

STROKE AND ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION CARE
IN RURAL NORTH IDAHO

by

Lindsay Stryhas

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A DNP Project Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF NURSING PRACTICE

In the Graduate College

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Lindsay Stryhas, titled Stroke and ST-Segment Elevation Myocardial Infarction Care in Rural North Idaho, and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.


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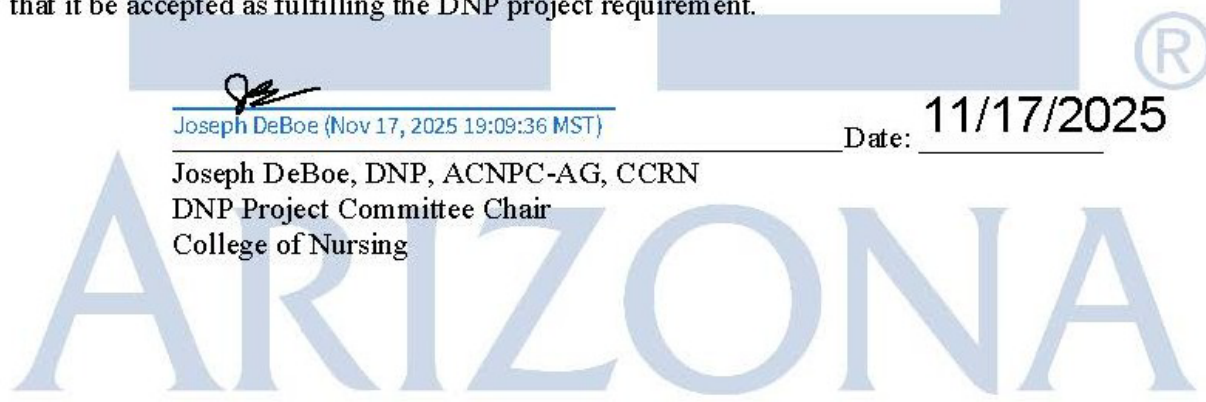

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Final approval and acceptance of this DNP project are contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.


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LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. The University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

DEDICATION

I want to dedicate this project to my son, Robby, and my fiancé, Stephen. Without the unconditional support of either of you, this project wouldn't have been possible. You both have been a steadfast light throughout this journey, and your support is something I could only have dreamed of. Without you, my graduate college journey wouldn't have been possible. Robby, you might not fully understand this yet, but you are the motivation behind all of this. Thank you for all the extra cuddles while Mom was working on homework or studying. Stephen, thank you for ensuring that everything extra was taken care of, allowing me to focus on school whenever needed, and for serving as my sounding board for any project or idea during this journey. I love you both more than you can ever understand.

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Abstract

Background: Rural communities exhibit disproportionately high mortality rates, particularly due to chronic health conditions, strokes, and ST-segment myocardial infarctions (STEMI).

Contributing factors include geographical barriers, limited access to specialist services, and minimal exposure to such cases. In North Central Idaho, St. Mary's Health, a critical access hospital, serves a predominantly aging population and is located over an hour from the nearest percutaneous coronary intervention (PCI) or stroke-capable facility. These delays in recognizing clinical conditions or activating appropriate clinical pathways adversely affect patient outcomes.

Purpose: The purpose of this quality improvement initiative was to enhance the knowledge and confidence of emergency room and prehospital personnel regarding stroke and STEMI protocols at St. Mary's Health, utilizing simulation-based educational methods.

Methods: Guided by the Institute for Healthcare Improvement's Plan-Do-Study-Act (PDSA) framework, simulation sessions were utilized to mock stroke and STEMI cases, followed by targeted education and facilitated debriefings. Pre- and post-intervention surveys assessed staff knowledge and confidence in recognizing symptoms and implementing protocols. Quantitative data were analyzed using paired t-tests and descriptive statistics.

Results: Seven participants completed both the pre- and post-surveys, while eleven participants completed at least some portion of the survey. Confidence in recognizing acute stroke symptoms increased by 200% ($p=0.008$), and confidence in identifying a STEMI increased by 600% ($p<0.001$). There was unanimous support for continuing simulations, with limited exposure to cases identified as the primary barrier to knowledge acquisition.

Conclusions: Simulation-based education significantly enhanced staff confidence and competence in managing time-critical emergencies within rural settings. Regularly scheduled simulation sessions support continuous professional development and have the potential to reduce door-to-needle and door-to-balloon times, thereby improving patient outcomes. Expanding this program to additional rural hospitals in Idaho could further mitigate disparities in emergent stroke and STEMI care between urban and rural populations.

Background

It is a well-documented fact that residents of rural areas face elevated risk factors for cardiovascular conditions, such as stroke and ST-Segment Elevation Myocardial Infarction (STEMI) (Dwyer et al., 2019). Moreover, these communities often have limited access to regional hospitals equipped to manage stroke and STEMI protocols and provide essential interventions. This issue is particularly pronounced in rural North-Central Idaho, where the nearest hospital capable of delivering percutaneous coronary intervention (PCI) or stroke treatment is at least an hour away from local critical access emergency departments. Timely intervention is crucial for preserving neurological and cardiac function in these scenarios. A lack of staff expertise or confidence can further delay the provision of appropriate care. A thesis by Julie Benz, conducted at a rural hospital in Colorado, demonstrated that before the implementation of a STEMI protocol, the average treatment time was 288 minutes—substantially exceeding the national benchmark of 90 minutes for door-to-balloon time (Benz, 2012; Levine, 2010).

The rural population of the United States (US) is substantial, representing approximately 15 to 20 percent of the total population. Moreover, this demographic is aging, with 19 percent of rural residents being over 65 (Harrington et al., 2020). These factors underscore the critical need for adequately trained hospital staff in rural areas, capable of confidently following protocols that ensure timely and appropriate patient care. Additionally, research indicates that the interval from a hospital capable of percutaneous coronary intervention (PCI) to patient treatment significantly influences mortality rates associated with heart attacks. Approximately 20% of the US

population resides in areas lacking proximal cardiac catheterization facilities, predominantly in rural regions (Harrington et al., 2020).

Conceptual Framework

The Institute for Healthcare Improvement's Model for Improvement served as the foundational framework for this quality improvement initiative. It offered essential guidance to facilitate the comprehensive advancement of the project. The Plan-Do-Study-Act (PDSA) cycle encompasses four critical components of a quality improvement process (Taylor et al., 2014). This cyclical model supports the implementation of small-scale interventions to test and refine strategies, thereby promoting sustainable enhancements in healthcare quality (Taylor et al., 2014).

The planning phase of this cycle involved identifying necessary changes and determining methods to collect supporting (*Quality, Service Improvement, and Redesign Tools: Plan, Do, Study, Act cycles and the model for improvement*), which are integral to quality enhancement, service improvement, and redesign processes. During this phase, a notable decline in staff competency has been recognized regarding the management of patients experiencing acute ST-Elevation Myocardial Infarction (STEMI) or stroke at St. Mary's Health. In response to this deficiency, a targeted goal was set to enhance staff competency by 25% through a simulation event scheduled for the end of September. Given our relatively small staff size, this target is feasible, as we anticipate up to 25 participants.

The subsequent step in this phase is the 'Do' phase, which involved the implementation of the plan developed during the initial stage. This phase facilitated data collection and focuses on quality, service improvement, and redesign efforts (*Quality, Service Improvement, and Redesign*

Tools: Plan, Do, Study, Act cycles and the model for improvement). Concurrent activities were also conducted during this period, with two separate simulation events scheduled together to maximize staff participation. Each event featured scenarios involving one STEMI patient and one stroke patient. Before the simulations, staff members completed a brief survey to evaluate their current knowledge of relevant policies and procedures about these patient conditions. During each simulation, staff were assigned a volunteer patient who would portray symptoms and present EKG findings, requiring participants to assess and provide appropriate care throughout the patient's illness. Following each simulation, a debriefing session was held in a confidential, non-judgmental, and structured manner to facilitate reflective learning. Upon completion, staff received targeted education and subsequently undertook the same knowledge assessment to measure learning outcomes and improvements.

The third step of this cycle was to study, which involved evaluating the collected data and assessing whether it met the predictions made during the planning stage (*Quality, Service Improvement, and Redesign Tools: Plan, Do, Study, Act cycles and the model for improvement*). This step also facilitates assessing the data (*Quality, Service Improvement, and Redesign Tools: Plan, Do, Study, Act cycles and the model for improvement*). During this project, this phase involved evaluating survey scores before and after the simulation events and comparing them with the predictions made during the planning stage.

The 'act' step represented the final phase of this cycle. During this stage, an evaluation was performed to assess whether the previous change is sustainable and to determine if additional cycles of Plan, Do, Study, and Act were necessary (*Quality, Service Improvement, and Redesign Tools: Plan, Do, Study, Act cycles and the model for improvement*). For this project,

the evaluation focused on whether the simulation activities are sustainable for the facility and staff, and whether further Plan-Do-Study-Act cycles are required to enhance staff education regarding stroke and STEMI patient care.

