Stroke Rehabilitation in the Philippines: An Audit Study

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ABSTRACT

Purpose: *Although cerebrovascular accident is a leading cause of mortality in the Philippines, there has never been a national survey of stroke client descriptors and rehabilitation practices. This paper reports on data from the audit of stroke care for inpatients in hospitals serviced by physiatrists.*

Method: *Audit was done of the medical records of stroke clients admitted to hospitals with rehabilitation units. Performance indicators for timely referral to rehabilitation were applied.*

Results: *A total of 1683 records were audited. The majority of clients had cerebral infarct followed by cerebral haemorrhage. The median length of stay was 7 days; stay was lengthier for haemorrhagic strokes. Only 54.1% of the clients were referred to rehabilitation, with a median delay of 3 days between admission and referral to rehabilitation. 25.4% of the clients had early referral to rehabilitation. 39.2% of the 1397 clients were referred to rehabilitation earlier than 2 days before discharge.*

Conclusion: *This Filipino study provides valuable information on stroke types and prevalence, demographics and rehabilitation practices. Despite the prevalence of post-stroke rehabilitation, it has been underutilised in the management of stroke.*

Key words: *Stroke rehabilitation, Philippines, audit study.*

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INTRODUCTION

Cerebrovascular accident is one of the leading medical conditions in the Philippines, with over 500,000 Filipinos (0.8% of the total adult population) suffering from stroke annually (Navarro, 2005). Treating acute stroke effectively requires evidence-based medical management and at times, surgical intervention as well as timely and ongoing physical rehabilitation (Brainin et al, 2007). Costs of treating stroke are significant and therefore, reducing stroke prevalence should be the ultimate goal (Navarro et al, 2014), especially in a developing country like the Philippines, where the per-person-per-year healthcare expenditure was US $ 202 per annum, as of 2012 (Who Health Organisation Updates, 2012). The aim of evidence-based management is to ultimately reduce unnecessary expenditure, by minimising the impact of sequelae of stroke such as reduced physical capacities, cognitive capacities, and social activities, which limit everyday participation in family and community (Inouye et al, 2000; Suputtitada et al, 2003). Without evidence-based management, post-stroke sequelae are likely to be much more serious, requiring higher and ongoing medical costs, significant personal costs in terms of suffering and activity restrictions, and significant community burden (Navarro et al, 2014). Thus, it is important that evidence-based healthcare is available for all stroke clients in the Philippines, so that scarce health resources are spent wisely, and the ongoing impact of stroke is minimised.

Equitable access to evidence-based rehabilitation for stroke clients in the Philippines poses a significant challenge because of multisector and multisystem reasons (e.g., environmental, geographical, social, personal, organisational, workforce, educational and financial) (Anderson & Alcantara, 2007; Dizon et al, 2012a, 2012b). Consequently, not every Filipino has ready access to specialist medical personnel to assist with stroke care, and the consequences of this on the Filipino economy are significant (Anderson & Alcantara, 2007). Thus, while decreasing stroke incidence in the Philippines should be a long-term aim, important immediate gains in reducing unnecessary health expenditure and improving health outcomes could be made if every stroke client was treated in the most evidence-based manner (Anderson &Alcantara, 2007; World Health Organisation Updates, 2012).

The Philippine Academy of Rehabilitation Medicine (PARM) is at the forefront of evidence-based management of stroke in the country. PARM is the national

professional organisation for physiatrists, and all Filipino physiatrists are members (N=254). This group published stroke rehabilitation clinical practice guidelines in 2012, which incorporated an innovative approach to contextualise Western clinical practice guidelines for stroke care to Philippine conditions (Gonzalez-Suarez et al, 2012). Contextualisation was the name given to the process of translating best-evidence recommendations from good quality guidelines into achievable Filipino practice, by considering local context elements of 'how, when, why, who, what' (e.g., workforce and training, equipment, outcomes, responsibilities, timeframes).

PARM-contextualised stroke guidelines will be rolled out nationwide by the end of 2015. However, as an important pre-implementation step, current practice in stroke care and the demographics of stroke clients need to be established. Since there had never been a national audit of stroke descriptors or stroke rehabilitation practices in the Philippines, the stroke types, client demographics and gaps in practice quality had not been formally identified. Without this information, efforts to improve evidence-based practices may fail to target the areas of practice, which need it the most.

This paper reports on findings from a national audit of stroke clients and rehabilitation practices in Filipino hospitals serviced by physiatrists.

METHOD

The detailed methods of this clinical audit have been published previously (Gonzalez-Suarez et al, 2015). A summary of the methods and the procedures undertaken is reported here.

Ethics

In the absence of a national review board, ethical approval for the study was sought from the Ethical Review Board of each of the hospitals that participated in the study. If a hospital had no Ethical Review Board, permission to undertake the study and access medical records, were sought from the Medical Director.

Study Design

This was intended to be a comprehensive nationwide clinical audit study using medical record reviews, and involving hospitals with rehabilitation units serviced by physiatrists.

Study Sample

The Philippines has 3 main geographic groups of islands which are Luzon, Visayas and Mindanao. The national capital region or NCR is in the centre of Luzon. It is composed of 16 cities (Philippine Island: Geography of the Philippines; and National Capital Region, 2014). Data was gathered from the 3 geographic groups of islands and the national capital region.

Hospital recruitment was undertaken through PARM. There are a total of 1834 hospitals treating stroke clients in the Philippines (1111 private hospitals, 723public hospitals). Of these, only 15.8% (288) have rehabilitation units, serviced by one or more physiatrists.

