a realistic insight into possible achievements in the UK. The public's knowledge of stroke and its symptoms remains limited, even though it causes two out of five deaths and is the leading cause of long-term disability (Adamson et al., 2004; Statistisk sentralbyrå, 2011). However, in Norway and Sweden a more 'rehabilitation-driven' style of care is provided, compared to the UK's acute focus (Ringelstein et al., 2011).

Site H serves a population of 630,000. Until 1992, there was no stroke unit here, but now there are 15 dedicated beds dedicated, with the ability to increase to 17 beds, and plans for 23. Although it is not a combined stroke unit, the emphasis is on early mobilisation and rehabilitation. A continuous thrombolysis service is provided, with an inclusion time period of up to four-and-a-half hours after onset of symptoms, which is standard practice across Europe following the evidence provided by Safe Implementation of Treatments in Stroke: International Stroke Thrombolysis Registry (Wahlgren et al., 2008) and the ECASS 3 study (Hacke et al., 2008). The latter cites modest but significant improvement in clinical outcomes within this time period, with only the UK not observing this.

Patients not suitable for thrombolysis are often reviewed by the physician before admission to the Site H unit and if a number of beds are available then, like at Site A, patients where a diagnosis of stroke is unclear are admitted. To accommodate the admission of clear stroke patients, those who have achieved their rehabilitation goals or who are only awaiting placement will be outlied, or those diagnosed as not having had a stroke will be managed on general medical wards. As in the UK, if accommodation of new admissions is not possible then they are managed on a general medical ward, until beds become available.

Therapy sessions are based on everyday situations, with no set session times; this is known as a stroke treatment model (Bernhardt, 2008). Initial mobilisation is undertaken by at least two members of staff, and no transfer equipment, with the belief that it should be possible to attempt mobilisation if mobilisation was possible prior to the stroke event. An exception is made for those

who weigh 150 kilogrammes or more, and those who have developed hydrocephalus or suffered a myocardial infarction, as dictated by these specific treatment pathways. The risk of chronic back injury to staff, patient falls and acute injuries to both groups involved seems high; this a hazardous manual handling procedure, as set out by the European Directive 90/269 on manual handling of loads, which requires avoidance of this so far as is reasonably practicable (European Agency for Safety and Health at Work, 1990). However, Site H states that with extensive patient handling training, the emphasis is not on lifting patients but teaching patients to be as independent as possible with mobility, in a way that is safe for the patient as well as for the nursing and therapy staff (Bernhardt, 2008). Levels of staff injury in the unit have been reported as very low to date. To determine patients' progress, the physiotherapists use the Scandinavian Stroke Scale (Scandinavian Stroke Study Group, 1985), with full assessment undertaken on all newly admitted patients within four hours of admission (within core hours), in preparation for the first day meeting. Site G opts for the National Institutes of Health Stroke Scale, feeling that it provides a better insight into the severity of a patient's condition. With a wide variety of stroke scales used worldwide, it would seem more appropriate to have a uniform approach to assess stroke severity, for the sake of comparability and transferability in trials and discussions with other stroke units.

Table 7: Site H multidisciplinary team breakdown

Table 7			
Profession	Staffing levels and hours worked		Comments
Nurses and healthcare assistants <i>Norway does not have healthcare assistants</i>	Early shift (time)	07.00-15.00	Nurse : patient ratio
	Late shift (time)	14.30-22.00	
	Night shift (time)	21.30-07.15	
Stroke specialist nurse	2		They are team leaders for the blue and green teams and also provide hospitality to visitors and have an educational role for other members of nursing staff
Stroke consultant	3		-
Physiotherapist	2.65		Working 08.00-16.00
Occupational therapist	None		Currently no OT within the service
Therapy assistant	None		Norway does not have therapy assistants
Speech and language therapist	1		Working 08.00-16.00
Dietician	Unknown		-
SLT and dietetic assistant	None		Norway does not have SLT and dietetic assistants
Social worker	None		-
Counsellor	None		None
Psychologist	1		There is no stroke-specific psychologist, only a generic psychologist who provides a service to the whole hospital

