

BRAVEST: A Visual Teaching Aid for Stroke Clinicians

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Abstract

Stroke clinicians incorporate essential stroke care measures into their professional practice within certified stroke centers on a regular basis. Supported by evidence-based guidelines, these time-sensitive care requirements target the unique needs of stroke patients making them essential for optimal translation to bedside clinical practice. Varied interprofessional staff learning styles call for educational instruction to be engaging and innovative to yield intended results. This article introduces a new learning tool called *BRAVEST* (B: Blood pressure; R: Rehabilitation; A: Antithrombotics; V: Venous thromboembolism prophylaxis; E: Education; S: Statins therapy; T: Thrombolysis/Thrombectomy), a custom-made visual aid that presents evidence-based, certification-required acute stroke care as a creative mnemonic infographic to enhance interprofessional stroke clinicians' learning and retention.

Key words: Acute stroke, clinical education, knowledge retention, education modalities, teaching-learning methods.

INTRODUCTION

Interprofessional stroke clinicians that practice in certified stroke centers must be confident in their delivery of neurovascular care.¹ Clinical proficiency in acute stroke processes and secondary stroke prevention performance measures requires specialized knowledge that is best reinforced with stroke-specific education. Such training is especially important in centers where clinicians practice on mixed medical-surgical units instead of highly specialized stroke units. In the United States, regulatory bodies including The Joint Commission² and Det Norske Veritas³ require annual stroke education for staff working within all levels of stroke certified hospitals, with programs often assigning routine, adynamic learning modules to ensure attainment of required educational hours. However, this form of didactic education can be unengaging and non-specific, lacking the focus necessary to

drive performance improvement and retention of meaningful practice information. This results in a gap between authentic knowledge attainment and practical application of new material that is evident at the bedside, and ultimately may impact patient wellbeing through care delivery errors, and loss of hospital specialty certification. Zelenikova and colleagues found that for nurses, potential errors degrade self-confidence, and lead to work dissatisfaction⁴ and although these investigators' work was limited to nurse subjects, it is likely applicable to all stroke clinicians. To ensure educational efforts prepare clinicians for the practice environment, targeted content on stroke performance measures should be included in stroke training activities. The aim of this project was to develop an engaging mnemonic infographic to meet this need as an



innovative visual teaching tool to complement didactic education.

LITERATURE REVIEW

Learning occurs differently in each person, requiring instructional strategies that consider two key elements: 1) The educational content being shared; and 2) the teaching modality being utilized. A literature search was conducted to examine evidence supporting mnemonic infographics as effective teaching and learning tools to enhance knowledge retention and practice change in healthcare. Search terms included *education*, *infographics*, *mnemonics*, *multimedia learning*, and *visual learning tools*. Three major recurring themes emerged from this review: 1) Visual learning; 2) cognitive processing; and 3) knowledge transfer.

Visual Learning

Visual learning modalities are one of the most important methods that educators utilize to meet the needs of learners.⁵ Polowsky and Steciuch⁶ demonstrated that instruction with multi-media infographic tools utilizing visual graphics and animation yielded more knowledge in food science students than traditional lessons that lacked visual aids. Infographics used in a hybrid learning environment have also been shown to have a positive effect on physics students' attitudes toward technology in learning.⁷ Visual infographics have also been found to be beneficial and convenient as a method to summarize full length text articles.⁸

Cognitive Processing

Learning is impacted by the content of instructional materials as well as the learner's cognitive processing.⁹ Learning materials featuring the same information presented by more than one source and method (*content*

redundancy) as in multimedia content, leads to better learning outcomes than when presented concurrently using a singular source.⁹ In another study on infographic use in second language learning among Arabic speaking students, Alwadei and Ali Mohsen¹⁰ found that the experimental student group who received instruction via visual means achieved better scores on vocabulary recognition and vocabulary production than control group students who received traditional teaching. These results were no surprise given that infographic learning aligns with Robert Mayer's Cognitive Theory of Multimedia Learning which postulates that learners process information better when pictures and words are presented in combination.¹¹ Additionally, Ongor and Uslusoy⁵ explored use of multimedia-based education in a cohort of nursing students, finding that those in the experimental group who received multiple visual applications in their instruction achieved better cognitive learning outcomes than those in the control group who received only simple power point instruction.