Participation in the audit was purely voluntary, although it was hoped that all physiatrists would participate. The clinical audit protocol was presented at the annual convention of PARM in Manila, Philippines last February 2013, and at regional conferences of the organisation in Laoag (Ilocos Norte), Iloilo City (Iloilo), and Alabang (Metro Manila) later in 2013 (Fig 1). In addition to presentations, personal invitations to take part in the clinical audit were sent to all physiatrists. Those who consented to participate were given copies of the audit protocol, and ethical approval or hospital approval was facilitated by the primary researcher.

Sample Size Calculations

It was anticipated that all 288 hospitals with rehabilitation units would be available for sampling. Records were initially sampled by hospital, but it was difficult to estimate the appropriate number of records per hospital. It was recognised that accurate identification of records of stroke clients and obtaining a robust sample of the records would be a challenge, since all the Filipino hospital records were kept and accessed in different ways. Sampling was discussed by PARM participants, and it was agreed that the most defensible approach was to retrospectively and consecutively sample the last 10% of the records of the past year's stroke client admissions, working backwards chronologically from the audit study commencement date (Gregory et al, 2008). Thus, participating physiatrists were required to identify the number of stroke clients admitted to their hospital during the past 12 months, calculate 10% of this, and obtain this number by working retrospectively from the audit commencement date. All stroke client records were to be included in the audit, irrespective of death after admission or health outcomes.

Registering for the Audit

As soon as physiatrists indicated their willingness to participate, ethical approval or hospital approval was obtained. The hospital name, regional location and public/private type were determined.

Data Items

A consensus list of audit data items, which was developed by PARM, attempted to comprehensively describe the profile of Filipino stroke clients. Before using it, this list was validated for content by representative physiatrists, physical therapists and occupational therapists. Mean content validity index was 0.97. These data items were reported in the protocol (Gonzalez-Suarez et al, 2015). Appendix A has a sample data collection form.

Data Collectors

Data was collected by different people, depending on the availability of personnel and the location of the hospital (physiatrists, hired research assistants, or medical and physical therapy interns on rotation in the participating hospitals). To ensure accuracy of data collection and reliability of the data collectors, they were first given standard training to orient them with the data collection form and the data collection process. Due to the likely variability of data recording in participating hospitals, specific instructions were provided to help data collectors find correct information from the medical records. Five sample cases were independently extracted by all data collectors and inter-reliability was calculated by dividing the number of data for which there was complete agreement among the data collectors, by the total number of data based on recommendations of Dixon and Pearce (2010). Further training was provided as needed, based on the results of the reliability procedure. Inter-rater reliability among assessors was initially 63% (moderate agreement); this was further improved to 87% upon clarification of data items and extraction processes.

Indicators of Good Practice

This paper reports on 4 quality practice indicators:

- Referral to rehabilitation, where
    - o good practice was defined as the rehabilitation referral date being less than 25% of the expected length of stay, and

- good discharge planning which occurred if the referral occurred at least 2 days before discharge, and

- Continuous rehabilitation being provided.

Data Handling and Management

Completed data collection forms were sent to the PARM office where they were checked for compliance, and a unique de-identified code for each hospital was provided. A purpose-built Microsoft Excel spreadsheet was constructed for data entry.

Data Analysis

Data was analysed descriptively for characteristics of stroke clients. Although deceased clients were counted initially, those who died at different points throughout the episode of care relevant to the indicators were taken off the sample. Compliance with each of the 4 quality indicators was reported as percentage of client records, where information on the quality indicator was recorded. No evidence in the records about compliance with an indicator was considered to be non-compliance (i.e., not recorded, did not happen). Differences in length of stay were determined for those clients where care was or was not compliant with the quality indicators. The influence on compliance of stroke type, age, gender, and hospital type and region was considered for each indicator.

SAS Version 9.2 (2013) was used for all analysis. Means (standard deviations or SD) and percentages were provided as appropriate, for demographic details and rehabilitation practices. Wherever appropriate, t-tests, ANOVA models, chi square models or odds ratios were applied to determine significant differences or associations.

A post hoc power calculation was undertaken using the referral to rehabilitation indicator, by applying the one proportion test calculation in two different statistical software (SigmaXL 7.0 Ontario Canada, and STATA 12.1 College Station TX).

RESULTS

Sample

A total of 49 hospitals (8 public and 41 private hospitals) participated (17% of the total possible hospitals with rehabilitation units). Of the 1683 records retrieved,

403 (24%) were from public hospitals and 1182 (76%) were from private hospitals. Table 1 reports the hospital descriptors per region.

Table 1: Hospital Descriptors

	Luzon (n=21)	Visayas (n=9)	Mindanao (n=9)	National Capital Region (n=10)	Number of Records
Public Hospitals	4	0	2	2	403 (24%)
Private Hospitals	17	9	7	8	1280 (76%)

Sample power to accurately predict the rate of referral to rehabilitation exceeded 90%.

Part 1: Stroke Client Characteristics

Age and Gender

The dataset contained 1665 records where information on gender and age was provided. There were roughly equal numbers of records per gender (897 men or 53.9%; 768 women or 46.1%). Average age of clients was 63.3 years (SD 13.4), with age for males being 61.9years (SD 13.0), and for females 64.9 years (SD 13.6). Using Student's t-test, there was astatistically significant gender difference in age with men being, on average, 3 years younger than women ($p<0.05$). Table 2 reports age and gender details. For both men and women, the peak age group for suffering a stroke was 60-79 years, using percentages.

