Marshall Medical Center  
1100 Marshall Way  
Placerville, CA 95667

Janice Weaver, RN, BSN  
Performance Improvement/  
Stroke Specialist  
Quality Management  
jweaver@marshallmedical.org  
530-344-5418

Rapid Response Team-  
Stroke Alert (In-Patient)

Areas of Focus:
- Patient Safety
- Quality Improvement
- Patient Experience

Executive Leader Statement:

On behalf of the entire Executive Team at Marshall Medical Center, we support and endorse the submission of this application for the C. Duane Dauner Quality Award. We believe the care and management provided to our in-patients experiencing stroke-like symptoms has been optimized with early identification and treatment of a stroke. This was accomplished by growing our RRT program and facilitating better outcomes for our patients. Marshall Medical Center utilized the resources already in place, looked at the process from a patient centered, data driven approach and implemented a collaborative, multidisciplinary, timely response to assess and intervene when staff, family or friends suspect a patient may be experiencing a stroke. This approach can be easily replicated by other facilities, regardless if they already have a Rapid Response Team in place or not. This program has assisted in successful, timely administration of Alteplase to save lives and maintain quality of life for patients experiencing a stroke. As a Primary Stroke Center, and the only hospital on the Western Slope of El Dorado County, our patients count on Marshall to be innovative and provide the highest quality of care. This program is an exemplary example of innovation and should be recognized and honored.

Michelle Norris-Even, BSN, RN  
Executive Director of Quality and Education
Executive Summary

Hospitalized patients experiencing stroke symptoms present a unique challenge in their care and management, primarily due to resources, co-morbidities, or admission for another diagnosis, procedure or surgery. Marshall Medical Center had previously implemented an in-patient Rapid Response Team (RRT) to address changes or deterioration in a patient’s condition and provide early recognition and assessment, more timely evaluation, and appropriate interventions to improve patient outcomes. Stroke patients were initially included in this RRT Procedure. However, review of in-patient stroke cases at our Stroke Quality Committee identified that in-patient strokes were not managed the same as those arriving from outside the hospital and presenting to the Emergency Department (ED). In-patient strokes were not receiving the same emergent response, level of care and timely interventions and treatment. Standards of care such as Alteplase administration and potential mechanical thrombectomy were not clearly defined in our in-patient processes. The Stroke Quality Committee recognized the need to improve stroke care and response time to in-patients with signs and symptoms of stroke with the goal of limiting disabilities and improving quality of life for both the patient and their families.

Background and relevance of the problem being addressed and effort undertaken:

Marshall Medical Center evaluates and treats approximately 23 stroke patients per month (265 stroke patients per year) through our ED. In contrast, our in-patient stroke volume averages 1-4 patients per month (12-48 patients per year). Organizational focus has previously been on streamlining and refining the ED stroke alert process to improve response times, early evaluation and treatment to meet the American Heart Association/American Stroke Association and Joint Commission guidelines. All efforts and resources were spent on improving door to thrombolytic time in the ED, currently at 51.5 minutes (median). Time and resources were not as readily delegated to in-patient stroke care. There was no stroke specific rapid response team. The organization did not have Hospitalists at night to respond to RRTs. The ED physician responded to all off hour RRTs. For in-patients with signs and symptoms of stroke, order to head CT results median time was 40 minutes (ED was 23 minutes), and head CT results within 45 minutes of order time was at 67% compliance (ED was at 84%).

