Editorial

Of Stroke Treatment, Algorithms, Trials, and Such

In this issue of the Mayo Clinic Proceedings (pages 1027 to 1039), Brown and colleagues from the Mayo Clinic stroke service present a detailed, carefully considered, timely algorithm that incorporates their current advice for assessment and management of patients with minor strokes and transient ischemic attacks (TIAs). The report includes the rationale behind the practical advice and provides support for their positions from studies in the literature.

My reaction is unreserved admiration. Bravo. I believe in algorithms—they are the best approach for now and the future. The Mayo stroke service is among the most experienced and distinguished in the United States. Brown and his current associates were preceded by Siekert, Millikan, Whisnant, Sundt, Karnes, and Sandok—all well-known leaders in the field of cerebrovascular disease. Furthermore, the algorithm is scholarly, relatively clear, and practical. I am aware of only four previous published attempts at presenting guidelines for management of stroke,4 all of which differed considerably and only one of which provided an algorithm.4

Why should algorithms be used? Hearing or reading the most erudite didactic presentation often does not tell a physician how to approach and manage an actual patient. The clinical approach to patients involves a series of questions; decisions are sequential and depend on answers to these queries.5-6 The “what-if approach mimics the bedside experience better than does a didactic lesson. Algorithms and decision trees graphically illustrate the what-if approach and define key decision points.

Do algorithms have negative aspects? Algorithms concern disease. Physicians treat unique patients. The preferences, biases, and knowledge of patients and their families, the presence of other illnesses and conditions, and individual needs, wants, and demands are difficult to incorporate into an algorithm. The nuances of complex diseases such as stroke are also difficult to include in an algorithm, as are unusual disorders, findings, and exceptions to the rules. Algorithms are not meant to be law. They are only guides or maps to help direct the way in caring for the “average” patient.

What should algorithms include? Of foremost importance is identification of the key questions. Physicians who are not specialists in a particular field often do not know what questions are critical and what data are essential. If they knew the right questions, they could better refer to appropriate resources to help interpret answers. The next step is determining, at each decision point, the key data items that influence which arrow or path in the algorithm to follow. For example, in an assessment of whether cardiac-origin embolism is likely, the key questions are as follows: Does the patient have ischemia in one or multiple vascular territories? hemorrhagic infarcts? heart symptoms, signs, or known cardiac disease? severe and sudden onset of neurologic signs? rapid clearing of a severe neurologic deficit? systemic embolism? If cardiac-origin embolism is likely, the action response is cardiac evaluation and possibly interim treatment—such as with anticoagulants, as mentioned in the algorithm. What-if questions are essential. For example, if a patient has an attack of unilateral cerebral hemisphere dysfunction, what is the first step? If duplex ultrasonography shows carotid artery disease, then what? If duplex scans show normal findings, should some treatment be administered during evaluation and, if so, when and what type?

What preceded algorithms? Assessment and treatment of patients with cerebrovascular disease have a short history. Miller Fisher described TIAs and carotid artery disease in the early 1950s. From 1950 until now, the main approach was to prescribe treatment depending on the time course of ischemia—that is, TIA, progressing stroke, reversible ischemic neurologic deficit, or “completed stroke.” Time courses, however, do not predict the presence or absence of brain infarction, the cause of ischemia, or the prognosis.9-10 Any of the common vascular pathologic conditions, such as carotid artery disease, cardiac-origin embolism, hypercoagulability, or penetrating artery occlusive disease, can cause TIAs, prolonged but reversible deficits, or persistent signs. Treatment should depend mostly on what is wrong with the patient,9 including assessment of the following factors: (1) the site, nature, and severity of the causative vascular (cardiac or hematologic) lesion; (2) the pathophysiologic features of the symptoms (such as hypoperfusion, embolism, or vasoconstriction); and (3) the presence and severity of the brain lesion—is the brain normal, infarcted, or reversibly ischemic (“stunned”)? The cookbook approach to treatment based on time course has no theoretical basis and has failed miserably during the past nearly half-century. Treatment based on time course should become a relic of the past, of historical interest only.

Another familiar approach, unfortunately still espoused by some clinicians, is what I call the “skin cream” method. My grandfather once had an itchy rash. His dermatologist...
The brain is the Rolls-Royce of the body—it defines humanity and individuality. Would anyone trust a Rolls-Royce to an inexperienced mechanic at an ill-equipped local gas station? For assessment, by whom and with what are more important considerations than whether to hospitalize.

Race, sex, and risk factors are not sufficiently emphasized as important factors in evaluation. In general, white men most frequently have extracranial carotid and vertebral artery disease, whereas blacks and persons of Chinese, Japanese, and Thai origin and women more often have intracranial disease.¹¹ Demographic features should be considered in planning the assessment of the patient.

Patients with involvement of the anterior circulation and those with posterior circulation disease should be assessed in the same fashion and to the same extent.¹² This algorithm suggests different approaches. The two circulations share the same blood, blood pressure, heart, risk factors, and pathologic conditions. Modern neuroimaging and ultrasound studies offer effective noninvasive evaluation of each area. The only differences are anatomic—where to insonate and image.