Site G

Healthcare in Sweden makes up a significant portion of the welfare state and is based on the fundamental principle of equality. Regardless of economic status, everybody has the right to healthcare, and there is a long tradition for delivering high-quality, economically viable healthcare, being for many years ranked top provider (Swedish Association of Local Authorities and Regions, 2005, p3). Three main principles apply to this system: equal access, care based on need, and cost effectiveness. All patients have a free choice of healthcare provider although in some cases referral is required (Swedish Healthcare Academy, 2011). Stroke care has greater focus here than in any other country in Europe (Indredavik, 2009); the country has had dedicated stroke units since the 1970s, striving to improve stroke services consistently through a national plan to increase public awareness (Riksförbundet, 2010).

The stroke unit visited was merged in 2009, previously being spread across three hospital sites. The unit now has 48 beds across two wards, divided into what are called 'modules' – similar to teams – for stroke neurology, stroke medicine and geriatric stroke. Like Site H, the team members here do not see this as a combined stroke unit but their emphasis of care remains based on acute management and early rehabilitation, requiring an extensive multidisciplinary team (see Table 8). The hospital itself serves a local population of 700,000 as well as providing highly specialised care to 1.7 million inhabitants, with 2,700 beds in total.

Table 8: Site G multidisciplinary team breakdown

Table 8			
Profession	Staffing levels and hours worked		Comments
Nurses and healthcare assistants* <i>*Sweden does not have healthcare assistants</i>	Early shift (time)	06.45-15.30	Nurse : patient ratio 1 registered nurse and 2 enrolled nurses (equivalents) per module area 1 registered nurse and 2 enrolled nurses (equivalents) per module area. A mixture of 5 registered and enrolled nurses for the whole unit
	Late shift (time)	13.30-22.00	
	Night shift (time)	21.00-07.00	
Stroke specialist nurse	No		Only a service development lead
Stroke consultant	Unknown		The unit is broken down into 'modules' - what we would know as bays, or perhaps teams: 3 neurology 2 geriatric 2 medicine
Physiotherapist	8 full-time equivalent		They rotate modules every 6 months, including spending time with the ESD team. They work from 07.30-16.30

Table 8		
Profession	Staffing levels and hours worked	Comments
Occupational therapist	8 full-time equivalent	They rotate modules every 6 months, as well as ALL working with the ESD team, providing continuing care in the community to the patients they were seeing on the stroke unit. They work from 07.30-16.30
Therapy assistant	1 occupational therapy assistant but no physiotherapy assistant	The unit wanted an additional qualified physio rather than an assistant
Speech and language therapist	1 full-time equivalent	There are 4 full-time equivalent SLTs for the whole hospital, who each have their own case load on the stroke unit
Dietician	1	50% of time is dedicated to the unit
SLT and dietetic assistant	None	There are no SLT or dietetic assistants in Sweden
Social worker	3	Provide a service to the unit as well as each having responsibility for a couple of other wards. They review patients on the unit in the morning so they can hold patient and family meetings in the afternoon and resolve issues that patients feel may arise on discharge, including paying the bills. They attend the weekly multidisciplinary team meeting
Counsellor	3	Dedicated to the stroke unit
Psychologist	3	Provide a service to the whole hospital; they are not stroke specific

A continuous thrombolysis service is available, with one bed held on the unit for thrombolysis admissions. The ambulance service, which has had specific stroke training, uses the National Institutes of Health Stroke Scale to assess patients and contacts the stroke team directly. The initial assessment is performed in radiology, saving on average 33 minutes in 'door to needle' time. If a patient meets the criteria for administering tPA then the bolus is given while in radiology and the infusion started once on the unit. Fewer stroke patients are now admitted via A&E, with most admitted directly to the unit. The acute nurse, who works from 8am to 4pm Monday to Friday, is essential for the success of this process. Any nurse within the unit can undertake this role, which involves acting as ward coordinator and being the contact for potential admissions to the unit. The acute nurse can also discuss the decision to admit with one of the stroke physicians, who base their conclusions on patient notes and brain imaging, with the admission philosophy being to admit patients where there is doubt, as opposed to missing the diagnosis.

