

# ICH Critical Pathways

FROM WORKSHOP EXERCISE TO  
WORKPLACE EXPERIENCE



**iTEAM™**  
ICH Training, Education, Awareness  
and Management

CME e-Newsletter

Issue No. 1 – Summer 2007

## Interactive Conferences Continue the Mission Begun at the Workshops

Building on the momentum of the regional iTEAM™ ICH Critical Pathways CME/CE Workshops in June 2006, a series of critical pathways teleconferences were held in March 2007. Each teleconference was moderated by an esteemed thought leader in the area of ICH. The faculty included Mark J. Alberts, MD, Professor of Neurology, Northwestern University, Feinberg School of Medicine; Matthew E. Fink, MD, Professor of Clinical Neurology, Weill Cornell Medical College; J. Claude Hemphill III, MD, MAS, Associate Professor of Clinical Neurology, University of California, San Francisco, School of Medicine; and Michael A. Sloan, MD, MS, Director, USF Stroke Program.

During the teleconferences, the faculty discussed medical updates on the management of intracerebral hemorrhage (ICH) from the literature and the International Stroke Conference 2007 and provided practical advice for implementing critical pathways. Afterwards, 4 hospital teams (University of North Carolina Stroke Center, Chapel Hill, North Carolina; St. Joseph's Medical Center, Paterson, New Jersey; Providence St. Peter Hospital, Olympia, Washington; and Alexian Brothers Hospital Network, Chicago, Illinois) provided progress reports on their critical pathways experiences; then all teleconference participants shared in a lively exchange. Highlights of all these events are featured in this e-newsletter.

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This activity is a CME program of the ICH Training, Education, Awareness and Management (iTEAM™) initiative, developed by the Network for Continuing Medical Education (NCME) and supported by an educational grant from Novo Nordisk Inc.

## Hospitals Share Their Experiences in Developing ICH Critical Pathways

### FEATURED INSTITUTION

#### University of North Carolina Stroke Center, Chapel Hill, North Carolina

*Building on current successes...*

Susan E. Wilson RN, MSN, C-ANP, an Assistant Professor and Nurse Practitioner who spearheads stroke treatment and prevention research trials, presented her institution's pathway progress for UNC Stroke Center. First, she emphasized the importance of considering the immediate- and short-term goals on the progress checklist presented by Michael A. Sloan, MD, MS, Director, USF Stroke Program, when developing ICH critical pathways (Table 1). She also highlighted some key points that were presented at last year's ICH Critical Pathways CME/CE Workshop. She stressed that the goal of critical pathways is to optimize and streamline patient care by providing standardized treatment that relies on evidence-based medicine and best practices, resulting in improved clinical outcomes and reduced cost of care (Table 2).<sup>1</sup> An important principle for the development of critical pathways is building on current successes. Ms. Wilson emphasized that new pathways can take advantage of existing tools and pathways. She concluded her overview by stating that to maintain and enhance the quality of health care at any type of stroke center it is crucial to implement a continuous quality improvement process by which outcomes data can be tracked and assessed and improvements can be made as

TABLE 1

### Progress Checklist for Developing and Implementing ICH Critical Pathways

#### Immediate Goals

- Assemble team and set up meeting of working group
- Develop draft pathways
- Circulate pathways to all neurology/neurosurgery, ED, and neurology nursing staff for comments
- Circulate discharge plan and other tools to all neurology/neurosurgery, ED, and neurology nursing staff for comments

#### Short-term Goals/Activities

- Finalize critical pathways
- Launch critical pathways
- Circulate memo
- Grand rounds/conference: Neurology/Neurosurgery Department
- Grand rounds/conference: Emergency Department
- Grand rounds/conference: Nursing Department

needed. Ms. Wilson provided a brief update of her own team's experience in revising its ICH critical pathways at UNC Stroke Center:

We are currently working on revising our ICH pathways and are about 60% done. When we initially developed our ICH critical pathways, we used our ischemic stroke pathways as a starting point because some of the management issues are similar. Our old ICH pathways were neurosurgery driven; however, as we re-evaluate our existing pathways, we are using a comprehensive, multidisciplinary team approach, as we did for our ischemic stroke pathways. Our nurse champions include a nurse practitioner from neurology and a nurse practitioner from neurosurgery. In addition to re-evaluating our ICH pathways internally, to see what other hospitals have come up with, we have contacted several local sister hospitals asking them to share their ICH pathways with us.

