Obstetric Emergencies

THIRD EDITION

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The authors and publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

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Preface

Apparent interest in the prevention of maternal deaths in obstetrics prompted the writing of a monograph on that subject in 1961. The theme was expanded in the second edition to include emergencies of all types that may be met with during pregnancy, labor, and the immediate postpartum period. Detailed consideration was given to such areas as clotting disorders, life-threatening infections, shock, acute renal failure, anesthetic emergencies, and the use of ultrasonography. The third edition of *Obstetric Emergencies* includes the most recent advances in maternal–fetal medicine, with an additional chapter on antepartum evaluation of the fetus.

The book was written specifically to provide guidance to specialists, residents, family practitioners, and nurses who are involved in the management of the acutely ill obstetric patient. An effort has been made throughout to present the reader with a positive approach to emergency situations. Where possible, a definite course of action is outlined, and modern trends in diagnosis and management are stressed. Drug dosages suitable for the "average" patient in each particular situation are given, but the importance of individualization is stressed. The Table of Contents reflects the logical sequence in which the chapters of text were arranged and, where necessary, the text is supplemented with figures and tables. The index was designed to be as comprehensive and functional as possible. *Obstetric Emergencies* is not an obstetric textbook, but rather intended as a "ready reference manual" on the many emergencies that can occur in obstetrics.

D.C.
R.E.W.
T.C.F.O'C.
R.A.K.

Preface to the Second Edition

These will enable the obstetrician to decide which is "watchful waiting," which is "hopeful procrastination," and which is "criminal negligence."

W. J. Dieckmann
Am J Obstet Gynecol
50:590, 1945

A preventable maternal death is the greatest tragedy in medical practice. Obstetric emergencies allow little time for thought, and often only the prompt and appropriate intervention of an alert doctor or nurse averts catastrophe. This book is written specifically to provide guidance to specialists, residents, family practitioners, and nurses who are involved in the management of the acutely ill obstetric patient.

Because of the apparent interest in the subject a monograph was written in 1961. The theme has been expanded in this edition to include emergencies of all types which may be met with during pregnancy, labor and the immediate postpartum period. Detailed consideration is given to such areas as clotting disorders, life-threatening infections, shock, acute renal failure, anesthetic emergencies and the use of ultrasonography. Throughout the book an effort is made to present the reader with a positive approach to emergency situations. Where possible, a definite course of action is outlined, and modern trends in diagnosis and management are stressed. Drug dosages suitable for the "average" patient in each particular situation have been given but the importance of individualization is stressed.

This is not an obstetric textbook but rather a "ready reference manual" on obstetric emergencies. With this in mind a serious effort has been made to provide a logical chapter sequence, a detailed table of contents and a good index. Where necessary the text is supplemented with figures and tables. For their assistance with these we thank the staff of the Departments of Medical Illustration of the University of Miami School of Medicine and St. Louis University. The original illustrations are mainly the work of Mr. William McNab, to whom we are grateful for his many recommendations.

For numerous helpful suggestions we owe thanks to our colleagues Dr. James M. Ingram, Dr. J. Donald Wargo, Dr. Paul E. Demick, Dr. Allan McLeod, Dr. Edward J. Diamond, Dr. H. Praphat, Dr. Manuel R. Comas, and to Sister Jeanne Meurer, M.S., C.N.M., of St. Louis University School of Nursing. For their assistance in typing the manuscript we thank Barbara Chorley, Moira Morgan and Rita Florentino.

For their help and patience throughout the preparation of the manuscript we thank the staff of Harper & Row.

Finally, this book is dedicated to mothers everywhere and especially to Margaret, Jane, and Mary.

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Acknowledgments

We thank the staff of the Departments of Medical Illustration of the University of Miami School of Medicine, St. Louis University, and Tampa General Hospital for their assistance in preparing many of the tables and figures. The original illustrations are mainly the work of Mr. William McNab, to whom we are grateful for his many recommendations.

The inspiration for the book came from the late Dr. James Henry Ferguson.