Once discharged, the follow-up process in place differs from those of the other sites. At six weeks, all patients return to see their named nurse to discuss any concerns or problems since discharge, then at three months, all have an appointment with their consultant. This consultant review occurs at all the sites visited, with Site G also providing a phone service to patients to undertake a service satisfaction questionnaire, as required by the Swedish Stroke Register (Asplund, 2011).

Implications for practice

This comparison of stroke units and their benefits within Europe and the UK has looked at the patient pathway, paying particular attention to the combined stroke unit model. By looking at the whole pathway as opposed to focusing on the ward environment, it has been possible to see how effective these sites are in meeting patient need, and to identify any differences in the services available to patients between acute stroke units and combined stroke units.

For service design (organisations and commissioners)

It has become clear that being labeled as a combined stroke unit is not important; a wide evidence base supports the view that early intervention and rehabilitation is key to a successful recovery across all sites (Indredavik et al., 1999; Langhorne et al., 2002; Bernhart, 2008). The basic framework applied to care across all sites generally remains the same, with the overall goal for patients to regain some degree, if not all, of their independence. In addition to this, like Ringelstein et al. (2011), this study has found that the UK and European (in this case Norway, Sweden and Germany) models concentrate on the exclusive treatment of stroke patients on stroke units, with a comprehensive multidisciplinary, stroke-trained team, using a combination of pre-acute therapies and investigations, as well as integrated rehabilitation, including mobilisation and re-training of activities of daily living.

What has become apparent, however, is that the nursing to patient ratio in UK stroke units is far lower than that at the European stroke units, and these figures are widespread across the respective countries as a whole in relation to stroke services, with the UK nurse to population ratio being below the European average (Organisation for Economic Co-operation and Development, 2010). With rehabilitation being the responsibility of the whole multidisciplinary team, including the nursing staff (Williams et al., 2010), it could be argued that for UK stroke units to facilitate rehabilitation to the best practice level of its European equivalents, nursing levels need to be reviewed. The skill-mix also needs review, as current studies looking at acuity and dependency (Department of Health, 2012b) do not reflect the complex nature of stroke patients. Reduced staffing levels and a more diluted skill-mix hinders patient rehabilitation through less availability of staff to engage actively with patients or assist with activities of daily living in a manner conducive to rehabilitation, due to the time constraints in managing a large number of highly dependent patients. There is also an impact on the cost and quality of care provision (Ball, 2010).

If these ratios were similar to those in Europe, the need for community support and the number of patients requiring placement would be reduced, reducing the burden on the NHS (Bernhardt et al., 2008; Miller et al., 2010). The patient should be central to this service and, in an attempt to address this, a questionnaire system similar to that used in Sweden could help to improve the service in a patient-focused manner.

Services should also be redesigned to ensure the best is obtained from the resources available within the healthcare system as a whole and more precisely those related to stroke services; this means targeting local investments (Department of Health, 2009) as competing with a health service that is free and increasingly efficient is difficult. Private organisations do not focus on stroke care as they provide virtually no emergency services and little primary care; instead they mostly concentrate on outpatient consultations and elective surgery, with most specialists spending the bulk of their time working for the NHS (Rivett, 2010). This is why UK stroke services are unable at present to compete with countries such as Germany, however, privately funded services do seem to have their own drawbacks, with patients potentially over investigated and having unnecessarily extended lengths of stay (Tu et al., 2002). One such area that could be redesigned is community services. The European countries visited have more established provisions, providing unlimited secondary rehabilitation in terms of time scale. However, it is important to remember that the need for such a

service varies from country to country depending on local cultures, political views and resources available (Brainin et al., 2000). It may be worthwhile for PCTs or their successor bodies to investigate the benefits of developing similarly structured community rehabilitation teams to those in Norway and Sweden, which are especially beneficial to stroke survivors, due to the potential of continued functional improvement for years following their event (Vega, 2009).

