

Arthur E. Guedel Memorial Anesthesia Center

The Importance of the Guedel Chart

By Clyde W. Jones, M.D., F.A.C.A.

One of the pivotal bits of information that I learned as a beginning resident in anesthesiology in 1963 was the Guedel Chart (originally published in 1937), outlining the assessment of anesthetic depth. Some of my teachers who saw to it that I was trained in the fundamentals of ether administration allowed me to see in graphic outline the utility of this masterpiece of the measure of anesthetic depth. This chart is still imprinted on my brain and became not only useful in the operating room, but was used as a reference whenever I was called to treat an unconscious patient in the emergency room or other areas. By quickly mentally placing the patient on the Guedel Chart, I was afforded a brisk method of assessing the degree of respiratory and cardiovascular intervention necessary. This fundamental acquaintance with the Guedel Chart has been of inestimable value to my understanding of our specialty.

SIGNS OF GENERAL ANESTHESIA					
	Somatic - Muscles	Respiration Tachycardia — Inspiration — — Expiration —	Oculo- Pylar Muscles	Lid Surface	Pupil Reaction Size (mm)
1st Stage— Analgesia	Normal tone			+	• • •
2nd Stage— Delirium or Excitement	Disordered Activity (Coma)		← →	+	⊙ (Pupils dilated)
3rd Stage— Surgical Anesthesia	1st Plane 1st Plane			⊙	• • •
	2nd Plane 2nd Plane		×	⊙	• • •
	3rd Plane 3rd Plane		×	⊙	⊙ ⊙ (Pupils dilated)
	4th Plane 3rd Plane		×	⊙	⊙ ⊙
4th Stage Respiratory Arrest	1st Extreme			⊙	⊙ ⊙
Anaxia (Coma)	Complete Relaxation or Flaccid	Space	⊙ ⊙	⊙ ⊙	⊙ ⊙

The signs and stages of general anesthesia (adapted from Guedel).

Figure 1. The Guedel Chart.

Newer drugs and anesthetic agents forced us to seek other means of assessing anesthetic depth because, unlike ether, they often traversed the Guedel Stages with lightning-like rapidity. Philip Woodbridge presented an alternate way of looking at anesthetic depth, one which reflected the newer agents in 1957.

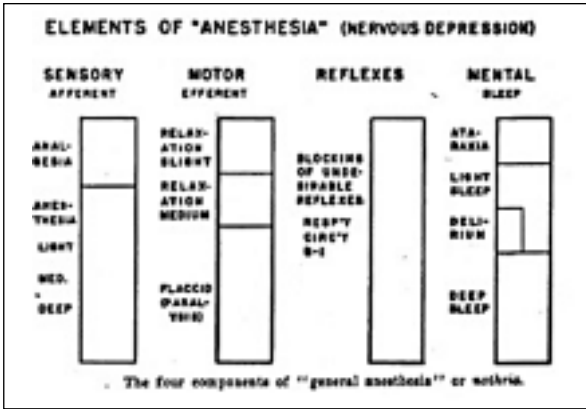


Figure 2. The Woodbridge Classification

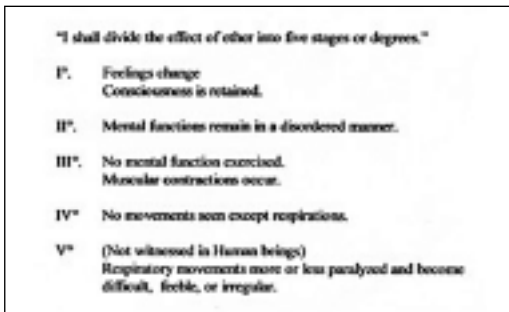


Figure 3. J. Snow's Five Stages of Ether.

It is to be remembered that Arthur Guedel was not the first to offer the Stages of Anesthesia, though he no doubt refined it. John Snow of England, the first full-time anesthesiologist, offered such a system in 1847. Now we are in the era of the processed EEG and its many implications. Thus, we march ever forward to finer and finer techniques of mensuration in a dynamic and sophisticated area of medical specialization.

