

# Post Ischemic Stroke Complication: How Much Nursing Diagnosis are Confirms by Neurologist?

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## Abstract

**Background:** Nursing role in post ischemic stroke is vulnerable by correct nursing recognition, due to limited study and evaluation of, this study was conducted.

**Material and method:** It was a retrospective cross-sectional study that all patients admitted with a diagnosis of ischemic stroke in the Ayatollah Rouhani Hospital of Babol from 2015 to 2016. Data was analyzed by chi-square, t-test and coefficient, Kappa tests in spss21.

**Results:** Of 300 ischemic stroke patients were studied, Distribution of sex was 154 (51.2%) female vs. 146 (48.5%) male, age range was 43-90 years with mean age of  $65.8 \pm 15.7$  years. Pain in 107 patients (35.5%), depression in 101 patients (33.6) and fever in 94 patients (31.2) were the most common early complications of ischemic strokes. Coefficient was excellent agreement between the neurologist and nurses (yes 703 (84%), no 136(16%), Kappa=0.76). The highest amount of agreement was in relation to the diagnosis of pressure ulcer (accurate 70 (93%), misdiagnose 5 (7%), Kappa=0.83) and dysphasia (accurate 79 (91%), misdiagnose 8 (9%), Kappa = 0.84). Although the lowest rate of agreement was in relation to the diagnosis of CHF (accurate 4 (17%), misdiagnose 20(83%), Kappa=0.10).

**Conclusion:** most common early complication was pain and the most accurate recognition by nurses was dysphasia and pressure ulcer. The total agreement between nurse and neurologist was favorable that nurses can play an important role to inform neurologist but continuous education to decrease misdiagnosis is recommended. It suggests a suitable feedback from neurologist to nurses. It can help nurses to analyzed how much it recognition was correct or need be more training.

**Keywords:** Nursing record; Ischemic stroke; Complications; Early diagnosis

## Introduction

Diabetes mellitus is a debilitating, costly chronic condition, with prevalence rates expected to increase through the year 2050 [1]. In the United States (US), an aging population and anticipated changes in the ethnic composition prompts an alert to proactively address preventive measures focused on early detection, lifestyle and behavior modifications, decreasing associated complications experienced, and reducing readmissions using culturally appropriate interventions [2]. Diabetes is a serious public health concern and a societal burden [2]. In 2015, there were approximately 23.1 million diagnosed cases of diabetes among Americans and estimated additional 7.2 million undiagnosed cases [3]. Patients diagnosed with diabetes have health care costs nearly 2.3 times greater compared to individuals without diabetes [4,5]. Direct and indirect expenditures related to the costs of care totaled approximately \$245 billion in 2012, up from \$98 billion in 1997 [3-6]. The largest contributor of expenditures related to the cost of care for diabetes is inpatient hospital care [4-7] and hospital readmissions

Stroke is one of the common and important neurological disorders in adults; due to high incidence and mortality rates has been particular importance [1,2]. The World Health Organization predicts by the end of 2020, stroke is the second cause of death after ischemic heart disease in developing and developed countries [3] that lead to large health burden in low and middle income countries and accounting for more than 85% of mortalities worldwide. Ischemic strokes are the most common type of stroke, accounting for 85% of all strokes. The 30-day adjusted mortality rate for ischemic stroke ranges from 5% to 20% [4].

In relation to the incidence of stroke in Iran, a report from Babol northern of Iran, the incidence of stroke was 50 per hundred thousand populations [5,6]. In recent years, despite to all prophylactic measures to reduce the incidence of stroke by decreasing pert time, advances in diagnosis, medical care and treatment of patients, but the number of patients has been increased [7].

Post stroke complication include pressure ulcer, dysphasia, pain, respiratory infections, urinary tract infection, fever, depression deep vein thrombosis, pulmonary embolism, myocardial infarction and cardiac arrhythmias, Congestive heart failure, urinary retention and peptic ulcers. These complications have adverse effects on the physical and mental status of these patients and involve their on other hand have an economic burden to society [8]. Complications of stroke in the early days of hospitalized patients significantly increasing mortality rate [9]. Frequent assessment of neurological status, blood pressure, blood sugar and temperature control and identify early stroke complication is the key to success in the care of these patients [10].

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One of the main goals in the care of patients that can lead to a better prognosis, is the early prevention of stroke complications, especially in the first week of hospitalization that most mortality due to stroke complications had been done [4].

