

## CASE REPORT

# Effectiveness of “Code White”: Joint Association of Administrator and Clinicians for Delivering Effective Treatment in Stroke Patients

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## ABSTRACT

Stroke is the sudden death of brain cells due to lack of oxygen caused by blockage of blood flow or rupture of an artery to the brain. The common symptoms include sudden loss of speech, weakness, or paralysis of one side of the body. Other symptoms could include black-out, sudden loss of vision, problems with balance and coordination, and difficulty in swallowing. It could be a cause of mortality and morbidity, if not treated in time. The field of stroke medicine has changed considerably in recent years with the development of hyperacute treatments such as thrombolysis, mechanical thrombectomy, and measures of secondary prevention. There are challenges in the diagnosis and management process due to the complex need and urgency of the patient treatment. The management of Nanavati Super Speciality Hospital using the assembly line technique proactively took a project of prompt and comprehensive management of stroke patients; in fact, a special emergency response code—“Code White”—was created to handle patients with stroke during emergency. The doctors, staff and administrative staff were sensitized and trained, and simulation exercises done for quick diagnosis, effective delivery of treatment, and to expedite the procedure. The doctors also prepared skits to train the resident doctors and the nursing staff. This article will review the measures taken, effectiveness of multidisciplinary approach of Code White in the treatment of patients with stroke.

**Keywords:** Mechanical thrombectomy, Stroke, Thrombolysis.

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## INTRODUCTION

A 6-month-long study was conducted in purview of assessing the effectiveness of (a) effect of sensitization, training, multidisciplinary coordinated approach in stroke patients within the golden hour<sup>1</sup> and (b) the effect of generation of Code White wherein an alert was made on the arrival of stroke patient. The code was activated in the Accident and Emergency (A and E) Department, MRI Department, and critical care unit (CCU) with the objective of treating the patient within the golden hour for best clinical outcomes. In Code White the patient with stroke symptoms were assessed immediately by clinicians, and the patient was transferred to the MRI section for investigations and transferred to (a) CCU for thrombolysis or (b) CCU/Cath lab for mechanical thrombectomy. In the entire exercise, the administrator takes an active role to combat the hindrances of administrative issues, viz. clearance for MRI, CCU admission, logistics, coordinating with relatives, pharmacy, and finance, and expedite the proceedings for effective management of patient as per stroke protocol. The assembly line technique was used to improve operational efficiency at various levels.

Nanavati Super Speciality Hospital is a 350-bed tertiary care hospital with its vision “To create a patient-centric tertiary healthcare organization focused on non-intrusive quality care utilizing leading edge technology with a human touch” and mission to achieve professional excellence in delivering quality care, push Frontiers of care through research and education, adhere to national and global standards in healthcare, ensure care with integrity and ethics, provide quality healthcare to all sections of society.”

The Nanavati team are passionate about delivering the highest standards of healthcare to their patients; in their quest for continual improvement, the management introduced emergency response team—Code White—in order to deliver the effective treatment to stroke patients within the stipulated time as per stroke protocol of

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AHA, with the conjoint team work of clinicians and administrators to reduce the adverse effects of delayed treatment in stroke patients and achieve client delight.

Nanavati Hospital is planning to start the “Tele-stroke” program for live discussion over stroke treatment delivery method and help patients.

## BACKGROUND

The study was done in a tertiary care hospital in Mumbai.

Duration of study = 6 months

Sample size = as per incidence

Benchmark set by hospital:

- In IV thrombolysis: door to needle TAT: 60 minutes
- In mechanical thrombectomy: onset of symptoms to mechanical thrombectomy—24 hours; for study purpose and expedition of the procedure in mechanical thrombectomy the benchmark was kept 6 hours.<sup>2</sup>

## MATERIALS AND METHODS

- This is a retrospective study of patients who were administered treatment of stroke in 6 months from December 2017 to May 2018 (Code White was started in November 17) in Nanavati Super Speciality Hospital.
- Stroke patients were treated for IV thrombolysis/mechanical thrombectomy in the months of December 2017 to May 2018; these patients were chosen for the study as per the incidence—hence the sample size is the actual number of stroke patients.
- Patients were admitted to the hospital and diagnosed stroke.
- Pharmacological intervention included IV thrombolytic drugs; the turnaround time (TAT) was measured as time of entry into accident and emergency till time of administration of thrombolytic drugs in the critical care unit after correct diagnosis and stabilization of patients.
- Mechanical thrombectomy was done in cases as per clinical judgement by the physician in Cath lab after correct diagnosis and stabilization of patient.

