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ORIGINAL ARTICLES

Predictors of medical complications in stroke patients confined in hospitals with rehabilitation facilities: A Filipino audit of practice

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Abstract

Background & Objectives: Most medical complications following acute stroke are preventable (such as cardiac events, pneumonia, bed sores and venous thrombosis). This was a study on the frequency of medical complications and their association with key performance indicators. *Methods:* The study used a cross-sectional baseline audit of stroke care practices. The audit captured details on the nature of the stroke, patient demographics, characteristics of hospital care, and compliance with six key quality indicators in Philippine Academy of Rehabilitation Medicine Clinical Practice Guideline on Stroke Rehabilitation. Patient records were retrospectively consecutively sampled. *Results:* A total of 1,683 patients were included in the audit which came from 49 hospitals. Medical complications were seen in 182 patients (11.2%). Pneumonia contributed to half the medical complications (50%), followed by respiratory failure (7.7%) and gastrointestinal bleeding (3.8%). Presence of medical complications were associated with in-patient mortality (OR 3.3 (95% CI 2.1-5.3)) and prolonged hospital stay (16.1 ± 20.7 days vs 9.6 ± 10.9 days). The best predictor model for pneumonia included variables of not having a swallow screen within the first 24 hours, having a nasogastric tube inserted, not achieving medical stability, not having a stroke unit in the admitting hospital, having suffered a previous stroke and being older.
Conclusion: Non-adherence to evidence-based stroke care rehabilitation guidelines contributed significantly to medical complications in an audit of Filipino stroke patients

Keywords: Audit, clinical practice guideline, medical complications, pneumonia, stroke

INTRODUCTION

Estimates of the frequency of medical complications in people after suffering astroke range from 24.2% to 95%.[1] In the acute phase post-stroke, medical complications can include dysphagia, cardiac events and pneumonia, while other complications such as bed sores and venous thrombosis may occur later in the stroke.[1,2] Most medical complications are preventable with good risk assessment and evidence-compliant care.[1,3] There are wide-ranging ramifications of medical complications post-stroke, including higher costs

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of care, longer hospital stays, increased risk of mortality and poorer functional outcome.[1,4-7]

In 2012, the Philippine Academy of Rehabilitation Medicine (PARM) published an innovative clinical practice (CPG) which collated recommendations from nine developed nations' stroke rehabilitation CPGs and two Filipino CPGs; then contextualized them for Philippine settings.[8] Prior to implementing the Filipino-contextualised stroke CPG, PARM conducted a national baseline audit of hospitals with rehabilitation facilities to establish a profile of Filipino stroke patients and to describe current practice in Filipino stroke care.[9] We recently reported preliminary findings from this baseline audit, on characteristics of Filipino stroke patients, and compliance with six key indicators of quality care, as outlined in selected recommendations in the PARM-contextualised CPG.[9] These indicators are presented in Table 1.

This paper reports further information from the baseline audit data, regarding prevalence of medical complications post-stroke, and the association between post-stroke medical complications, stroke patient characteristics, compliance with key indicators, and length of hospital stay.

METHODS

This was a cross-sectional audit of medical records. Patients were admitted between January to December 2014 were audited. The records were audited in January to June 2015. Ethical approval was provided by the Institutional Review Board of each participating hospital. If there was no available ethical review board for a hospital, permission was sought from the medical director.

At the time of the audit, there were 1,834 hospitals in the Philippines admitting stroke patients. However only 288 (15.8%) of these had rehabilitation centres serviced by physiatrists. Hospital recruitment was undertaken through the PARM membership network. Participation was voluntary.

There was no standard medical recording process in the Philippines. The PARM group expected variability in the way data was collected and reported in the medical record. Thus the audit sample size for each hospital, and the sampling approach, were determined on a pragmatic basis. Ten percent of stroke patient admissions for each hospital in the previous 12 months was calculated, and this number of per-hospital patient records was identified consecutively (backwards), starting from the most recently discharged patient.

The audit captured recorded details on the nature of the stroke, patient demographics, characteristics of hospital care, and compliance with six key quality indicators which had the highest level of evidence from the PARM contextualized CPG.[10,11] The key indicators are listed in Table 1.