Purpose

Rural healthcare has historically faced challenges in maintaining the most current practices and delivering efficient care. This issue is similarly evident at St. Mary's Health. Despite these challenges, staff and providers strive to provide the highest-quality, most efficient care possible. However, their efforts are often hampered by infrequent exposure to certain conditions due to limited opportunities for active simulation and ongoing training. A systematic review comparing care received by patients in rural versus urban settings found that patients presenting to metropolitan hospitals were more likely to receive thrombolytic therapy, such as TPA, for stroke symptoms than those treated in rural hospitals (Dwyer et al., 2019). The review also indicated that rural hospitals typically see fewer stroke patients, which hampers their ability to stay current with evolving treatment protocols (Dwyer et al., 2019).

Patients presenting with STEMI at rural healthcare facilities face similar deficiencies in care quality. A cross-sectional study analyzing Medicare beneficiaries aimed to assess disparities in outcomes for individuals experiencing stroke or STEMI in rural versus urban settings. The findings revealed that patients at rural facilities were significantly less likely to undergo percutaneous coronary intervention (PCI). Additionally, the 30-day mortality rate for these patients was notably higher, particularly among those admitted to critical access hospitals (Dwyer et al., 2019).

The primary aim of this project was multifaceted, reflecting the community's significance and the need for optimal care. Specifically, the initiative sought to improve staff education and confidence regarding the designated stroke and STEMI protocols at St. Mary's Health, with the ultimate goal of achieving designation as a Level II STEMI center and a Level III Stroke center. Additionally, the project aspired to reduce mortality rates among patients presenting with stroke or STEMI, minimize care delays, and thereby enhancing patient outcomes and overall community health.

Methods

Site

This project was completed at St. Mary's Health, a critical access hospital in North Central Idaho. This facility has received the Idaho Time Sensitive Emergency designation as a STEMI Level II and Stroke Level III center.

Participants and Recruitment

Recruitment for this project was conducted through email invitations directed to healthcare providers, nursing staff, and emergency medical personnel. Additionally, verbal reminders were provided during monthly meetings in the lead-up to the project's completion. The target participants included all providers delivering emergency care, nursing staff working in emergency departments, and emergency medical personnel involved in pre-hospital care via ambulance prior to transfer to this facility.

Intervention

The intervention for this project involved staff engaging with two simulated patients who are staff volunteers: one presenting with a STEMI and the other with a stroke. Participants

were expected to administer care in accordance with their training and to utilize all available resources effectively. Following the simulation exercises, a debriefing session was conducted to assess participants' current knowledge and to demonstrate best practices for STEMI and stroke management. All staff completed this debriefing prior to partaking in any post-intervention evaluations.

Evaluation Measures

The intervention was evaluated using a standardized survey administered to participants both prior to and following the simulation. This assessment measured staff knowledge related to STEMI and stroke management, including appropriate medication dosages, their effects, and potential side effects. Additionally, the survey evaluated staff familiarity with transfer policies and procedures, as well as alternative treatments to be administered when immediate transfer is not possible.

Analysis

Survey data were imported into Excel for analysis using qualitative statistical review methods. Participants' pre- and post-intervention confidence levels were graphically represented to facilitate visual assessment. Additionally, a quantitative analysis of staff free-text responses from both pre- and post-surveys will be conducted, with results systematically compiled into a table for ongoing evaluation throughout the project.

Ethical Considerations

Participation in the event was entirely voluntary. All participants were provided informed consent prior to involvement, as confirmed through email recruitment. By electing to participate, individuals acknowledged their informed consent. Ethically, the event fostered a blame-free

environment conducive to learning, while ensuring confidentiality and maintaining participant anonymity. Each participant had equitable opportunities for engagement. Additionally, the debriefing session was structured to foster a safe, supportive, and non-judgmental environment.

IRB Review and Approval

The University of Arizona's Institutional Review Board (IRB) determined that this project was not considered human research (Appendix D). St. Mary's Health did not require IRB approval, but completed the site authorization letter before finishing this project.

Results

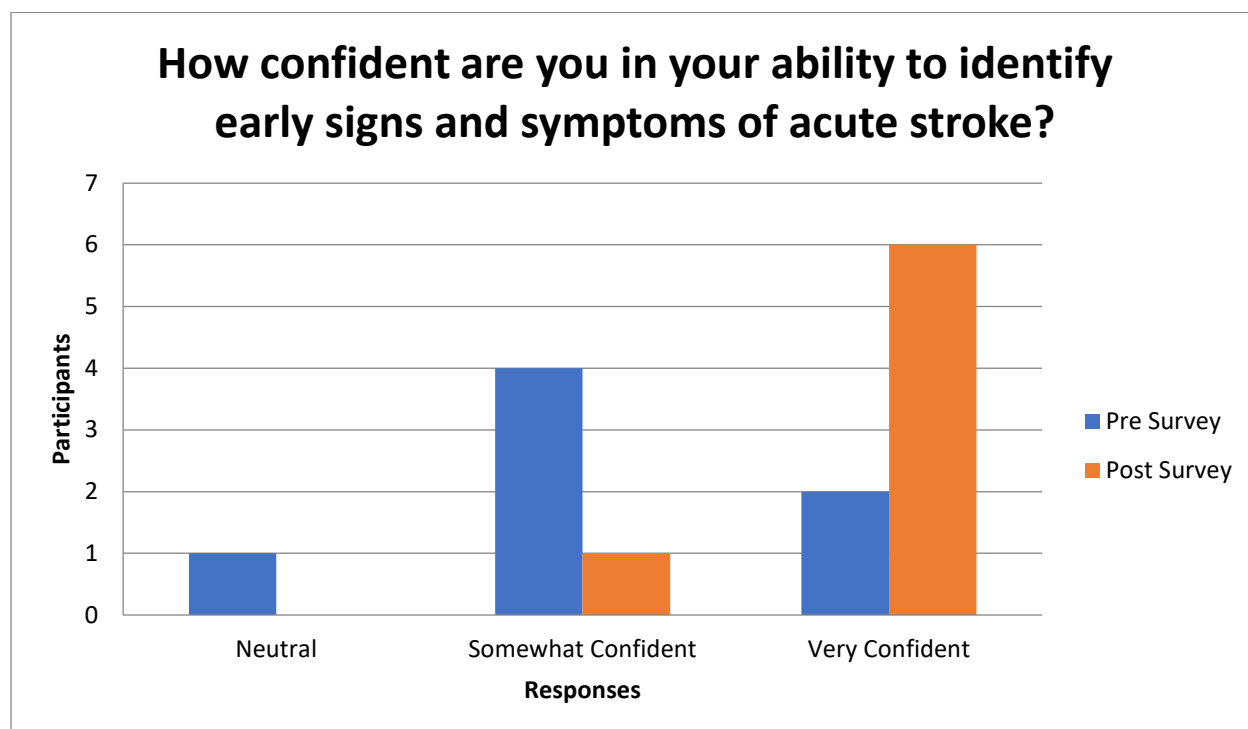
The simulation event resulted in the completion of eleven surveys by participants, representing a significant decrease from the sixty staff members initially recruited. It is hypothesized that this decline in participation was influenced by varying staff schedules and the increased workload associated with the recent implementation of a new electronic medical record system. The event achieved a 66% completion rate for both pre- and post-surveys. Notably, only three participants who did not complete the pre-survey subsequently completed the post-survey, and only one participant completed the pre-survey but not the post-survey. The surveys were made readily accessible during the event via printed QR codes. It is further posited that the proportion of participants who completed both surveys was affected by late arrivals or early departures due to EMS calls.

For data analysis, all surveys included an anonymous individual ID number, allowing pre- and post-data to be paired for analysis. Those surveys that did not complete the pre- or post-survey were excluded from data analysis for questions one through nine, but did remain for question ten, as this question was for universal suggestions to improve confidence. This resulted

in a total of seven surveys being used for data analysis, which is a significantly small sample size and may yield elevated statistical significance.

Figure 1

How confident are you in your ability to identify early signs and symptoms of acute stroke?