## Aim

To study the average time taken for a stroke patient: thrombolysis and mechanical thrombectomy

- Door to needle TAT (turnaround time)
- Onset of symptoms to mechanical thrombectomy TAT.

The hospital took reference of "American Heart Association (AHA)/American Stroke Association (ASA) 2018 Guidelines for the Early Management of Patients with Acute Ischemic Stroke"

The following are key points to remember from the American Heart Association (AHA)/American Stroke Association (ASA) 2018 guidelines for the early management of patients with acute ischemic stroke:<sup>2</sup>

- These 2018 guidelines are an update to the 2013 guidelines, which were published prior to the six positive "early window" mechanical thrombectomy trials that showed a clear advantage of "extended window" mechanical thrombectomy for patients with large vessel occlusion who could be treated out to 16–24 hours.
- The benefits of intravenous (IV) tissue plasminogen activator (tPA) are time-dependent, and treatment for eligible patients should be started as quickly as possible (even for patients who may be candidates for mechanical thrombectomy).
- IV tPA should be administered to all eligible acute stroke patients within 3 hours of last known normal and to a more selective group of eligible acute stroke patients (based on ECASS III exclusion criteria) within 4.5 hours of last known normal. Centers should attempt to achieve door-to-needle times of <60 minutes in ≥50% of stroke patients treated with IV tPA.<sup>2,3</sup>

Intravenous thrombolytic therapy is strongly time dependent.<sup>1</sup>

The therapeutic outcome of thrombolytic therapy is best if done immediately after the onset of symptoms as per guidelines.

Hence as an endeavor, it was decided to monitor the average time taken for the management of patient of stroke:

- Thrombolysis at NSSH—TAT of door to MRI
- Mechanical thrombectomy—TAT of onset of symptoms to mechanical thrombectomy.

## Inclusion Criteria

- Retrospective cases were identified as per incidence and based on the primary clinical diagnosis as "stroke."
- All the stroke cases were included irrespective of the age, gender, and past clinical history of the patients.

## Exclusion Criteria

Patients who have any neurodeficit but were not primarily diagnosed as stroke were excluded from the study.

## DISCUSSION

### Door to Needle TAT in IV Thrombolysis

- 33% of the patients were thrombolysed within the benchmark of 60 minutes (1 hour) TAT (door to needle).
- 67% cases took more than 60 minutes to be thrombolysed, but out of these 67%, 61% cases were thrombolysed within 3 hours of onset of symptoms of stroke—which is as per AHA guidelines (Flowchart 1).

The mean time for door-to-needle TAT is 52 minutes.