These six indicators, the level of evidence and evidence sources, their descriptions and how they were audited are outlined in Table 1.[12-16] In addition, data on three key performance criteria were collected and used in analysis to provide a more comprehensive picture of association: availability of a stroke unit (Level A)[12,1], use of nasogastric tube (Level B)[14], and delivery of continuous rehabilitation (Level 1+[12], Level I, B[15]).

The audit items and the data collection form were developed by the principal authors (CGS, KG) from the PARM contextualized CPG. The face and content validity of the audit items was confirmed by discussions between representative physiatrists, physical and occupational therapists, whose practices were mainly in the rehabilitation of stroke patients in general hospitals in Manila. The content validity index score (CVI) was used to express agreement (0.97[9,17]). An exemplar sample data collection form is provided in Appendix A.

Data in most sites was collected by volunteers (medical and paramedical personnel), however in 12 hospitals, hired research assistants were used when volunteers were unavailable. All data collectors were given standard training prior to commencing the audit. This included orientation to the data collection form and training in data collection processes. Information on medical complications was collated verbatim from the medical records, as descriptions of medical complications extracted from physicians' notes, findings of laboratory tests and radiological findings. These descriptions were coded later into consistent categories. The dataset took account of the patients who died at different points throughout the hospital episode of care. Missing data was not replaced or extrapolated, and in instances where missing data influenced the construction of new variables, this was noted, and the number of viable responses was reported.

Information extracted from the audit data included demographics (age, gender), stroke characteristics (type of stroke, previous stroke), hospital characteristics (geographic location, type of hospital (public or private), presence of a stroke unit, compliance with key indicators, and discipline of the main doctors managing the patient. New variables were created to denote

Table 1: Performance indicators and description collected in the audit

Key Indicators	
1. Swallow assessment within 24 hours of admission 2. Referral to Rehabilitation Medicine when patient is medically stable 3. Increasing intensity of exercise according to tolerance of patient 4. Pressure care risk assessment followed by regular evaluation for prevention of pressure sores 5. Providing appropriate pressure-relieving aids and strategies to prevent pressure sores 6. Patient /carers provided with a discharge plan.	
1. Swallow assessment (screen) within 24 hours of admission	
Definitions	Swallowed screening involves: • A screening of swallowing undertaken by a trained health professional • 'Within 24 hours' is the time from admission to hospital to documented time of screening • Swallowing is screened using a validated screening instrument. Documentation of the outcome of the screening i.e. a description of whether or not the patient failed the screening. • Documentation of the action required following the outcome of the screening ie. if failed screen then referral to Rehabilitation Medicine and speech pathologist for formal assessment and remain 'nothing per orem'.
Data elements	Compliance requires documented evidence of a response to each of the elements: • Validated instrument used • Outcome of the screening recorded • Action required following the outcome of the screening recorded • Time of screening Patients that have an impaired level of consciousness or are designated as requiring palliative care are considered to have an impaired swallow and compliance with this indicator is deemed to have occurred if there is "Documentation of the action required following the outcome of the assessment".
Numerator	Number of stroke patients with documented evidence of swallow screen conducted within 24 hours of admission, during audit period.
Denominator	All stroke patients admitted to hospital during the audit period.
Exceptions	Not applicable for patients who had died in the Emergency Department (ED) or had been designated as 'palliation only' while in ED.
Evidence Base	Level 1+[12], Level 1[13]

2. Referral to Rehabilitation Medicine when patient is medically stable	
Definitions	Documented referral to rehabilitation medicine when patient is medically stable. Medical stability is defined when medical complications have been resolved. Likewise, deterioration within the first hour of admission to the stroke unit or direct admission to intensive care, concurrent progressive neurologic disorder and acute coronary syndrome are considered as being not medically stable. Such assessment usually involves the use of validated and reliable assessment tools.
Data elements	Compliance requires documented evidence of : • assessment by the attending physician • Documentation of the outcome of the assessment by the attending physician • Date and time of referral
Numerator	Number of stroke patients with referral to Rehabilitation Medicine
Denominator	Total number of stroke patients admitted to hospital during audit period.
Exception	Not applicable for patients who had died or had been designated as 'palliation only', or were in ICU within the first 48 hours of admission.
Evidence Base	Level B [14]; Level 1+ [12]; Level A, 1 [15]