Table 2: Stroke Client Characteristics (mean age ± SD), n (% total) each age group

	Mean age (± SD) years	18 -39 years	40 -59 years	60 – 79 years	> 80 years
Male	61.9 ±13.0	43 (4.8%)	332 (37.0%)	449 (50.1%)	73 (8.1%)
Female	64.9 ± 13.6	20 (2.6%)	251 (32.7%)	376 (48.9%)	121 (15.8%)
Total		63 (3.8%)	583 (35.0%)	825 (49.6%)	194 (11.7%)

Stroke Type

Details on stroke type were available from 1647 records. The most common type of stroke was infarct (reflecting 77.9% of all strokes), with the 60-79 year age group suffering this most frequently (39.9%). The second most common form of stroke was haemorrhagic (19.7%), with the 40-59 year age group most commonly suffering this (9.1%). Overall, however, the frequency of stroke type was similar per gender and age group($p>0.05$) using chi square analysis. Table 3 outlines overall frequency of stroke occurrence. Information on age group and gender / age characteristics of stroke affected persons is provided in Appendix 1.

Table 3: Stroke Descriptors for all Clients

Males and Females					
	18 -39 n (% of total strokes in all ages)	**40 -59 n (% of total strokes in all ages)**	**60 - 79 n (% of total strokes in all ages)**	**> 80 n (% of total strokes in all ages)**	**Total stroke**
Cerebral Haemorrhage (% reflects total strokes	23 (1.4% of total strokesinall ages)	150 (9.1%)	131 (7.9%)	21 (1.3%)	325 (19.7% of all strokes)
Cerebral Infarct	36 (2.2%)	421 (25.6%)	658 (39.9%)	169 (10.3%)	1284(77.9%)
Arteriovenous Malformation	3 (0.1%)	0	1 (0.1%)	0	4 (0.2%)
Subarachnoid Bleed	0	8 (0.5%)	11 (0.7%)	4 (0.2%)	23 (1.4%)
Intracerebral Aneurysm	0	4 (0.2%)	6 (0.4 %)	1 (0.1%)	11 (0.7%)
	62 (3.8%) total strokes	583 (35.4%)	807 (49%)	195 (11.8%)	1647(missing 36 records)

Stroke type reported by side of lesion is outlined in Table 4. Using chi square analysis, there was no difference between sides for the frequency of infarcts; however, there was a clear preference for the left side in haemorrhagic strokes. The other types of strokes had too few numbers to make robust comparisons.

Table 4: Stroke Type and Side of Stroke (n and % of stroke type reported)

	Left n (% of each particular stroke subtype)	Right n (% of each particular stroke subtype)	Both n (% of each particular stroke subtype)	Not Specified n (% of each particular stroke subtype)	Total
Cerebral Haemorrhage	167 (51.5%) of the haemorrhagic strokes	133 (41.0%)	15 (4.6%)	9 (2.8%)	324 (19.7%) of all strokes
Cerebral Infarct	536 (41.8%)	541 (42.2%)	183 (14.3%)	21 (1.6%)	1281(78.0%)
Arteriovenous Malformation	3 (75%)	1 (25%)	0	0	4 (0.2%)
Subarachnoid Bleed	8(34.8%)	12 (52.2%)	2 (8.7%)	1 (4.3%)	23 (1.4%)
Intracerebral Aneurysm	1 (9.1%)	5(45.4%)	2 (18.2%)	3 (27.3%)	11 (0.7%)
Total	715 (43.5%)	692 (42.1%)	202 (12.3%)	34 (2.1%)	1643 Missing 40

Length of Stay (LoS)

Data on length of stay was available for 1545 clients. The median length of stay was 7 days (25th-75th%: 4-11 days), range 0-63 days. After the records of all deceased clients (n=55 or 3.3%) were removed from the dataset, as well as those for whom no information was provided on type of stroke (leaving n=1549), the effect on LoS (split at the median value) of three groupings of stroke type was considered - haemorrhagic, infarct, and all other stroke types combined (AV malformations, subarachnoid bleeds or intracerebral aneurysms). The combined group was set at the default for comparative analysis. Clients with haemorrhagic strokes were significantly more likely to have a longer length of stay (more than 7 days) than all other stroke types (OR= 2.4, 95% CI 1.4-4.1), while LoS for infarct strokes was similar to that of all other strokes combined (OR = 0.9, 95% CI 0.6-1.6) (See Table 5).

Table 5: Median Length of Stay for different Stroke Types

	Cerebral Haemorrhage	Cerebral Infarct	Arteriovenous Malformation	Subarachnoid Bleed	Intracerebral Aneurysm
Length of Stay: Median (25th-75th%)	9 (4.5,14)	6 (3.5, 10)	20 (11,29)	5.5 (2,12)	5.5 (2,12)
Range of days of Stay	0- 73	0-163	11-30	1-33	2-21
N	290	1204	3	4	11
Missing Data	4	15	0	0	0

There was no effect on LoS of gender (OR = 0.9, 95% CI 0.8-1.2) or age group, using the 40-59 year olds as the comparator group (OR=1), 18-39 year olds (OR=9, 95% CI 0.6-1.7); 60-79 year olds (OR=0.8, 95% CI 0.6-0.9); 80+ year olds (OR=1.2, 95% CI 0.9-1.7). LoS was significantly shorter in private hospitals than in public hospitals (OR=0.4, 95% CI 0.3-0.5). Regarding location, clients treated in hospitals in NCR were significantly more likely to have LoS longer than 7 days, as compared to hospitals on any other islands - Luzon (OR= 0.4, 95% CI 0.3-0.6); Visayas (OR=0.3, 95% CI 0.2-0.4); Mindanao (OR=0.4, 95% CI 0.3-0.6). Appendix 2 provides information on age and gender referral to rehabilitation.