In May 2017, under the direction of the Stroke Quality Committee and the Stroke Program Medical Director, the organization went “live” with the Rapid Response Team (RRT)-Stroke Alert initiative for in-patients. The RRT-Stroke Alert initiative provides a rapid, consistent, coordinated and multidisciplinary team approach to the care and management of in-patients experiencing the signs and symptoms of stroke to improve patient outcomes. This initiative was aligned with the ED stroke alert process to provide the same response on the in-patient hospital side as for patients arriving from the outside. This required support from senior leadership and management, physician and staff engagement, development of policies/procedures, an in-patient stroke alert algorithm, education and training, and a performance improvement process to evaluate the new program. The new RRT-Stroke Alert initiative for in-patients follows the clinical practice guidelines of the AHA/ASA and Brain Attack Coalition.
Describe the effort, including the scope, process, strategies, and tactics utilized, challenges encountered and how they were addressed:

The RRT-Stroke Alert initiative was approved by the Stroke Quality Committee, which consists of the Stroke Program Medical Director (Neurologist), Hospitalist, ED Physician, Stroke Coordinator, ICU Director, ED Nursing leadership, Director of Diagnostic Imaging, Laboratory Director, EMS Coordinator, Rehabilitation Services representative, Director and PI Specialist for the Telemetry Stroke Unit, the Executive Director and Assistant Director of Quality and Education, Transitional Care Director, and Quality Assessment Specialists for core measures. The ICU Director became our RRT Stroke Alert champion, in collaboration with the Stroke Coordinator. Physician engagement was obtained at Medical Staff meetings. Team roles were defined. The RRT was expanded to include a pharmacist for potential Alteplase candidates, a phlebotomist for stat lab draws, and a clinical imaging assistant who arrives with a gurney to expedite transport to CT. The Hospitalist, respiratory therapist, ICU RRT RN, and house supervisor also respond. RRT- Stroke Alerts are paged overhead by the PBX Operator to alert all team members to respond and alerts diagnostic imaging of a potential stroke patient to ensure CT scanner availability. Policies and procedures were revised, including development of an in-patient stroke alert algorithm (see attached). There was extensive physician and staff training (staff meetings, charge nurse meetings, updates to monthly organizational publications/newsletters), staff rounding, mock drills were conducted, in-patient stroke order sets were developed in our new EMR system, and telemedicine neurology was implemented in the ICU with designated telemedicine equipment. Performance improvement measures were implemented to monitor and evaluate the new program. Each RRT-Stroke Alert was concurrently and retrospectively reviewed by the ICU Director and the Stroke Coordinator and evaluated for areas of improvement as well as successes. Each RRT-Stroke Alert encounter was also evaluated by the participating primary RN to have front-line staff input and identify areas for improvement, including communication between disciplines. The ICU RRT-Stroke Alert RN also returns to the unit 2 hours after the stroke alert is completed to check on the patient’s status. The PBX Operator who receives the stroke alert activation completes an evaluation form and forwards to the Stroke Coordinator for review. In 2019, a program in MIDAS was developed by the data analysts for collecting data and tracking RRT-Stroke Alerts electronically. Timely feedback was provided at the staff and physician level, and data was reported monthly at Stroke Quality Committee and Medical Staff Committees. The focus of the RRT-Stroke Alert initiative is on early recognition of stroke symptoms and arrival of the RRT-Stroke Alert, including the physician, within 5 minutes of the stroke alert activation. This allows for timely assessment and evaluation, interventions, diagnosis, and appropriate treatment. Per the RRT-Stroke Alert Procedure, the head CT scan is to be completed within 20 minutes of order time and resulted within 45 minutes of the order time to identify potential thrombolytic or MER eligible candidates. Lab work is expected to be resulted within 45 minutes of order time. The goal is time of arrival of the RRT-Stroke Alert to administration of thrombolytics within 60 minutes for those patients meeting criteria, the same expectation as those patients arriving via EMS or by private vehicle to the ED. The patient is transferred to ICU for Alteplase administration or if a higher level of care is needed. The Patient Safety goals of the RRT-Stroke Alert focus on the in-patients
receiving the same immediate, high quality of care as those in the ED. Management and
care of in-patient strokes follows the recommended clinical practice guidelines of the
American Heart Association/American Stroke Association and the Brain Attack Coalition.
The stroke alert implementation team faced several challenges. Our organization is a rural,
111 bed, independent, non-profit hospital. The Hospitalists were not available in-house
24/7, and the ED physician responded to stroke-alerts at night. Radiologists were not
available in-house 24/7. CT scans and imaging were interpreted by off-site radiology
services (StatRad). The organization had limited resources and budget constraints as the
organization was transitioning to a new EMR system that year. Despite these challenges,
the RRT-Stroke Alert program was successfully implemented in May 2017. In November
that year, Nocturnists were hired to provide 24/7 in-house physician coverage for the
organization, extensive education was provided to the off-site radiology services, and new
in-house stroke electronic order sets were developed, all without incurring a cost to the
organization. Several months after the successful implementation, the Stroke Program
Medical Director and our only Neurologist, passed away suddenly. An Interim Stroke
Medical Director stepped in, and our RRT-Stroke Alert program continued its success in
2018 and 2019.