For numerous helpful suggestions we owe thanks to our colleagues Dr. Donald E. Marsden, Dr. Jose Scerbo, Dr. Thomas McDonald, Dr. Somporn Praphat, Dr. J. Donald Wargo, Dr. Allan McLeod, Dr. Samuel Weinstein, Dr. Manuel R. Comas, and Sister Jeanne Meurer, M.S., C.N.M., of St. Louis University School of Nursing. For their assistance in typing the manuscript we thank Anne Housley, Betty Monti, and Margaret Thompson. For her editorial assistance we thank Margaret Cavanagh.

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Contents

Chapter 1

Common Obstetric Emergencies

Ralph E. Woods, Denis Cavanagh

"There are but two things that have much effect on me at a labour-haemorrhage and convulsions."
William Hunter (1718–1783)

GENERAL CONSIDERATIONS

Fewer than 1% of pregnant women in the world today are under the care of specialist obstetricians. Out of necessity most women are delivered by midwives, handywomen, and husbands. Midwives vary in quality from the neat, well-trained American or European nurse to the unkempt, incantation-chanting crones who play the role in many other parts of the world.

Despite statements to the contrary (based largely on failure to recognize that different countries define perinatal mortality differently) the standard of perinatal care in the United States is among the highest in the world. About 95% of pregnant women see a physician at some time during pregnancy. Although only about 50% of these are under the care of a specialist obstetrician, there is little hazard in this provided (1) the patients receive good antepartum care; (2) they are referred for specialist consultation should any abnormality be detected; and (3) they are delivered in an adequately equipped hospital.

The physician who practices in an area with specialists available will usually be able to refer his high-risk patients without difficulty. On the other hand, a rural family practitioner may have no specialist consultation available and less than adequate hospital facilities. Although the latter situation is an undesirable one, it will not be made to disappear simply by ignoring its existence. Many women's lives are saved annually by the family physicians and nurse-midwives on our urban and rural medical frontiers. Every effort must be made to give them as much help as possible while plans go forward to provide the needed facilities for specialist consultation, transfusion, and major surgery in these areas.

Obstetric emergencies may develop even in low-risk patients, so all doctors and nurses who participate in the care of pregnant women must be prepared to deal with such situations.

To plan this book along practical lines, an effort was made to determine the types of emergencies most commonly met with in home deliveries. These statistics are available in the reports of obstetrical emergency services set up in areas where domiciliary obstetrics is common. A physician working in a small hospital will be confronted with similar situations. Thus an analysis of these emergency service calls brings the problem into better perspective than any review of serious complications from a large obstetrics department.

There has recently been a trend in the United States for "consumers" to demand home deliveries, so here as elsewhere we must be prepared to cope with emergencies in the home setting. Current statistics on obstetric emergencies are difficult to obtain. However, there is no reason to believe that the order of frequency has altered significantly in the past 25 years so far as maternal emergencies are concerned.

Collected figures representing emergencies occurring under diverse circumstances in both rural and urban areas are reviewed in Table 1-1. Obviously hemorrhage and convulsions are the bugbears of obstetric practice, and when we add sepsis we have the three most common causes of maternal death. Many of the emergencies could be avoided by better antepartum care, but there is no doubt that unforeseen complications will arise despite the most careful screening.

In the last several decades, policies aimed at universal hospital confinement have been promoted in the interest of mother and infant. Acceptance and implementation of these policies have been associated with dramatic declines in maternal and perinatal mortality. Although there is no certainty that these relationships are causally related, it remains our firm belief that in the absence of economic pressure and geographic necessity, home deliveries or deliveries in inadequately equipped and staffed facilities are earmarks of an inefficient maternity and newborn-care system. When emergency situations occur, even in low-risk patients, time is never on the side of the patient.