Lacunar infarcts are not considered. I believe, as do many others,¹³,¹⁴ that the causes of lacunae and the management of patients with penetrating artery disease differ from those in patients with other stroke mechanisms.

In the algorithm, too much emphasis is placed on the number of ischemic spells. Many patients with severe strokes have no or only a single TIA.

What do I advise? The following guidelines for management of patients are important.

1. Determine what is wrong with the patient. A precise diagnosis has considerable intrinsic value. I do not believe in just testing for treatable causes. Knowing what is wrong with the patient also indicates what is not wrong and helps in the ascertainment of prognosis and omission of tests and treatments not likely to work. Logical although unproven treatments can be tried if the situation warrants. Knowledge facilitates frank discussions with the patient and family members about the diagnosis, prognosis, and treatment options.

2. Assessment should be done immediately and rapidly. The brain is vulnerable and must be protected at all costs.

3. The responsible physician should have extensive knowledge and experience in brain disease and stroke and needs access to modern technology and experienced colleagues (such as cardiologists, hematologists, neurologists, and surgeons).

4. Use the algorithm as a guide, but consider the individual patient and family and their preferences and exceptions to the rules.

5. Be open and responsive but skeptical about new tests and treatments.

6. Weigh benefits versus risks in the individual patient in choosing tests and treatments. Unlike established therapeutic trials, no physician is obligated to use the same treatment for all patients. Tailoring should depend on the details of the individual problem and patient.

I applaud the work of Brown and colleagues. It is an excellent start in the right direction. Their algorithm needs application and testing in the field and may be modified by experience. Nothing is exactly right the first time. The Mayo Clinic stroke service merits our appreciation and thanks for a brave and thoughtful undertaking.

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REFERENCES


9. Caplan LR. TIAs: we need to return to the question, ‘What is wrong with Mr. Jones?’ [editorial]. Neurology 1988; 38:791-793

10. Caplan LR. Terms describing brain ischemia by tempo are no longer useful: a polemic (with apologies to Shakespeare). Surg Neurol 1993; 40:91-95


MAYO FOUNDATION COURSES AND MEETINGS

ROCHESTER

February 1 to 8, 1995
Update in Clinical Neurophysiology
Rochester, Minnesota
This meeting will feature didactic and practical instruction in clinically useful techniques of electroencephalography, polysomnography, electromyography, nerve-conduction studies, and assessment of somatosensory visual- and auditory-evoked potentials for qualified participants (request brochure for special enrollment requirements).

February 4 to 8, 1995
Selected Topics in Internal Medicine
Silverado Resort, Napa Valley, California
New diagnostic and therapeutic approaches to clinical problems in internal medicine will be presented at this course.

February 9 to 11, 1995
Mayo Clinic State-of-the-Art Symposium: Arrhythmia Management
Silverado Resort, Napa Valley, California
This symposium features lectures on clinical approaches to the management of arrhythmia.

For further information, please contact Postgraduate Courses, Mayo Clinic, Rochester, MN 55905 (507-284-2509).

JACKSONVILLE

February 23 to 26, 1995
3rd Annual Anesthesia Equipment Management Conference
Orlando, Florida
Structural accommodations required for anesthesia equipment that should be considered in plans to construct or remodel an operating room suite and the various measures for maintenance of such equipment will be the focus of this conference.

For further information, please contact Sharon Kator, Division of Education Services, Mayo Clinic Jacksonville, 4500 San Pablo Road, Jacksonville, FL 32224 (904-223-2909).

SCOTTSDALE

January 12 to 13, 1995
2nd Annual Current Topics in Critical-Care Medicine
The Ritz-Carlton Hotel, Phoenix, Arizona
Problems of general interest to intensive-care specialists will be presented at this 2-day course.

January 14 to 15, 1995
5th Annual Current Topics in Anesthesiology
The Ritz-Carlton Hotel, Phoenix, Arizona
This program of lectures and discussions will focus on problems frequently encountered by anesthesiologists.

January 20 to 22, 1995
Electromyography in Clinical Practice
Mayo Clinic Scottsdale, Scottsdale, Arizona
Didactic and practical instruction in clinically useful techniques of electromyography and nerve-conduction studies will be featured at this course.

February 16 to 18, 1995
Mayo Interactive Surgical Symposium
Orange Tree Golf and Conference Resort, Scottsdale, Arizona
This course for general surgeons will review current issues relating to trauma and critical care and to endocrine, gastrointestinal, hepatobiliary, vascular, thoracic, and breast surgery.

For further information, please contact the Medical Education Office, Mayo Clinic Scottsdale, 13400 E. Shea Blvd., Scottsdale, AZ 85259 (602-391-7447).

MAYO MEDICAL LABORATORIES WORKSHOPS

January 23 to 27, 1995
Challenges in Hematology and Hematopathology
Snowmass, Colorado
This conference will address many of the disorders currently challenging hematologists and hematopathologists, with special emphasis on the contributions of new technology to diagnosis and treatment.

For further information, please contact Mayo Medical Laboratories’ Office of Continuing Education, 360 Hilton, Mayo Clinic, Rochester, MN 55905 (1-800-533-1710).