For stroke teams and services

Since the undertaking of this scholarship, Site A has become a combined stroke unit, and the local PCT has implemented an early supported discharge team that works closely with the acute sector. If such teams work closely with the stroke units and are possibly even located on the same site, members of the team will be able to attend multidisciplinary team meetings and therapy sessions, build a rapport with the patients and determine their suitability for the service earlier. This could reduce length of stay because less time would be required to reassess rehabilitation needs and goals. Another advantage is the close working relationship built between the stroke unit and early supported discharge team.

The thrombolysis pathway will always require continuous monitoring and review to reduce further the 'door to needle' time, with interdepartmental and organisational cooperation being important factors. Although, not discussed in this paper, there is an argument to say that providing further training, such as work-based learning programmes led by senior stroke nurses and stroke medical staff, to A&E departments and paramedics would increase awareness of stroke-related priorities. Undertaking a university module to serve this purpose may not be practical or cost-effective, as A&E staff require a broad, generalised knowledge base to deal with the variety of patients admitted, and difficulties may arise with courses focused solely on one clinical area. A system similar to that of the 'stroke angel' at Site F would increase the accuracy and quality of information provided in the form of a pre-alert, enabling the stroke service to have a better knowledge of past medical history in advance of a patient's arrival.

For individual practitioners in their day-to-day work

More broadly, this project has shown that professional boundaries help to avoid duplication of roles and help create a cost-effective health service and although necessary, within a stroke unit MDT they may in fact be detrimental to patient recovery. Equally, professionals should not be task oriented and should not see certain responsibilities as belonging only to their professional group. The focus should always be on the patients' needs, aspirations and goals and not those of the professional. Every activity of daily living can be undertaken in a therapeutic way and, by providing patient-centred and focused care, it is possible to meet the goals patients see as important. Also the promotion and undertaking of early rehabilitation is essential to recovery and therefore it is important to ensure that patients do not adopt the 'sick role', first identified by Parsons (1951), whether of their own accord or because of how a practitioner is treating them, by taking away independence. The 'sick role' results in the patient not undertaking social responsibilities or self-care, relying on healthcare professionals to cater for their physical needs and make decisions on their behalf (Faulkner et al., 2002). This is not conducive to a stroke patient's recovery.

As this scholarship was only able to touch upon the skills, responsibilities and knowledge base required by nursing staff, at this time, all that can be offered are summative suggestions. These are based on observed practice or identified as being required at Site A:

- More interdisciplinary team training.
- Increased joint working with therapist
- An holistic, patient-centred, therapeutic approach to care

- Empowerment of the patient to undertake activities independently, even if this requires repetition of the activity afterwards.
- A balance in providing a medical and therapeutic model of care
- A competency work-based learning approach for nursing staff. A good example of this is the STARS (Stroke Training and Awareness Resources, 2012)

Conclusion

As we have seen, the label of combined stroke unit is less important than early intervention and rehabilitation in terms of patient recovery (Kalra and Langhorne, 2007). In addition, nurse to patient ratios are far lower in the UK than across Europe and this needs to be reviewed in order to facilitate better outcomes; low staffing levels can hinder patient rehabilitation (RCN, 2009). If members of the multidisciplinary team were less task oriented and less focused on the responsibilities traditionally associated with their profession, then patient needs, aspirations and goals could move up the agenda. In addition, using one generic stroke scale worldwide would make comparison of stroke outcome easier.