Part 2: Quality Indicators

Referral to Rehabilitation

Based on clients who were alive and for whom information was available on LoS, 911 (54.1%) were referred to rehabilitation. There was a significantly longer LoS (nearly 5 times longer) if clients were referred to rehabilitation (OR= 4.9, 95% CI 3.9-6.1)). The median number of days between admission and referral to rehabilitation was 3 days (25-75% 0.49) (n=842). Age had no effect on referral to rehabilitation, with all age groups likely to be referred in a similar way; with the 40-59 year old group as comparison (OR=1) :18-39 years (OR=0.9, 0.5-1.6); 60-79 years (OR=0.8, 0.7-1.0); 80+years (OR=0.6, 0.4-0.9). Both haemorrhagic stroke and infarct clients were significantly more likely to be referred to rehabilitation, as compared to all other stroke types (OR=1): haemorrhagic (OR= 2.5, 95% CI 1.4-4.3); infarcts (OR=1.7, 95% CI 1.1-2.8) (See Tables 6a, 6b).

Table 6a: Referral to Rehabilitation per kind of Stroke

	Total	Cerebral Haemorrhage n (% of each subtype of stroke)	Cerebral Infarct n (% of each subtype of stroke)	Arteriovenous Malformation n (% of each subtype of stroke)	Subarachnoid Bleed n (% of each subtype of stroke)	Intracerebral Aneurysm n (% of each subtype of stroke)
Referred	889 (57.9% of total stroke)	191 (65.2%) of total haemorrhagic	696 (56.7%) of total infarct	2 (66.7%)	7 (36.8%)	3 (27.3%)
Not Referred	646 (42.1%)	102 (34.8%)	523 (43.3%)	1 (33.3%)	12 (63.2%)	8 (72.3%)
N	1535	293 (19.1%)	1209 (78.8%)	3 (0.2%)	19 (1.2%)	11 (0.7%)
Missing Data	47					

Table 6b: Referral to Rehabilitation per Age Group

	18 -39 n (% of age group)	40-59 n (% of age group)	60-79 n (% of age group)	>80 n (% of age group)
Referred	33 (56.9% of age group	344 (61%)	438 (57.1%)	92 (50.5%)
Not referred	25 (43.1%)	220 (39%)	329 (42.9%)	90 (49.5%)
N	58 (3.79%)	564 (35.9%)	767 (48.8%)	182 (11.6%)

Good (early) Rehabilitation Referral Practice (occurring within the first 25th LoS)

This had happened for only 208 clients (25.4%). In comparison to the combined group of AV Malformations, Subarachnoid Bleeds and Intracerebral Aneurysms, clients with haemorrhagic strokes were significantly less likely to be referred to rehabilitation within the first 25% of their LoS (OR= 0.4, 0.4-0.8), while the likelihood of slower referral to rehabilitation was lower for clients with strokes from infarcts (OR=0.6, 95% CI 0.4-1.1). However, clients in the age group of 80+ years were 1.6 times more likely (significant) to be referred to rehabilitation early, as compared to all other age groups: 18-39 year olds (OR=0.9, 95% CI 0.5-1.6); 40-59 year olds (OR=1); 60-79 year olds (OR=1.1, 95% CI 0.9-1.4); 80+ yearolds (OR=1.7, 95%CI 1.2-2.4). Discounting the AV Malformation stroke type (because

of small numbers), there were similar (non-significant) early referral practices to rehabilitation for all stroke types (ranging from 52% for haemorrhagic strokes to 79% for subarachnoid bleeds) using chi square analysis. Age hadno effect on early referral (between 55% and 67% of clients in each age group were referred within the first 25% of their LoS). Appendix 3 provides supplementary information on early referral practices, type of stroke and age.

Good Discharge Referral Practice (referral to rehabilitation earlier than 2 days before discharge)

This was experienced by 548 clients. There were nearly 800 missing records for this detail (leaving n=787 for analysis). Therefore, good discharge referral practices could only be identified in 343 records (75.6% of available records). Although age had no influence on good discharge referral practices, there appears to be a significant influence of stroke, with fewer subarachnoid bleeds and intracerebral aneurysms being referred in a timely manner prior to discharge, than haemorrhagic stroke or infarcts.

Continuous Therapy

Based on the clients who were referred to rehabilitation, there appeared to be a significant effect of stroke type on subsequent receipt of continuous therapy. Haemorrhagic stroke clients received continuous therapy more commonly than any other stroke type (See Table 7a). Significantly fewer people above 80 years of age had continuous therapy compared with all other age groups, using chi square analysis (See Table 7b).

Table 7a: Continuous Therapy following Referral to Rehabilitation by kind of Stroke

	Cerebral Haemorrhage n (% of each subtype of stroke)	Cerebral Infarct n (% of each subtype of stroke)	Arteriovenous Malformation n (% of each subtype of stroke)	Subarachnoid Bleed n (% of each subtype of stroke)	Intracerebral Aneurysm n (% of each subtype of stroke)	Chi Square
Continuous	160 (61.8%) of total haemorrhagic	526 (48.8%)	2 (66.7%)	7 (36.8%)	2 (20%)	P<0.05
Not Continuous	99 (38.2%)	552 (51.2%)	1(33.3%)	12(63.2%)	8(80%)	
Total	259 (18.9%) of all strokes referred to rehab	1078 (78.7%)	3 (0.2%)	19 (1.4%)	10 (0.7%)	

Table 7b: Continuous Therapy by Age Group

	18 -39 years n (% of age group)	40-59 years n (% of age group)	60-79 years n (% of age group)	>80 years n (% of age group)	Chi Square
Continuous	27 (52.9% of this age group	290 (56.8%)	335 (49.1%)	59 (37.3%)	P<0.05
Non-Continuous	24 (47.1%)	221 (43.2%)	347 (50.9%)	99 (62.7%)	
Total	51 (3.6%) of total referred of all ages	511 (36.4%)	682 (48.4%)	158 (11.3%)	
Total =1402					
Missing 163					

While attempts were made to find reasons for discontinuing therapy (from the notes), the amount of missing data was a constraint. The most common reason appeared to be the occurrence of adverse events (n=95) (See Table 8).