References

Figure 1: Guedel, Arthur E. *Inhalation Anesthesia—A Fundamental Guide*. 1937.
 Figure 2: Woodbridge, Philip D. *Changing Concepts Concerning Depth of Anesthesia. Anesthesiology*, Vol. 18, #4, pp. 536-550, Jul-Aug 1957.
 Figure 3: Snow, John. *On the Inhalation of the Vapor of Ether*. 1847.

Guedel Contributors for 2005-2006

Virgil M. Airola
Augusto C. Alarcon
Paterno A. Almendral
Glenn W. Alper
Clarita G. Amurao
Eduardo E. Anгуizola
Merrill P. Bacon
Timothy E. Baldwin
Sanjoy Banerjee
Steven E. Banschach
William H. Barbee
Jonathan F. Barrow
Edwin E. Batte
Kevin P. Becker
John I. Benet
Dean B. Berkus
Ronald S. Bierma
John B. Bornstein
Harriet B. Branick
Terrance W. Breen
Heinrich A. Brinks
Romualdas V. Brizgys
D. Robert Buechel
Ralph B. Busch, Jr.
Rick R. Bushnell
Selma H. Calmes
James W. Carlin
Paul D. Carlton
Ian Chait
Anthony H. Chang
Calvin Chang
Chun T. Chen
Yong S. Chen
Gerald Y. Choi
Gerald Y. Choi
Sungkey L. Chong
Jon W. Churnin
Richard W. Clark
Rodney D. Clark
Jonathan T. Clarke
Daniel M. Cosca
Harry J. Cozen
Thomas H. Cromwell
James L. Crook Jr.
Brandt R. Culver
Gary L. Cutter
Patricia A. Dailey
Martha Y. Daly
Maria A. De Castro
Robert P. DeVoe
John O. Dimowo
John W. Ditzler
Robert F. Dong
Donald B. Dose
George G. Doykos
Christine A. Doyle
Varner E. Dudley III
Samir Dzankic
John C. Eckels
Steven A. Ecoff
Peter K. Ely
Richard C. Engel
Paul Englund
Paul G. Epler
Aubrey G. Eyer
Mark R. Fahey
Mark R. Fahey
Carl W. Fisher
Richard P. Fogdall
Wayne A. Foran
Mary J. Ford
Brandt A. Foreman
Wendy W. Forrest
Peter E. Frasco
Kenneth T. Furukawa
Jeffrey D. Galland
Donald J. Galligan
Robert C. Garbak
Laurens N. Garlington
J. Kent Garman
Robert M. Gasway
Steven J. Gerschultz
John W. Gibbs Jr.
John C. Glina
Adamson G. Go
Paul Goehner
Steven D. Goldfien
Alex L. Goodman
Randall L. Goskowicz
L. Richard Greenstein
George A. Gregory
Philip A. Greider
Hans J. Gritsch
Nita N. Grover
Gary T. Guglielmino
Edward F. Gunz
Galust G. Halajyan
Klane L. Hales
Brian P. Harney
Richard E. Harris
Fredrick E. Harrison
John S. Hattox
Richard D. Hauch
Quin R. Hauss
John M. Haworth
William L. Hazard
Thomas D. Heiman
Eva H. Henriksen
Michael G. Hernandez
George P. Herr
Mark Hilberman
Paul F. Hoar
Richard W. Horrigan
Leland R. House Jr.
Samuel C. Hughes
Patrick C. Humphreys, Jr.
Eric J. Hunt
Kha K. Huynh
Shale F. Imeson
George G. Izmirian
Russell T. Jackson
Stephen H. Jackson
James R. Jaworski
Robert A. Jelinek
William Jenkins
Paul W. Johnson
Clyde W. Jones
Hasmukh G. Joshi
Robert W. Kalayjian
Patricia A. Kapur
Eva M. Kavan
Kaye H. Kelley
Robert T. Keszler
Sung-Hwan Kim
Kenneth Y. Kimura
Gilbert E. Kinyon
Arthur C. Klein
Irv Klein
Wayne M. Kleinman
Sandra W. Kluwe
Brian N. Kopeikin
Harold S. Korduner
Caroline J. Labrie
Michael J. Laflin
Michael Lam
George H. Lampe
Laurence A. Lang
Nathaniel C. Law
Edwin R. Lee
George I. Lee
Hee Y. Lee
In Soo Lee
Kee Y. Lee
Gary A. Leopold
Yvonne I. Leramo
Norman Levin
Kuang C. Liao
Teresa H. Liao
Michael J. Lillie
Frederick A. Lodge
Ann S. Lofsky
James F. Lourim
Shawn W. Lucas