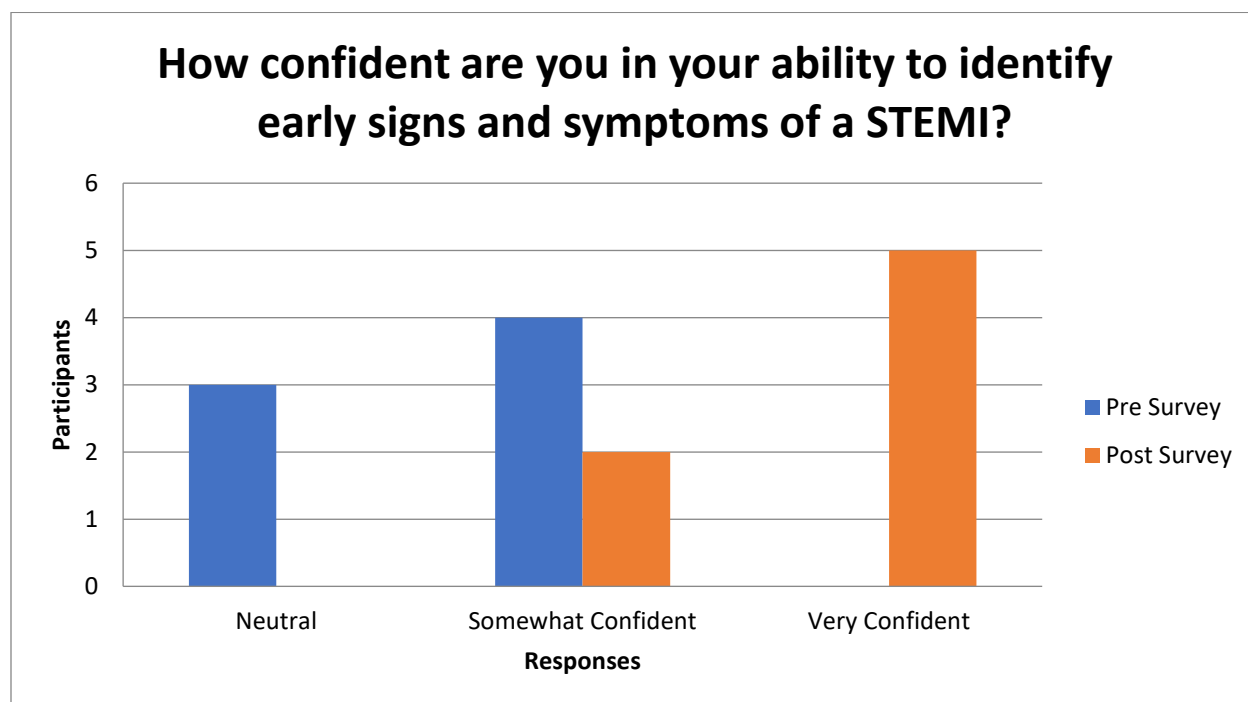


Before the event, four participants reported feeling somewhat confident in their ability to identify early signs and symptoms of an acute stroke. In comparison, two participants expressed a high level of confidence. After the simulation, only one participant remained somewhat confident, while six reported feeling very confident in their ability to recognize an acute stroke. The number of participants rating themselves very confident changed from 2 to 6 (a 200% increase). The percentage change was calculated by subtracting the post-survey responses for very confident from the pre-survey responses for very confident and dividing by the pre-survey responses. This was then multiplied by 100 to result in the percentage change. This calculation

was used for all percentage change calculations in this paper. This resulted in a p-value of 0.008, indicating statistical significance.

Figure 2

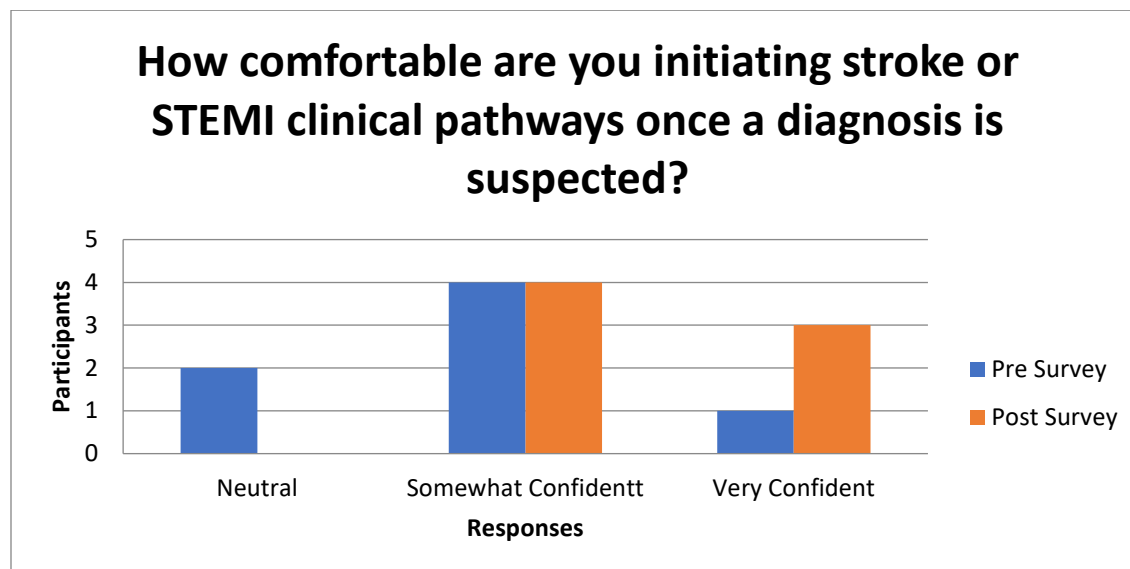
How confident are you in your ability to identify early signs and symptoms of a STEMI?



Before participating in the simulation, three participants reported a neutral perception of their ability to identify early signs and symptoms of a STEMI, while four participants felt somewhat confident. Following the intervention, confidence levels increased noticeably, with five participants stating they felt very confident in recognizing these signs and symptoms. In contrast, before the simulation, no participants rated themselves as very confident. This reflects a p-value of 0.00002, demonstrating statistical significance. The percentage change for this question could not be calculated as the starting result was zero respondents were very confident.

Figure 3

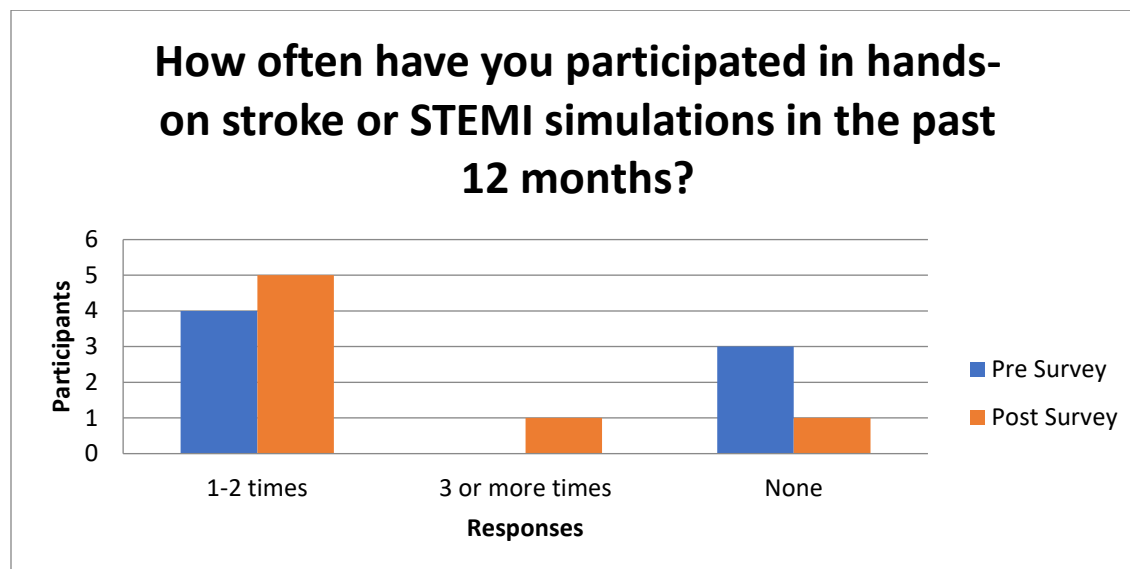
How comfortable are you initiating stroke or STEMI clinical pathways once a diagnosis is suspected?



This question showed a statistically significant change in responses between the pre- and post-surveys, as both surveys indicated moderate confidence levels. Notably, the number of participants rating their confidence as 'very confident' increased from one before the simulation to three afterward. The number of participants rating themselves as very confident increased from 1 to 3 (200% increase) after the simulation, resulting in a p-value of 0.03, which indicated statistical significance.

Figure 4

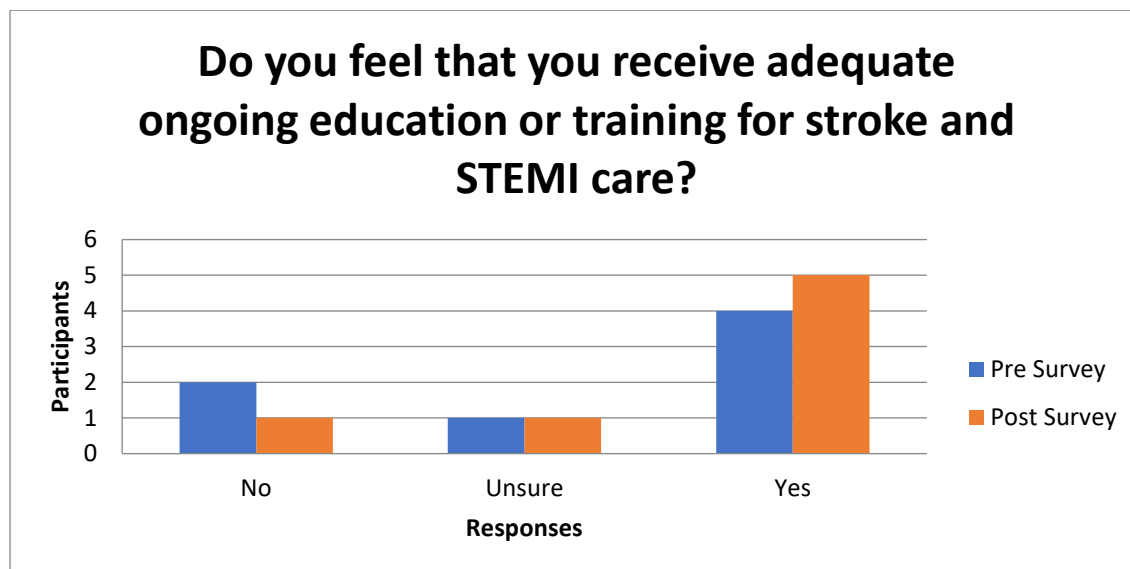
How often have you participated in hands-on stroke or STEMI simulations in the past 12 months?