3. Increasing intensity of exercise according to tolerance of patient	
Definitions	Documented mobilization starting with supportive care with low intensity exercise such as range of motion exercise progressing to stroke mobilization rehabilitation which is the period of rehabilitation when patient are given functional exercise related to walking and starts with the patient learning to sit up on the bed. This is done by a physical therapist.
Data elements	Compliance requires documented evidence of: • Patient's assisted or unassisted mobilization • Time of first mobilization • Use of a validated and reliable assessment tool (Functional Independent Measure)
Numerator	Number of stroke patients with documented progression of mobilization
Denominator	Total number of stroke patients admitted to hospital during audit period.
Exceptions	Not applicable to those who had died or had been designated as 'palliation only' in the first 24 hours, or were ordered to rest in bed by medical staff.
Evidence Base	Level 1+[12,15]

4. Pressure care risk assessment followed by regular evaluation for prevention of pressure sores	
Definitions	Documented pressure care risk assessment using validated and reliable tool in the evaluation of stroke patients Regular evaluation will be performed every 5 days.
Data elements	Compliance requires documented evidence of a response to each of the elements: • Validated instrument used(Braden Assessment tool) • Outcome of the assessment recorded • Action required following the outcome of the assessment recorded
Numerator	Number of patients with documented pressure care risk assessment done on a regular basis (once every 5 days)
Denominator	Total number of applicable stroke patients admitted to hospital during audit period.
Exception	Not applicable for patients who had died or had been designated as 'palliation only'
Evidence Base	Level B[14], Level 1[15]

5. Providing appropriate pressure-relieving aids and strategies to prevent pressure sores	
Definitions	Documented provision of strategies to prevent pressure sores such as: pressure-relieving mattress, use of proper positioning, turning, and transferring techniques and judicious use of barrier sprays, lubricants, and protective dressings and padding to avoid skin injury due to maceration, friction or excessive pressure
Data elements	Compliance requires documented evidence of a response to each of the elements: • Documented evidence of providing pressure relieving aids and strategies • Use of validated tool to assess presence of pressure sore (Bates Jensen Wound Assessment) • Grading of pressure sore if present based on the National Pressure Ulcer Advisory Panel (NPUAP) • Outcome of the assessment recorded • Action required following the outcome of the assessment recorded
Numerator	Number of applicable stroke patients with documented provision of pressure relieving aids.
Denominator	Total number of applicable stroke patients admitted to hospital during audit period with evidence of impaired function evidenced by use validated assessment such as Barthel Index or Modified Rankin scale; or if not present, physical examination showing impaired function
Exception	Not applicable for patients who had died or had been designated as 'palliation only'
Evidence Base	Level B [14], Level 1[15]

6. Patient /carers provided with a discharge plan	
Definitions	Documented evidence that patient received a plan that outlines care in the community after discharge. The specific care plan should address one or more of the following: • Monitoring and managing symptoms and signs of illness including risk management if symptoms develop or become worse. • Managing the impacts of illness on their lifestyle, emotions and interpersonal relationships. • Adherence to treatment regimes • Contact details for services, including rehabilitation services, to which the patient has been referred or follow-up appointments and community support contacts.
Data elements	Compliance with this indicator requires • Documented evidence of a care plan having been provided to any patient who is going home.
Numerator	Number of applicable stroke patients with care plan provided to patient/family prior to hospital discharge during audit period.
Denominator	Total number of applicable stroke patients discharged directly to home from the acute hospital during audit period.
Exception	Not applicable for patients who had died or had been designated as 'palliation only',
Evidence Base	Grade A [14], Level I[15], Level 1++[12], Consensus statement [16]

medical complications, length of stay (LoS) (discharge date to admission date), the number of days to medical stability (admission date to the date when medical stabilitywas noted in the medical chart), and the number of days before rehabilitation commenced (admission date to the date of commencement of rehabilitation). These time periods were also calculated as percentages of LoS.

