# Complete Summary

## GUIDELINE TITLE

Stroke: 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations.

## BIBLIOGRAPHIC SOURCE(S)

Stroke. In: 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Suppl):III110-4. [69 references]

## GUIDELINE STATUS

This is the current release of the guideline.

## COMPLETE SUMMARY CONTENT



## SCOPE

### DISEASE/CONDITION(S)

Acute ischemic stroke

### GUIDELINE CATEGORY

Evaluation
Management
Risk Assessment
Treatment

### CLINICAL SPECIALTY

Emergency Medicine
Family Practice
Internal Medicine
Neurology

## INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Emergency Medical Technicians/Paramedics
Health Care Providers
Hospitals
Nurses
Physicians

## GUIDELINE OBJECTIVE(S)

To provide guidance on the treatment of acute ischemic stroke

## TARGET POPULATION

Individuals with acute ischemic stroke

## INTERVENTIONS AND PRACTICES CONSIDERED

### Assessment

1. Out-of-hospital stroke assessment tools
    - Cincinnati Prehospital Stroke Scale
    - Los Angeles Prehospital Stroke Scale
2. Computerized tomography
3. Magnetic resonance imaging

### Treatment

1. Oxygen administration
2. Fibrinolytic therapy
    - Intravenous (IV) tissue plasminogen activator (tPA)
    - Intra-arterial tPA
3. Glucose control
    - IV or subcutaneous insulin

### Management

1. Training of Emergency Medical Services (EMS) personnel (stroke identification, and to minimize delays in dispatch and transport to hospital)
2. Pre-hospital triage
3. Admission of patient to a stroke unit

## MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of diagnosis
- Neurological outcomes
- Survival
- Improved functional outcomes

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

All reviewers were instructed to search their allocated questions broadly. Reviewers documented their search strategies to ensure reproducibility of the search. The minimum electronic databases searched included the Cochrane database for systematic reviews and the Central Register of Controlled Trials (http://www.cochrane.org/), MEDLINE (http://www.ncbi.nlm.nih.gov/PubMed/), EMBASE (www.embase.com), and the master reference library collated by the American Heart Association (AHA). To identify the largest possible number of relevant articles, reviewers were also encouraged to perform hand searches of journals, review articles, and books as appropriate.

The reviewers documented the mechanism by which studies relevant to the hypothesis were selected. Specific study inclusion and exclusion criteria and study limitations were documented. Inclusion of all relevant evidence (from animal and manikin/model studies as well as human studies) was encouraged.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

#### Levels of Evidence

**Level 1**: Randomized clinical trials or meta-analyses of multiple clinical trials with substantial treatment effects

**Level 2**: Randomized clinical trials with smaller or less significant treatment effects

**Level 3**: Prospective, controlled, nonrandomized cohort studies

**Level 4**: Historic, nonrandomized cohort or case-control studies

**Level 5**: Case series; patients compiled in serial fashion, control group lacking

**Level 6**: Animal studies or mechanical model studies

**Level 7**: Extrapolations from existing data collected for other purposes, theoretical analyses

**Level 8**: Rational conjecture (common sense); common practices accepted before evidence-based guidelines

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

A worksheet template was provided with step-by-step directions to help the experts document their literature review, evaluate studies, and determine levels of evidence. When possible, 2 expert reviewers were recruited to undertake independent evaluations for each topic.

### Assessing the Quality of Evidence

In this step reviewers were asked to determine the level of evidence of relevant studies (Step 2A), assess the quality of study research design and methods (Step 2B), determine the direction of results (Step 2C), and cross-tabulate assessed studies (Step 2D).

The levels of evidence used for the 2005 consensus process were modified from those used in 2000. In many situations summary conclusions were based on lower levels of evidence because human clinical trial data was not available. The reviewers assessed the quality of research design and methods and allocated each study to 1 of 5 categories: excellent, good, fair, poor, or unsatisfactory. Studies graded as poor or unsatisfactory were excluded from further analysis.

Reviewers evaluated the direction of the study results as supportive, neutral, or opposed and then depicted the data in 1 of 2 grids. The grids were 2-dimensional, showing quality and levels of evidence. The reviewers completed a Supporting Evidence grid and a Neutral or Opposing Level of Evidence grid.

### Controversies Encountered

*Studies on Related Topics (Level of Evidence [LOE] 7)*

Many reviewers identified studies that answered related questions but did not specifically address the reviewer's initial hypothesis. Examples include the extrapolation of adult data for pediatric worksheets and extrapolation of the results of glucose control in critically ill patients to the postresuscitation setting.

Worksheet reviewers were instructed to clearly designate evidence that represented extrapolations. Reviewers could designate such studies as LOE 7, or they could assign a level of evidence based on the study design but include terms such as "extrapolated from" with specific relevant details in the draft consensus on science statements to indicate clearly that these were extrapolations from data collected for other purposes.

*Animal Studies and Mechanical Models*

Animal studies can be performed under highly controlled experimental conditions using extremely sophisticated methodology. Irrespective of methodology, all animal studies and all studies involving mechanical models (e.g., manikin studies) were classified as LOE 6. Specific details about these studies (including methodology) are included in the summary of science where appropriate.

