Paper

Improvement in stroke care after establishment of the Stroke Unit

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Abstract

***Objective*:** To determine whether there was an improvement in stroke care after the establishment of the Stroke Unit at the Institute of Neurology, National Hospital of Sri Lanka.

Design: The process of acute stroke care was evaluated by retrospective case record analysis of 192 patients with stroke admitted to the Stroke Unit. These results were compared with a previous audit of 263 patients treated in the neurology wards. The two audits used identical methodology, and were conducted using an audit package developed by the Royal College of Physicians of London.

***Methods*:** Sixty audit items related to stroke care were assessed, and compared between the two audits. Performance for each item was recorded as a percentage, and was graded from 'very poor' to 'very good'. The difference between the two audits for each item was expressed as an odds ratio (OR).

***Results*:** Care was graded as 'very good' or 'good' for 56.7% of audit items, compared to 20% in the first audit. Significant improvements in care (OR>1.0, p<0.05) were noted in 50 out of the 60 audit items. Large improvements were seen in assessment of risk factors, CT scanning, rehabilitation oriented clinical assessments and initiation of secondary preventive measures.

***Conclusion*:** Establishment of the Stroke Unit has led to significant improvements in the process of stroke care.

Index words: audit, stroke care, stroke unit, developing country, Sri Lanka

Introduction

Stroke is the second leading cause of death worldwide, and the fourth leading cause of global disease burden[1]. In Sri Lanka, where hospital statistics are the only reliable source of morbidity and mortality data, it ranks fourth among the leading causes of in-hospital deaths[2]. It continues to be a major global health problem in the 21st century, causing significant morbidity, mortality, and disability.

After years of therapeutic nihilism, there is renewed enthusiasm in facing the challenge of stroke. Rapid pre-hospital transport systems, advanced neuroimaging techniques and an emergency approach have revolutionised stroke care, aimed at delivering thrombolytic therapy or endovascular treatment for acute ischaemic stroke. Thrombolysis and endovascular treatment, however, are indicated only in ischaemic stroke, require enormous logistic support to be administered within narrow therapeutic time windows, carry inherent risks of complications, and are costly. Even in developed countries, only about 1.4-12% of eligible patients reportedly receive such treatment[3,4,5,6,7,8,9]. They remain therapeutic options that cannot be widely used in many of the developing countries, where more than two-thirds of strokes and 87% of stroke-related deaths in the world occur[10,11].

Management of patients in a stroke unit is an effective and cost-effective intervention after acute stroke[12,13,14]. It produces significant improvements in short term and long term outcome measures[12,14], and is one of the few interventions of proven benefit available for all types of patients, including those with haemorrhagic stroke[15]. Importantly, it is an intervention that can be easily made available in developing countries with limited resources. Even though there is a large evidence base highlighting the benefits of stroke unit care, data regarding such benefits from the developing countries are extremely limited[16].

Over the past two decades, audits of stroke care have driven quality improvement efforts in many parts of the world, but these initiatives have been largely confined to developed countries. They continue to highlight deficiencies of stroke care, even in these settings[4,17,18,5,19,20,21,6,8,22,23,24].

We previously carried out an audit of acute stroke care at the Institute of Neurology, National Hospital of Sri Lanka, Colombo (NHSL) in 1997 which highlighted

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serious deficiencies[25]. Following this, many changes were made in the structure and process of stroke care, and the most important of these was the establishment of the first stroke unit in the country at the NHSL in 1998. The objective of the present study was to determine whether there was an improvement in acute stroke care after the establishment of the Stroke Unit.

Methodology

We evaluated the process of acute stroke care by retrospective case record analysis of 192 consecutive patients with stroke admitted to the Stroke Unit of the Institute of Neurology over a period of two years (1998-2000) (**Audit 2**). These results were compared with the results of the previous audit (**Audit 1**) which analysed 263 consecutive stroke patients treated in the neurology wards over a period of 3 years (1994-1997)[25]. The two audits employed identical methodology, with similar inclusion and exclusion criteria. Both were conducted using the same audit package developed by the Royal College of Physicians of London and the UK Stroke Audit Group (the RCP Audit Package)[26].

The audit consisted of 60 audit items categorised under 13 care domains, each related to a particular aspect of stroke care. The result for each audit item was expressed as a percentage value, which was an indication of the quality of documentation of care. For the purpose of this study, we graded quality of care for each audit item as; Very good (81-100%), Good (61-80%), Average (41-60%), Poor (21-40%) and Very poor (0-20%). Results from the two audits were compared using a software programme provided with the audit package. The difference between the two audits for each audit item was expressed as an odds ratio (OR). The significance of this difference at the 5% level was expressed as a p value. An odds ratio of greater than unity (OR>1) indicated that the quality of care in the group of patients audited after the establishment of the Stroke Unit (Audit 2) was better than in Audit 1, whereas an OR<1 indicated that care in the second audit was comparatively poorer. Statistical non-significance (p>0.05) was denoted as OR=NS. The odds ratios and the p values were derived directly from the software package. The detailed methodology of the audit has been previously described[26,27].

Results

Care was graded as 'Very good' or 'Good' for 56.7% of audit items, compared to 20% in the first audit. 'Very poor' care was observed for only 13.3% of the audit items in Audit 2, compared to 50% in Audit 1. (Table 1) Significant improvements in care (odds ratio >1.0, p<0.05) were noted with regard to 50 (83.3%) of the 60 audit items tested. There was no statistically significant difference in care for the other ten items (p>0.05). None of the audit items showed a decline in care (odds ratio <1.0, p<0.05) (Table 2).

