

Editor: George D. Lundberg, MD
Deputy Editor: M. Therese Southgate, MD
Senior Editors: John D. Archer, MD, Helene M. Cole, MD, Bruce B. Dan, MD
Senior Contributing Editor: Drummond Rennie, MD
Contributing Editors: Charles B. Clayman, MD, Lawrence D. Grouse, MD, PhD, Lester S. King, MD, Harriet S. Meyer, MD, Carlotta M. Rinke, MD
Statistical Editor: Naomi Vaisrub, PhD
Morris Fishbein Fellow: Don Riesenber, MD
Medical News—Editor: Phil Gunby; **Associate Editors:** Kimberly Glasbrenner, Marsha F. Goldsmith, Charles Marwick (Washington, DC), Beverly Merz; **Assistant Editor:** Chris Anne Raymond, PhD
Associate Editor: Roxanne K. Young
Assistant Editors: Charlene Breedlove, Sharon Iverson (Letters to the Editor), Elizabeth Knoll
Editorial Services Manager: Martha Carney
Production Manager: Marlene M. Hinsch
Assistant Production Manager: John R. Sayban
Editorial Processing Manager: Cheryl Iverson
Assistant Editorial Processing Manager: Paula Giltman
Permissions and Graphic Design: Dennis J. Shipley
Production Supervisors: Lori A. Barba (Copy Editing), Thomas J. Handrigan (Illustrations), Elizabeth Petrikenas (Proofreading), John R. Sayban (Advertising), Mary C. Steermann (Editorial), Jo Anne Weiskopf (Layout)
Copy Editing: James Zrimsek
Proofreading: Hemranee Bhoyroo, Patricia Coyne, Lisette Sabbach, Barbara Wojtowicz
Senior Production Assistants: Karen Branham, Diane Darnell, Jerri Hall-Gortowski, Jill Harvey, Debra Lucas, Terese Noto, Susan Price, Helen Sorrell, Ellen Yoshihara
Production Assistant: Darlene E. Filipis
Illustrations and Layout: Donna Hagler, Mary Planek-Vanco, Sandra Williams
Cover Editor: M. Therese Southgate, MD
Editorial Coordinator: Cathy Watkins
Editorial Supervisor: Cassandra Johnson
Editorial Assistants: Mary Cannon, Michele Knutsen, Mary Ann Lilly, Rosemary Navarro, Annette Nunnally, Ethel Pinkston, Theresa Raines, Diane Theriault
Senior Secretary: Shirley Goins
Indexing: Norman Frankel (Supervisor), Mary Kay Tinerella, Pam Wood

All articles published, including editorials, letters, and book reviews, represent the opinions of the authors and do not reflect the official policy of the American Medical Association or the institution with which the author is affiliated, unless this is clearly specified.

JAMA, THE JOURNAL of the American Medical Association (ISSN 0098-7484), is published four issues per month by the American Medical Association, 535 N Dearborn St, Chicago, IL 60610. Phone (312) 645-5000. Cable address "Medic" Chicago.

SUBSCRIPTION RATES—The subscription rate per year for members of the AMA is \$2 included in the annual membership dues. The subscription rate per year for nonmembers is \$52 for one year, \$90 for two years in the United States and US possessions; in all other countries, one year, \$68; two years, \$110 (add \$30 surcharge to each one-year subscription and \$60 surcharge to each two-year subscription for air delivery to the United Kingdom and Europe only). Rates to medical students and residents, \$26 for one year, \$45 for two years in the United States and US possessions. Rates for subscriptions for delivery to Australia, Bangladesh, India, Japan, Nepal, New Zealand, South Korea, and Sri Lanka are available through respective exclusive agents. Address all subscription communications to American Medical Association, Circulation and Fulfillment Division, 535 N Dearborn St, Chicago, IL 60610. Phone: (312) 280-7154.

CHANGE OF ADDRESS—POSTMASTER, send all address changes to Caryl L. Wertheimer, Director of Fulfillment, 535 N Dearborn St, Chicago, IL 60610. Notification of address change must be made at least six weeks in advance; include both old and new addresses, a recent mailing label, and your new zip code.

Second-class postage paid at Chicago and additional mailing office.

JAMA[®] Registered in the US Patent and Trademark Office.