Describe the results of the effort:

Our median number of RRT-Stroke Alert activations is approximately 3 per month. This
number has remained steady since the RRT-Stroke Alert has been implemented. Prior to
the implementation of the RRT-Stroke Alert, the median time for head CT results was 40
minutes, and our compliance rate for results within 45 minutes was at 67%. After the stroke
alert initiative was rolled out to the organization in May 2017, the median time for head CT
results decreased significantly by approximately 50% to 20 minutes, and the compliance
rate for CT results within 45 minutes increased from 67% to 100% and has sustained 100%
compliance to present date. (See attached Performance Improvement Report). The
response time for the RRT-Stroke Alert from the time of activation is less than 5 minutes
and has sustained high compliance at 100% of the time. Prior to the implementation of the
RRT-Stroke Alert initiative, zero in-patients had received Alteplase for acute ischemic
stroke. Post implementation, 3 in-patients that year received Alteplase (within 37, 57, and
59 minutes). A month after we went "live", in June, a patient in our Transitional Care
Center was undergoing Physical Therapy in the gym. An assistant physical therapist
recognized the signs and symptoms of stroke, called a RRT-Stroke Alert, and the team
responded within 2 minutes of the activation. The patient received a stat head CT scan
within 20 minutes and was transferred to the ICU with thrombolytics administered within
59 minutes of recognition of symptoms. This was our first success story of our new RRT-
Stroke Alert program. In October 2017, 5 months after the new initiative was implemented,
a 95 year old female was receiving rehabilitation in our Transitional Care Center. She
developed a sudden onset of stroke symptoms (facial droop, slurred speech, and weakness
to her left hand), and the RRT-Stroke Alert was activated and arrived within 3 minutes. The
head CT scan was ordered and resulted within 11 minutes. The patient was transferred to
ICU and received thrombolytics within 37 minutes from the arrival of the RRT-Stroke Alert.
The patient was able to return to the Transitional Care Center a week later with all
neurological deficits resolved. One in-patient in 2018 and one in-patient in 2019 also successfully received thrombolytics.

**Discuss the significance of the results. How do the results demonstrate outstanding achievement?**

Our first success story from June 2017 was brought to the attention of our Board of Directors Quality Committee. Each member of the RRT- Stroke Alert who participated in the exemplary care of this patient received a letter of recognition. "We understand that you responded to a Stroke Alert in TCC and this was our first in-house patient to benefit from the thrombolytic medication under the new RRT-Stroke Alert procedure. The entire team worked seamlessly together to assure that our patient received an excellent continuum of care by not only recognizing the patient's challenge, but in reacting so quickly with professionalism, proficiency and compassion. Your masterful response made all the difference in the life of this patient entrusted to our care. Your team embodies Marshall Medical Center's commitment to providing excellent health care with a Patient First focus. From the BOD Quality Committee, please accept our gratitude for your exemplary care. You are a credit to Marshall Medical Center and a blessing in our community. ” In addition, during our Joint Commission survey for Primary Stroke Center certification in October 2017, the Joint Commission was highly impressed and recognized our new RRT-Stroke Alert program and encouraged us to develop an abstract to share with other facilities who could learn from our initiative.