For statistical analysis, sample characteristics and compliance with indicators were reported as descriptive statistics. Chi square and t-tests were used to test simple differences between patients with and without medical complications. Univariate logistic regression models were constructed to establish associations between medical complications, non-compliance with indicators, and the influence of hospital and patient characteristics. Stepwise multivariate logistic regression models were constructed to establish risk characteristics for each adverse event if there was sufficient numbers for analysis. The significant univariate predictors were entered into the model in strength order, and the log likelihood ratio was calculated for the addition of each additional factor. The model that best accounted for the greatest variability in the outcome variable was identified.

RESULTS

Data was available for analysis from records of 1,683 patients from 49 hospitals (8 public (16.3%), 41 private (83.7%)). The participating hospitals all came from the three largest island groups in the Philippines (Luzon, Mindanao, Visayas).[18] Approximately three-quarters of the patient records (1,280)(76.1%) were from private hospitals. Throughout the hospital stay, 104 (6.2%) patients died. Missing or inadequate data was found in approximately 12% records. There was no systematic pattern to unavailable data.

Stroke type was predominantly from infarct (78.9%), followed by hemorrhagic stroke (18.9%), subarachnoid bleed (1.2%), intracerebral aneurysm (0.7%), and arteriovenous malformation (0.2%).

Medical complications were suffered by 182 (11.2%) patients throughout the hospital stay. While it was not possible to tell from the medical records whether medical complications contributed to death, the odds of death occurring in people who had medical complications compared with people who had none, was significant (OR 3.3 (95% CI 2.1-5.3)).

Patients who did not suffer medical complications had significantly shorter lengths of stay ($p<0.05$) compared with patients who suffered medical complications (9.6 ± 10.9 days vs. 16.1 ± 20.7 days). On average, patients suffering medical complications stayed in hospital 6.5 days longer (95% CI: 4.4-8.5). In line with the prevalence of stroke type, infarcts were the most

Table 2: Frequency of different types of medical complications, and significance of association with personal factors and service descriptors

Medical Complications	**Frequency**	*Significantly associated with*						
N=182		*Type of stroke*	*Age*	*Sex*	*Previous stroke*	*Hospital Location*	*Physician in charge*	*Pub/ private*
Myocardial infarct	2 (1.1%)							
Restroke	3 (1.6%)							
Gastrointestinal bleed	7 (3.8%)	All were infarcts	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05
Kidney failure	1 (0.6%)							
Cardiorespiratory arrest	1 (0.6%)							
Respiratory failure	14 (7.7%)	22.3% hemorrhagic, 72.7% infarcts	p>0.05	p>0.05	**p<0.05**	p>0.05	p>0.05	p>0.05
Pneumonia	91 (50%)	17.8% hemorrhagic, 80.8% infarct, 1.4% subarachnoid bleed	**p<0.05**	p>0.05	***P=0.06***	p>0.05	p>0.05	p>0.05
Urinary Tract Infection	NA							
Upper Respiratory Tract Infection	NA							

commonly represented in both patients suffering, or not, medical complications.

Medical complications and their frequency of occurrenceare reported in Table 2. The most commonly occurring adverse event was pneumonia (50%), followed by respiratory failure (7.7%) and gastrointestinal bleeding (3.8%). Nineteen patients with pneumonia also suffered one other adverse event (7 related to cardio-respiratory arrest; 7 to respiratory failure, 2 to pressure sores, 1 to gastrointestinal bleeding, and 2 to urinary tract infection). Table 2 also reports the significance of relationships of the different types of medical complications with personal factors and service descriptors. Only the significance of the relationships of personal factors and service descriptors with pneumonia are described, because of the low numbers of patients with other medical complications. The remainder of the results report the analysis of the pneumonia data (N=91).

Considering those patients who suffered an adverse event (N=182), patients suffering pneumonia were no more likely to die than patients suffering from any other adverse even (OR 1.2 (95% CI: 0.5-2.7). Patients with pneumonia were, on average, 4.8 years older (95% CI: 1.7-7.9 years) than stroke patients who contracted other medical complications. There were no differences in gender, hospital location, physician type, hospital type or previous stroke for patients who suffered pneumonia, compared with another other patient with an adverse event.