Question four examined the frequency of participants' engagement in hands-on simulation events related to stroke or STEMI care within the past 12 months. The findings indicated that, before the survey, only four participants had participated in any simulation activities, while three had never engaged in such hands-on training. This also showed that, post-simulation, only one participant had participated in hands-on simulation three or more times.

Figure 5

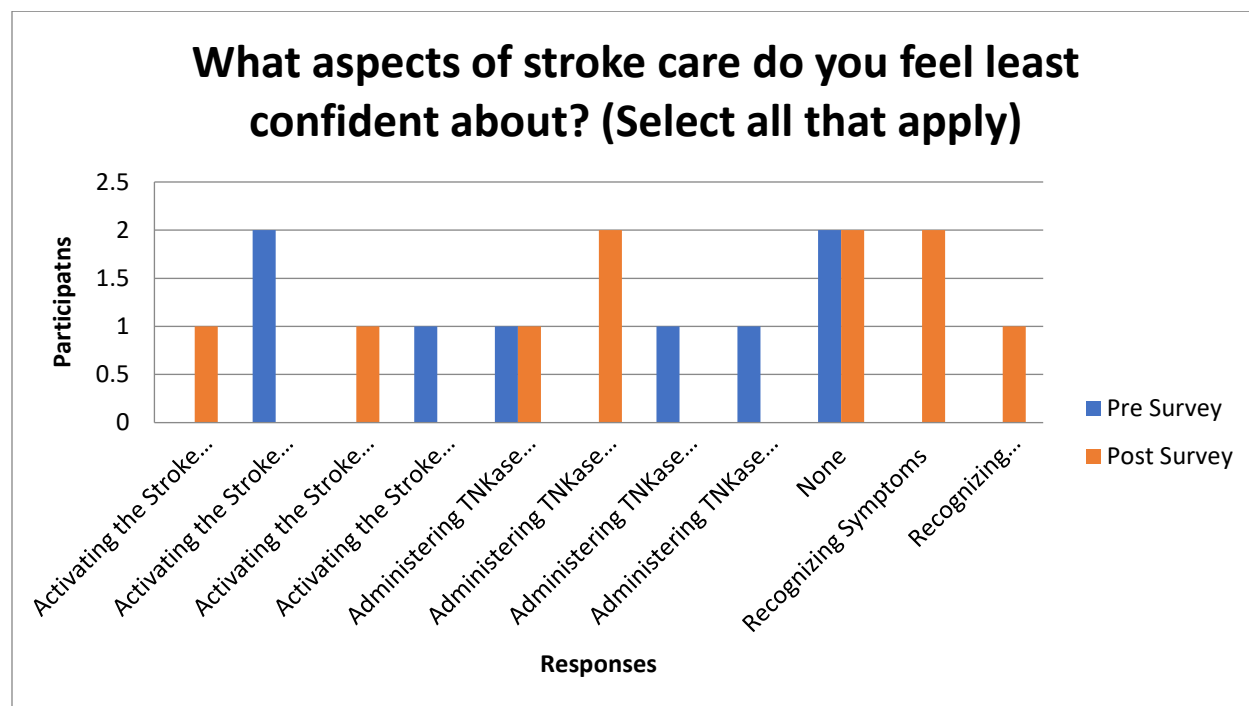
Do you feel that you receive adequate ongoing education or training for stroke and STEMI care?



Question five assessed participants' perceptions of the adequacy of ongoing education regarding stroke and STEMI care. Results showed that two participants responded 'no,' whereas four responded 'yes,' implying that only 57.1% of participants felt they had received sufficient education on this critical subject. Post-simulation responses showed that five participants now stated they felt they were receiving adequate ongoing education through participation in this simulation event.

Figure 6

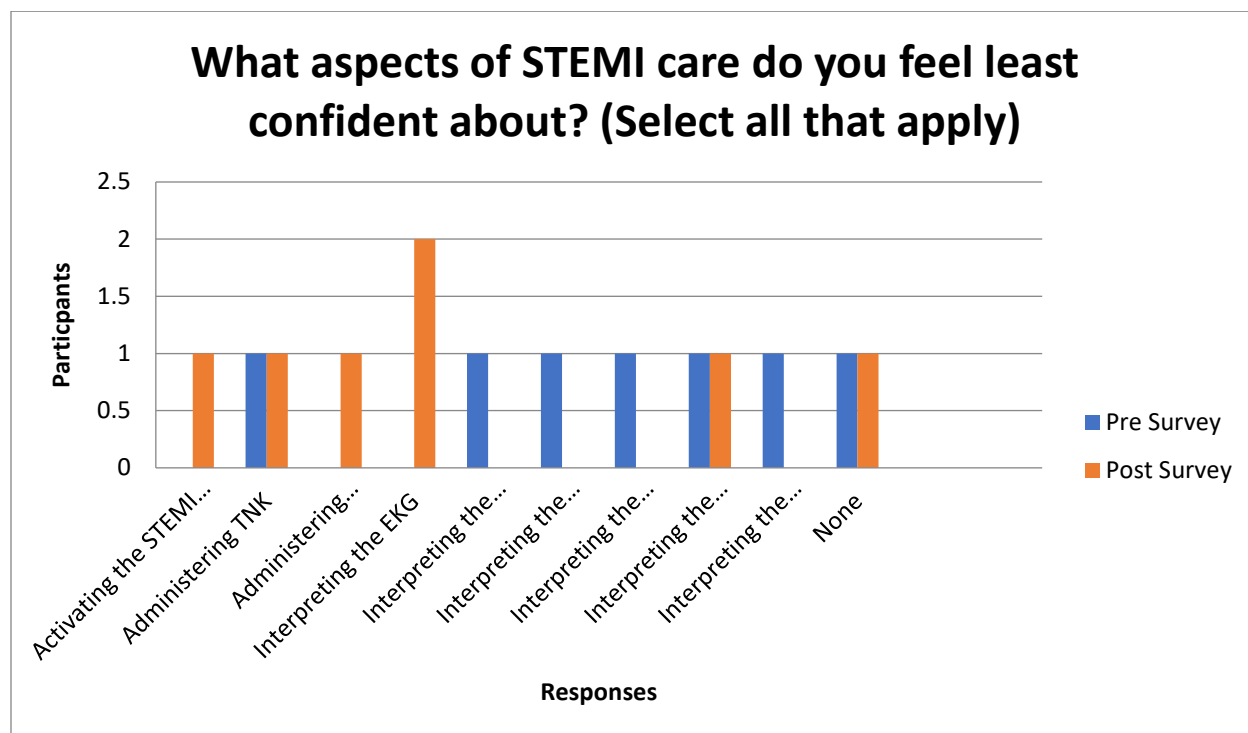
What aspects of stroke care do you feel least confident about? (Select all that apply)



Question six explored aspects of stroke care about which participants felt least confident, with the most common responses being the administration of TNKase, activation of the Stroke Alert, and communication with transfer centers.

Figure 7

What aspects of STEMI care do you feel least confident about? (Select all that apply)

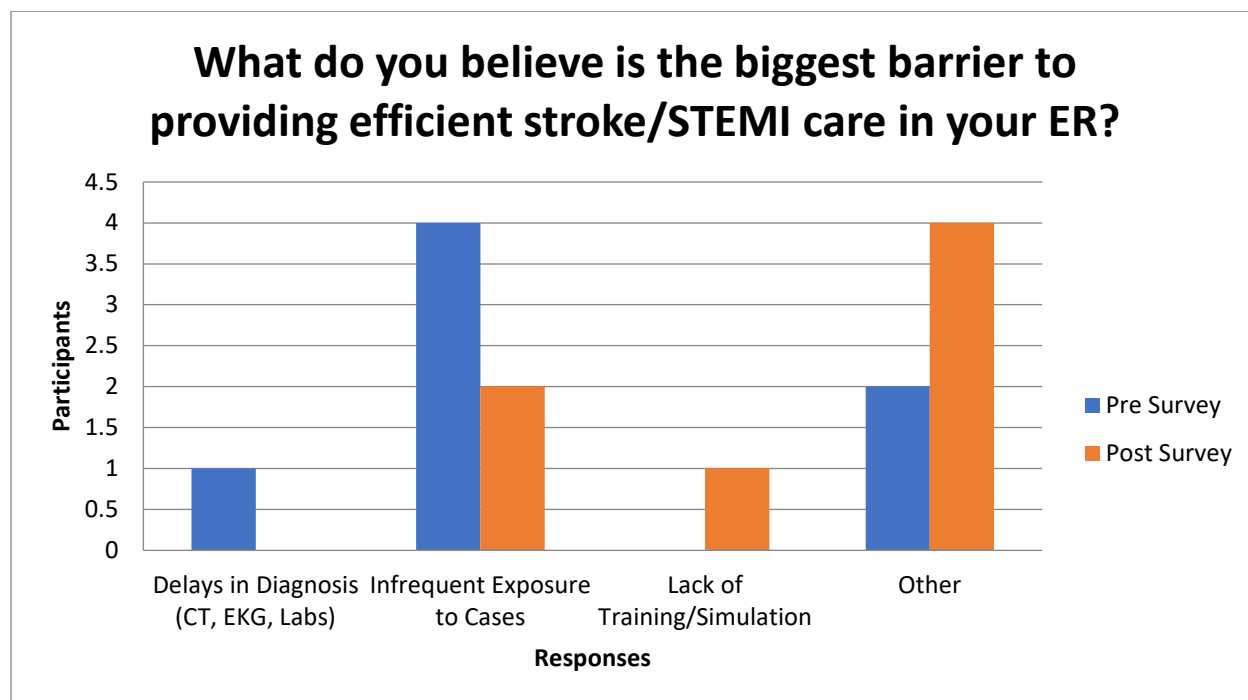


Question seven evaluated which components of STEMI care participants felt least confident in, revealing that the most frequently identified areas were EKG interpretation, understanding medication protocols, initiating the transfer process, and administering TNKase. The results showed that there were fewer selections of areas where staff felt least confident after participating in this simulation event.