Nursing had an essential role in this issue, because nursing care include 24 hours a day that lead to spend more time at the bedside on other hand nurses can view, record, report and assess the effect of care, treatment and patients' reactions. Nurses also due to their wide roles in patient care, member of rehabilitation team, patient's education, and nurse-patient relationship can increase the patient recovery process [11,12]. If nurses be more familiar with the complications of stroke, with early detection of ischemic stroke complications can play an important role in care that lead to early treatment and prevention of these complications.

Due to limited study in this issue and vital role of nurses in recovery process this study was conducted. The aim of this study is assessment how much nurse's diagnosis was confirmed by neurologist.

## Methodology

### Ethic

The study had been approved by the Research Council and Ethics Committee of Deputy of Research and Technology of Babol University of Medical Sciences. Informed consent was obtained from patients or their relatives.

### Inclusion criteria

Inclusion criteria consisted of all patients with a diagnosis of ischemic stroke which was the first time occurred. Ischemic type of stroke in this study was selected because of the high rate incidence of this type of stroke, on other hand most hemorrhagic stroke cases from the beginning of hospitalization may be transfer to intensive care unit wards.

### Exclusion criteria

Exclusion criteria included those who had a history of disease such as dementia or any cognitive disorders, movement disorders, all cases which were part of stroke differential diagnosis such as head trauma, metabolic disorders, migraines and seizures, systemic infections and patients with previous pressure ulcer. Cases where their information in their hospital records was incomplete were also excluded.

### Complications

Complications of ischemic stroke which was recorded in the hospital sheet had been selected that include of pressure ulcer, pain, fever, dysphasia, respiratory infections (aspiration pneumonia), urinary tract infection, depression, Intravascular coagulation, pulmonary embolism, myocardial infarction, cardiac arrhythmia, congestive heart failure, urinary retention and gastrointestinal problems (ulcers, hemorrhage) [13]. Complication was defined according of health care guideline in Anderson study that was shown in Table 1 [14].

### Data collecting

Complications which were recognition by nurse and record in the hospital sheet before the neurologist diagnose according to the time was entered in checklist as early diagnose by nurse. In this study stroke nurses had Bachelor (BSc) with 5 years' experience in stroke care patients that worked in this ward. Ischemic stroke complications which was confirmed by neurologist or order the treatment according the

nurse report was considered as confirm the nurse diagnoses if the date was after the nurse report. Furthermore, in this study one neurologist was the responsible to assessment the nurse detection that accurate or misdiagnose. Finally, complication that diagnosed by neurologist was considered as criteria and entered in the checklist. The checklist was consisted of two-part: first, nurse diagnose with the date and second, neurologist diagnose with date, if two parts was similar and nurse has early detection rather than neurologist, it considers as early detection and accurate.

### Statistical analyze

All data was recorded in statistical software (spss21). Chi-square, was used in order to determine the frequency of early complications with variable, also coefficient of agreement (kappa) was used for agreement between the nursing diagnosis that confirms by neurologist or not. P-value<0.05 was significant.

### Findings

Of 300 ischemic stroke patients were studied, Distribution of sex was 154 (51.2%) female vs. 146 (48.5%) male, age range was 43-90 years with mean age of  $65.8 \pm 15.7$  years. Pain in 107 patients (35.5%), depression in 101 patients (33.6%) and fever in 94 patients (31.2%) were the most common and pulmonary edema in 10 patients (3.3%) was the least early complications of post ischemic strokes. Prevalence of Complication has been shown in Table 2. Coefficient was excellent agreement between the neurologist and nurses (yes 703(84%), no 136(16%), Kappa =0.76). Based on these findings, the highest amount of agreement was in relation to the diagnosis of pressure ulcer (accurate 70(93%), misdiagnose 5(7%), Kappa=0.83) and dysphasia (accurate 79(91%), misdiagnose 8(9%), Kappa=0.84). Although the lowest rate of agreement was in relation to the diagnosis of CHF (accurate 4(17%), misdiagnose 20(83%), Kappa=0.10) (Table 3).

### Discussion

This study was conducted on 300 ischemic stroke patients to assessment how much nurse's diagnosis was confirmed by neurologist and finding that strong and weak point of nurses diagnose.