**Describe sustainability and scaling of the achievement:**

Marshall Medical Center is a non-profit, independent, community hospital (111 licensed beds) with limited resources compared to the larger Stroke Centers and Acute Care Hospitals in Northern California. Unlike the larger facilities, for after-hours imaging, an offsite Radiology service (StatRad) interprets images. The new RRT-Stroke Alert Program was designed to align with the ED Stroke Alert response and provide the same level of expertise and care for in-patients as those arriving from the community. Telemedicine Neurology capabilities were expanded outside the ED to include the ICU. The in-patient stroke response is now the same as the ED stroke response to ensure continuity of care across the continuum. Both the ED and RRT-Stroke Alert follow the clinical practice guidelines of the AHA/ASA. The RRT-Stroke Alert was also successfully implemented with no additional cost to the organization and prior to the development of the in-patient electronic order sets and Nocturnists' arrival in November, 2017. After the implementation in 2017, 2018 and 2019 continue to see the same high quality stroke care and improved patient outcomes.

**Describe key lessons learned and any advice to colleagues who might try to undertake a similar effort:**

Marshall Medical Center initially implemented the RRT to consistently respond to all activations (medical, cardiac, respiratory, stroke) in the event of a change in patient’s status or deterioration. There was no stroke specific team response. Other health care facilities can also introduce a stroke specific RRT that is comprised of key, trained personnel who are
critical to timely stroke care and management. In addition to the organizational RRT comprised of ICU RNs and physicians, our organization added additional staff members to the original team to specifically respond to RRT-Stroke Alerts-a pharmacist for potential Alteplase candidates, a phlebotomist for stat blood draws, and a clinical diagnostic imaging assistant for rapid transport to CT scan. The RRT-Stroke Alert was built off the foundation of the organizational RRT and the ED Stroke Alert Process. A critical key to the success of our new stroke alert initiative was physician and staff engagement, leadership support, and communication among disciplines. Our organization never lost sight of the patient safety focus-our patients come first.
For the acute in-patient stroke, the head CT should be resulted within 45 minutes from order time. The goal is head CT results within 45 minutes of time ordered at least 90% of the time. In May, 2017, the RRT Stroke Alert was implemented for the in-patient areas.

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<td>Total Stroke Patients (N)</td>
<td>58</td>
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<td>Median time from order to head CT results (mins)</td>
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<td>% within 45 minutes</td>
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**Q1FY 19 Stroke - Inpatient Head CT Results for Acute Stroke**

- **RRT Stroke Alert program began May 2017**
- % within 45 minutes
- Median time from order to head CT results (mins)
Patient with Signs / Symptoms of Stroke

Call 555 for Rapid Response Team “Stroke Alert”

RN at bedside/ Charge RN coordinate assist.

Notify attending physician

RN records time of onset, if witnessed, or time patient last seen without deficit.

RN ensure patent IV
Obtain fingerstick blood sugar/ECG per physician order / standardized nursing procedure

RN perform patient assessment-if alteplase candidate complete alteplase screening checklist

RN RRT Team member accompany patient to/from CT

CT Results to attending physician. Neurologist consult completed if indicated by MD.— see Note

If patient to be transferred Contact Case Mgr, HS, CN to arrange CCT

Does CT show Cerebral bleed

Yes

No

Evaluate patient for alteplase?
Use alteplase criteria checklist

Alteplase candidate?

Yes

No

Physician determines appropriate level of care

Call pharmacy and request to directly speak with pharmacist - STAT @ ext 2648

Transfer to ICU

Goal
RRT response Within 5 minutes

Goal
CT within 20 minutes
Target 45 minutes to results

Obtain orders for STAT CT/Labs
CBC, PT/INR, PTT, Type/screen, CK, troponin, HCG (if appropriate)

Do not delay CT for lab draw or ECG

NOTE: If Neurologist unavailable call 24/7:
1. U.C.Davis – Physician Consultation (800) 482-3284
After greeting Press #1 - operator will page Neurologist.
2. Sutter Transfer Team 24/7 at 877-777-6680
3. Dignity Health Stroke Team at (888)637-2941