Knowledge Transfer

Knowledge transfer initiated by an educator using visual educational tools can lead to behavior change. Egan and colleagues found that the use of infographics decreased cognitive burden and increased knowledge attainment, compared to teaching that lacked visual stimulation.¹² Mnemonic checklists utilized by hospital clinical teams have also been shown to trigger learning and behavior alignment in care delivery that leads to improved patient safety.¹³ Page and colleagues found that use of visual mnemonic learning tools by nurses resulted in increased recall, knowledge, and improved rates of education of cancer patients.¹⁴ Similar results were found by Carter and colleagues who found that use of a mnemonic was associated with improved workflow compliance in the



identification of penicillin allergies.¹⁵

Collectively, the evidence that supports infographic mnemonic learning demonstrates the effectiveness of this method to improve visual learning, cognitive processing, and knowledge transfer. These findings support the development of a learning tool focused on required acute stroke knowledge using this innovative approach.

DEVELOPMENT OF BRAVEST

BRAVEST was designed using a framework the encompassed visual learning, cognitive processing, and knowledge transfer principles, making it a non-traditional teaching tool to complement standard didactic instruction for stroke clinicians. BRAVEST is an original design that features mnemonic infographic content that converts leading evidence-based stroke care into a single visual aid to guide and impart knowledge on stroke performance measures and improve translation to practice (Figure 1). In alignment with Robert Mayer's Cognitive Theory of Multimedia Learning,¹¹ BRAVEST is an example of instructional material that stimulates visual cognitive pathways to promote learning by presenting text and images together.

BRAVEST was designed using the web-based Canva® graphic design application.¹⁶ The mnemonic is depicted vertically and spells out BRAVEST using the first letter of each key word on the graphic. Next to each line of text is a Canva®-generated graphic image that corresponds to each key word. Each letter of BRAVEST is a specific stroke care item assimilated from the American Heart Association / American Stroke Association clinical practice guidelines for acute ischemic stroke:¹⁷

B: Blood pressure (know parameters); image of blood pressure cuff.

R: Rehabilitation (PT, Speech & Swallow); image of a woman speaking and physical therapist walking a patient.

A: Antithrombotics (both antiplatelets and anticoagulants); image of a bottle of aspirin.

V: Venous thromboembolism prophylaxis (mechanical or anticoagulant); image of a lower leg with arrows pointing inward.

E: Education (patient and family); image of an open book with a hovering brain.

S: Statin therapy (high intensity); image of a cross section of a cholesterol-lined artery.

T: Thrombolysis (and thrombectomy); image of pink brain with darkened area of stroke.

The infographic's multimedia elements were chosen to enable learners to visualize information.¹⁸ The configuration of text and picture together aim to generate the cognitive eye and mind connection.¹⁹ The checklist-like layout of mnemonic and text intends to assist learners with mental organization.²⁰ The back of the BRAVEST graphic displays a reference list in a visually similar layout citing available resources demonstrating to users the necessary connection between the educational content and evidence-based practice recommendations. As an added creative element, the term BRAVEST carries a known definition that relates conceptually to moral strength and courage.²¹ As such, the mnemonic and title BRAVEST are expected to carry a positive association to motivate stroke clinicians to apply evidence in practice supported by use of the learning tool.

Introducing BRAVEST to stroke clinicians should occur in tandem with the descriptions of each corresponding care item listed in Table 1. Comprehension of the rationale behind stroke treatment and how it applies to practice are central to ensuring that evidence-based care is rendered appropriately to acute