In view of increasing consumer demands to return pregnancy, labor, deliv-

TABLE 1-1. Common Obstetric Emergencies

Type of Emergency	Dewhurst (1952)	Hagberg (1956)	Sutherland (1959)	Total	%
Postpartum hemorrhage and retained placenta	245	65	71	381	45.1
Postpartum hemorrhage and shock	143	102	44	289	34.2
Abortion	33	3	14	50	5.9
Eclampsia	23	4	6	33	3.9
Antepartum hemorrhage	9	14	10	33	3.9
Secondary postpartum hemorrhage	9	3	3	15	1.8
Other conditions	27	1	16	44	5.2
Total	489	192	164	845	100.0

(Dewhurst CJ: Emergency obstetrical service: review of 489 cases in Manchester area. Lancet 2:746, 1952; Hagberg CJ: The Capetown obstetric flying squad: Its conception, organization and operation. South Afr Med J 30:1140, 1956; Sutherland AM: Personal communication: recorded "flying squad" cases, Southern General Hospital, Glasgow, Scotland, April 15, 1956–July 20, 1959.)

ery, and newborn care to a home-, family-, and parent-controlled environment, there may be an even greater need to reidentify complications and emergency situations in mothers and their infants and to reemphasize principles of management. This is particularly true when practitioners—physicians or midwives—attend too few patients to maintain competence in the recognition and management of these complications.

Major social changes have occurred in the area of human reproduction and include (1) decline in domiciliary care, (2) decline in the birth rate in many areas, and (3) a shift in age-parity distribution of births. These and other changes have undoubtedly affected the incidence of certain complications. Current statistics on similar populations served by similar systems are difficult to come by, but as already stated, there is no reason to believe that the order of frequency of maternal complications has been altered in the past 25 years.

There is need, however, to draw attention to the increasing variety of complications that might be encountered in the delivery of maternity and newborn infant care. These are the result of the changing nature of obstetrics. The changing physical and medical characteristics of women undertaking childbirth account for some. Others are due to improved recognition and understanding of pathologic and pathophysiological entities. Some might be considered as iatrogenic—that is, arising as a result of certain practices used in obstetric and neonatal care. Lastly, certain emergencies and complications (Table 1-2) in the newborn are presented inasmuch as those who attend labor and delivery are often responsible for the immediate care of the newborn. It is emphasized that the two populations in which the complications were observed are not comparable in number, time, social, or other characteristics.

If an indicator of maternal and infant care, such as infant mortality, is

TABLE 1-2. Some Types of Complications in Domiciliary Cases

	Patients	
Condition	**No.***	**No.†**
Total No. of Patients	287	155
Normal deliveries	231	133
Patients with complications	56 (19%)	22 (14%)
Toxemia	1	6
Hemorrhage	3	1
Prolonged labor	31	15
Malpresentations	1	2
Prolonged rupture of membranes	7	—
Induction/augmentation	0	14
Lacerations	53	—
Infections	5	—
Mothers transferred to hospitals	56	3
Mothers needing C-section	4	0
Prematurity	8	1
Fetal distress (meconium/bradycardia)	6	9
Early respiratory problems	9	29
Stillbirth	1	0

(Adapted from *Mehl LE *et al*: Birth and Family 2:4, 123, 1975; †Cox CA *et al*: Br Med J 1:84, 1976)