Limitations of the research

There were several limitations identified in this study. First, there may be bias within the discussion as stated previously due to the author's employment status during the study and this may have affected opinions on services, although not intentionally. As there were limited sources of research available within this area at the time of writing, some of the older elements of the evidence base used may not be entirely relevant to the stroke practice explored here. Due to rapidly changing attributes of stroke services, research can be relevant but consideration should be given to new changes and developments. For example, Vital Signs has now become Integrated Performance Measure Monitoring (Department of Health, 2010b) and the National Stroke Sentinel Audit has now changed twice – first to the Sentinel Audit Stroke Improvement National Audit Programme (SINAP) (Royal College of Physicians, 2012a) and now to the Sentinel Stroke National Audit Programme (SSNAP) (Royal College of Physicians, 2012b). There are also changes to healthcare structures to consider, as in the UK PCTs are giving way to GP-led commissioning bodies (Department of Health, 2012a) and this may affect the access to acute and community stroke services in the future. Due to time constraints, the visits provided only an overview of the services available, with most of the knowledge gained coming through discussion with members of staff, potentially resulting in an element of bias. Although, the benefits of this qualitative study are the precise details gathered from staff on how the services run on a daily basis, it can be difficult to evidence change without quantitative data. Also, although the use of the English language was of a high standard across the European sites, interpretation was difficult at times, with the ability to observe practice between members of the multidisciplinary teams and with patients limited, especially with limited knowledge of the different uniforms and, in some cases, there being no difference between uniforms to identify professional groups within the team.

There is a significant need for research to explore regularly the effects of these changes within healthcare and specifically stroke services. In addition, this study reiterates the importance of further research to identify best practice and improve stroke services internationally.

Future research should look at

- Investigating whether the benefits of stroke unit care depends on the establishment of a ward dedicated only to stroke management or could be achieved through a mobile stroke team or a generic disability service – a mixed rehabilitation unit, which specialises in the management of disabling illnesses including stroke, as suggested by Cochrane Collaboration (2009)
- The impact of nursing levels and skill mix on in-hospital length of stay for stroke patients

- Further comparison of the role of the stroke specialist nurse and the medical role, in addition to investigating the diversity of roles labeled as stroke specialist nurse
- As there is currently limited statistical data comparing different stroke unit structures and their benefits, with no firm conclusions drawn over the most effective model, this should be seen as a priority

Now that a link has been established between the above stroke units it is important to maintain this. We should strive together to improve patient care and outcome, by learning from one another, with further observational studies over a longer time period, involving units of excellence from around the world.

References

- Adamson, J., Beswick, A. and Ebrahim, S. (2004) Is stroke the most common cause of disability? *Journal of Stroke and Cerebrovascular Disease*. Vol. 13. No. 4. pp 171-177.
- Aitken, M. (2007) The dignity and privacy of patients. *Journal of the Royal Society of Medicine*. Vol. 101. No. 3. pp 108-109.
- Asplund, K. (2011) *Riks-Stroke: The Swedish Stroke Register*. Umeå, Sweden: Västerbotten County Council. Retrieved from: www.riks-stroke.org/index.php?content=&lang=eng. (Last accessed 8 October 2012).
- Attias-Donfut, C., Ogg, J. and Wolff, F.C. (2005). Family support. In: Börsch-Supan, A., Brugiavini, A., Jürges, H. et al. *Health, Ageing and Retirement in Europe – First Results from the Survey of Health, Ageing and Retirement in Europe*. Mannheim: Mannheim Research Institute for the Economics of Ageing. pp 171-178
- Ball, J. (2010) *Guidance on Safe Nurse Staffing Levels in the UK*. London: The Royal College of Nursing.
- Barton, T.D., Bevan, L. and Mooney, G. (2012) A governance framework for advanced nursing. *Nursing Times*. Vol. 108. No. 25. pp 22-24.
- Bernhardt, J., Chittravas, N., Meslo, I.L. et al. (2008) Not all stroke units are the same: a comparison of physical activity patterns in Melbourne, Australia and Trondheim, Norway. *Stroke: Journal of The American Heart Association*. Vol. 39. No. 7. pp 2059-2065.
- Brainin, M., Bornstein, N., Boysen, G. et al. (2000) Acute neurological stroke care in Europe: results of the European Stroke Care Inventory. *European Journal of Neurology*. Vol. 7. No. 1. pp 5-10.
- Busse, R. and Riesberg, A. (2004). *Germany: Healthcare System in Transition, First Edition*. Germany: World Health Organization.
- Christensen, K., Doblhammer, G., Rau, R. et al. (2009) Ageing populations: the challenges ahead. *The Lancet*. Vol. 374. No. 9696. pp 1196-1208.
- Commonwealth Fund (2010) *International Profiles of Healthcare Systems*. New York: The Commonwealth Fund.
- Darzi, A. (2007) *Our NHS Our Future: NHS Next Stage Review Interim Report*. London: Department of Health.
- Department of Health (2004) *The NHS Improvement Plan: Putting People at the Heart of Public Services*. London: Department of Health.
- Department of Health (2005) *Reducing Brain Damage: Faster Access to Better Stroke Care*. London: National Audit Office.
- Department of Health (2007a) *National Service Framework for Older People*. London: Department of Health.
- Department of Health (2007b) *National Stroke Strategy*. London: Department of Health.
- Department of Health (2008) *NHS Improvement Programme*. London: Department of Health.
- Department of Health (2009) *Stroke: Act F.A.S.T Awareness Campaign*. London: Department of Health.