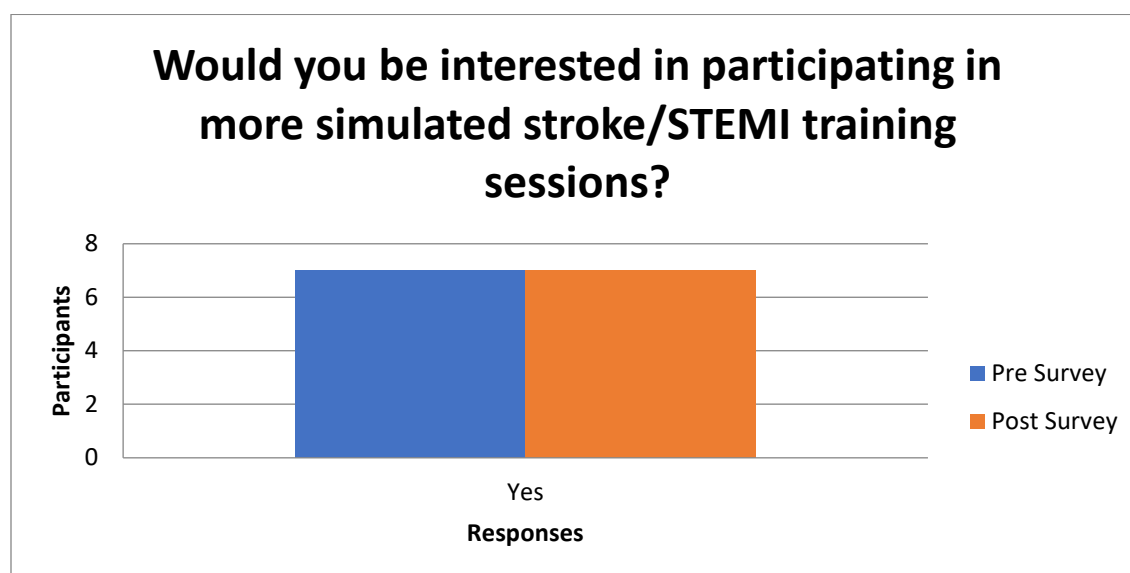
Regarding questions eight and nine, these aimed to identify the primary barriers perceived by staff in delivering adequate care and to assess participants' interest in engaging in additional simulation events. The most frequently cited barrier was infrequent exposure to relevant cases, while there was unanimous agreement among participants regarding their interest in further simulation activities.

Figure 8

What do you believe is the biggest barrier to providing efficient stroke/STEMI care in your ER?

**Figure 9**

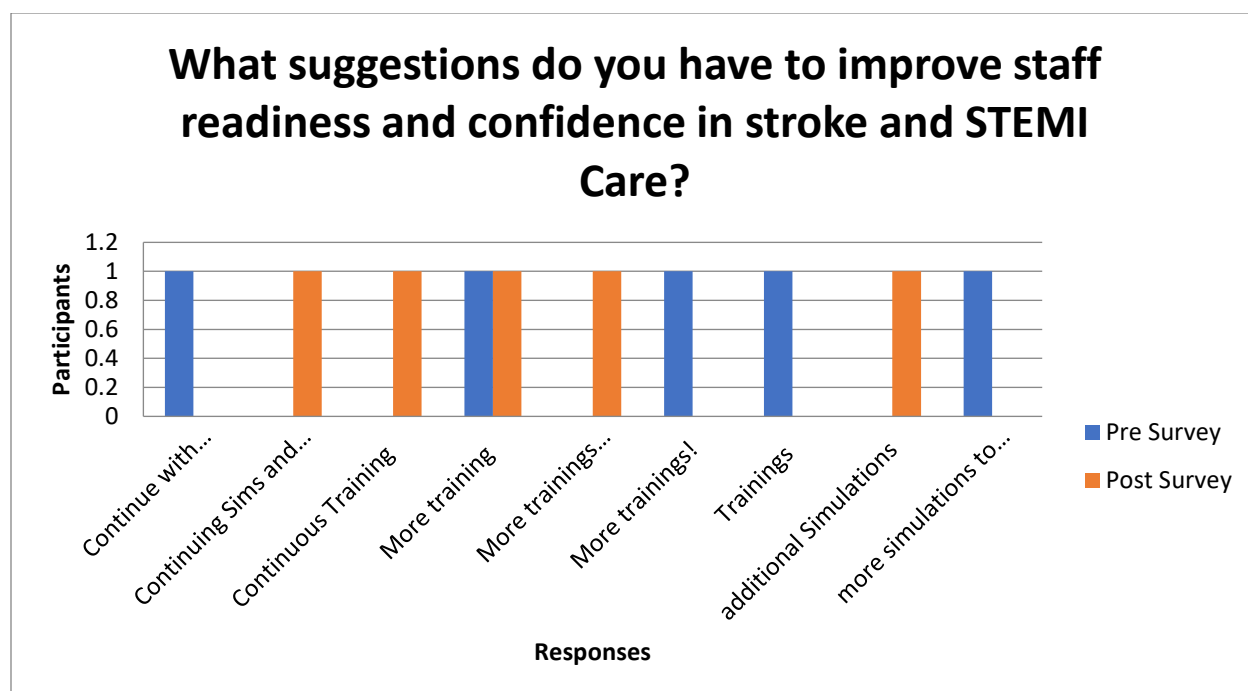
Would you be interested in participating in more simulated stroke/STEMI training sessions?



The final question solicited qualitative feedback on suggestions to improve staff readiness and confidence in managing stroke and STEMI cases. The predominant themes identified were a need for more training and additional simulation sessions.

Figure 10

What suggestions do you have to improve staff readiness and confidence in stroke and STEMI care?



Discussion

During the presentation, participants provided substantial positive feedback, highlighting the simulation's usefulness and its role in increasing their knowledge of best practices. A key discussion point was the request to laminate the new VAN score and position it in the ambulance for EMS personnel to complete before reaching the emergency department. Additionally, a recommendation was made to laminate these scores and incorporate them into the existing stroke packets available in the emergency department and on the nursing floor. Historically, EMS

personnel lacked access to the NIH scale for review and completion before hospital arrival. It was proposed that the NIH scale be laminated and made accessible within the ambulance for EMS staff. Both initiatives have now been implemented to enhance patient management outcomes.

Questions one, two, three, and five exhibited a confidence increase exceeding 100% between the pre- and post-surveys. Specifically, questions one and two assessed staff confidence in recognizing early signs of stroke and STEMI, with the observed increase significantly surpassing the targeted 25% improvement. These responses indicate that the project successfully achieved its goal. Question three evaluated confidence in initiating the stroke and STEMI pathways, which increased by 200%, as evidenced by completion of simulation-based education. This suggests enhanced staff ability to manage these conditions effectively upon patient presentation. Additionally, question five measured participants' perceptions of their educational adequacy regarding these conditions, demonstrating a 100% increase from pre- to post-survey.

The statistical analysis of questions one through three was conducted using a paired t-test with 95% confidence intervals, with a P-value of less than 0.05 considered statistically significant, along with the previously mentioned percentage increase. Responses to each question were rated on a scale from one ('not at all confident') to five ('very confident'). Seven participants completed both the pre- and post-surveys. For question one, the pre-survey mean was 4.14, which increased to a post-survey mean of 4.86, with a mean increase of 0.71 points ($p = 0.008$), indicating a significant rise in confidence in recognizing stroke symptoms. Question two showed a pre-survey mean of 3.57 and a post-survey mean of 4.71, with a mean improvement of 1.14 points ($p = 0.00002$), reflecting a highly significant enhancement in the ability to recognize

STEMI symptoms. For question three, the pre-survey mean was 3.86, rising to 4.43 post-survey, with a mean increase of 0.57 points ($p = 0.030$), demonstrating a significant but smaller effect regarding pathway initiation.