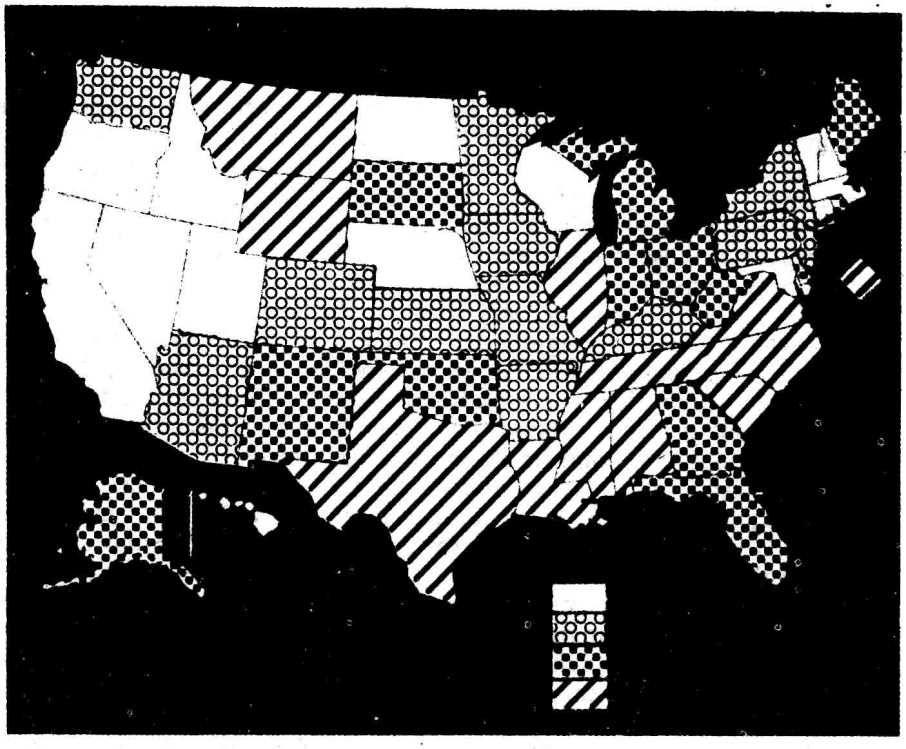

FIG. 1-1. Geographic distribution of infant mortality in the United States (1972). (Minnesota Systems Research, Inc)

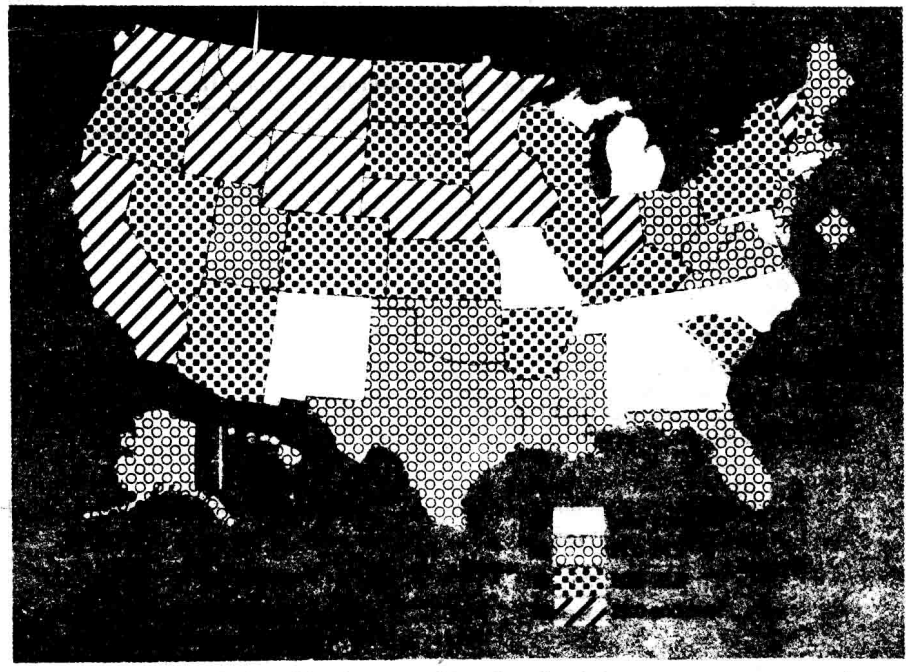

FIG. 1-2. Geographic distribution of family physicians per 100,000 population in the United States (1972). (Minnesota Systems Research, Inc)