The most common early complication of ischemic stroke in this study was pain, which was in more than 35.5% of patients. In Harrison study, mentioned that post-stroke pain is a common but a forgotten complication, which has a prevalence of % 6-49 [15]. In Nesbitt study concluded that it is important that nurses can differentiate between different types of post- ischemic stroke pain, because they have different cause and different type of management [16]. Pain in stroke are common and have a significant impact on quality of life, also they are potentially treatable and maybe neglect by medical team. It is recommended that more attention in this problem and suggest suitable pathway to decrease pain after stroke with first non-pharmacological method.

The most accurate early nurses diagnose in ischemic stroke patients was dysphasia and pressure ulcer while most misdiagnose was congestive heart failure.

Dysphasia was most accurate early detect by nursing that neurologist confirmed and ordered according it to other procedure such as nasogastric tube with frequency of % 28.9 in Babol post ischemic patients. In Carnaby study, concluded that dysphasia in post stroke period time may lead to dehydration, and malnutrition dehydration, and malnutrition [17]. In Cohen study reported that in acute stroke, the prevalence of dysphasia has been reported as between 28% to 65%

Complication	Definition	Complication	Definition
Fever	Temperature $\geq 38.0^{\circ}\text{C}$ at any time during the first week.	Pneumonia	Chest pain when you breathe or cough. Confusion or changes in mental awareness (in adults age 65 and older) Cough, which may produce phlegm. Fatigue. Fever, sweating and shaking chills.
Infections	Urinary tract infection (UTI): Clinical symptoms of UTI combined with positive urine dipstick examination for nitrite and/or pyuria Chest infection: Auscultator respiratory crackles combined with at least 1 of the following: temperature $>38^{\circ}\text{C}$ , new purulent sputum, or positive chest radiograph	Seizure	Losing consciousness, which is followed by confusion. having uncontrollable muscle spasms. drooling or frothing at the mouth. falling. Having a strange taste in your mouth. Clenching your teeth. biting your tongue. Having sudden, rapid eye movements
Pressure ulcer	Any skin break or necrosis resulting from pressure of trivial injury (excluding those related to falls)	Urinary tract infection	Strong and frequent urge to urinate. cloudy, bloody, or strong-smelling urine. Pain or a burning sensation when urinating. nausea and vomiting. muscle aches and abdominal pains.
Dysphagia	Trouble with swallowing(dysphagia) after a stroke. Slurred speech, due to weakness of the muscles used in speaking, may also result.	Depression	Trouble concentrating, remembering details, and making decisions. Fatigue. Feelings of guilt, worthlessness, and helplessness. Pessimism and hopelessness. Insomnia, early morning wakefulness, or sleeping too much. Irritability. Restlessness. Loss of interest in things once pleasurable, including sex
Pain	Stroke patients may experience common problem of pain, numbness, or abnormal sensations after a stroke. These senses may be due to damage to the sensory regions of the brain and firm joints.	MI*	Pressure, tightness, pain, or a squeezing or aching sensation in your chest or arms that may spread to your neck, jaw or back. Nausea, indigestion, heartburn or abdominal pain. Shortness of breath. Cold sweat. Fatigue. Lightheadedness or sudden dizziness.
Intravascular coagulation	Patients with Multiple bleeding sites, Bruising of skin, mucous membranes, Internal bleeding. Lack of blood supply to tissues (ischemia) Sudden onset of high fever, severe general malaise, and extensive purpura of the extremities.	CHF*	Shortness of breath (dyspnea) when you exert yourself or when you lie down. Fatigue and weakness. Swelling (edema) in your legs, ankles and feet. Rapid or irregular heartbeat. Reduced ability to exercise. Persistent cough or wheezing with white or pink blood-tinged phlegm.
Urinary retention	Difficulty starting to urinate. Difficulty fully emptying the bladder. Weak dribble or stream of urine. Loss of small amounts of urine during the day. Inability to feel when bladder is full. Increased abdominal pressure. Lack of urge to urinate	Gastrointestinal hemorrhage	Blood in the stool. Vomiting blood or what looks like coffee grounds. Dark, tarry stools. Abdominal cramps or diarrhea. Fatigue. Paleness in appearance. Anemia

\*CHF: Congestive Heart Failure, MI: Myocardial Infarction

Table 1: Definition of complication after stroke.