Table 8: Reasons for Discontinuing Rehabilitation

Reasons	Total
1. Financial	9 (1.1%)
2. Indicated by Doctor	14 (1.7%)
3. Family decision	5 (0.6%)
4. Adverse events	97 (12%)
5. Physical/occupational therapy not needed	7 (1.2%)
6. Not available (no information)	3 (0.4%)
7. High blood pressure	3 (0.4%)
8. No available physical and/or occupational therapy	2 (0.35%)

DISCUSSION

In the Philippines, this appears to be the first audit which describes the demographic profile and rehabilitation practices of stroke clients admitted to public and private hospitals, which have rehabilitation units serviced by physiatrists.

Client Characteristics

Findings pertaining to the high prevalence of cerebral infarct, the lack of gender effect and the most at-risk age group (60 -79 years) are similar to findings in high-income countries like the United States of America and Australia, and developing countries like India (Dans et al, 2005; Hall et al, 2012; Kulshreshtha et al, 2012; Australian Institute of Health and Welfare, 2013; World Health Organisation Updates, 2015).

The current study showed that the median length of stay for clients with acute stroke (approximately 7 days) was shorter when compared to other Asian countries. For Japan, Thailand and China, the mean length of stay was 90, 78 and 32 days respectively (Suzuki and Asano, 1993; Tu et al, 2002; Suputtitada et al, 2003). The main reason for the difference in LoS is most likely definitional, and specific to the Filipino healthcare system. In other Asian countries, hospital stay usually involves time spent in both acute care hospitals and rehabilitation hospitals, which are often supported by the country's health insurance system. In the Philippines, only the acute management of stroke is counted, and this is only partially funded by health insurance.

Quality Indicators

Only half the sample (54.1%) was referred to rehabilitation, with the median number of days from admission to referral being 3 days. Good (early) referral practice (occurring within the first 25% of the LoS) occurred for only 25.4% of the referred group. Clients who were referred to rehabilitation had 5 times longer length of stay as compared to those who were not referred for rehabilitation. Considering that the data was collated only in hospitals with rehabilitation centres, this suggests a significant under utilisation of the hospitals' rehabilitation facilities. One of the difficulties of rehabilitation in the Philippines is the access to, and availability of, adequate rehabilitation facilities. Only 15.8% of Filipino hospitals have rehabilitation units. Furthermore, there is no sub-acute and chronic care facility in the Philippines, which could cater to the rehabilitation needs for neurological, medical and orthopaedic clients who have to be transferred out of acute care. Since clients are usually discharged from hospital to undergo home or out-patient rehabilitation, they may extend their hospital stay so as to become more functional prior to discharge. Philippine Health Insurance (Philhealth) only partially shoulders expenses for the hospital bed, medication, and surgery for clients confined in hospital. At present, rehabilitation services are not subsidised

by PhilHealth. Furthermore, even if clients have private health insurance in the Philippines, there is a cap on the number of rehabilitation treatments that can be reimbursed by the health insurance. Rehabilitation becomes a financial burden borne solely by the family. Often, to minimise expenses, rehabilitation is not provided as early as possible. This negates one of the key recommendations of clinical practice guidelines, which is early mobilisation of stroke clients (possibly within the first 24 hours or when the client is medically stable). This is considered to be an effective component in acute stroke management which could improve the overall outcome of clients (Brainin et al, 2007). However, as demonstrated in this audit in a developing country, financial consideration is the primary issue in effective, equitable rehabilitation of strokeclients, and not the implementation of evidence-based management (Brainin et al, 2007).

The current study also found that clients with haemorrhagic strokes were significantly less likely to be referred to rehabilitation as compared to clients who had cerebral infarcts. Although studies have shown that early rehabilitation is an effective, therapeutic intervention strategy for clients with intracranial haemorrhage (leading to better clinical outcomes inphysical and psychological health), many healthcare professionals are still hesitant to recommend early mobilisation (Dewey and Bernhardt, 2007; Bai et al, 2012; Liu et al, 2014). Since clinical guidelines for the management of intracranial haemorrhage recommend close monitoring and stringent blood pressure control in the early period, this could underpin reluctance in implementing early active treatments (Liu et al, 2014). A qualitative study by Skarin et al (2011) showed that 60%, or 122 of the 202 interviewed health practitioners involved in stroke rehabilitation, expressed concerns about early mobilisation of stroke clients, especially those with haemorrhagic stroke. Their concerns related to cardiovascular stability and physical ability of clients to tolerate early active treatment.

Limitations

The sample is constrained by the small number of hospitals which participated (17% of the total possiblyeligible hospitals); hence, the findings may not be generalised because of biases inherent in this sample. However, there was good representation of public and private hospitals in each main island region, and high post hoc power calculation, using referral to rehabilitation as the indicator. Thus this sample provides robust and useful information as a basis to find reasons for poor practices.

Among the other limitations of the study, it should first of all be noted that the collection of data was done voluntarily by physiatrists and their interns/ students, which could explain the constrained sample size. Secondly, there could have been variability in the interpretation of data extracted from chart reviews, as there is no standardised method for making entries in charts in different hospitals. Lastly, it was not possible to quantify the severity of stroke by outcome measures, as no hospital recorded this. The recommended scales are the National Institute of Health Stroke Scale and the modified Rankin Scale which are predictive of the client's rehabilitation or long-term care needs (Sulter et al, 1999; Anemaet, 2002; Chlegel et al, 2004; Jamie et al, 2007). This information would have provided clearer details about the quality indicators of stroke rehabilitation, particularly in terms of clinical decision-making.