Alignment with DNP Essentials

This project aligned with the first DNP essential: Organizational and Systems Leadership for Quality Improvement and Systems Thinking (II), as established by the American Association of Colleges of Nursing (AACN). DNP Essential II aims to prepare graduates to lead quality improvement initiatives and enhance patient safety across healthcare systems, ensuring that all populations receive high-quality, safe care (“The Essentials of Doctoral Education for Advanced Nursing Practice,” 2006). Specifically, this project focused on improving quality by increasing staff education and confidence in caring for patients with stroke or STEMI. It also aimed to foster systems thinking by exposing staff to less frequently encountered cases, thereby enhancing their skills and competency. Furthermore, the project closely aligns with DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice, as demonstrated through the data collection and analysis process. Essential III emphasizes the use of research methods to gather relevant data, perform thorough analysis, and evaluate outcomes (“The Essentials of Doctoral Education for Advanced Nursing Practice,” 2006). This involved designing and implementing an intervention, collecting data from participants, and analyzing the results to inform practice improvements and guide the development of additional interventions.

This project emphasized the DNP Essential VI, which focuses on Interprofessional Collaboration for Improving Patient and Population Health Outcomes. The AACN regards DNP Essential VI as a critical standard that ensures Doctor of Nursing Practice (DNP) graduates

possess proficient communication and collaboration skills. These competencies enable graduates to develop and implement innovative practices for patient populations and to effectively lead diverse interdisciplinary teams (“The Essentials of Doctoral Education for Advanced Nursing Practice,” 2006). The initiative aimed not only to strengthen nursing confidence and competence in providing stroke and STEMI care but also to improve emergency medical services’ knowledge and confidence in managing patients with these conditions, ultimately facilitating optimal outcomes. This example exemplifies how interprofessional collaboration can be leveraged to reduce adverse patient outcomes and enhance future performance metrics, such as door-to-CT and door-to-needle times.

Sustainability

This project demonstrated significant potential for sustainability by fostering ongoing improvements in staff confidence and competence in the care of patients experiencing stroke or STEMI medical events. All patient care scripts were provided to the current Stroke and STEMI coordinator at St. Mary’s Health. Furthermore, data collection indicated that staff members are interested in continued education and simulation exercises to enhance their practice in managing these critical conditions. Additionally, the Stroke and STEMI coordinator will continue to collaborate with EMS personnel to ensure they feel well-supported and confident in delivering optimal care to stroke and STEMI patients.

Limitations

The limitations of this study include a small sample size ($n = 7$), as it was conducted explicitly within a single rural hospital setting and subsequently generalized to emergency room nurses and EMS providers associated with one EMS company. Despite efforts to promote

participation through email invitations and verbal reminders, attendance was limited to eleven individuals, which is considerably fewer than the total number of nursing, provider, and EMS staff currently employed at the facility. Although a statistically significant increase in staff confidence was observed following the simulation, it remains unclear whether similar results would be obtained in other rural hospitals in north-central Idaho. Furthermore, only one EMS company among many that transport patients to St. Mary's Health participated in the simulation, thereby limiting the dissemination of current protocols to other EMS agencies that serve this facility.

Conclusion

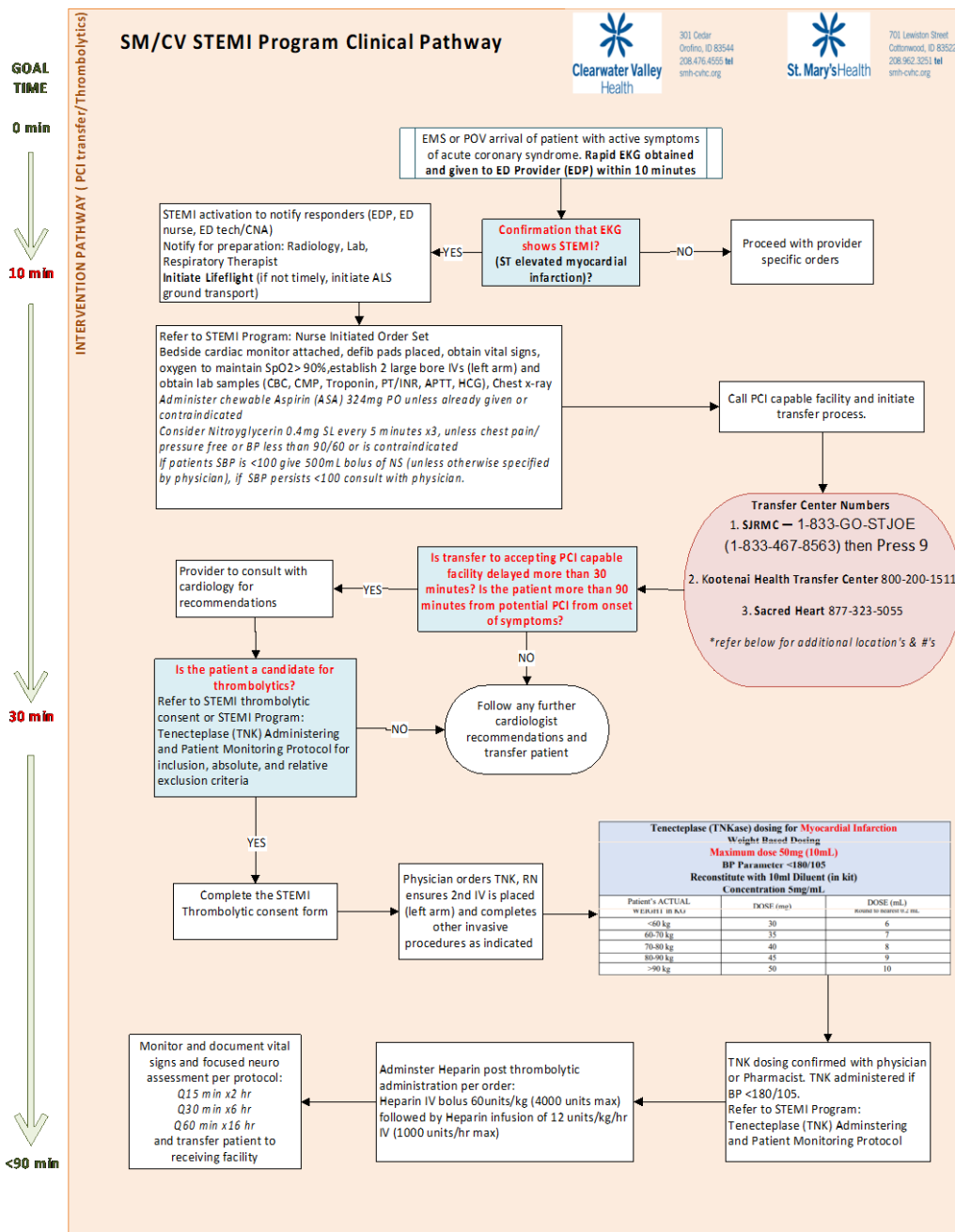
The objective of this Doctor of Nursing Practice (DNP) project was to enhance staff education and confidence in managing stroke and STEMI cases within the emergency department at St. Mary's Health. This was achieved through the implementation of simulated training sessions. Results indicated a significant increase in staff confidence levels regarding the recognition of stroke and STEMI symptoms, as well as adherence to established protocols for these conditions, both before and after the simulation exercises. Furthermore, feedback revealed a substantial demand for increased exposure to relevant cases and additional educational and simulation opportunities. This quality improvement (QI) initiative demonstrated that an evidence-based simulation focusing on stroke and STEMI care can effectively augment healthcare providers' knowledge and confidence, ultimately improving patient care outcomes in rural North Central Idaho.

Implications for Future Practice

This quality improvement project has significant implications for future clinical practice in rural North Central Idaho. Its primary benefit is that regular simulation exercises can reinforce current protocols while enhancing staff knowledge and confidence in caring for critically ill patients. Furthermore, ongoing simulations will improve staff ability to recognize specific signs and symptoms, potentially leading to reductions in door-to-CT, door-to-EKG, and door-to-needle times. Additionally, sustained simulation efforts may foster stronger collaborations between rural hospitals and regional centers, where these patients are frequently transferred for definitive care, thereby enabling participation from both sites in these training events.