In developing our pathways, our multidisciplinary team started with the prehospital setting. Rapid on-scene assessment and emergent transportation to the most appropriate facility ensures the best possible outcome for the patient, and immediate notification of the receiving facility will help to marshal the appropriate resources and personnel. The emergency medical service (EMS) community needs to be formally incorporated into the continuum of stroke care along with the emergency department (ED). This can best be facilitated through participation of the medical center and ED staff in the educational activities of the EMS personnel and by formal written agreements for prehospital notification and triage to a stroke center, such as ours. We also educated our ED physicians and nurses on immediate

TABLE 2

**Objectives of Critical Pathways<sup>1</sup>**

|  |
|--|
| • Prevent underutilization of medications, reduce time in ICU/hospital, reduce costs |
| • Ensure quality-of-care measures (eg, door-to-drug times)                           |
| • Optimize patient triage and appropriate referral center utilization                |
| • Facilitate communication with specialists and PCP postdischarge                    |
| • Enhance patient compliance and outcomes  |
| • Minimize potential for medical errors  |
| • Improve compliance with national standards (JCAHO)                                 |
| • Ensure patient exposure to studies and trials                                      |

assessment and stabilization protocols, and our intensive care (ICU) staff on general and specific ICH treatment protocols in the ICU. Additionally, we involved the rehabilitation team in appropriate discharge planning.

In developing our operational ICH pathway tools, our interdisciplinary team, along with an oversight committee, reviewed clinical practice guidelines and evidence-based guidelines. Once the updated American Heart Association (AHA)/American Stroke Association (ASA) ICH guidelines are published, which is expected to occur shortly [the guidelines have subsequently been published], we will incorporate them into our new ICH pathways. As we did for our ischemic stroke pathways, we plan on using a stroke data registry to collect outcomes data, evaluate patient care, and target areas that need improvement, thereby providing continuous quality assurance.

**FEATURED INSTITUTION****St. Joseph's Medical Center, Paterson, New Jersey**

*Continuing to weigh the evidence...*

Avery Katz, MD, Chief of Neurology, describes St. Joseph's Medical Center as a somewhat unique large tertiary care facility with a level 2 trauma center in an urban setting that sees approximately 500 to 600 strokes per year, with over 20% due to ICH. St. Joseph's has been working very closely with the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) toward certification as a comprehensive stroke center. Dr. Katz shared his experience in developing critical pathways at his institution:

Our institution has already set up community and EMS education and training to minimize delays in prehospital dispatch, assessment, and transport, and our ED personnel have been well trained on diagnosing and treating acute stroke. Upon arrival to our ED, patients with ICH are being evaluated and diagnosed within 3 hours. At this point, however, we are still working toward reaching our short-term goals in developing our ICH pathways. One of the

barriers we are up against is the lack of standardized, evidence-based ICH guidelines. For example, there is a paucity of evidence about the use of fresh frozen plasma, prothrombin complex concentrates, and recombinant factor VIIa for reversing anticoagulation and/or reducing hematoma expansion. Controversy also exists in regard to blood pressure management: How low should you go? Is decreasing blood pressure really going to decrease the size of the hematoma expansion? It's been 8 years since the AHA/ASA published guidelines for managing ICH. The 2007 update will provide some more evidence-based information. Our team will need to continue to evaluate the data and continue our efforts to standardize our protocols. Another barrier we face is the issue of added cost, especially for treatments used off-label. While the use of some of these therapies, for example factor VIIa, has the potential to improve patient outcomes and benefit society overall, the hospital administrators often don't see it that way—they look at the immediate cost burden. This is an on-going challenge for us.

## FEATURED INSTITUTION

## Providence St. Peter Hospital, Olympia, Washington

*Working on overcoming barriers...*

Annie Sanford, RN, Data Analyst, along with Charlene Griffiths, Stroke Coordinator, represented Providence St. Peter Hospital, a 300-bed hospital with a 13-bed stroke/neuroscience unit. Over the past year, Providence St. Peter Hospital has been working with JCAHO towards getting certification as a primary stroke center and has worked extensively on its ischemic stroke pathways. ICH pathways are the next priority for Providence St. Peter Hospital. Ms. Sanford provided an update as to what has transpired at her hospital:

We have conducted research on best practices and have received input from our stroke team as to what should be included in the ICH critical pathways. A draft of what has been developed thus far is currently being circulated among neurologists, neurosurgeons, ED physicians, and nursing staff for their comments. Our biggest obstacles in rolling out our ischemic pathways were educating personnel and making sure that proper documentation was carried out. It was also a challenge to coordinate the efforts of all the team members and to communicate a consistent message to all involved. This again seems to be one of our big struggles in developing our ICH pathways. In addition, we have recently undergone some turnover in our neurosurgery department—2 new neurosurgeons have been hired and we are looking to hire 1 more. We are hoping that following this transition period, we will see a bit more enthusiasm and receive more feedback from that department. We are also planning on doubling the size of our neurology unit and will then need to train all new personnel. So currently we are dealing with some staffing issues that have created some obstacles in our pathway development.