Despite these limitations, the present study provides valuable information on stroke rehabilitation practices in the Philippines, which can serve as indicative and necessary baseline data prior to the widespread implementation of evidence-based stroke rehabilitation management.

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REFERENCES

Anderson B, Alcantara MO (2007). Technical assistance to the Republic of Philippines for the health sector development programme ADB TA 4647-PHI: final report. 2007. Available from: http://www2.adb.org/Documents/Reports/Consultant/39066-PHI/39066-PHI-TACR.pdf. [Accessed on 12 March 2015]

Anemaet WK (2002). Using standardised measures to meet the challenge of stroke assessment. Topics in Geriatric Rehabilitation; 18 (2): 47-62. http://dx.doi.org/10.1097/00013614-200212000-00006

Australian Institute of Health and Welfare (2013). Stroke and its management in Australia: an update. Available from: http://apo.org.au/node/34784. [Accessed on 13 January 2015]

Bai Y, Hu Y, Wu Y, Zhu Y, He Q, Jiang C, Sun L, Fan W (2012). A prospective, randomised, single-blinded trial on the effect of early rehabilitation on daily activities and motor function of patients with haemorrhagic stroke. Journal of Clinical Neuroscience; 9: 1376–1379. http://dx.doi.org/10.1016/j.jocn.2011.10.021. PMid:22819061

Brainin M, Teuschl Y, Kalra L (2007). Acute treatment and long-term management of stroke in developing countries. Lancet Neurology; 6: 553–61. http://dx.doi.org/10.1016/S1474-4422(07)70005-4

Chlegel DJ, Tanne D, Demchuk AM, Levine SR, Kasner SE (2004). Prediction of hospital disposition after thrombolysis for acute ischaemic stroke using the National Institutes of Health Stroke Scale. Archives of Neurology; 29 (6): 1258-1259.

Dans AL, Morales DD, Velandria FV, Abola T, Roxas A, Punzalan F, Sy RA, Paz-Pachecho E, Amarillo L, Villaruz MV (2005). National nutrition and health survey [NNHeS]: atherosclerosis-related diseases and risk factors. Philippine Journal of Internal Medicine; 43: 103–15.

Dewey HM, Bernhardt J (2007). Acute stroke patients–early hospital management. Australian Family Physician; 36: 904–12. PMid:18043775

Dixon N, Pearce M (2010). Clinical Audit Manual. Romsey: Healthcare Quality Quest Ltd.

Dizon JMR, Grimmer-Somers K, Kumar K (2012a). A pilot study of the evidence-based practice training programme for Filipino physiotherapists: emerging evidence on outcomes and acceptability (2012a). Internet Journal of Allied Health Science and Practice; 10(2): 1-12. Available from: http://ijahsp.nova.edu/articles/Vol10Num2/pdf/Dizon.pdf. [Accessed on 20 December 2014]

Dizon JMR, Grimmer-Somers K, Kumar K (2012b). Study Protocol effectiveness of the tailored EBP training program for Filipino physiotherapists: a randomised controlled trial. BMC Medical Education; 11: 14. Available from: http://www.biomedcentral.com/1472-6920/11/14. [Accessed on 14 November 2014]. http://dx.doi.org/10.1186/1472-6920-11-14. PMid:21489229 PMCid:PMC3100239

Gonzalez-Suarez CB, Grimmer-Somers K, Dizon JM, King E, Lorenzo S , Valdecaňas C, Gambito E, Fidel B (2012). Contextualising Western guidelines for stroke and low back pain to a developing country [Philippines]: An innovative approach to putting evidence into practice efficiently. Journal of Healthcare Leadership; 4: 141–156. Available from: http://www.dovepress.com/contextualizing-western-guidelines-for-stroke-and-low-back-pain-to-a-d-peer-reviewed-article-JHL [Accessed on 14 January 2015]. http://dx.doi.org/10.2147/JHL.S35370

Gonzalez-Suarez CB, Dizon MR, Grimmer K, Estrada M, Liao L, Malleta ARD, Tan ME, Marfil V, Versales CS, Suarez JL, So KC, Uyehara ED (2015). Protocol for audit of current Filipino practice in rehabilitation of stroke inpatients. Journal of Multidisciplinary Healthcare; 2 (8): 127-38.

Gregory B, Van Horn C, Kaprielan V (2008). Eight steps for a chart audit for quality care. Family Practice Management; 15 (7): A3- A8. PMid:18763679

Hall MJ, Levant S, DeFrances CJ (2012). Hospitalisation for Stroke in U.S. Hospitals, 1989–2009. NCHS data brief, No. 95.

Inouye M, Kishi K, Ikeda Y, Takada M, Katoh J, Iwahashi M, Hayakawa M, Ishihara K, Sawamura S, Kazumi T (2000). Prediction of functional outcome after stroke rehabilitation. American Journal of Physical Medicine and Rehabilitation; 79: 513–518. http://dx.doi.org/10.1097/00002060-200011000-00007 PMid:11083301

Jamie L, Banks A, Charles A, Marotta CA (2007). Outcomes validity and reliability of the modified Rankin scale: Implications for stroke clinical trials: A literature review and synthesis. Stroke; 38: 1091-1096. http://dx.doi.org/10.1161/01.STR.0000258355.23810.c6 PMid:17272767

Kulshreshtha A, Anderson LM, Goyal A, Keenan NL (2012). Stroke in South Asia: a systematic review of epidemiologic literature from 1980 to 2010. Neuroepidemiology; 38:123–12. http://dx.doi.org/10.1159/000336230. PMid:22433930

Liu N, Cadilhac D, Andrew N, Zeng L, Li Z, Li J, Li Y, Yu X, Mi B, Li Z, Xu H, Chen Y, Wang J, Yao W, Li K, Yan F, Wang J (2014). Randomised controlled trial of early rehabilitation after intracerebral haemorrhage stroke: difference in outcomes within 6 months of stroke. Stroke; 45(3): 502-3507.