- Department of Health (2010a) *Equity and Excellence: Liberating the NHS*. White Paper. London: The Department of Health.
- Department of Health (2010b) *Integrated Performance Measures Monitoring: Stroke 2010-11*. London: Department of Health.
- Department of Health (2010c) *The Revised Operating Framework for the NHS in England 2010-2011*. London: Department of Health.
- Department of Health (2010d) *Vital Signs Monitoring*. London: Department of Health.
- Department of Health (2011) *Stroke Rehabilitation in the Community: Commissioning for Improvement*. London: Department of Health.
- Department of Health (2012a) *Health and Social Care Act*. London: Department of Health.
- Department of Health (2012b) *NHS Institute for Innovation and Improvement: Quality and Value*. London: Department of Health.
- Deutschen Gesellschaft für Neurologie (2008) *Akuttherapie des Ischämischen Schlaganfalls*. Berlin: Deutschen Gesellschaft für Neurologie.
- European Agency for Safety and Health at Work (1990) *European Directive 90/269 on Manual Handling of Loads*. Bilbao: European Agency for Safety and Health at Work.
- Faulkner, M. and Aveyard, B. (2002) Is the hospital sick role a barrier to patient participation. *Nursing Times*. Vol. 98. No. 24. p35.
- Florence Nightingale Foundation Travel Scholarships. Retrieved from: www.florence-nightingale-foundation.org.uk/content/page/35/. (Last accessed 8 October 2012).
- Foley, N., Salter, K. and Teasell, R. (2006) Specialized stroke services: a meta-analysis comparing three models of care. *Cerebrovascular Disease*. Vol. 23. Nos. 2-3. pp 194-202.
- Gommans, J., Barber, P.A. and Fink, J. (2009) Preventing strokes: the assessment and management of people with transient ischaemic attack. *New Zealand Medical Journal*. Vol. 122. No. 1293. pp 3556.
- Goven, L., Langhorne, P. and Weir C.J. (2007) Does the prevention of complications explain the survival benefit of organized inpatient (stroke unit) care? Further analysis of a systematic review. *Stroke: Journal of The American Heart Association*. Vol. 38. No. 9. pp 2536-2540.
- Griffin, M., Haywood, D. and Hussain, N. (2010) *Review of Vital Signs Recording for Stroke and Transient Ischaemic Attack*. Oxford: South Central Cardiovascular Network.
- Hacke, W., Kaste, M., Bluhmki, E. et al. (2008) Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. *New England Journal of Medicine*. Vol. 359. pp 1317-1329.
- Helsedirektoratet (2010) *Behandling og Rehabilitering ved Hjerneslag*. St Olavs: Helsedirektoratet.
- Hoffman, A., Down, C., Grant, R. et al. (2009) *National Sentinel Stroke Organisational Audit*. London: Royal College of Physicians/Intercollegiate Stroke Working Party.
- Indredavik, B., Bakke, F., Slødahl, A. et al. (1999) Treatment in a combined acute and rehabilitation stroke unit: which aspects are most important? *Stroke: Journal of The American Heart Association*. Vol. 30. No. 5. pp 917-923.
- Indredavik, B. (2009) Stroke unit care is beneficial both for the patient and for the health service and should be widely implemented. *Stroke: Journal of The American Heart Association*. Vol. 40. No. 1. pp 1-2.
- Intercollegiate Stroke Working Party (2009) *National Sentinel Stroke Audit: Organisational Audit 2009*. London: Royal College of Physicians.
- Intercollegiate Stroke Working Party (2010) *National Sentinel Stroke Audit: Organisational Audit 2010*. London: Royal College of Physicians.
- Kalra, L. and Langhorne, P. (2007) Facilitating recovery: evidence for organised stroke care. *Journal of Rehabilitation Medicine*. Vol. 39. No. 2. pp 97-102.
- Kothari, R,U., Brott, T., Broderick, J,P. et al. (1995) Emergency physicians accuracy in the diagnosis of stroke. *Stroke: Journal of The American Heart Association*. Vol. 26. pp 2238-2241.
- Langhorne, P. and Pollock, A. on behalf of The Stroke Unit Trialists' Collaboration (2002) What are the components of effective stroke unit care. *Age Ageing*. Vol. 31 pp 365–371.