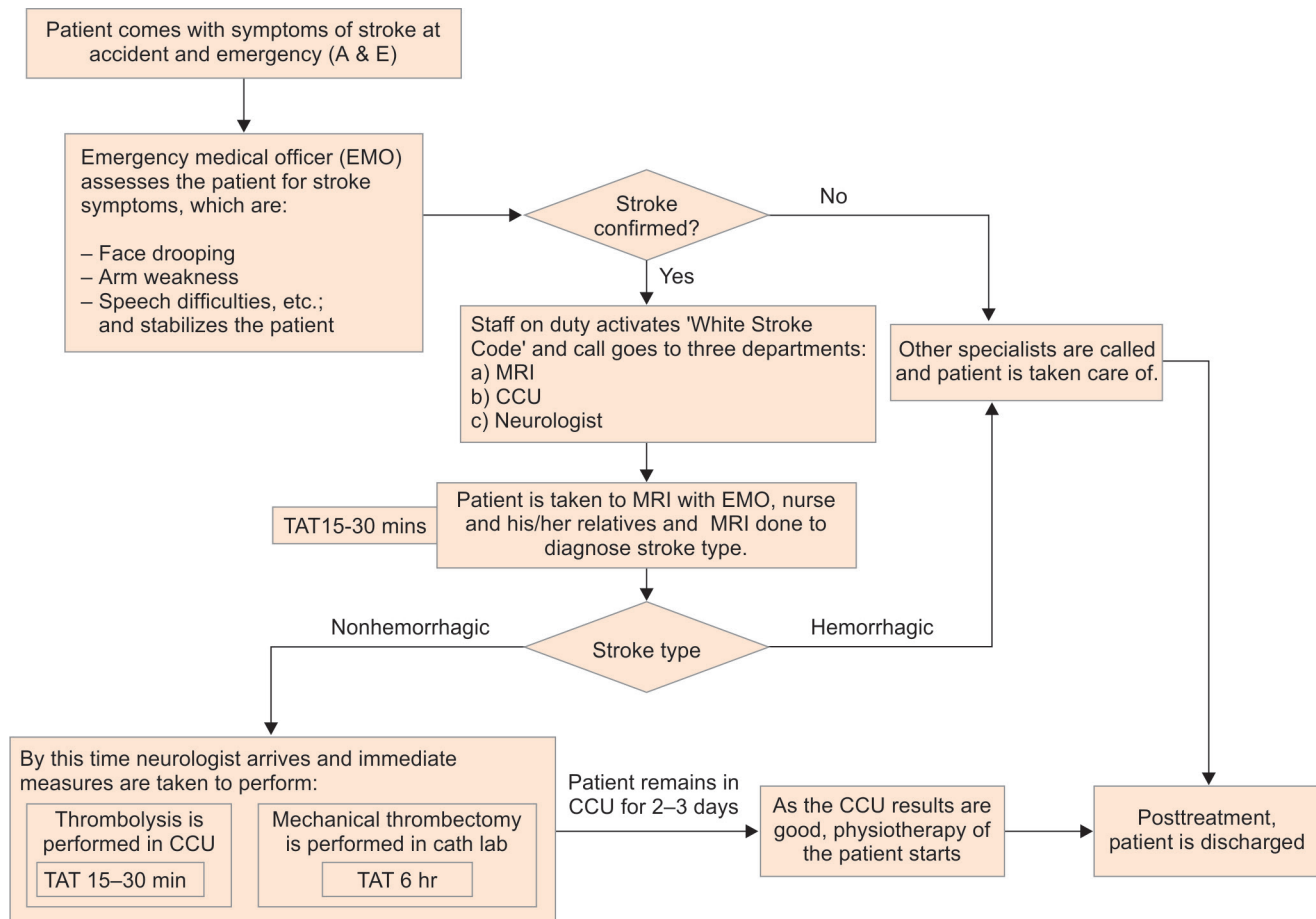
### TAT of Onset of Symptoms to Mechanical Thrombectomy

- For 88% of patients, mechanical thrombectomy was done within the benchmark of 24 hours of onset of symptoms (Fig. 1);
- 12% of the cases took more than 24 hours for the procedure because patients came to hospital after a significant delay (patient presented late, after 24 hours of onset, case of posterior circulation stroke).

## CONCLUSION

The emergency code introduced—Code White—for stroke management is very successful. The joint efforts of administrators with clinicians have contributed to the intravenous thrombolytic therapy in 93% cases within the recommended time from onset of symptoms; a further 33% were thrombolysed within 1 hour—the benchmark set by hospital. The joint efforts are definitely a victory in mechanical thrombectomy as in all cases the procedure was carried out within 6 hours from the entry of the patient to hospital. This study is more commendable as no patient deserving the treatment was found devoid of the treatment in spite of many constraints.

The joint efforts of administrators and clinicians can contribute to future endeavors with persistent zeal and efforts in many arenas as well.

**Flowchart 1:** Process flow for stroke management

## RECOMMENDATIONS

NSSH has undertaken a special program for the management of stroke patients. NSSH has discussed protocols with a renowned state university too for exchange of ideas.

NSSH should continue sensitization, training of emergency medical officers, residents and staff for quick diagnosis of stroke symptoms and further treatment.

Hospital administrators should think of innovative measures of joint collaboration in comprehensive care of patients and strive toward client delight.

The hospital should continue to use the assembly line technique to improvise processes in other vital areas toward comprehensive patient care.

## LIMITATIONS OF THE STUDY

- Lack of awareness of symptoms of stroke. The main limitation of the study was the lack of awareness of symptoms of stroke in patients due to which there could be dropouts thereby reducing the sample size.
- The cost of the treatment is a major challenge, and every time stroke is indeed an emergency, making it difficult for the relatives to arrange finance.
- Delayed diagnosis and eligibility of candidates, sometimes because of misleading history/interpretation.