## FEATURED INSTITUTION

## Alexian Brothers Hospital Network, Chicago, Illinois

*Getting ready to launch...*

Wendy Fedder, RN, BSN, and Marilyn Mehta, RN, Clinical Nurse Specialist, gave a brief overview of Alexian Brothers' progress over the past 9 months in developing a set of standing orders for ICH:

Through a multidisciplinary effort, we have recently assembled a stroke performance improvement team, and although we do not use what would typically be referred to as critical pathways, the stroke team is working toward creating order sets for ICH. Approximately 9 neurosurgeons and neurologists from both private practice and the University of Illinois, Chicago, who all see patients at the Alexian Brothers, have had input in developing these

standing order sets. In addition to including JCAHO criteria, we have incorporated the use of factor VIIa into our standing orders. The order sets have been completed and have gone through the Pharmacy and Therapeutics Committee and other appropriate committees and are expected to be officially launched within the next month or so.

## ICH Update

## Highlights From the International Stroke Conference 2007

Drs. Alberts, Fink, Hemphill, and Sloan presented highlights from the International Stroke Conference 2007 held in San Francisco, California from February 7-9. Two of those presentations are summarized below—the first is a study conducted by Hall et al on the average transport time for ICH patients from outlying EDs to stroke centers, which clearly shows that there is room for improvement, and the second is a study by Goldstein et al suggesting that the presence of contrast on computed tomography (CT) angiography is a useful marker to guide therapies aimed at decreasing the risk of hematoma expansion.

A review of the Medical College of Georgia Stroke Data Bank between January 2004 and January 2006 was undertaken to determine characteristic delay times between triage of patients with ICH at outlying feeder hospitals and their definitive arrival to a stroke center. Fifty-three patients were identified with complete data to establish time intervals. Time to arrival was  $\leq 3$  hours in 28% of ICH patients and  $>3$  hours in 72% of ICH patients (Figure 1). For all transported patients, the average time interval from triage at an outlying emergency department to arrival at a definitive stroke center was 5 hours and 3 minutes. For a subgroup ( $n=23$ ) originating only from REACH (a network of acute ischemic sites), the time to arrival (TTA) was 4 hours and 53 minutes. For patients receiving live REACH telestroke consultation ( $n=12$ ), TTA was 4 hours and 59 minutes. Even when helicopter transport was utilized ( $n=12$ ), TTA remained 4 hours and 5

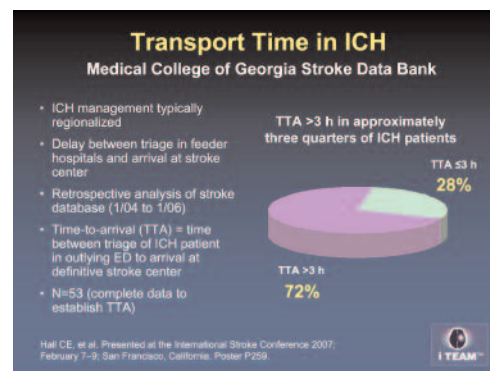


Figure 1

minutes (Figure 2). Given that the TTA times in this study represent initial triage times rather than actual stroke onset times, it is clear that current paradigms for evaluation and transport of patients to regional stroke centers for definitive management will not support delivery of emerging acute therapies for ICH requiring narrow time windows of 3 to 4 hours. To succeed with time constraints such therapies will need to be brought to patients with ICH at the outlying hospitals, including those that are rural and lack both stroke teams and on-site radiologic expertise. One option to flatten these obstacles and bring emerging therapies to patients with ICH is via extension of telestroke models already effective in the treatment of acute ischemic stroke (Figure 3).<sup>2</sup>