- Leal, J., Luengo-Fernández, R., Gray, A. et al. (2006) Economic burden of cardiovascular diseases in the enlarged European Union. *European Heart Journal*. Vol. 27. No. 13. pp 1610–1619.
- Melnik, B.M. and Fineout-Overholt, E. (2010) *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice, Second Edition*. London: Wolters Kluwer. p575.
- Miller, E.L., Murray, L., Richards, L. et al. (2010) Comprehensive overview of nursing and interdisciplinary rehabilitation care of the stroke patient. *Journal of the American Heart Association*. Vol. 41. No. 10. pp 2402-2448.
- Moon, L., Moise, P. and Jacobzone, S. (2003) *Stroke Care in OECD Countries: A Comparison of Treatment, Costs and Outcomes in 17 Countries*. Paris: OECD.
- Nabavi, D.G., Ringelstein, E.B., Faiss, J. et al. (2012) Zertifizierungskriterien der Regionalen und Überregionalen Stroke Units in Deutschland. *Der Nervenarzt*. Vol. 83. No 8. pp 1039-1052.
- National Collaborating Centre for Chronic Conditions (2008) *Stroke: Diagnosis and Initial Management of Acute Stroke and Transient Ischaemic Attack (TIA)*. London: National Institute for Health and Clinical Excellence.
- National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group (1995) Tissue plasminogen activator for acute ischemic stroke. *New England Journal of Medicine*. Vol. 333. No. 24. pp 1581-1587.
- Organisation for Economic Co-operation and Development (2010) *Health at a Glance*. Paris: OECD.
- Parsons, T. (1951) *The Social System*. Glencoe, Illinois: The Free Press.
- Pellerin, C., Rochette, A. and Racine, E. (2011) Social participation of relatives post-stroke: the role of rehabilitation and related ethical issues. *Journal of Disability and Rehabilitation*. Vol. 33. Nos. 13-14. pp 1055-64.
- Quan, K. (2012) *Cultural Differences that Affect Health Care*. Retrieved from: www.netplaces.com/new-nurse/what-you-learned-in-school/cultural-differences-that-affect-health-care.htm. (Last accessed 8 October 2012).
- Quinn, P., Brownlee, H., Keating, M. et al. (2012) *The Regulation and Quality Improvement Authority Review of Mixed Gender Accommodation in Hospitals*. Belfast Health and Social Care Trust. Belfast: The Regulation and Quality Improvement Authority.
- Rees, P. and Butt, F. (2004) Ethnic change and diversity in England, 1981–2001. *Area*. Vol. 36. No. 2. pp 174-186.
- Reid, T.R. (2009) *The Healing of America: A Global Quest for Better, Cheaper, and Fairer Healthcare*. London: Penguin.
- Riksförbundet (2010) *Stroke – Riksförbundet*. Stockholm: Stroke Förbundet. Retrieved from: www.strokeforbundet.se/show.asp. (Last accessed 8 October 2012).
- Ringelstein, E.B., Kaste, M., Hacke, W. et al. (2007) Stroke care in Europe - the role of stroke units. *European Neurological Disease*. Vol. 2. pp 24-26.
- Ringelstein, E.B., Busse, O. and Ritter, M.A. (2011) Current concepts of stroke units in Germany and Europe. *Schweizer Archiv für Neurologie und Psychiatrie*. Vol. 162. No. 4. pp 155-160.
- Rivett, G. (2010) *National Health Service History*. London: NHSHistory.com. Retrieved from: www.nhshistory.com/shorthistory.htm. (Last accessed 8 October 2012).
- Royal College of Physicians (2012a) *Stroke Improvement National Audit Programme (SINAP)*. London: Royal College of Physicians. Retrieved from: www.rcplondon.ac.uk/resources/stroke-improvement-national-audit-programme-sinap. (Last accessed 8 October 2012).
- Royal College of Physicians (2012b) *Sentinel Stroke National Audit Programme (SSNAP): Help Notes for Acute Organisational Audit 2012*. London: Royal College of Physicians.
- Scandinavian Stroke Study Group (1985) Multicenter trial of hemodilution in ischemic stroke: background and study protocol. *Stroke: Journal of The American Heart Association*. Vol. 16. No. 5. pp 885-890.
- Statistisk Sentralbyrå (2011) *Health*. Oslo: Statistics Norway. Retrieved from: www.ssb.no/helsetilstand/. (Last accessed 8 October 2012).
- Stroke Association (2010) *Family and Carer Support Service*. London: Stroke Association.