- Infrastructural barrier: distance between the accident and emergency, MRI Department and CCU.

## CHALLENGES IN THE MANAGEMENT OF STROKE

- The main challenge in effective management of stroke is to increase the awareness of symptoms of stroke among the general population so as to identify and effectively diagnose such cases in order to clinically manage the patient to improve outcome.
- There should be efforts to create awareness for identification of symptoms, timely transfer to healthcare organization to receive timely treatment and improve the quality of life of stroke patients.

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## PATIENT SAFETY: STROKE MANAGEMENT PROCEDURE

## SYMPTOMS OF STROKE (F-A-S-T)

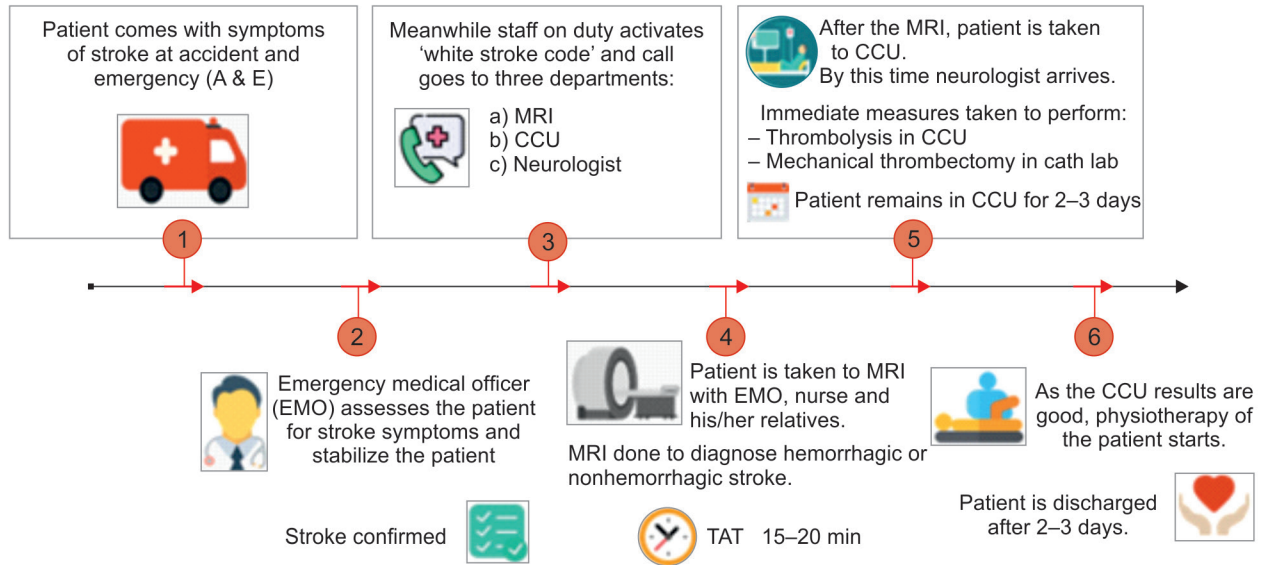
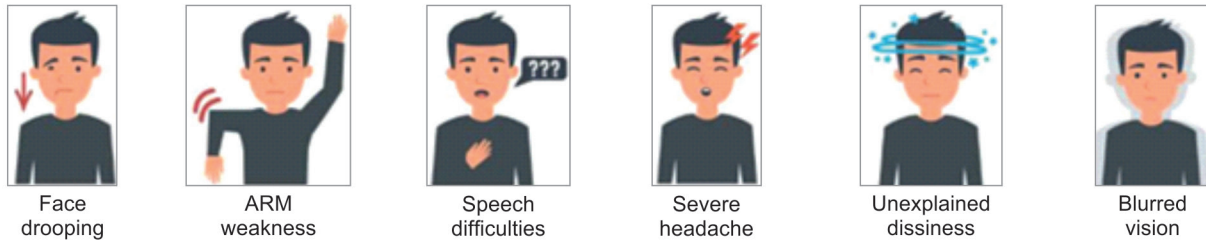


Fig. 1: Training poster for staff and doctors

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