

## Medical Complications during Inpatient Stroke Rehabilitation at a Tertiary Care Rehabilitation Hospital in Riyadh, Saudi Arabia

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### ABSTRACT

**OBJECTIVE:** To determine the frequency and types of medical complications that occur during stroke inpatient rehabilitation at a tertiary care rehabilitation hospital in Saudi Arabia.

**METHODS:** A retrospective study conducted in a tertiary care rehabilitation hospital in Riyadh Saudi Arabia

**RESULTS:** Our study included 60 patients with an age range of 20-95 years (mean=63 years); 37(62%) males and 23(38%) females. Left side of body was more commonly involved (62%). The strokes were predominantly ischemic in origin (78.3%). Hypertension (95%), diabetes mellitus (65%), history of smoking (26.7%), prior stroke (26.7%) and hyperlipidemia (21.7%), were the most common preexisting conditions found in our study. Musculoskeletal pain (63.33%), depression (21.6%), urinary tract infection (18.33%), and stroke progression (7%), were the most frequently occurring medical complications in stroke patients.

**CONCLUSIONS:** Medical complications are common during inpatient stroke rehabilitation. The most common medical complications were musculoskeletal pain, followed by depression and urinary tract infection. Early prevention, detection, and treatment of the most commonly occurring complications should be established.

**KEYWORDS:** Medical Complications; Rehabilitation; Risk factors; Saudi Arabia; Stroke

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### INTRODUCTION

Stroke is considered as one of the major causes of long-lasting disability throughout the world<sup>1</sup>. Functional improvement may attain after rehabilitation, though complications of stroke are possibly delayed functional recovery, extend the hospital length of stay (LOS), deteriorate stroke outcomes and increase the cost of care<sup>2,3</sup>.

Earlier studies showed that 44%–75% of stroke patients underwent inpatient rehabilitation experience at least one complication during that period<sup>4,5</sup>. The most common types of medical complications that occur are a musculoskeletal pain<sup>6-8</sup>, pressure ulcer<sup>7-8</sup>, depression<sup>9</sup> and infection<sup>5,10</sup>. Acute phase complications in stroke patients increase post stroke mortality<sup>11</sup>.

Previous hospital-based studies from the Arabian Peninsula reported that strokes are more common in younger age groups when compared with Western patients, but there are certain similar risk factors that are associated with each type of stroke<sup>12-14</sup>. The evidence demonstrated that age, the intensity of neurological deficits and disability caused by the stroke, and some pre-existing medical conditions as risk factors for medical complications for stroke

patients who underwent inpatient stroke rehabilitation<sup>5,8</sup>.

The management of medical complications constitutes prominent part inpatient stroke rehabilitation. Knowing which complications often occur and identifying the clinical characteristics that are associated with an increased risk of experiencing these complications would be valuable in facilitating implementation of appropriate prevention and management strategies as these complications are either preventable or treatable if identified early<sup>5,8</sup>.

Stroke inpatient rehabilitation is an active medical service. The inpatient rehabilitation of stroke patients is often complicated by the occurrence of medical complications. If recognized early, most of these complications are preventable or treatable. Proper management of these complications requires close multidisciplinary collaboration between the physiatrist and other medical specialists. The vast majority of current findings concerning medical complications during stroke inpatient rehabilitation are based on data collected in developed countries<sup>5,8,15</sup>.

We conducted this study with the aim to evaluate the magnitude of common medical complications during inpatient stroke rehabilitation in a tertiary care rehabilitation hospital in Saudi Arabia. This study will

generate local data which will help to improve prevention and management of complications during inpatient stroke rehabilitation

**METHODOLOGY**

A retrospective study was conducted between 2012-2013 to gain more insights about the medical complications, and its risk factors that occur during inpatient stroke rehabilitation at King Fahad Medical City, Riyadh, Saudi Arabia.

All patients ≥ 18 years of age, who undergoing inpatient stroke rehabilitation at KFMC over one year were included in the study. Patients who had other neurological diseases, such as parkinsonism, poliomyelitis, and cancer, were excluded from the study.

