

Communicable Disease Control

A Volume for the Health Officer and Public Health Nurse

THIRD EDITION

BY

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Preface to the Third Edition

In preparing a third edition of this volume, *Communicable Disease Control*, the authors have realized that they were faced with a dual task—modernization and perspective. The first of these is the usual problem of any revision. It has involved incorporation of new knowledge and removal of that which is outdated. While the developments of the past five years have been somewhat less striking than were those of the years of World War II, the advances have nevertheless been so far reaching that many of the practices acceptable in 1948 are today obsolete. New antigens and drugs have been developed, new uses found for old products. New concepts of pathogenesis have been advanced, with resultant changes in administrative practices. As the work of revision has progressed, the authors have been increasingly impressed with the progress and changes of the years that have elapsed since the earlier revision. In accordance with the policy followed in the earlier editions, historical developments—including recent concepts and practices that have been superseded as a result of new discoveries—are discussed only to the extent necessary for an understanding of present-day thought and practice.

The second task, change in perspective, has been more difficult. As public health problems and causes of death, the communicable diseases have declined in importance. At the turn of the century they accounted for 31 per cent of all deaths in the registration states. The first quarter of the twentieth century saw such striking reductions in the death rates that public health workers justly prided themselves on their accomplishments. None could foresee, however, the almost phenomenal changes that lay ahead in the second quarter of the century. Antibiotics, chemotherapy, insecticides, new antigens, improved case-finding procedures—these are but a few of the significant developments that have brought about an unprecedented decline in the toll of infectious disease. Today these diseases are responsible for less than 7 per cent of the deaths in the United States, and several of the infections that were rampant a few years ago are now medical curiosities. The concept of “eradication” has appeared more and more in the literature.

All of this necessitates a change in perspective. No longer can the health department program be built around the communicable diseases.

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Death Rates for Certain Diseases
U.S. Registration Area
Deaths per 100,000 Population

	1900	1925	1950
Diphtheria	40.3	7.8	0.3
Malaria	6.2	2.0	0.1
Measles	13.3	2.3	0.3
Pneumonia (and influenza)	202.2	121.7	27.0
Scarlet fever	9.6	2.7	0.2
Tuberculosis	194.4	84.8	22.6
Typhoid fever	31.3	7.8	0.1
Whooping cough	12.2	6.7	0.7

No longer can the prospect of lower rates from typhoid fever, malaria, hookworm, or diphtheria be used to persuade a community of the need for a full-time health department. No longer must the health officer budget so heavily for the care of infectious disease, nor does the community need to plan so generously for hospitalization for these conditions. As a group, the communicable diseases have been brought under control, and each year sees even more striking reduction. The health officer must put these conditions in their proper relationship to the other needs of his community health program. He must analyze critically those procedures that are worth while and eliminate those that are unproductive, however much they may be hallowed by tradition.

Yet the successes of which public health is so proud must neither blind us to the problems that remain nor lull us into a sense of complacency. There are still many unknowns in the infectious diseases, much still to be accomplished in applying that which is already known. Poliomyelitis and encephalitis have not been controlled. Tuberculosis still causes over 30,000 deaths a year. Children still die from diphtheria and whooping cough. Brucellosis is widespread, and the common cold is as common as ever. Rheumatic fever is still uncontrolled; each year it leaves thousands of children or young adults with seriously damaged hearts. In many parts of the world intestinal infections still rank as a major cause of death, and malaria is far from eradicated. Jungle yellow fever is a constant threat; and cholera, plague, and typhus may at any time escape their bounds. The virulence of many of the infections has declined, but there is no assurance that this decline is permanent nor that present control measures will be equally effective if virulent strains of organisms

reappear. The incidence of some infections may actually be increasing. While we may take just pride in past accomplishments in control of infectious disease, we must be equally on our guard lest this pride turns into complacency. "Pride cometh before a fall."

In preparing this revision the authors have tried to recognize this change in perspective without losing sight of the need for continued watchfulness. An attempt has been made to evaluate control procedures, eliminating wherever possible those which cannot be shown to be of value. Opinions will doubtless differ as to certain details, for there are many difficulties and hazards in trying to sail the narrow channel between the Scylla of overcaution and the Charybdis of neglect. To the extent that the procedures and ideas here presented are progressive and modern yet at the same time not dangerously radical, the authors will have succeeded in their task.

Three new chapters have been added. One of these deals with the control of communicable diseases in the school. Such a chapter seems indicated as the schools present many special administrative problems. For ease of reference, much of the school material that appeared under other headings in the first two editions has been brought together in this new chapter. The other new chapters deal with hepatitis and Q fever, problems of growing importance to health departments.

As in earlier editions, we have been aided greatly by our associates, friends, and critics who have made invaluable suggestions. To all of these we present our sincere thanks, even though we may have failed to concur with all of them. We alone accept full responsibility for the ideas here expressed. In no way should they be interpreted as official pronouncements or expressions of opinion of the agencies with which we are now or have formerly been connected.

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Preface to the Second Edition

The seven years which have elapsed since the publication of the first edition of this volume have probably witnessed more important changes in communicable disease control practice than has any comparable period of history. It has been a period of war in which scientific and technical developments, rather than brute strength, have been deciding forces. As in former years, infectious disease has often been a dominant element in determining the success or failure of military ventures. At one period infection, uncontrolled, threatened the entire success of the Pacific campaign.