Appendix A

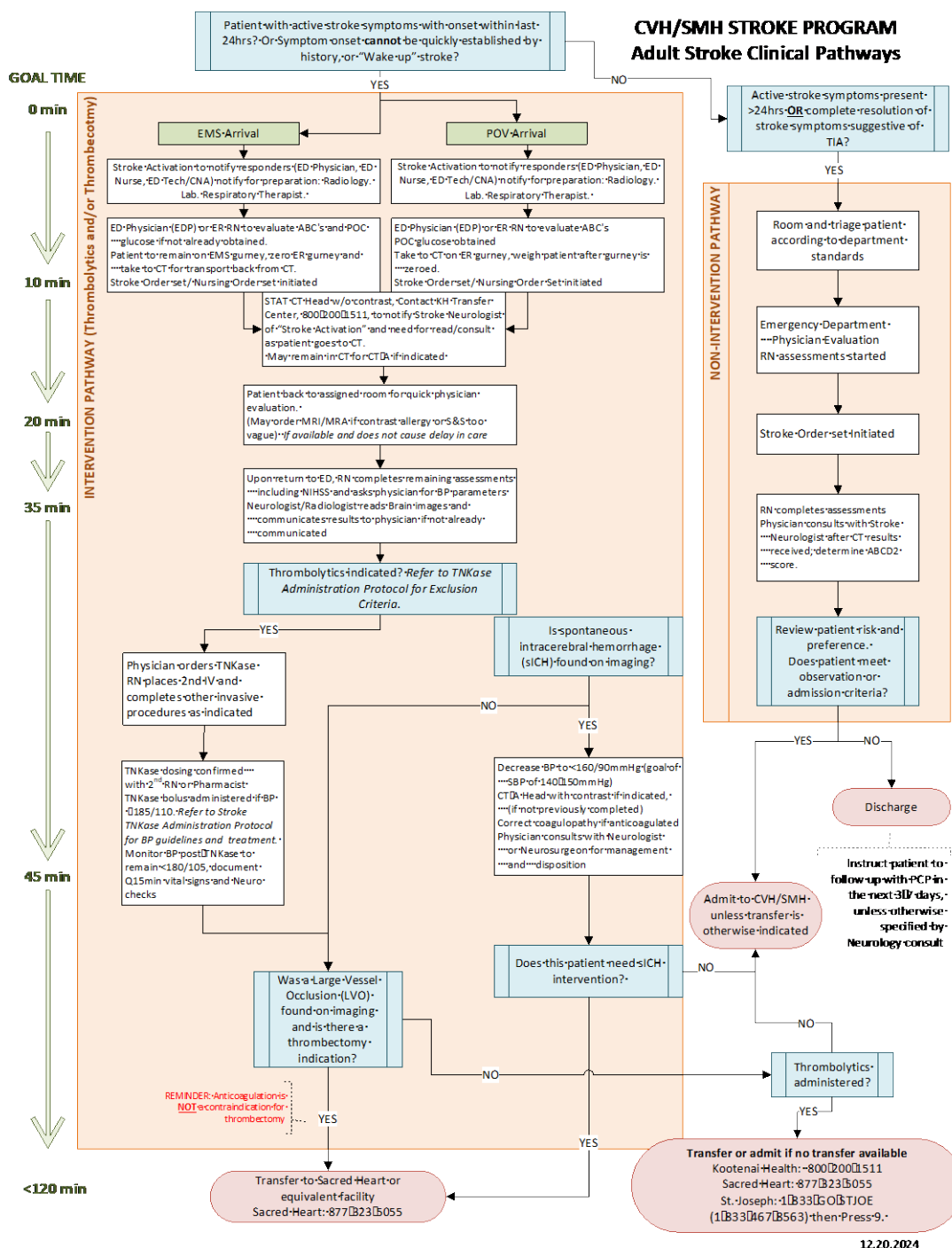
SM/CV STEMI Program Clinical Pathway



***additional transfer locations & phone #'s:**
 Deaconess: 855-473-7772 or 509-473-7770 or 855-647-3030 SL. Patricks-Missoula 888-878-7287 Missoula-Community Medical Center: 406-327-4726

Appendix B

CVH/SMH Stroke Program Adult Stroke Clinical Pathway



Appendix C
Acute Stroke Worksheet

Acute Stroke Worksheet

Protocol for Acute Stroke – Refer to Adult Stroke Clinical Pathway & Related Policies

Last Known Well – Date / Time _____ ED Arrival - Date / Time _____
 Mode of Arrival (circle): POV EMS / Agency _____ CT Time: _____
 CT Read Time _____ Neuro Consult Time _____ TNKase Admin. Time _____
 Call to Transport Time _____ Depart Time _____ Arrival NIH _____ Depart NIH _____

M/F _____ AGE _____ HT _____ WT (KG) _____ IV Contrast Allergy? (Y/N) _____ Pre-med? _____
 CTA Time _____ CTA Read Time _____ Bedside Glucose Time / Result _____ / _____
 NPO Since? _____ ECG Rhythm _____ Previous CVA / TIA / ICH? _____
 Initial V/S BP _____ P _____ R _____ T _____ O2 Sat _____
 Anticoagulant / Antiplatelet? _____ Med Name & Dose _____ Last Taken _____
 LAB / XRAY Ordered (circle)? (do not delay transport for results) PT/PTT BMP CBC CXR EKG

BLOOD PRESSURE MANAGEMENT GUIDELINE: (Orders for medications must be entered in the EMR)

For thrombolytic eligible patients: Ensure BP less than 185 mm HG systolic and less than 110 mm HG diastolic before TNKase administration, AND less than 180/105 mm HG for the first 24 hours after treatment. (Unless otherwise specified by neurologist.) DO NOT give thrombolytics if BP goal isn't achieved.

For hemorrhagic stroke patients: Ensure BP is less than 160/90. Goal SBP is 140-150

- NICARDIPINE 40 mg in 200 ml 0.9NS IV Infusion. Initial dose: 5mg/hr.
May increase by 2.5 mg / hr, every 5 minutes up to a maximum rate of 15 mg/hr.
- Labetalol 10 mg IV over 1 minute. (Hold for HR <60)
- If BP goal not met with first dose of Labetalol, may give Labetalol 20 mg IV over 1 minute. (Hold for HR <60)

If unable to meet BP goals, DO NOT give TNKase. Notify MD.

TNKase DOSING GUIDELINE: (Orders for medications must be entered in the EMR)

To be given within 0 - 4.5 hrs of symptom onset. Ensure invasive procedures are completed prior (IV, F/C, etc.)

- TNKase (Tenecteplase) 0.25 mg/kg IV over 5 seconds. (Maximum dose 25mg)
Double check dose with MD or second RN, review contraindications, and have patient sign consent.
Use 'Neuro Check / V/S Monitoring Worksheet' post-TNKase, and keep SBP w/in parameters set by MD /Neurologist

RN Signature: _____ MD Signature: _____

Send 1 copy with transferring patient, and 1 copy to Stroke Coordinator. (Not a permanent part of patient chart.) This information is intended as a guideline only. Please use your best judgement and document in EMR as well as this form.

Patient Label

Appendix D

Site Authorization Letter/The University of Arizona Institutional Review Board

Determination Letter

St. Mary's Health
701 Lewiston St
Cottonwood, ID USA 83522

Date: March 25, 2025

Human Subjects Protection Program
The University of Arizona
845 N Park Ave., Suite 537A
Tucson, AZ 85719

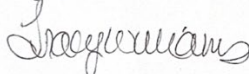
Please note that Ms. Lindsay Stryhas, a University of Arizona Doctor of Nursing Practice student, has permission from the St. Mary's Health Hospital to conduct a quality improvement project at our facility for her project, "Stroke and ST-Segment Evaluation Myocardial Infarction Care in Rural North Central Idaho."

Ms. Stryhas will conduct a pre-survey, deliver an education presentation, and then conduct a post-survey of healthcare providers at St. Mary's Health. She will recruit providers through email. The email will describe the project, what they will be asked to do, and the time involved. Ms. Stryhas's activities will be completed by October 31st 2025.

Ms. Stryhas has agreed to provide my office with a copy of the University of Arizona Determination before she recruits participants. She will also present aggregate results to the providers at their monthly staff meeting.

If you have any questions, please get in touch with my office.

Signed,



Tracy Williams MSN, RN
Director of Nursing
St Mary's Health



University of Arizona IRB
 845 N Park Ave., Suite 537A
 Tucson, AZ 85719
 Fax: 520-621-9810
VPR-IRB@arizona.edu

NOT HUMAN RESEARCH

June 26, 2025

Lindsay Stryhas

Dear Lindsay Stryhas:

On 6/26/2025, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title:	STROKE AND ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION CARE IN RURAL NORTH IDAHO
Investigator:	Lindsay Stryhas
IRB Submission ID:	STUDY00006590
Sponsor:	None
Prime Sponsor:	None
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Advisor Attestation.pdf, Category: Institutional Approval; • Email.docx, Category: Recruitment Materials; • Informed_Consent_STEMI_Stroke_Simulation.docx, Category: Consent Form; • IRB-Protocol-for-Determination-of-Human-Research-v2025-03-Lindsay Stryhas (1).docx, Category: IRB Protocol; • Simulation Outline.docx, Category: Participant Material; • St. Mary's Health.pdf, Category: External Site Authorization; • Stroke_STEMI_Confidence_Survey_Updated.docx, Category: Participant Material;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.



Appendix E
Staff Confidence Survey

Staff Confidence Survey: Stroke & STEMI Care in the Emergency Room

1. How confident are you in your ability to identify early signs and symptoms of acute stroke?
 Very confident Somewhat confident Neutral Slightly confident Not confident at all
2. How confident are you in your ability to identify early signs and symptoms of a STEMI?
 Very confident Somewhat confident Neutral Slightly confident Not confident at all
3. How comfortable are you initiating stroke or STEMI clinical pathways once a diagnosis is suspected?
 Very comfortable Somewhat comfortable Neutral Slightly comfortable Not comfortable at all
4. How often have you participated in hands-on stroke or STEMI simulations in the past 12 months?
 3 or more times 1-2 times None
5. Do you feel that you receive adequate ongoing education or training for stroke and STEMI care?
 Yes No Unsure
6. What aspect of stroke care do you feel least confident about? (Select all that apply)
 Recognizing symptoms Activating the stroke alert pathway Administering TNKase (thrombolytics) Completing NIH Stroke Scale Communicating with Transfer Centers
 None Other: _____
7. What aspect of STEMI care do you feel least confident about? (Select all that apply)
 Interpreting the EKG Activating the STEMI alert Administering TNK Initiating transfer to PCI facility Understanding medication protocols (Aspirin, NTG, Heparin, etc.)
 None
8. What do you believe is the biggest barrier to providing efficient stroke/STEMI care in your ER?
 Lack of training/simulation Infrequent exposure to cases Poor interdisciplinary communication Delays in diagnostics (CT, EKG) Lack of clear protocols Other: _____
9. Would you be interested in participating in more simulated stroke/STEMI training sessions?
 Yes No Maybe
10. What suggestions do you have to improve staff readiness and confidence in stroke and STEMI care?