Those stroke patients who were unable to complete stroke rehab program (due to death, discharge against medical advice, difficult discharge patients and patient transfer to other acute medical service) were also excluded from the study.

Stroke is typically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system by a vascular cause, including cerebral infarction, intracerebral hemorrhage, and subarachnoid hemorrhage<sup>16</sup>. The patient medical records were reviewed, and the following data were recorded, (i) demographic and clinical characteristics, which included the age, gender, side and type of stroke, location of the lesion, mean time from stroke onset to rehabilitation, length of hospital stay and discharge status; (ii) medical complications occurring during acute inpatient rehabilitation, medical complications were defined as medical management problems that caused additional physician evaluation, modification in medication or further medical interventions; and (iii) risk factors for medical complications which included: age > 50 years, smoking and pre-existing medical conditions.

**Ethical considerations**

Ethical approval was obtained from the ethics committee at KFMC.

**Statistical analysis**

All categorical variables were presented as numbers and percentages. Continuous variables were articulated as the mean ± standard deviation (SD). All data were analyzed using SPSS version 22 (IBM Corporation, Armonk, NY, USA).

**RESULTS**

Our study included 60 patients with a mean age (±SD) of 63.55(±14.6) years. Demographic and clinical characteristics of patients are presented in Table I. There were 37(61.7%) male patients. The left side of the body was more commonly involved (62%). Strokes

were predominantly ischemic in origin (78.3%).

Data presented either as number and percentage or mean and standard deviation.

Table II listed the types and frequencies of medical complications. Our results show that musculoskeletal pain (63.33%), depression (21.6%), urinary tract infection (18.33%), and stroke progression (7%) were the most frequently occurring medical complications during the inpatient rehabilitation of stroke patients.

Risk factors for medical complications during inpatient stroke rehabilitation are presented in table III. The three most common risk factors for medical complications were hypertension 57 (95%), followed by patient age > 50 years old 51 (85%) and diabetes Mellitus 39 (65%). About 27% of the patients had either history of prior stroke or smoking as risk factors for medical complications amongst stroke patient who underwent inpatient stroke rehabilitation.

The mean onset-to-rehabilitation ward admission interval was 22.7 (±27.4) days. The mean length of stay at rehabilitation was 21.3 (±48.7) days. Furthermore, 93.3% patients were discharged home, while (3.3%) patients were discharged against medical advice.

**TABLE I: DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PARTICIPANTS**

Characteristics	Categories	
Gender	Male	37 (61.7)
	Female	23 (38.3)
Age group	≤50 years	9 (15)
	>50 years	51 (85)
Side of stroke	Right	20 (33.3)
	Left	37 (61.7)
	Bilateral	3 (5.0)
Type of stroke	Ischemia	47 (78.3)
	Hemorrhage	13 (21.7)
Location of lesion	Supratentorial	52 (86.7)
	Infratentorial	8 (13.3)
Mean Time from Stroke Onset to Rehabilitation (days)		22.7 ±27.4
Mean length of stay (days)		48.7 ±21.3
Discharge Status	Home	56 (93.3)
	Discharged against medical advice	2 (3.3)
	Other Service	1 (1.7)
	Died	1 (1.7)

**TABLE II: MEDICAL COMPLICATIONS OCCURRED DURING THE INPATIENT REHABILITATION OF STROKE PATIENTS**

Medical Complications	n (%)
Musculoskeletal pain	38(63.3)
Depression	13(21.6)
Urinary tract infection	11(18.3)
Stroke progression	4(6.6)
Pressure ulcer	3(5.0)
Pneumonia	2(3.3)
Seizures	1(1.7)
Upper gastrointestinal bleed	1(1.7)
Sudden death	1(1.7)

**TABLE III: RISK FACTORS OF MEDICAL COMPLICATIONS DURING INPATIENT STROKE REHABILITATION**

Variables	n (%)
Hypertension	57 (95)
Age >50 years	51 (85)
Diabetes Mellitus	39 (65)
History of prior stroke	16 (26.7)
Smoking	16(26.7)
Hyperlipidemia	13 (21.7)
Arrhythmia	5(8.3)
Chronic Obstructive Pulmonary Disease	4(6.7)
Angina	1(1.7)

## DISCUSSION

In Saudi Arabia, very few studies have highlighted the rehabilitation perspectives of stroke patients. The common medical complications and associated factors that arise during inpatient stroke rehabilitation have not yet been studied in this region.