Complication	Category	Frequency N (%)	Complication	Category	Frequency N (%)
Intravascular coagulation	yes	22(7.3)	Pneumonia	yes	48(15.9)
	no	278(92.4)		no	252(83.7)
Pulmonary edema	yes	10(3.3)	Seizure	yes	14(4.7)
	no	290(96.3)		no	286(95)
CHF & MI	yes	24(8)	Urinary tract infection	yes	85(28.2)
	no	276(91.7)		no	215(71.4)
ECG changes	yes	59(19.6)	Pain	yes	107(35.5)
	no	241(80.1)		no	193(64.1)
dysphasia	yes	87(28.9)	Fever	yes	94(31.2)
	no	213(70.8)		no	206(68.4)
Urinary retention	yes	34(11.3)	pressure ulcer	yes	75(24.9)
	no	266(88.4)		no	225(74.8)
Gastrointestinal hemorrhage	yes	55(18.3)	Depression	yes	101(33.6)
	no	245(81.4)		no	199(66.1)

Table 2: Frequency of early post ischemic stroke complication. ECG: Electrocardiogram

[18] nurses plays vital role in planning the care of the patient and if found abnormal then immediately inform a doctor that prevent other relevant complication such as aspiration and pneumonia.

After dysphagia, pressure ulcer was the second agreement and early nursing recognition ( $Kappa=0.83$ ). In Cox J, concluded that the most important predictors of pressure ulcer progression, including immobilization, longer hospital stay, rate of tissue perfusion (diabetes,

vascular disease, blood flow, blood pressure, smoking and edema), grade of the pressure on the skin and tissue, aging and low serum albumin, higher incidence of pressure ulcer based on a scale of Braden. In relation to the prevention and treatment of pressure ulcer can be said that the first step is to identify these risk factors [19]. In Coleman S, expressed that upon detection of pressure ulcer, it needs to careful nursing care, considering that pressure ulcer, in addition to delaying the recovery, imposes at great cost to the patient and patient's family

Variable	Physician Nurse	Yes	No	Kappa	Std Error	p-value
Pneumonia	yes	38(79)	12(5)	0.73	0.05	0.001
	no	10(21)	240(95)			
Urinary tract infection	yes	74(87)	15(7)	0.79	0.03	0.001
	no	11(13)	200(93)			
Pain	yes	92(86)	18(9)	0.76	0.03	0.001
	no	15(14)	185(91)			
Pressure Ulcer	yes	70(93)	15(7)	0.83	0.03	0.001
	no	5(7)	210(93)			
Fever	yes	86(91)	18(9)	0.8	0.03	0.001
	no	8(9)	188(91)			
Depression	yes	94(93)	18(9)	0.81	0.03	0.001
	no	7(7)	181(91)			
Intravascular coagulation	yes	14(64)	9(3)	0.59	0.09	0.001
	no	8(36)	269(97)			
MI	yes	14(58)	7(3)	0.59	0.09	0.001
	no	10(42)	269(97)			
Pulmonary edema	yes	2(20)	2(1)	0.27	0.15	0.001
	no	8(80)	288(99)			
ECG changes	yes	48(51)	16(7)	0.72	0.05	0.001
	no	11(49)	225(93)			
CHF	yes	4(17)	18(7)	0.1	0.07	0.06
	no	20(83)	258(93)			
Dysphasia	yes	79(91)	12(6)	0.84	0.03	0.001
	no	8(9)	201(94)			
Urinary retention	yes	30(88)	12(5)	0.75	0.05	0.001
	no	4(12)	254(95)			
Gastrointestinal hemorrhage	yes	48(87)	14(6)	0.77	0.04	0.001
	no	7(13)	231(94)			
Seizure	yes	10(71)	6(2)	0.64	0.1	0.001
	no	4(29)	280(98)			
TOTAL	yes	703(84)	192(71)	0.76	0.01	0.001
	no	136(16)	79(29)			

**Table 3:** Amount of agreement between nurse and physician diagnosis.

[20]. In this study early detection of pressure ulcer was seen by nurses that inform to neurologist. It can sooner start the pressure ulcer hospital instruction and avoid improvement of skin injury and this benefit referred to patients and health care system.

Depression is another common early post ischemic stroke complication which was at least in 30% of cases. Although post-ischemic stroke depression has been reported as a common complication in other studies but in our previous study in this region it was in 18% of cases [21]. In Hackett study, that was prolonged follow-up, it concluded 25% of cases had been depressed during two years after the stroke; this was at least 50% in first three months after stroke onset [22]. In Robinson study, the depression after stroke due to disturbances in psycho-social aspects of patients leads to decrease of quality of life and even death [23]. Due to effect on quality of life after stroke that can probably neglected by family, this issue has an important role and recommend to intensive view from medical team with education to patient's family to period visit and aware about sign and symptom to decrease this complication, especially attention via nurses.