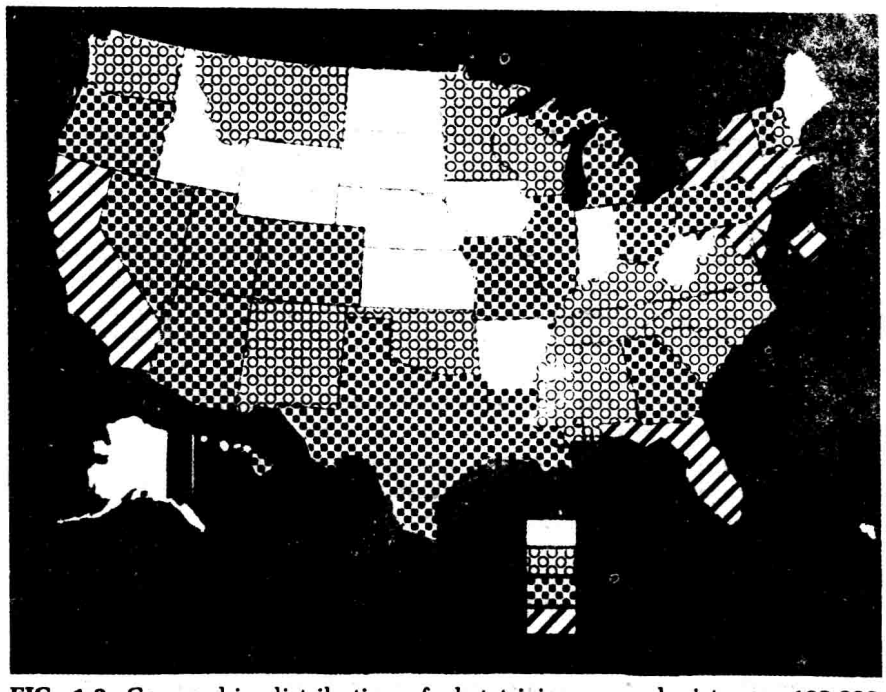

FIG. 1-3. Geographic distribution of obstetrician-gynecologists per 100,000 women aged 15–44 in the United States (1972). (Minnesota Systems Research, Inc)

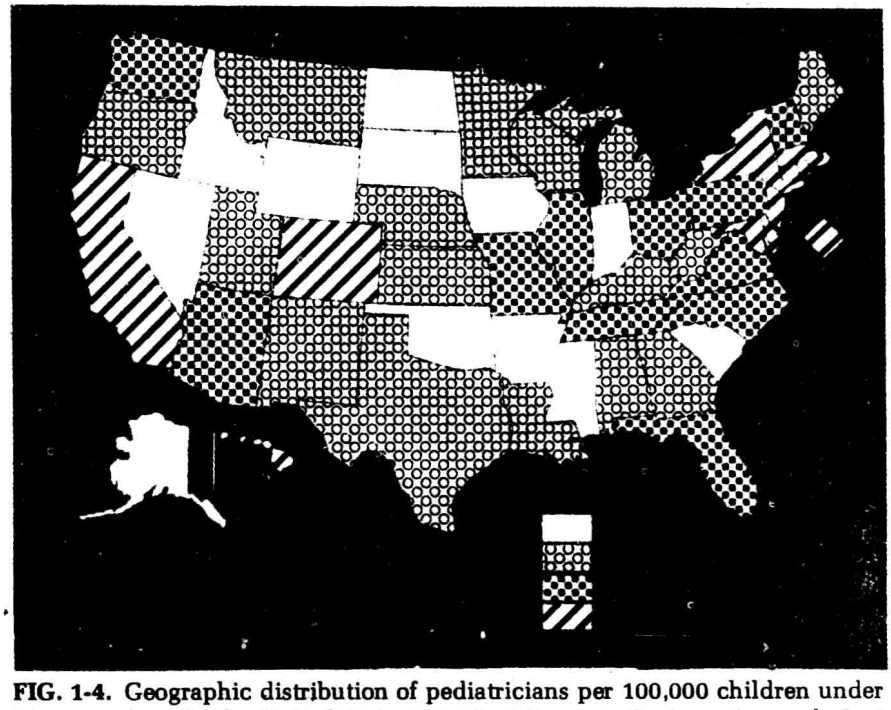

FIG. 1-4. Geographic distribution of pediatricians per 100,000 children under 20 years of age in the United States (1972). (Minnesota Systems Research, Inc)

considered, it will be noted that in the United States there is a considerable range, depending upon geographic location and the population served (Fig. 1-1). It will also be noted that the availability of an adequate number of providers of care is related to the improvement in infant mortality rates (Fig. 1-2 to 1-4).