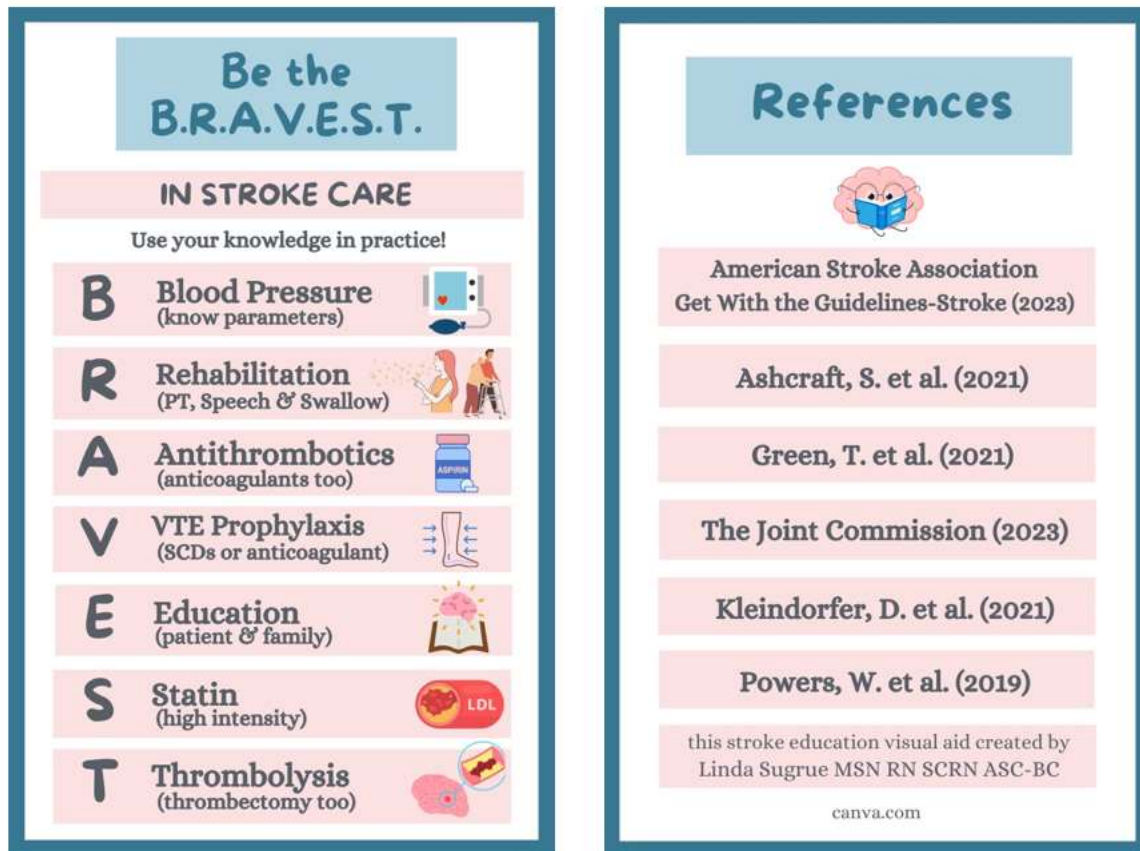


Figure 1: The BRAVEST Mnemonic Infographic

stroke patients. Shifting from tasks to performance measures has the potential to leverage and elevate clinical practice while promoting clinician empowerment as competent and trusted providers. A critical factor in provision of effective education is creation of a learning environment where clinicians can become self-sufficient in the delivery of safe and effective care.²² BRAVEST takes a big step toward stimulating self-sufficiency, supporting development of such a learning environment.

An original slide deck with custom voice over was designed to partner with BRAVEST to detail each element of the mnemonic. Stroke clinical leaders are encouraged to use BRAVEST to complement standard formal stroke-specific education that is provided to interprofessional staff. In the clinical environment, BRAVEST can also be used as

a change of shift guide to enhance targeted communication of care delivery during patient handoffs. Other creative uses of the tool should be encouraged and shared via stroke-specific listservs such as the Association of Neurovascular Clinicians (ANVC) Member Discussion Forum.²³ Unit educators or managers should consider using BRAVEST to engage staff in the presentation of elements of the mnemonic to the team at weekly huddles. The graphic can also be modeled into badge tags and distributed to all interprofessional staff as a clinical reference. BRAVEST can be enlarged into a laminated poster for stroke unit bulletin boards or digitalized for posting to the stroke page of a certified stroke center's internal intranet.