Considering all patients in the audit (N=1,683), patients with an adverse event of pneumonia were significantly more likely to die than any other patient (OR 3.33 (95% CI: 1.84-6.03)). There were no significant relationships between suffering pneumonia with gender, hospital location, physician type or hospital type. Compared with the other patients in the sample, patients who had pneumonia were significantly older (mean age difference -5.1 (95% CI -7.9 to -2.3)). However, whilst there was a significant linear increasing risk of pneumonia with age ($p<0.05$), no one age group was more at-risk of pneumonia than any other (compared with patients <40 years, the

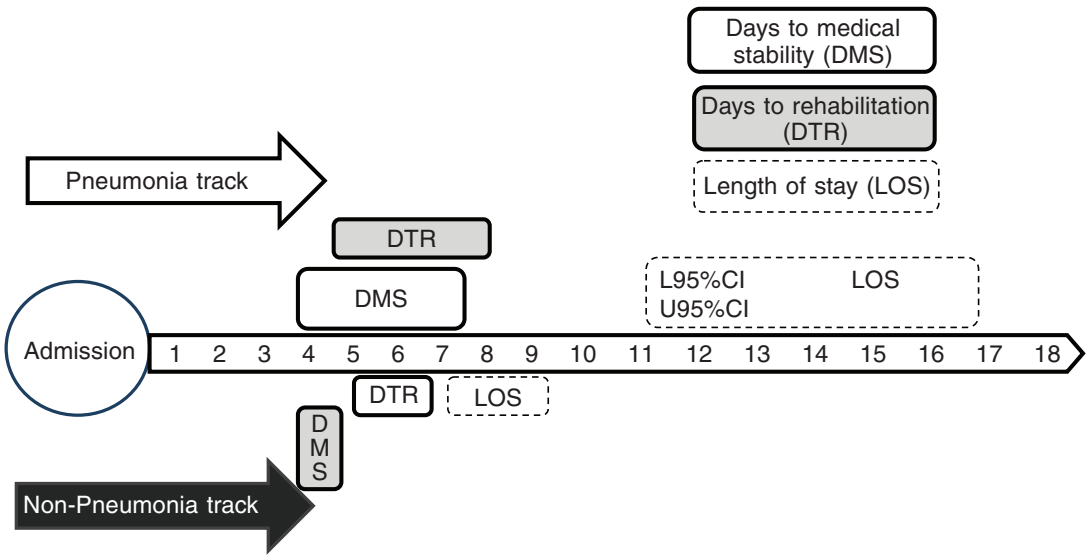

Figure 1. Hospital pathways for patients with and without pneumonia (Lower and Upper 95%CI)

40-59 year age group OR was 1.6 (95% CI 0.2-12.6); the 60-79 year age group OR was 3.0 (95% CI 0.4-22.4); and the 80+ year group OR was 5.8 (0.8-44.6). Contracting pneumonia trended towards significance of association with having suffered a previous stroke (OR 1.57 (95% CI 0.97-2.56)).

Figure 1 outlines the critical points in the pathway through the hospital stay for patients with, and without, pneumonia. The blocks represent the number of days between the upper and lower confidence intervals for number of days to medical stability, number of days to referral to rehabilitation and length of stay. The differences between patients with and without pneumonia become apparent from early in the hospital stay, with non-pneumonia patients having significantly earlier referral to rehabilitation, less variability in the determination of medical stability, and significantly shorter lengths of stay.

On the indicators of poor performance, considering the entire sample, contracting pneumonia was significantly associated with five indicators (not being medically stable; non-compliance with swallow screen within 24 hours post-stroke, inserting nasogastric tube, not having a stroke unit available and not having pressure relieving aids provided), as shown in Table 3. Table 3 also indicates that a pneumonia event was significantly associated with poor quality care initially after admission but attracted compliance with good quality care later in the hospital admission episode.