Goldstein et al conducted a retrospective review of a prospectively ascertained cohort of 494 consecutive patients with ICH presenting to Massachusetts General Hospital between January 2002 and March 2006. Exclusion criteria included tumor, aneurysm, arteriovenous malformation, infarct, any neurosurgical procedure performed in the hospital, and lack of CT angiography or follow-up CT scan. One hundred and four patients were available for analysis. Contrast extravasation was operationally defined as the presence of any high-density material within the hematoma not clearly attributable to a blood vessel. Serial hematoma volumes were measured by computerized planimetry. Hematoma expansion was defined as an increase in volume >33% (Figure 4). Hematoma expansion was significantly ( $P=.003$ ) associated with contrast extravasation on CT angiography; hematoma expansion occurred in 22% of patients with contrast extravasation on CT angiography and in only 2% of patients without contrast extravasation on CT angiography (Figure 5). The presence of contrast extravasation had a 93% sensitivity for identifying patients with hematoma expansion; the negative predictive value was 98%. The presence of contrast extravasation had a 50% specificity for hematoma expansion and the positive predictive value was 24%. Contrast extravasation was the only independent predictor of hematoma expansion. Use of this marker may extend the time window for hemostatic therapy, potentially doubling the number of patients who can benefit (Figure 6).<sup>3</sup>

## References

1. Cannon CP, O'Gara PT. *Critical Pathways in Cardiology*. Lippincott Williams & Wilkins; 2006.
2. Hall CE, Patel SV, Reingold JL, et al. Transport intervals for ICH patients to regional stroke center. Presented at the International Stroke Conference 2007; February 7-9, 2007; San Francisco, California. Poster P259.
3. Goldstein JN, Fazen LE, Snider R, et al. Contrast extravasation on CT angiography predicts hematoma expansion in intracerebral hemorrhage. *Neurology*. 2007;68:889-894.

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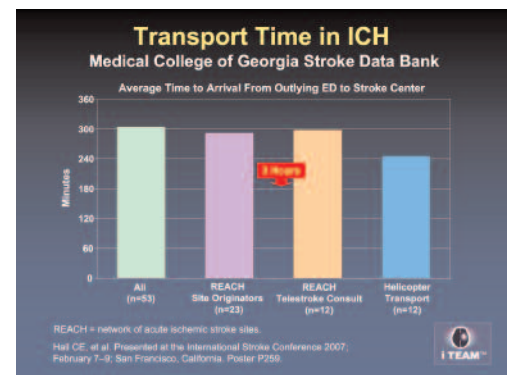


Figure 2

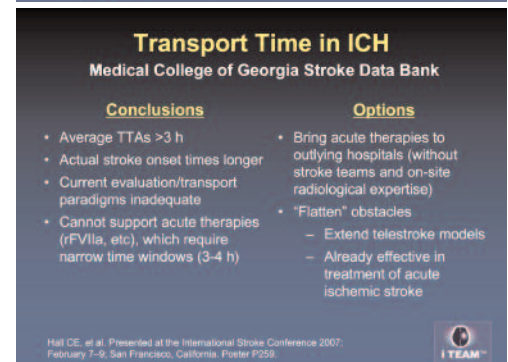


Figure 3

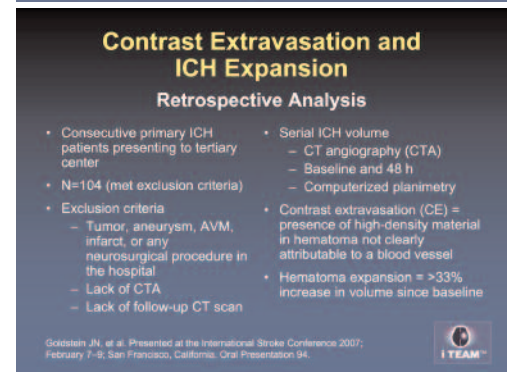


Figure 4

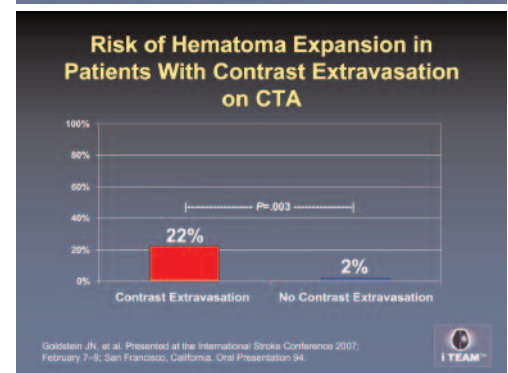


Figure 5



Figure 6