Further reduction in maternal and perinatal mortality and morbidity will be reached only through the combined efforts of consumers, providers, and government. Improvement in physical and emotional health, social circumstances, and patterns of childbearing have an important role to play. Wider use of improved antepartum, intrapartum, and neonatal care is obviously important, particularly in the context of tiered, regional perinatal programs. The need for emergency care can be expected to decrease as the general standard of maternal and infant care improves. However, the provider—whether obstetrician, nurse, midwife, or other—must always be prepared to meet the unheralded emergency if tragedy is to be averted.

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Chapter 2

Clotting Disorders in Pregnancy

Denis Cavanagh

"there are alterations in the blood or blood vessels, of a temporary nature, which prevent its clotting, and thus, during labor or operations, cause death."

J. B. de Lee
American Journal of Obstetrics 44:785, 1901

GENERAL CONSIDERATIONS

Pregnancy predisposes women to certain clotting disorders, and their occurrence during pregnancy may in turn predispose to hemorrhage, shock, and even maternal and fetal death. For this reason, the obstetric team must be familiar with some of the more common coagulation disorders that may be encountered during pregnancy, labor, and the puerperium.

REVIEW OF HEMOSTASIS

To understand these clotting disorders properly, knowledge of the normal mechanism of hemostasis is necessary. Hemostasis is the general term applied to the life-saving process that stops the flow of blood from injured vessels. Certain requirements must be met: (1) blood vessels and extravascular tissues must be normal; (2) platelets must be normal in quantity and quality; and (3) clotting factors in plasma and serum must be present in adequate quantity (Table 2-1).

THE THROMBOTIC PROCESS

The coagulation process may be divided into three phases: (1) the vascular phase, (2) the platelet phase, and (3) the coagulation phase.

The Vascular Phase

When an injury occurs to a small vessel and results in the extravasation of blood, three responses follow that help limit the injury: (1) vasocon-

TABLE 2-1. Coagulation Factors Present in Plasma and Serum

Factors present in plasma	Normal values (mg/100 ml)	Presence or absence in normal serum
*I Fibrinogen	200–400	Absent
II Prothrombin	75–125	5%
V Labile factor, proaccelerin	75–125	Absent
VII Stable factor, proconvertin	75–125	Present
VIII Antihemophilic globulin	50–200	Absent
IX Plasma thromboplastin component	50–200	Present
X Stuart-Prower factor	75–125	Present
XI Plasma thomboplastin antecedent	70–130	Present
XII Hageman factor	70–130	Present
XIII Fibrin-stablizing factor, Fibrinase	50–200	Absent
Platelets	150,000–400,000/mm^3	Absent

* Roman numerals indicate standard or international nomenclature for coagulation factors. Missing are III, thromboplastin, a tissue factor not normally present in circulating plasma or serum in significant amounts; IV, calcium ion, present in all tissues and fluids; and VI, not included in current nomenclature.

(Cavanagh D, Comas MR: In Romney S, Gray MJ, Little B, *et al* (eds): Gynecology and Obstetrics: The Health Care of Women. New York, McGraw-Hill, Copyright © 1975. Used with permission)

striction markedly reduces blood flow through the area; (2) the escape of blood into the relatively rigid extravascular supporting tissue increases the pressure within these structures and helps collapse capillaries and venules; and (3) various substances such as tissue thromboplastin (factor III) and adenosine diphosphate (ADP) are released from the injured tissue and help to initiate the final coagulation phase.

The Platelet Phase

Platelets adhere to the surface of the injured vessel and aggregate to one another almost instantaneously after an injury. This results in the formation of a platelet plug that may, depending on the extent of the injury, provide temporary or complete hemostasis. Platelet adhesion and aggregation are encouraged by ADP (derived from injured tissues) and the anti-VW factor (so named because of its lack in Von Willebrand's disease).

Platelets have other functions in normal coagulation. They release adenosine triphosphate (ATP) as well as ADP and various phospholipids collectively known as platelet factor III. They also release thrombosthenin, a contractile protein that is responsible for the clot retraction.

The Coagulation Phase

This phase is absolutely necessary for the formation of a firm thrombus, which will later be the structural basis for the reconstructive process.

The mechanisms by which the coagulation factors interact is not exactly known, but when activated, each factor sequentially activates the factor next in line in a "waterfall" sequence. This is the so-called cascade theory of coagula-