Navarro JC (2005). Prevalence of stroke: community survey. Philippine Journal of Neurology; 9: 11–5.

Navarro J, Baroque A, Lokin J, Venketasubramanian N (2014). The real stroke burden in the Philippines. International Journal of Stroke; 9: 640–641. http://dx.doi.org/10.1111/ijs.12287. PMid:24844610

Philippine Island: Geography of the Philippines; and National Capital Region (internet) Available from: http://www.philippineislands.ph/en/geography_of_the_philippines.html; http://www.philippine-islands.ph/en/national_capital_region-philippines.html [Accessed on 4 January 2015]

Skarin M, Bernhardt J, Sj◉holm A, Nilsson M, Linden T (2011). 'Better wear out sheets than shoes': a survey of 202 stroke professionals' early mobilisation practices and concerns. International Journal of Stroke; 6: 10–15. http://dx.doi.org/10.1111/j.1747-4949.2010.00534.x. PMid:21205235

Sulter G, Steen C, De Keyser J (1999). Use of Barthel Index and Modified Rankin Scale in acute stroke trials. Stroke; 8: 1538-1541. http://dx.doi.org/10.1161/01.STR.30.8.1538

Suputtitada A, Aksaranugraha C, Granger CV, Sankaew M (2003). Results of stroke rehabilitation in Thailand. Disability and Rehabilitation; 25: 1140–45. http://dx.doi.org/10.1080/0963828031000152039 PMid:12944154

Suzuki I, Asano R (1993). Epidemiology of stroke in Japan (in Japanese). Nihon Rinsho; 51: 20 – 29. PMid:8283666

Tu F, Tokunaga S, Deng ZL, Nobutomo K (2002). Analysis of hospital charges for cerebral infarction stroke inpatients in Beijing, People's Republic of China. Health Policy; 59: 243–56. http://dx.doi.org/10.1016/S0168-8510(01)00182-8

World Health Organisation Updates: Philippines profile. Available from: http://www.who.int/countries/phl/en/. [Accessed on 12 January 2015]

Appendix 1

Supplementary information on Gender / Age and Length of Stay characteristics of Stroke

FEMALES					
Cerebral Haemorrhage (% reflects total strokes	3 (0.4% of total strokes over all ages)	64 (8.5%)	56 (7.5%)	10 (1.3%)	133 (17.8% of all strokes)
Cerebral Infarct	15 (2.0%)	175 (23.4%)	296 (39.5%)	106 (14.2%)	592(79.0%)
Arteriovenous Malformation	2 (0.3%)	0	0	0	2 (0.3%)
Subarachnoid Bleed	0	5(0.7%)	6 (0.8%)	4 (0.5%)	15 (2.0%)
Intracerebral Aneurysm	0	2 (0.3%)	4 (0.5 %)	1 (0.1%)	7 (0.9%)
	20 (2.7%) total strokes	246 (32.8%)	362 (48.3%)	121 (16.2%)	749 (19 missing records)
MALES					
Cerebral Haemorrhage (% reflects total strokes	20 (2.3% of total strokes over all ages)	83 (9.4%)	75 (8.5%)	11 (1.2%)	189 (21.5% of all strokes)
Cerebral Infarct	21 (2.4%)	239 (27.2%)	357 (40.6%)	60 (6.8%)	677(76.9%)
Arteriovenous Malformation	1 (0.1%)	0	1 (0.1%)	0	2 (0.2%)
Subarachnoid Bleed	0	3 (0.3%)	4 (0.6%)	0 (0%)	8 (0.9%)
Intracerebral Aneurysm	0	2 (0.2%)	2 (0.2 %)	0 (0.%)	4 (0.4%)
	42 (4.8%) total strokes	327 (37.2%)	440 (50%)	71(8.1%)	880 missing 17 records

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Stroke by Gender and Age Group (Females)

	18 -39 years	40 -59 years	60 – 79 years	> 80 years	Total Stroke
Cerebral Haemorrhage (% reflects total strokes	3 (0.4% of total strokes over all ages)	64 (8.5%)	56 (7.5%)	10 (1.3%)	133 (17.8% of all strokes)
Cerebral Infarct	15 (2.0%)	175 (23.4%)	296 (39.5%)	106 (14.2%)	592(79.0%)
Arteriovenous Malformation	2 (0.3%)	0	0 (0.%)	0	2 (0.3%)
Subarachnoid Bleed	0	5(0.7%)	6 (0.8%)	4 (0.5%)	15 (2.0%)
Intracerebral Aneurysm	0	2 (0.3%)	4 (0.5 %)	1 (0.1%)	7 (0.9%)
	20 (2.7%) total strokes	246 (32.8%)	362 (48.3%)	121 (16.2%)	749 (19 missing records)

Stroke by Gender and Age Group (Males)