Copyright © 1986 by the American Medical Association



THE COVER

A Paramedic Team Performing Cardiopulmonary Resuscitation, modified from a photograph by H. Armstrong Roberts, Inc., Philadelphia.

(Several paramedics poised are to perform cardiopulmonary resuscitation; one who is about to apply chest compression, and another who is holding two defibrillation paddles.)

MEDICAL NEWS & PERSPECTIVES 2849

'Silent Ischemia' Challenges Diagnostic, Treatment Skills . . . No Easy Answers in Public CPR Training
From the NIH 2856

LEADS FROM THE MMWR 2861

INSTRUCTIONS FOR AUTHORS 2879

REFERENCE DIRECTORIES

US Meetings 2881

Foreign Meetings, Jan 10; Organizations of Medical Interest, Jan 24/31; State Associations and Exams and Licensure, Jan 17; AMA Officials, April 4

LETTERS 2893

STANDARDS AND GUIDELINES FOR CARDIOPULMONARY RESUSCITATION (CPR) AND EMERGENCY CARDIAC CARE (ECC)

Part I—Introduction 2905

A Historical Perspective 2905
 The 1979 National Conference Recommendations 2906
 Definitions and Intent: Standards, Guidelines, and Certification 2906
 The 1985 National Conference 2907
 Emergency Cardiac Care 2909
 Education and Evaluation 2910
 Role of the AHA 2912
 Implementation of Standards and Guidelines 2912

Part II—Adult Basic Life Support 2915

Indications for BLS 2915
 The Sequence of BLS: Assessment and the ABCs of CPR 2915
 CPR Performed by One Rescuer and by Two Rescuers 2921
 Foreign-Body Airway Obstruction Management 2922
 Warning Signs of Stroke 2925
 Unique Situations 2925
 Pitfalls and Complications 2925
 Safety in Training for and Providing CPR 2926
 The Physically Challenged CPR Student 2928
 Special Resuscitation Situations 2929
 Near Drowning 2929
 Traumatic Injury 2929
 Electric Shock 2930
 Hypothermia 2931

Part III—Adult Advanced Cardiac Life Support 2933

Basic Life Support 2933
 Adjuncts 2933
 Cardiac Monitoring and Arrhythmia Recognition 2937
 Drug Therapy 2937
 Electrical Therapy 2942
 Patient Management: Application of ACLS 2944
 Specific Cardiac Arrest Sequences 2945
 Postresuscitation Care 2949
 Termination of BLS or ACLS 2951

Part IV—Pediatric Basic Life Support 2954

Causes of Cardiopulmonary Arrest 2954
 The Sequence of CPR 2955
 Airway Obstruction Management 2959

Part V—Pediatric Advanced Life Support 2961
 Adjuncts for Airway and Ventilation 2961
 Adjuncts for Artificial Circulation 2963
 Cardiac Monitoring and Arrhythmia Recognition 2964
 Establishing and Maintaining an IV Infusion 2964
 Drug Therapy, Defibrillation, and Postresuscitation Care 2964

Part VI—Neonatal Advanced Life Support 2969
 Environment and Assessment 2970
 Initial Steps: Positioning, Suctioning, and Stimulating 2970
 Ventilation 2971
 Chest Compressions 2972
 Medications 2972
 Postresuscitation Care 2973

Part VII—Emergency Cardiac Care Units (in EMS Systems) 2974
 Standards for Prehospital ALS Units (Fixed and Mobile) 2974
 Defibrillation 2976
 Standards and Guidelines for Fixed ECC Units 2976
 Standards for Mobile ECC Units 2977

Part VIII—Medicolegal Considerations and Recommendations 2979
 Decision Making: Providing, Withholding, and Withdrawing Life Support 2979
 Liability Risks of Individuals, Groups, and Institutions 2982
 Role of the 'Ethics Committee' in Decision Making 2983
 Medicolegal Considerations in the Pediatric Age Group 2983
 Recommended Legislative Action 2984

CONFERENCE AGENDA 2985

COOPERATING AGENCIES 2986

FACULTY 2987

EDITORIALS

**The 1985 Conference on Standards and Guidelines for
 Cardiopulmonary Resuscitation and Emergency Cardiac Care** 2990
 W. H. Montgomery, MD, Honolulu