The most misdiagnose was the heart failure that can be relate to physician diagnose but nurse can help to early diagnose by early detection and record and inform to physician.

Previous history of cardiovascular disease was also prevalent: 16.2% had history of MI, 33.4% CAD, 13.8% CHF, 11.0% Atrial Fibrillation and 21.6% peripheral arterial disease. The risk of MI or vascular death was relatively higher during the first year after stroke than for each of the subsequent 4 years (8.2% at year 1 and 17.4% at year 5). Univariate predictors of MI or vascular death were age  $\geq$  70 years, history of MI, CAD, CHF, AF, and embolic stroke subtype. CHF was not predictive of the outcome independently of CAD and AF. Our 5-year risk data provide evidence that the long-term risk of MI and vascular death is as high after ischemic stroke as the risk of coronary risk equivalents. Because survivors of ischemic stroke may be more likely to die of cardiac causes than of recurrent stroke [24].

Chronic heart failure (CHF) is caused by a loss of ventricular function and by various adaptation responses, including neuro-hormonal activation, peripheral vasoconstriction, and salt and water retention. A large number of clinical, hemodynamic, biochemical and electrophysiological factors have now been identified that are related to prognosis in patients with CHF [25]. Cardiovascular disease and hypertension are also important factors favoring stroke recurrence. Early diagnosis and vigorous treatment of these cardiac impairments may offer an opportunity to prevent recurrence and to improve longevity among stroke survivors [26].

In this study misdiagnosis between the neurologist and the nurse was in relation to the diagnosis of congestive heart failure, it was due to that this diagnosis is a difficult issue and is a specialist diagnosis. In systematic review conducted by Robinson study, have shown that early diagnosis of these complications by nurses was more correct and earlier than physicians, in some cases [23], that it would reduce the length of the stay and cost of care of hospitalized patients. Kerr study suggests that there are complex challenges and complications associated with stroke patients. They also noted that's why the most important and specialized issues is present in the diagnosis and treatment of complications of stroke. So, they emphasize the nurse's role in early diagnosis of these complication is an important Issue, they note that, nurses must have the knowledge and skills needed in this area [26]. In acute stroke, time is essential in selecting appropriate treatment so as to minimize or prevent residual effects produced by the injury [26]. Coefficient was excellent agreement between the neurologist and nurses with 84 percent accurate and Kappa =0.76. It showed that Babol stroke nursing had knowledge and experience to correct recognition and play role in multidisciplinary team, but in some recognition need to more training.

limitations of this study was many different factors can be as barrier in early diagnosis of post ischemic stroke complications by nurses and we should be considering this fact that there are some special issues in stroke patients such aphasia which may be as a difficulty issue in contact with stroke patients and second it was due to retrospective study we had problem in documentation and incomplete nursing report that need to more awareness and attention.

## Conclusion

Most common early complication of ischemic stroke was pain that need to be highlighted. The most agreement on the early diagnosis of post ischemic stroke complications in early post hospitalization period made by nurses and confirmed by neurologist was dysphagia and pressure ulcer. The total agreement between the nurse and neurologist was favorable Nursing recording in hospital sheet disclose trend of nursing care, medical diagnosis, treatment and nursing and patient response to the treatment. Any information to assess ongoing needs and the patient's condition should be recorded in the appropriate place in hospital sheet. If nurses be familiar with early detection of post ischemic stroke complications, can play an important role to inform neurologist that probably reducing severity of these complications and early treatment, so more education of nurses in these issues to decrease misdiagnosis is recommended.

Accurate nursing records as a base for early recognition are suggested to the highlighted nursing role in multidisciplinary team and communication with neurologist with early detection. It suggests a suitable feedback from neurologist to nurses. It can help nurses to analyzed how much it recognition was correct or need be more training.

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## Conflict of Interest

There was no conflict of interest.

## Disclosure

This work was presented in 10<sup>th</sup> Iranian Stroke Congress in Tehran, Feb 2018.

## Authors' Contributions

AlijanAhmadiAhangar, designed the study, prepared the manuscript, approved the final version and supervised the study. Payam saadat participated in neurologic examination and diagnosis of stroke patient, Mina Galeshi, Samaneh Hosseinalipour collected the data. Hemmat Gholinia, Hamed Hosseinzadeh participated in data analysis. Shayan Alijanpour participated in prepared the manuscript and approved the final version.

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