Table 3: Meeting performance indicatorsand contracting pneumonia (or not)

	Effective sample (n)	OR (95%CI)
Not indicated as medically stable	1541	**2.1 (1.3-3.3)**
Not providing swallow screen within 24 hours of admission	1149	**1.8 (1.1-3.2)**
Having a nasogastric tube inserted	1516	**2.5 (1.6-3.9)**
Not referred to rehabilitation	1411	1.2 (0.7-1.8)
Not having a stroke unit available	1640	**1.6 (1.0-2.6)**
Not having continuous rehabilitation	1411	0.9 (0.5-2.1)
Not increasing exercise intensity	1411	1.1 (0.6-2.0)
Not having pressure care assessment	1436	1.4 (0.8-2.3)
Not having pressure relieving aids provided	1479	**2.2 (1.3-3.5)**
Not referred to outpatient care	1525	1.3 (0.8-2.0)

Significant associations bolded

Table 4: Stepwise modelling for predictor variables for pneumonia (OR [95%CI])

$Chisq_{df}$ from log likelihood ratio (p value)	No NGT inserted	Non-medical stability	No stroke unit	No swallow screen	Previous stroke	Age (in years)
19.7_{1} p<0.001	3.2 [1.9-5.2]					
38.23_{2} p<0.001	3.2 [1.9-5.5]	3.1 [1.9-5.4]				
39.9_{3} p<0.001	2.9 [1.7-5.1]	2.9 [1.6-5.2]	1.6 [0.9-2.9]			
38.8_{4} p<0.01	3.4 [1.6-7.2]	4.7 [2.3-9.7]	1.8 [0.9-3.5]	0.5 [1.2-1.1]		
39.1_{5} p<0.01	2.8 [1.3-5.9]	5.8 [2.9-11.7]	1.7 [0.9-3.2]	0.6 [0.3-1.4]	1.2 [0.6-2.3]	
45.9_{6} p<0.01	2.9 [1.3-6.4]	5.2 [2.5-10.9]	1.8 [0.8-3.4]	0.6 [0.2-1.4]	1.1 [0.5-2.2]	1.03 [1.01-1.06]

On modelling pneumonia risks, *s*tepwise multiple regression modelling that entered the significant univariate associates in strength order suggested that the best predictor model for pneumonia included not achieving medical stability, not having a stroke unit in the admitting hospital, not having a swallow screen within the first 24 hours, having suffered a previous stroke and being older as shown in Table 4. Increasing age in this model was considered in years, with each year incurring an increase of, on average, 3% risk of contracting pneumonia post-stroke.

DISCUSSION

Our study showed that 11.2% of the participants had medical complications of which 50% of medical complications is pneumonia. The prevalence of the medical complications is lower than other studies.[1,19] Similar to the these studies, chest infection is one of the most common medical complications seen in hospitalized stroke patients.[1,19] The varied reported frequency of complications could be due to the differences in study designs, inception cohorts, hospital settings and the criteria used for identifying medical complications.

Similar to other studies, those with medical complications had a longer length of stay with a mean of 16.1 ± 20.7 days.[20,21] The study of Spratt *et al*. in Australia showed that there are four variables that predicted a prolonged hospital stay of more than 30 days which are age >65 years, diabetes mellitus, infection which included pneumonia and urinary traction infection; and discharge Rankin Scale >2.[20] Ingeman *et al*. reviewed the Danish medical registry and reported that the length stay of patients with medical complications ranged from 31-56 days as compared to those without medical complications (9-13 days). Medical complications included pneumonia, urinary tract infection, pressure ulcer, falls, venous thromboembolism, constipation.[21]

It is of interest that the mean hospital stay in Philippines for stroke patients is shorter compared to their western counterparts. This may be due to the fact that there is no sub-acute and chronic care facility in the Philippines where stroke patients may be transferred out of acute care for rehabilitation.[9] Patients are usually discharged from hospital for home or out-patient rehabilitation making the length of stay shorter.