CPR 1986: What's New 2992
 C. M. Rinke, MD, Chicago

A PIECE OF MY MIND

Lifeline 2996
 J. S. Sartin, MD, Rochester, Minn

DOMESTIC ABSTRACTS 3002

QUESTIONS AND ANSWERS 3017

BOOKS 3021

OBITUARIES 3029

CLASSIFIED ADVERTISING 3030

CME Corner 3044

INDEX TO ADVERTISERS 3044

CORRECTION 2900
 Letter to the Editor: **AIDS and Testing for AIDS**
 D. E. Dasse, MD, Riverside, Calif, M. Kanter, MD, Los Angeles, R. S. Klein, MD

AMA Officers
President: Harrison L. Rogers, Jr, MD*; **President-Elect:** John J. Coury, Jr, MD*; **Immediate Past President:** Joseph F. Boyle, MD; **Secretary-Treasurer:** George L. Collins, Jr, MD*; **Speaker, House of Delegates:** James E. Davis, MD; **Vice-Speaker, House of Delegates:** John L. Clowe, MD

AMA Trustees
 David J. Brailer (student); Lonnie R. Bristow, MD; Rufus K. Broadaway, MD; George L. Collins, Jr, MD* (Secretary); Ronald M. Davis, MD (resident); John H. Dawson, MD; William S. Hotchkiss, MD* (Chairman); Robert E. McAfee, MD; Alan R. Nelson, MD* (Vice-Chairman); Joseph T. Painter, MD*; John J. Ring, MD*; Raymond Scalettar, MD; Jerald R. Schenken, MD; John Tupper, MD
 *Executive Committee

EDITORIAL BOARD

Kenneth A. Arndt, MD
 Boston

Byron J. Bailey, MD
 Galveston, Tex

Arthur E. Baue, MD
 St Louis

Donald J. Dalessio, MD
 La Jolla, Calif

Cecilia M. Fenoglio, MD
 Albuquerque

William H. Foega, MD
 Atlanta

Renee C. Fox, PhD
 Philadelphia

Daniel X. Freedman, MD
 Los Angeles

Vincent A. Fulginitti, MD
 Tucson

Morton F. Goldberg, MD
 Chicago

Marilyn Heins, MD
 Tucson

Edward C. Hill, MD
 San Francisco

James F. Holland, MD
 New York

King K. Holmes, MD, PhD
 Seattle

Harold G. Jacobson, MD
 Bronx, NY

Robert J. Joynt, MD
 Rochester, NY

Richard L. Landau, MD
 Chicago

Daniel J. McCarty, MD
 Milwaukee

William W. McLendon, MD
 Chapel Hill, NC

Arno G. Motulsky, MD
 Seattle

Robert E. Rakel, MD
 Houston

Domeena C. Renshaw, MD
 Chicago

Martha M. Sarasua, MD, PhD
 Charleston, SC

Alfred Soffer, MD
 Park Ridge, Ill

Robert M. Veatch, PhD
 Washington, DC

Executive Vice-President: James H. Sammons, MD
Senior Deputy Executive Vice-President: James S. Todd, MD
Deputy Executive Vice-President: Whalen M. Strobhar
Assistant Executive Vice-President: M. Roy Schwarz, MD
Vice-President, Scientific Information: George D. Lundberg, MD
Vice-President, Publishing and Marketing: John T. Baker
Director, Publication Production and Printing Division: Norman D. Richey
General Sales Manager; Director, Advertising Sales and Promotion Services Division: D. Joseph Dennehy
Director, Circulation-Fulfillment Division: Lee A. Parent
Director, Promotion and Western Sales: Thomas J. Carroll
Director, Advertising Services: Raymond Christian
ADVERTISING OFFICES: Eastern: 600 Third Ave, Suite 700, New York, NY 10016 (Manager: Robert C. Corcoran [212-867-8640]; Representatives: Bill Tice, Cliff Vanderhoof); Midwest/Farwest: 535 N Dearborn St, Chicago, IL 60610 (Manager: Thomas J. Carroll [312-280-7182]; Representative: Daniel T. Mjolsness); Classified Advertising: Delores Boudent [312-280-7190]
ADVERTISING PRINCIPLES—Advertisements in this issue have been reviewed to comply with the principles governing advertising in AMA publications. A copy of these principles is available on request. The appearance of advertising in AMA publications is not an AMA guarantee or endorsement of the product or the claims made for the product by the manufacturer.