Guedel (cont'd)

Philip D. Lumb
Nelly K. Mac
Thach D. Mai
Ann Marie Mallat
Douglas K. Mandel
Gerard Manecke
Dennis T. Mangano
Guillermo T. Mantuano
Floyd F. Marchi
Steven R. Marcum
Lewis S. Margolis
Bert W. Marks
Steven L. Marlowe
Rosemarie Marshall Johnson
Linda J. Mason
Thomas P. Mathews
William G. Maxwell
Michael D. McGehee
Fred J. McKibben
Stuart Melnick
A. Duane Menefee
Bernard S. Millman
Iqbal Mirza
Gayle R. Misle
LeRoy Misuraca
Avery C. Mittman
Alan R. Mizutani
Daniel Y. Mochizuki
Jack L. Moore
Patrick A. Moore
Randall D. Morton
Suha Murad
Steven Naleway
Teri R. Namba
Marco S. Navetta
Philippa Newfield
Alan K. Nirady
Melvin S. Nunn
Nader S. Nwaiser
Aidan P. O'Brien
Helen T. O'Keefe
Richard J. O'Leary, Jr.
Alan F. Olson
Blanka A. Orloff
Paul J. Pabst, Jr.
Jeffrey D. Parks
Robert S. Peck
Constance H. Pinkerman
Gail P. Pirie

Robert E. Ploss
Jonathan J. Porter
Marvin H. Primack
Chunyuan Qiu
Maria Concepcion G. Rabe
Saroja V. Rajashekara
Michele E. Raney
David Raybould
John H. Redpath
Phillip C. Reed
Danielle M. Reicher
Roland D. Reinhart
Mark J. Richman
Francisco C. Rico
Miguel A. Rivera
Beverly B. Roberson
H. Douglas Roberts
Susanne C. Roessler
George G. Romero
Lynn B. Rosenstock
David J. Ruderman
Laura A. Russell-Stringer
Donal P. Ryan
Kenneth R. Sacks
Stanley I. Samuels
Robert H. Sanborn
Surinder Sandhu
Stanley J. Scheurman, Jr.
Richard M. Schlobohm
William O. Schultz
Warren Schweitzer
John W. Severinghaus
David A. Shapiro
James J. Shea
Susan S. Sheridan
Carla B. Shnier
Karen S. Sibert
Mark A. Singleton
Stephen J. Skahan

Laura Slaughter
Eric T. Smith
Gary C. Smith
John R. Spence
John M. Stanec
William R. Stevens
Philip C. Stillman
Jeffrey S. Stuart
Daniel E. Sucha
R. Lawrence Sullivan, Jr.
Andrew D. Sun
Frank A. Takacs
David Y. Tang
Jeffrey C. Thue
Richard E. Tirrell
Narendra Trivedi
Gerald E. Tull
Joseph A. Vasek
Christopher J. Vasil
Jerrold A. Vest
Steven G. Vitcov
Mark E. Vukalcic
Gerald H. Wade
Wayne T. Walker
Michael A. Walter
Henry C. Walther
Brian W. Wamsley
Steven Wang
Eric A. Wardrip
Walter L. Way
Paul M. Weidoff
Richard A. Weikel
Marc L. Weller
Stephen Y. Wen
David P. Whalen
Jeffrey D. White
Freddie A. Williams, Jr.
Marc D. Wolfsohn
Lillian S. Wong
Robert L. Worthington
Stephen P. Yeagle
Ken Yew
Nicole Yi
Larry Yip
Paul B. Yost
Vian Younan
Anni Yue
Mark I. Zakowski
Eric J. Zeeb



Arthur E. Guedel Memorial Anesthesia Center,
2395 Sacramento Street, San Francisco, CA 94115
(415) 923-3240; <http://www.cpmc.org/professionals/hslibrary/collections/guedel>