Table 1: BRAVEST Education Key Points

Stroke Care Item	Description	Key Stroke Clinician Knowledge Points
B: Blood Pressure	<ul style="list-style-type: none"> • Careful balance to maintain safe and adequate brain perfusion • Permissive hypertension ranges and time windows 	<ul style="list-style-type: none"> • Know frequency, parameters, range, processes for intervention • Report clearly during handoffs • Document responsibly and timely in medical record
R: Rehabilitation	<ul style="list-style-type: none"> • Physical therapy (PT) & speech/language pathology (SLP) evaluations • Disability and ambulation assessment • Strategies tailored to individual needs: Maximize mobility, determine diet consistency/modification, maintain patient safety • Occurs prior to discharge 	<ul style="list-style-type: none"> • Dysphagia screening prior to any oral intake • Align care with PT/SLP recommendations i.e. ambulation aids, positioning, feeding, etc. • Communicate in handoff, with emphasis on swallow status and mobility status • Document responsibly and timely in medical record
A: Antithrombotics for Secondary Stroke Prevention	<ul style="list-style-type: none"> • Time-sensitive secondary stroke prevention medications • Antiplatelets or anticoagulants • Administered on day of arrival or day after arrival • Prescribed at discharge 	<ul style="list-style-type: none"> • Nil per os (NPO) not disqualifier for aspirin; give via suppository as directed • Telemetry or hard-wired cardiac monitoring to capture atrial fibrillation or flutter; consider loop recorder implantation • Communicate with providers • Include information in handoffs • Document responsibly and timely in medical record
V: Venous Thromboembolism (VTE) Prophylaxis	<ul style="list-style-type: none"> • Immobility places patients at risk for VTE • Time-sensitive, administered on day of arrival or day after arrival • Modalities: <ul style="list-style-type: none"> ○ Mechanical (intermittent [sequential] pneumatic compression devices or Geko T3 neuromuscular stimulator strips); ○ Chemical (subcutaneous or oral anticoagulants) 	<ul style="list-style-type: none"> • Antiplatelets or dual antiplatelets alone do not provide VTE prophylaxis • Include information in handoffs • Document responsibly and timely in medical record
E: Education	<ul style="list-style-type: none"> • Secondary stroke prevention measures; key information to include: <ul style="list-style-type: none"> ○ Activation of ambulance ○ Post-discharge follow-up ○ Prescribed discharge medications ○ Stroke warning signs and symptoms ○ Stroke risk factors including individual risk factors 	<ul style="list-style-type: none"> • A key scope of practice item • Provide language appropriate materials and obtain feedback • Engage families if patient is unable to participate in education • Utilize TEACH BACK method and visual aids • Report clearly in handoffs • Document responsibly and timely
S: Statin Therapy for Secondary Stroke Prevention	<ul style="list-style-type: none"> • Time-sensitive measure • High-intensity dose per LDL, age, tolerance • Prescribed at discharge 	<ul style="list-style-type: none"> • Know LDL goals • Report intolerance • Communicate in handoffs • Document clearly

<p>T: Thrombolysis & Thrombectomy</p>	<ul style="list-style-type: none"> • Time-sensitive rescue treatments for acute ischemic stroke • Triggered by early recognition of signs and symptoms • How to activate a stroke alert • Eligibility criteria to establish candidacy 	<ul style="list-style-type: none"> • Know and utilize BEFAST • Identify and report deviations from patient’s baseline • Have clear understanding of stroke alert processes and treatment windows • Assist with fact-finding, last known well, medications, stroke scale scoring • Perform handoffs including side by side neuro assessment • Perform serial neuro assessments and vital signs • Collaborate and communicate with other disciplines • Document responsibly and timely
<p>References</p>	<ul style="list-style-type: none"> • List of Clinical Practice Guidelines (CPG) • Evidence-based literature supporting care items listed on BRAVEST 	<ul style="list-style-type: none"> • Know which CPGs guide the hospital’s stroke program • Know how to access CPGs in your facility

CONCLUSION

Bedside stroke clinicians benefit from education that corresponds to their practice specialization. The non-traditional, creative, innovative instructional material represented by BRAVEST was developed in response to targeted stroke clinician learning needs related to performance measures. Supported

by literature, the BRAVEST mnemonic infographic provides a multimedia approach to education, with multiple visual elements designed to communicate information to learners in an engaging way that promotes cognitive learning. BRAVEST content adds to the specialization efforts of stroke clinicians charged with maintaining high standards of practice and meeting hospital regulatory expectations.

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