- Stroke Association (2011) *About the Stroke Association*. London: Stroke Association.
- Stroke Training and Awareness Resources (STARS) (2012) *Stroke Core Competencies*. Edinburgh: Stroke Training and Awareness Resources. Retrieved from: www.strokecorecompetencies.org/node.asp?id=home. (Last accessed 8 October 2012).
- Stroke Unit Trialists' Collaboration (2007) *Organised Inpatient (Stroke Unit) Care for Stroke*. *Cochrane Database Systematic Review*. Issue 4: CD000197.
- Sulch, D., Perez, I., Melbourn, A. et al. (2000) Randomised controlled trial of integrated (managed) care pathway for stroke rehabilitation. *Stroke: Journal of The American Heart Association*. Vol. 31. No. 8. pp 1929-1934.
- Swedish Association of Local Authorities and Regions (2005) *Swedish Health Care in an International Context: A Comparison of Care Needs, Costs and Outcomes*. Stockholm: Swedish Association of Local Authorities and Regions. p3.
- Swedish Healthcare Academy (2011) *Swedish Healthcare System*. Stockholm: Swedish Healthcare Academy. Retrieved from: www.swedishhealthcare.se/sida1.html. (Last accessed 8 October 2012).
- Thomas, S., Osborn, R., Squires, D. et al. (2011) *International Profiles of Health Care Systems*. New York: The Commonwealth Fund.
- Tu, F., Tokunaga, S. and Deng, Z. et al. (2002) Analysis of Hospital Charges for Cerebral Infarction Stroke Inpatients in Beijing, People's Republic of China. *Health Policy*. Vol. 59. No. 3. pp 243-256.
- Vega, J. (2009) *Stroke Rehabilitation is a Critical Part of Stroke Recovery*. New York: About.com. Retrieved from: <http://stroke.about.com/od/livingwithstroke/a/livingwithstrok.htm>. (Last accessed 8 October 2012).
- Wahlgren, N., Ahmed, N., Dávalos, A. et al. (2008) Thrombolysis with alteplase 3–4.5 h after acute ischaemic stroke (SITS-ISTR): an observational study. *The Lancet*. Vol. 372. No. 9646. pp 1303-1309.
- Weir, N.U., Sandercock, P.A., Lewis, S.C. et al. (2001) Variations between countries in outcome after stroke in the International Stroke Trial (IST). *Stroke: Journal of The American Heart Association*. Vol. 32. Vol. 6. pp 1370-1377.
- Williams, J., Perry, L. and Watkins, C. (2010) *Acute Stroke Nursing, First Edition*. Oxford: Wiley-Blackwell.

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