Our study also found an association between medical complications with mortality. Variation in lengths of follow-up and levels of confounding control between the studies makes direct comparisons difficult. Ingeman *et al*. showed that those with pneumonia had a higher 30 day mortality rate while the highest 1-year mortality rate was found among patients with pneumonia and pressure ulcer.[21] Koennecke *et al*. reviewed the Berlin stroke register and reported that complications such as recurrent stroke, seizure, urinary tract infection, or deep venous thrombosis with or without pulmonary embolism had an odds ratio of in-hospital death of 6.60 (95% CI: 4.29, 8.04) with length of stay <7 days. For those with hospital stay >7 days, pneumonia and other complications had an odds ratio of in-

hospital death of 2.75 (95% CI: 1.97, 3.83) and 2.69 (95% CI: 1.93, 370) respectively.[6] However, because neurological and medical complications were analysed as one, we are not able to discern which of these complications had more impact to mortality.

This is the first Filipino study to report on the occurrence of pneumonia, particularly related to non-compliance with evidence-based performance indicators. Our findings suggest that more can be done to improve the quality and safety of Filipino hospital care for acute stroke patients, and in particular, in the prevention of pneumonia.

Our study showed that not performing a simple but essential procedure such as the swallow screen significantly increased the risk of developing pneumonia. The swallow screen was recorded as having been tested in only 13.7% patient records. Screening for dysphagia by swallow screening in the first 24 hours after suffering a stroke is strongly evidence-based.[10] Our finding concurs with previous studies.[4,22-24]

We also found that placement of a NGT did not protect against the development of pneumonia. In Hannawi's review, enteric feeding methods such as a percutaneous gastrostomy tube or a nasal feeding tube did not eliminate the occurrence of pneumonia, since aspiration can still occur.[4] Patients with NGT have swallowing dysfunction that is related to upper airway sensitivity, glottis injury and laryngeal dysfunction which could lead to aspiration.[4] Studies showed that patients with NGT developed pneumonia in 44% and 22.5% of the study population.[22,25] Furthermore, aspiration may influence immunological changes, producing stroke-induced immunodepression. Stroke induced immunodepression affects complex humoral, neural pathways that include the hypothalamic-pituitary-adrenal axis, parasympathetic and sympathetic systems which could also contribute to the development of stroke associated pneumonia.[5]

Of note is that contracting pneumonia was associated with having no dedicated stroke unit in the hospital. The benefits of a stroke unit may reflect vigilance of the multidisciplinary team which undertakes effective, earlier and repeated assessments of possible medical complications, compared to the care given in regular wards.

Our results also provided further evidence for the association of increasing age and history of previous stroke with the development of pneumonia. Previous studies consistently reported the association between increasing age and the development of pneumonia, although with different risk data.[1,5,22,26,27] Age greater than 65 years old or 80 years old was reported as being associated with pneumonia, whilst Hinchey *et al*. reported a 2% increase in the incidence of pneumonia for every one year increase in age.[1,22,26]

There are conflicting findings regarding the association of previous strokes in the development of the pneumonia.[23,27,28] It may be that what is more relevant to post-stroke pneumonia development is not simply a previous history of stroke but the severity of previous strokes, and/or the impact of disability from previous strokes. Stroke severity is often assessed in the literature, and in clinical practice by the Modified Rankin Scale.[29] Disability from stroke is often assessed by the Functional Independence Measure or the Barthel Index.[30-33] This information could be recommended for routine collection in Filipino hospitals for all stroke patients. In the presence of non-modifiable risk factors such as previous stroke, health care professionals should be attentive to the possible occurrence of pneumonia in stroke patients presenting with a history of previous stroke events.

There are many limitations in this study, largely related to sampling and data quality. We attempted to capture a representative sample of Filipino stroke patients, however given the small number of responding hospitals of the eligible sample of hospitals, we cannot be certain that our sample is representative. Only hospitals served by physiatrists were included in the study which may further influence the prevalence of medical complications. Moreover, being a retrospective audit of medical records which had variable quality of reporting, and significant missing data, we acknowledge that we were only able to capture information on complications that were explicitly recorded. Thus, lack of information does not mean that complications did not occur in our sample.

In conclusion, despite the study limitations, this study provides an important insight into the frequency and potentially-important associates of medical complications in Filipino stroke patients. Measuring and understanding the factors associated with medical complications and better application of evidence-based care will guide the improved treatment strategies required to decrease the frequency of avoidable medical complications and improve the quality of health care.

DISCLOSURE

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Conflict of Interest: None

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