*Studies Evaluating Diagnosis or Prognosis*

The default levels of evidence used for the 2005 consensus process were not designed for the review of studies that evaluate diagnosis or prognosis. For these studies other methods of assigning levels of evidence were considered (such as those proposed by the Oxford Centre for Evidence-Based Medicine [http://www.cebm.net/]). Worksheet reviewers planning to include alternative levels of evidence were asked to define such levels clearly and to retain the default levels of evidence.

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus
Expert Consensus (Consensus Development Conference)

## DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Worksheet reviewers created a summary of the science. In the summary format reviewers were encouraged to provide a detailed discussion of the evidence, including the outcomes evaluated and the strengths and limitations of the data.

The final step in the science summary process was the creation of draft consensus on science statements and treatment recommendations. Statement templates were provided to standardize the comprehensive summary of information. Elements of the consensus on science statement template included the specific intervention or assessment tool, number of studies, levels of evidence, clinical outcome, population studied, and the study setting. Elements of the treatment recommendation template included specific intervention or assessment tool, population and setting, and strength of recommendation.

The statements drafted by the reviewers in the worksheets reflect the recommendations of the reviewers and may or may not be consistent with the conclusions of the 2005 Consensus Conference.

All 380 participants at the 2005 Consensus Conference received a copy of the worksheets on CD-ROM. Expert reviewers presented topics in plenary, concurrent, and poster conference sessions. Presenters and participants then debated the evidence, conclusions, and draft summary statements. Each day the most controversial topics from the previous day, as identified by the task force chairs, were presented and debated in one or more additional sessions. The International Liaison Committee on Resuscitation (ILCOR) task forces met daily during the conference to discuss and debate the experts' recommendations and develop interim consensus science statements. Each science statement summarized the experts' interpretation of all the relevant data on a specific topic. Draft treatment recommendations were added if a consensus was reached.

### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

### METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

### DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Completed worksheets were posted on the Internet for further review. The initial process involved posting the worksheet to a password-protected area of the American Heart Association Intranet (accessible to worksheet reviewers). In December 2004 the completed worksheets were posted on an Internet site that could be accessed by the public for further review and feedback before the 2005 Consensus Conference in Dallas (www.C2005.org).

Wording of science statements and treatment recommendations was refined after further review by International Liaison Committee on Resuscitation (ILCOR) member organizations and the international editorial board. This format ensured that this final document represents a truly international consensus process.

The manuscript was ultimately approved by all ILCOR member organizations and by an international editorial board. The American Heart Association (AHA) Science Advisory and Coordinating Committee and the editor of *Circulation* obtained peer reviews of this document before it was accepted for publication. The document is being published simultaneously in *Circulation* and *Resuscitation*, although the version in *Resuscitation* does not include the sections on stroke and first aid.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

## Out-of-Hospital Setting

Once the stroke victim is identified, transport and triage are important decisions that require the participation of hospitals and community notification. Each receiving hospital should define its capabilities for treating patients with acute stroke and should communicate this information to the emergency medical services (EMS) system and the community.

## Oxygen

Administration of supplementary oxygen to hypoxemic stroke patients by out-of-hospital and in-hospital medical personnel is recommended. Because there is conflicting evidence regarding the benefits of supplementary oxygen administration to normoxemic stroke patients, healthcare professionals may consider giving oxygen to these stroke patients on an individual basis.

## Out-of-Hospital Stroke Assessment Tools

EMS systems must provide education and training to minimize delays in prehospital dispatch, assessment, and transport. With training in the use of relatively simple stroke assessment tools, prehospital providers can identify potential victims of stroke with high sensitivity and specificity.

Paramedics should be trained in the recognition of stroke with a validated, abbreviated out-of-hospital neurologic evaluation tool such as the Cincinnati Prehospital Stroke Scale or the Los Angeles Prehospital Stroke Screen.

## Prehospital Triage

Initial low-level evidence indicates a favorable benefit from triage of stroke patients to designated stroke centers, but this concept should be explored using more rigorous levels of evidence.

## Fibrinolytic Therapy

## Intravenous (IV) Fibrinolytics

In the setting of a clearly defined protocol, a knowledgeable stroke team, and institutional commitment, IV administration of tissue plasminogen activator (tPA) to patients with acute ischemic stroke who meet the National Institute of Neurological Disorders and Stroke (NINDS) eligibility criteria is recommended. There is strong evidence to avoid all delays and treat patients as soon as possible.

Although not every hospital is capable of organizing the necessary resources to safely administer fibrinolytic therapy, every hospital with an emergency department should have a written plan describing how patients with acute stroke are to be managed in that institution. The plan should detail the roles of healthcare professionals in the care of patients with acute stroke and define which patients will be treated with fibrinolytic therapy at that facility and when transfer to another hospital with a dedicated stroke unit is appropriate. Emergent computerized tomography (CT) or magnetic resonance imaging (MRI) scans of

patients with suspected acute stroke should be reviewed quickly by a physician who is expert in the interpretation of those studies.