In this study, the participants were younger with a mean age  $63.55 \pm 14.6$  years, and there was only one patient died during rehabilitation.

Our study showed that the majority of patients were males, left side of the body was more commonly involved, and strokes were predominantly ischemic in origin.

In agreement with previous studies, this study revealed that preexisting medical conditions (hypertension, diabetes mellitus, history of prior

stroke, hyperlipidemia and cardiac arrhythmia) as key risk factors for stroke<sup>17-21</sup>.

Moreover, our results showed that musculoskeletal pain, depression and urinary tract infection were the most frequently occurring medical complications during stroke rehabilitation. These results are almost similar to different studies conducted in Singapore, Taiwan, and Thailand<sup>4,6,7</sup>. Hung et al. found that the most common complications in their study were (15.0%) musculoskeletal pain, (13.6%) urinary tract infection, (9.3%) depression, (4.9%) upper gastrointestinal tract bleeding, and (4.9%) pneumonia<sup>4</sup>. The commonest complication observed in our study was a musculoskeletal pain, which was found in 63.3% of patients, which was higher than the rate found in a multicenter prospective study conducted by Kuptniratsaikul et al. in Thai patients with stroke, which found to be 32.4%<sup>6</sup>, and another study conducted in Taiwan by Hung et al., which reported to be 15%<sup>4</sup>. These results may have contributed to the variances in the selection and diagnostic criteria and the design of the study.

A recently conducted study in Poland by Janus-Laszuk B et al, also reported urinary tract infection (23.2%), depression (18.9%), falls (17.9%), unstable hypertension (17.6%), and shoulder pain (14.9%) as most common medical complication which effects functional outcomes<sup>22</sup>.

In our study, depression was the second most common complication (21.6%), associated with stroke. The risk of fatality is higher in stroke patients with depression when compared to stroke patients who are not depressed<sup>23,24</sup>. Previous studies report the incidence of post-stroke depression as being ranged between 29% and 36%, reliant on the diagnostic criteria and population being studied<sup>25,26</sup>. Diagnosis of post-stroke depression may be challenging and is reported to be missed in 50–80% of cases by non-psychiatric physicians<sup>27</sup>. Thus, the early evaluation and management of post-stroke depression should be performed to enhance the stroke rehabilitation program.

Regarding other complications observed in our study, pressure ulcers and pneumonia were also observed; although these complications occurred less frequently, they still serious complications. Pressure ulcer increase risk of other post-stroke complication and in turn increases in post-stroke mortality<sup>28</sup>. Early prevention of pressure ulcer is important.

As such, aspiration precautions should be taken in these patients. Early swallowing evaluations must be performed in all stroke patients during the acute stage to assess the presence of dysphagia, as well as to determine the patients' risk of aspiration.<sup>29</sup> This can help prevent respiratory complications, which can be

life-threatening.

## CONCLUSION

Inpatient Stroke rehabilitation is an active medical service. Musculoskeletal pain, depression and urinary tract infections were most common medical complication during inpatient stroke rehabilitation in a territory care rehabilitation hospital in Saudi Arabia.

## RECOMMENDATIONS

In stroke rehabilitation units, protocols for the prevention, detection, and treatment of the most commonly occurring complications should be established. Patients and caregivers should be educated to improve their awareness of these complications. From a larger perspective, this measure may help stroke patients to achieve better functional outcomes while reducing their health care costs during inpatient rehabilitation. We hope that this study will improve the prevention and management of these complications and that it will also promote further prospective and multicenter studies.

The limitations of our study that the data were collected retrospectively by reviewing the patients' medical files and the results could have been influenced by the documentation quality. Furthermore, this was a single-hospital-based study. Studies performed with larger groups, or multicenter studies, are recommended.

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## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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