Table 1. Comparison of quality of care between the two audits

Quality of care		*Audit 1*	*OK%1*	*Audit 2*	*OK%1*
Very good	(91 – 100%)	04	6.7%	21	35%
Good	(76 – 90%)	08	13.3%	13	21.7%
Average	(51 – 75%)	11	18.3%	08	13.3%
Poor	(26 – 50%)	07	11.7%	10	16.7%
Very poor	(0 – 25%)	30	50%	08	13.3%

There were large improvements in relation to certain aspects of care that had scored poorly in the first audit. These included clinical parameters such as recording of certain risk factors (previous stroke or TIA, hyperlipidaemia, peripheral vascular disease), and neurological assessment including conscious level, mental state and visuospatial function. Performing CT scans, rehabilitation oriented clinical assessments and initiation of secondary preventive measures showed marked improvements.

No significant differences were noted in recording of blood pressure and fundoscopy as they were adequately performed in both audits. Improvements were not seen in discharge planning and some aspects of rehabilitation oriented assessment. Advice regarding smoking remained poor.

Discussion

Audit is a powerful tool for change. The purpose of audit is to identify deficiencies of care, and to introduce remedial interventions. Audit should then be repeated to evaluate the effectiveness of the interventions made. We were able to achieve this by completing the two audits before and after the establishment of the Stroke Unit, thus completing the audit cycle and demonstrating improvement in stroke care. This is the first such report from Sri Lanka, and to our knowledge, only the second report of stroke unit related improvements in care from a developing country.

We used a previously validated audit instrument, the RCP audit package, for this study. The RCP stroke audit package had been successfully used by several investigators previously[27,28]. This audit was based on retrospective case record evaluation, with its inherent limitations in evaluating quality of care, but any such

Table 2. Documentation of audit items of stroke care

Audit item	*OK%1*	*OK%2*	*OR>1 (p<0.05)*	*OR<1 (p<0.05)*	*OR-NS (p>0.05)*
1. History					
Source of history	62	79	2.55		
Rate of onset of symptoms	82	96	5.71		
Record of admission drugs	19	41	2.93		
2. Risk factors					
Previous stroke or TIA	22	76	11.3		
History of hypertension	71	91	4.21		
History of heart disease	51	83	4.59		
Peripheral vascular disease	00	46	218.0		
History of diabetes	60	83	3.24		
History of hyperlipidaemia	01	44	99.5		
Smoking	32	77	7.23		
Alcohol	30	78	8.16		
3. Pre-stroke function					
Record of dependence	15	60	8.42		
Use of social services	04	32			13.3
Employment	32	57	2.85		
4. General examination					
Pulse rate and rhythm	42	86	8.8		
Blood pressure	96	96			1.0
Heart sounds	79	97	9.9		
Neck bruits	22	69	7.6		
Peripheral pulses	02	48	48.4		
Fundoscopy	89	95			1.16
5. Neurological examination					
Conscious level	82	99	20.6		
Eye movements	69	89	3.62		
Power in the limbs	94	97	2.14		
Communication	39	90	14.3		
Trunk control or gait	12	53	8.48		
Swallowing	20	59	5.57		
Formal mental test score	02	36	37.2		
Visuospatial function	02	24	20.8		
Visual fields	36	56	2.26		
Sensory testing	58	86	4.4		
6. Clinical diagnosis					
Clear diagnostic formulation	22	71	8.39		
7. Usual baseline investigations					
Full Blood Count	93	99	14.9		
ESR	73	98	22.5		
Urea and Electrolytes	89	99	11.9		

(Continued)

Audit item	*OK%1*	*OK%2*	*OR>1 (p<0.05)*	*OR<1 (p<0.05)*	*OR-NS (p>0.05)*
Glucose	97	98	2.16		
ECG	62	99	56.7		
8. Special investigations					
CT Scan	68	98	21.3		
Investigate rare causes	63	80	2.34		
9. Immediate management plan					
Hydration	09	18	2.37		
Urinary incontinence	04	15	4.72		
10. Management in the first week					
Consultant review	84	99	18.1		
Review of important deficits	82	97	7.97		
11. Rehabilitation					
Record of personal interests	01	08			9.09
List of patients' problems	02	25	13.1		
Rehabilitation goals	00	98	14.2		
Re-assess functional status	03	99	99.9		
Multidisciplinary meeting	00	95			0
Information given to patient/relatives	01	00	13.9		
12. Discharge planning					
Ownership of accommodation	00	81			0
Type of accommodation	00	32			0
Living alone/ not	01	33	92.5		
Stairs / ground floor / lift	00	28			0
Access to toilet	00	02			0
Informal support available	02	33	31.6		
13. Secondary prevention					
Blood pressure after 4 days	81	96	6.06		
Antihypertensive medication	52	94	14.2		
Long term aspirin	77	94	59.2		
Long term anticoagulation	07	65	24.3		
Advice about smoking	00	01			2.6
Non invasive carotid imaging	31	81	9.40		

OK% - quality of care, expressed as a percentage (see text)
OR>1 (p<0.05) - denotes significant improvement in care
OR<1 (p<0.05) - denotes significant decline in care
OR=NS - denotes no significant change in care (p>0.05)

limitation would apply equally to both audits. These audits evaluated the process of care, before and after the establishment of a stroke unit, rather than outcome. In auditing stroke care, audit of process is considered better than that of outcome as setting standards is easier, and deficient areas and remediable actions are easy to detect[29,30]. Variation in case mix between the two audits would affect outcome measures, but not process of care.

Conclusions

Even though the benefits of stroke unit care have been well documented, data regarding such benefits from the developing countries remain scarce. We have shown that establishment of a stroke unit can produce significant improvements in stroke care, even in a developing country like Sri Lanka. We hope these findings would serve as a catalyst for the establishment of stroke units in the country.

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