**Intra-Arterial Fibrinolytics**

For patients with acute ischemic stroke who are not candidates for standard IV fibrinolysis, administration of intraarterial fibrinolysis in centers that have the resources available may be considered within the first 6 hours after the onset of symptoms.

**In-Patient Care**

**Stroke Units**

Hospitalized stroke patients experience improved outcomes when cared for by a multidisciplinary team experienced in managing stroke. Thus, when it is available, stroke patients who require hospitalization should be admitted to a stroke unit.

**Glucose Control**

For consistency with the American Stroke Association (Adams et al., 2005; Adams et al., 2003) and the European Stroke Initiative Guidelines (Klijn & Hankey, 2003), administration of IV or subcutaneous insulin may be considered for patients with acute ischemic stroke in the in-hospital setting to lower blood glucose when the serum glucose level is >10 mmol/L (about 200 mg/dL).

**Therapeutic Hypothermia**

There is insufficient scientific evidence to recommend for or against the routine use of hypothermia in the treatment of acute ischemic stroke (Class Indeterminate).

## CLINICAL ALGORITHM(S)

None provided

# EVIDENCE SUPPORTING THE RECOMMENDATIONS

## REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

## TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated

# BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

## POTENTIAL BENEFITS

Improved management of patients with acute ischemic stroke, including appropriate early recognition, triage, and treatment resulting in improved outcomes

### POTENTIAL HARMS

None stated

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

This document summarizes current evidence for the recognition and response to sudden life-threatening events, particularly sudden cardiac arrest in victims of all ages. The broad range and number of topics reviewed and the inevitable limitations of journal space require succinctness in science statements and, where recommendations were appropriate, brevity in treatment recommendations. This is not a comprehensive review of every aspect of resuscitation medicine; some topics were omitted if there was no evidence or no new information.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Effectiveness
Timeliness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Stroke. In: 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Suppl):III110-4. [69 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

## DATE RELEASED

2005 Nov 29

## GUIDELINE DEVELOPER(S)

American Heart Association - Professional Association

## SOURCE(S) OF FUNDING

American Heart Association

## GUIDELINE COMMITTEE

International Liaison Committee on Resuscitation (ILCOR)

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

A robust conflict of interest policy was developed to ensure full disclosure of potential conflicts and to protect the objectivity and credibility of the evidence evaluation and consensus development process. This policy is described in detail in an editorial companion document (see "Availability of Companion Documents" field). Representatives of manufacturers and industry did not participate in this conference.

Potential conflicts of interest of the editorial board are listed in Appendix 3 of the original guideline document (see "Availability of Companion Documents" field). Potential conflicts of interest of the worksheet authors are noted in the worksheets and can be accessed through the links to the worksheets contained in the original guideline document. All 380 attendees were required to complete forms in order to document their potential conflicts of interest. Most attendees were also worksheet authors. The information from the conflict of interest forms completed by all conference attendees, including worksheet authors, can also be accessed at the website http://circ.ahajournals.org/content/vol112/22_suppl/#APPENDIX. Readers of the print version can also access the statements at the American Heart Association website: www.C2005.org.

## GUIDELINE STATUS

This is the current release of the guideline.

## GUIDELINE AVAILABILITY

Electronic copies: Available from the American Heart Association Web site.

Print copies: Available from the American Heart Association, Public Information, 7272 Greenville Ave, Dallas, TX 75231-4596; Phone: 800-242-8721

## AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Introduction. 2005 International Consensus Conference on Cardiopulmonary Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Supplement):III-1-III-4.
- The evidence evaluation process for the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Supplement):III-128-III-130.
- Conflict of interest management before, during, and after the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Supplement):III-131-III-132.
- Controversial topics from the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005 Nov 29;112(22 Supplement):III-133-III-136.
- Appendix 1: Worksheet topics and authors. Circulation 2005 Nov 29;112(22 Supplement):B1-B14.
- Appendix 3: Conflict of interest for editors, editorial board, special contributors and reviewers, and honorees. Circulation 2005 Nov 29;112(22 Supplement):B16-B18.
- 2005 International Consensus Conference on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) Science with Treatment Recommendations. Section 2: stroke and first aid. Circulation 2005 Nov 29;112(22 Supplement):III-109.

Electronic copies: Available from the American Heart Association Web site.

Print copies: Available from the American Heart Association, Public Information, 7272 Greenville Ave, Dallas, TX 75231-4596; Phone: 800-242-8721

## PATIENT RESOURCES

None available

## NGC STATUS

This NGC summary was completed by ECRI on February 6, 2006. The information was verified by the guideline developer on March 7, 2006.

## COPYRIGHT STATEMENT

## DISCLAIMER

### NGC DISCLAIMER

The National Guideline Clearinghouse™ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at http://www.guideline.gov/about/inclusion.aspx .

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.



Date Modified: 11/3/2008


DEPARTMENT OF HEALTH & HUMAN SERVICES • USA