	18 -39 years	40 -59 years	60 – 79 years	> 80 years	Total Stroke
Cerebral Haemorrhage (% reflects total strokes	20 (2.3% of total strokes over all ages)	83 (9.4%)	75 (8.5%)	11 (1.2%)	189 (21.5% of all strokes)
Cerebral Infarct	21 (2.4%)	239 (27.2%)	357 (40.6%)	60 (6.8%)	677(76.9%)
Arteriovenous Malformation	1 (0.1%)	0	1 (0.1%)	0	2 (0.2%)
Subarachnoid Bleed	0	3 (0.3%)	4 (0.6%)	0 (0%)	8 (0.9%)
Intracerebral Aneurysm	0	2 (0.2%)	2 (0.2 %)	0 (0%)	4 (0.4%)
	42 (4.8%) total strokes	327 (37.2%)	440 (50%)	71(8.1%)	880 (missing 17 records)

Length of Stay and Age Group: Median (25%-75%)

	18 -39 years	40-59 years	60-79 years	>80 years	ANOVA
Length of Stay	7 (4,13)	7 (4, 11)	6(3.5,11)	7.5 (3.5,13.5)	P=0.04 With oldest age group having the longest length of stay DF= 3 Crit F = 2.74
Days of Stay	0-41	0-140	0-90	0-163	
N	56	560	763	183	
Missing	2	8	9	1	

Appendix 2

Supplementary details on Referral Practices
Good practice by Stroke: (if the rehabdate less than 25% of expected length of stay)

	Cerebral Haemorrhage	Cerebral Infarct	Arteriovenous Malformation	Subarachnoid Bleed	Intracerebral Aneurysm
Good Practice	153 (52%) of total haemorrhagic	741(60.8%)	1 (33.3%)	15 (78.9%)	8 (72.7%)
Bad Practice	141 (48%)	478(39.2%)	2 (66.7%)	4 (21.1%)	3 (27.3%)
Total	294 (19%)	1219 (78.8%)	3 (0.29%)	19 (1.2%)	11 (0.7%)
Total 1546 Missing= 36					

Good practice by Age Group: (if the rehabilitation referral dateis less than 25% of expected length of stay)

	18 -39 years	40-59 years	60-79 years	>80 years
Good Practice	32(55.2% of age group	322 (56.7%)	464(60.1%)	125 (67.9%)
Bad Practice	26 (44.8%)	246 (43.3%)	308 (39.9%)	59 (32.1%)
Total	58 (3.7%) of total referred of all ages	568 (35.9%)	772 (48.8%)	184 (11.6%)
Total 1582 Missing= 0				

Good referral discharge practices by stroke: (if referral was earlier than 2 days prior to discharge)

	Cerebral Haemorrhage	Cerebral Infarct	Arteriovenous Malformation	Subarachnoid Bleed	Intracerebral Aneurysm
Good Referral	145 (49.3%) of total haemorrhagic	474(38.9%)	2 (66.7%)	5 (26.3%)	1 (9.1%)
Bad Referral	149 (50.7%)	745(61.1%)	1(33.3%)	14(73.7%)	10(90.9%)
Total	294 (19%) of all strokes referred to rehab	1219 (78.9%)	3 (0.2%)	19 (1.2%)	11(0.7%)
Total 1546 Missing= 36					

Good referral discharge practices by Age Group: if referral was earlier than 2 days prior to discharge)

	18 -39 years	40-59 years	60-79 years	>80 years
Good Referral	24 (41.4% of age group	241(42.4%)	304(39.4%)	72(39.1%)
Bad Referral	34 (58.6%)	327 (57.6%)	468(60.6%)	112 (60.9%)
Total	58 (3.7%) of total referred of all ages	568 (35.9%)	772 (48.8%)	184 (11.6%)
Total 1582				

Appendix A

Sample Data Collection Form

Hospital _____ Hospital ID _____

Location _____

PARM's Stroke In-Patient Rehabilitation Guideline

Data Information Sheet

Name _____ Gender ( ) Male ( ) Female

Age_____ Birthdate _____

Date of Admission _____ Date of Discharge _____

A. Stroke Profile:

1. Kind of stroke ( ) Infarct ( ) Haemorrhagic ( ) AV Malformation
   ( ) Subarachnoid Bleed ( ) Intracerebral Aneurysm
2. Affected side of the brain ( ) Left ( ) Right ( ) Both
3. Acute stroke unit available ( ) Yes ( ) No
4. Attending physician ( ) Cardiologist ( ) Neurologist ( ) Surgeon
   ( ) Internist ( ) Family Physician
5. Presence of operative procedure ( ) Yes ( ) No
   a. What kind of operative procedure _____
6. Previous Stroke ( ) Yes ( ) No
   a. How many times ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( )5
   b. Previous admission (hospital) _____ Not indicated_____
7. Presence of adverse events during hospital stay ( ) Yes ( ) No
   What kind? _____

8. Date when client is medically stable ( ) indicated ( ) not indicated

   If indicated, what is the date ? _____

B. Rehabilitation:

1. Referred to rehabilitation ( ) Yes ( ) No

   a. Date of Referral _____

2. Did the client have continuous rehabilitation sessions? ( ) Yes ( ) No

   a. If no, give the reason _____

3. Evidence of increasing intensity of rehabilitation ( ) Yes ( ) No

   a. Assessment of tolerance ( ) Yes ( ) No

   b. Relevant outcome measures ( ) Yes ( ) No

   i. Please indicate _____

4. Presence of NG tube ( ) Yes ( ) No

   a. Swallow screen done before removal of NG tube ( ) Yes ( ) No

5. Risk assessment done for pressure sore development ( ) Yes ( ) No

   a. Regular evaluation done ( ) Yes ( ) No

   b. Outcome measures used _____

6. Evidence for providing Pressure-aids ( ) Yes ( ) No

   a. What pressure aid was given? _____

7. Referral to out- patient department ( ) Yes ( ) No

   a. Where to? _____

_____ _____ _____

Evaluator Signature Date

Cell no. _____