Appendix F
Stroke TPA Protocol



Document Title	Stroke Program: Tenecteplase (TNKase) Administration for Acute Stroke	Version	1
Approved By	Stroke & Stemi Policy Review Committee, Director of Nursing Services, Director of Quality Assurance, REGISTERED NURSE	Approval Date	08/19/2024
Reviewed By	*Policy Admin Group*	Reviewed Date	08/19/2024

PURPOSE:

To guide the care of stroke patients.

SCOPE:

Medical Providers (MD, DO), trained registered nurses (RN) in the Emergency Department, Charge RN (SMH) or the Rapid Response charge RN (CVH) will be guided on the care for the stroke patient population outlined in this policy.

POLICY:

Tenecteplase (TNKase) shall be considered for all patients ≥ 18 years of age presenting with new signs/symptoms of stroke. In cases younger than 18 years of age, ED Providers are advised to review the case with a pediatric neurologist skilled in strokes and neurovascular diseases within feasible time and available resources. ED Provider must consult with neurologist at accepting facility for guidelines of TNKase administration. Eligibility for intravenous (IV) TNKase therapy is based upon inclusion and exclusion criteria. These guidelines may include but are not limited to:

Prior to Tenecteplase (TNKase) Administration:

1. Obtain a brief history including establishing Last Known Well (LKW) time and determine if patient is a thrombolytic candidate. Refer to inclusion/exclusion criteria below.
2. ED Provider will communicate with RN regarding administration of TNKase.
3. ED Provider will review and obtain consent, if appropriate, for TNKase administration.
4. ED Provider or RN will obtain NIHSS. If RN performs the NIHSS, RN will notify ED provider of results.
A NIHSS must be obtained no more than 15 minutes before TNKase bolus is administered.
5. Review vital signs and necessary labs before administration of TNKase.
6. Obtain accurate patient weight in kilograms (kg).
7. Systolic blood pressure (SBP) > 185 mmHg or diastolic blood pressure (DBP) > 110 mmHg, order appropriate anti-hypertensive medication.
8. Ensure invasive procedures, such as IV starts, are complete

Inclusion Criteria

1. Symptoms suggestive of ischemic stroke that are deemed to be disabling, regardless of improvement (see Reference Table for "Disabling vs Non-disabling" deficits below)
2. Able to initiate treatment within 4.5 hours of Time Last Known Well
3. Age 18 years or older (younger than 18 years, thrombolytics should be considered in the appropriate patient with immediate consult to a pediatric neurologist if feasible, and transfer initiated.)

Absolute Exclusion Criteria (contraindications):

1. CT Scan demonstrating intracranial hemorrhage
2. Unable to maintain BP $< 185/110$ despite aggressive antihypertensive treatment
3. Blood Glucose < 50 mg/dl (however, should treat if stroke symptoms persist after glucose normalized)

Appendix G
STEMI TPA Protocol



Document Title	STEMI Program: Tenecteplase (TNK) Administering and Patient Monitoring Protocol for STEMI	Version	1
Approved By	Stroke & Stemi Policy Review Committee, Director of Nursing Services, Director of Quality Assurance, REGISTERED NURSE	Approval Date	09/19/2024
Reviewed By	*Policy Admin Group*	Reviewed Date	09/19/2024

PURPOSE: To guide care for administering thrombolytics- in the critical access hospital for a STEMI patient as directed by the receiving facility cardiologist to undergo timely primary percutaneous coronary intervention (PCI).

SCOPE: Medical Providers (cardiologist, ED physician), registered nurses (ED, Rapid Response) at St. Mary's Health and Clearwater Valley Health hospital settings.

POLICY: Tenecteplase (TNK) administration shall be considered for STEMI patients at the critical access hospital. Cardiologist consult is recommended prior to giving thrombolytics. These are general guidelines and may not apply to every situation and should not result in delays of care.

Inclusion Criteria: Diagnosis of STEMI on EKG (see criteria below) and if transfer is delayed or if patient is too unstable and FMC to PCI is anticipated to exceed 120 min. All patients receiving TNK at St. Mary's Health/Clearwater Valley Health should be transferred.

- A. Chest discomfort or cardiac related symptoms with associated ECG changes significant for ST elevation MI. Chest pain greater than 15 minutes, but less than 12 hours. Or 12-24 hours if there is ongoing ischemia.
- B. ST elevation in at least 2 contiguous leads with the following cutoffs:
 - a. V2-V3: > 2mm men >40 years old, > 2.5 mm in men < 40 years old or > 1.5 mm in women regardless of age
 - b. All other leads > 1 mm.
- C. New or presumably new Left Bundle Branch Block in STEMI patients and positive Sgarbossa criteria with symptom onset within 12 hours.
 - a. Sgarbossa A (or 1): In any lead when you have at least 1 mm of concordant ST elevation, i.e. if the QRS primary points up and the ST elevation is in the same direction that equates to occlusion.
 - b. Sgarbossa B (or 2): In V1, V2, or V3, if you have concordant depression of at least 1 mm, it is considered positive for ischemia
 - c. Sgarbossa C (or 3): Modified criteria - In one or more leads anywhere, when QRS complex is inverted, if there is ST elevation (which can be normal) of 25% or more of the size of the S wave, this is positive for ischemia.
- D. ST depression in > 2 precordial leads (V1-V4) may indicate posterior STEMI.

Appendix H
Consent Document

St. Mary's Health

Informed Consent for Participation in Simulation-Based Quality Improvement Project

Title: Simulation Event for STEMI and Stroke Patient Care Improvement

Principal Investigator: Lindsay Stryhas, BSN, RN

Project Location: St. Mary's Health

Date: September, 2025

Introduction

You are being asked to participate in a simulation event designed to improve the care provided to patients experiencing ST-Elevation Myocardial Infarction (STEMI) and Stroke. This simulation is part of a Quality Improvement (QI) project at St. Mary's Health. Your participation is entirely voluntary.

Purpose of the Project

The purpose of this quality improvement project is to identify system-level gaps, enhance interprofessional communication, and improve adherence to current STEMI and Stroke care protocols through simulation-based learning and debriefing. Additionally, anonymous pre- and post-event surveys will be used to assess participant knowledge, confidence, and perceptions before and after the simulation.

Procedures

If you agree to participate:

- You will complete an anonymous pre-event survey assessing your current knowledge and confidence regarding STEMI and Stroke care.
- You will then take part in a simulated clinical scenario involving a STEMI or Stroke patient, conducted in a realistic setting using mannequins and institutional protocols.
- After the simulation, you will engage in a structured debriefing session.
- Finally, you will complete an anonymous post-event survey to evaluate the impact of the simulation on your learning and practice.

Confidentiality

- No personally identifiable information will be collected or linked to your responses or performance.
- Survey responses will be kept anonymous and used solely for internal quality improvement.
- Simulation participation will not be used for performance evaluation or credentialing.

Appendix I
Recruitment Material

Dear St Mary's Health Staff,

I am inviting you to participate in a simulation event focused on the emergency care of Stroke and STEMI (ST-Elevation Myocardial Infarction) patients. This simulation is designed to mirror real-life emergency scenarios and will provide an opportunity for staff to practice rapid, evidence-based interventions in a supportive learning environment. This simulation is part of a Quality Improvement (QI) project aimed at enhancing staff readiness and improving the efficiency and outcomes of acute care for time-sensitive conditions like Stroke and STEMI.

Your participation will help us:

- Identify workflow barriers
- Improve interdisciplinary team communication
- Strengthen clinical decision-making under pressure

This simulation event is also being conducted as part of a quality improvement project.

- Participation is voluntary.
- All responses and observations will remain anonymous.
- By choosing to participate in the simulation, you are giving your consent to be included in this project.

No identifying personal or performance data will be collected or reported. The goal is to evaluate systems and protocols, not individual performance.

I appreciate your dedication to excellence in emergency care. Your participation is vital to improving outcomes for our most critical patients.

Thank You,

Lindsay Stryhas, BSN, RN

University of Arizona College of Nursing

DNP – AGACNP Student

Appendix J
Simulation Outline

Simulation Outline

Stroke Patient

- Patient will present with left sided weakness with onset of 45 mins prior to calling EMS.
- Patient Background
 - Name: "John Doe" 72-year-old male
 - Chief Complaint: Slurred Speech and left-sided weakness
 - Time Last Known Well: 45 mins prior to calling EMS
 - History: HTN, A-Fib (on Warfarin), type 2 diabetes
- Staff will work through current STROKE Pathway

STEMI Patient

- Patient will present to the emergency room directly with onset of sharp chest pain 15 mins prior
- Patient Background
 - Name: "Joe Smith" 58-year-old male
 - Chief Complaint: Sharp Chest Pressure x 15 mins, radiates to left arm
 - Vitals: HR 110, BP 142/88, RR 22, SpO2 96%, Temp 98.4 F
 - History: HTN, Hyperlipidemia, Smoker
 - NKDA, no prior MI
- Staff will work through current STEMI Pathway

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