During this period, the threat of disease has been met with research which has provided new weapons of communicable disease control far superior to any previously possessed. One needs merely mention the advent of penicillin, DDT, new antimalarials, and new antigens to realize the strides that medical progress has taken during this era. Many other discoveries, such as the sulfonamides, tetanus toxoid, and typhus and yellow fever vaccines which were relatively new and untried at the outbreak of war, have been subjected to severe field tests and found to measure up to the most optimistic predictions as to their efficacy. Many other fields of research have been actively pursued and valuable, though somewhat less spectacular, additions made to our armamentarium of disease prevention. Military necessity has been the spur and has often provided the facilities for much of this progress, but no one should lose sight of the fact that this progress rested on long and tedious fundamental research during the years of peace. Without this background, the rich harvest of war research could never have been reaped.

Although these new developments have greatly altered many of the details of disease control and opened many new vistas, they have not altered the fundamental principles. These remain unchanged and even strengthened. The student who has a firm grasp of these fundamentals has the framework on which he can hang new details as they become available.

In preparing this revision, the authors have therefore made no change in the fundamental pattern but have attempted to incorporate the many developments of the past seven years. The full impact of many of these is

still not clear. Much is still even in the realm of controversy. Whenever possible we have attempted to indicate these elements of uncertainty, yet have felt impelled to assist the reader by some sort of temporary appraisal. It should be recognized, however, that such appraisals are hazardous and may be upset by subsequent experience and research. An open mind in such matters is an essential attribute of every intelligent reader.

As in the first edition, the bibliography has been prepared as a guide to the reader who wishes to study a given topic more extensively but does not have access to a comprehensive metropolitan library. So far as possible, therefore, references have been given to the most readily accessible journals and to review articles even though this has often meant the deliberate omission of excellent articles in less accessible journals and of many articles to which historical priority is doubtless due. The reader who wishes to make an exhaustive review of any topic will obviously pursue his readings far beyond the few references that can be appended to any chapter.

In the preparation of this review, the authors are again indebted to their colleagues and friends who assisted with many helpful criticisms of the first edition and suggestions for the second.

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Preface to the First Edition

Communicable disease control presents two rather distinct problems, protection of the individual and protection of the community. While it is true that the community is merely the sum of its individual members, nevertheless the problems of protection are not simply the mass application of personal prophylaxis. The community presents a complex mixture of social, political, and economic influences that may either facilitate or impede the spread of disease. These same influences affect the control measures that may be developed. Just as the test-tube methods of the chemical research laboratory must be modified for adaptation to large-scale, industrial production—even though the basic reaction is unchanged—so must individual disease control measures be patterned according to community needs. Procedures that are effective in protecting the individual are often too expensive or cumbersome to apply en masse, whereas other measures of only partial personal value may yield real community protection if they reach a large enough group.

This volume is written principally from the standpoint of the community. While personal protection has not been neglected, emphasis has been placed on those procedures which are designed to protect the population as a group rather than merely the individual. In preparing the manuscript we have had in mind the problems that confront the health departments, the schools, the visiting nurse associations, and other community agencies. An attempt has been made to evaluate the various control measures as to their relative effectiveness and to outline programs that will yield the greatest return in terms of necessary expenditure. The public or private agency knows its problem is that of giving the greatest degree of protection for the greatest number of persons from the money made available through the appropriating agencies. It is therefore essential that funds not be wasted on control practices that yield too few returns; often expenditure of this money elsewhere in the public health program will give more health protection to the taxpayers. We have therefore attempted to appraise the practical value of various control measures and have been led to discard or minimize the importance of many as yielding too few returns in terms of the severity of the problem and the expense involved.

We have limited our discussion of control measures to those that are applicable under the conditions which confront the health department. No attempt has been made to consider details or techniques included in hospital care; patients so treated pass from the jurisdiction of the health department to that of the hospital authorities. Home care is always a community problem and often a health department's responsibility; it has therefore been included. The role of the sanitary officer and the principles governing his work have been pointed out; for the details of method and procedure the reader should consult the standard references on community sanitation. In the selection of diseases to be discussed, we have been governed by a desire to include those of major interest in most communities. Some diseases of great importance in other parts of the world have been given scant attention, because they are of such limited or local concern in the United States under present conditions.

Experience has taught us that a clearer concept of the epidemiology and control of the infectious diseases is obtained if an orderly pattern of thought is followed. The several diseases have therefore been considered under a set pattern that has been found to be useful for the student. The reader will note many repetitions. The pattern that has been followed makes these inevitable, but they have been retained to give a reasonable completeness to the several units of thought. No attempt has been made to include an exhaustive discussion of the epidemiology of the individual diseases; rather have we limited ourselves to those few facts essential to an understanding of the control program.

The references at the end of each chapter are intended as a guide to the student who wishes to supplement the material here presented. A conscious effort has been made to select books and periodicals to which the average reader will find easy access. Especially have we drawn upon review articles which summarize investigations within a rather broad field and which are supplemented by more extensive bibliographies. It is believed that these will be of more value to most workers than will exhaustive references to original data, though the serious and inquisitive student will, of course, wish to examine the facts upon which reviews are based. References presenting both sides of controversial matters have been included, regardless of our personal convictions as to the merits of the case. The reader should draw his own conclusions.

In the preparation of this volume we have had immeasurable aid from our associates and friends. In particular we are indebted to Dr. Wilson G. Smillie, who advised with us on the chapters on malaria and hookworm disease; to Dr. J. Arthur Myers, who read the chapter on tuberculosis; to Dr. Nels A. Nelson, for assistance with the chapter on

gonorrhea and syphilis; to Professor Theodore Olson, for help with the chapters on diseases spread through arthropods; to Miss Ida McDonald, for advice with respect to the nursing sections; and to Miss Jean Hirsch, for the diagrams. These friends cannot be held responsible for the views here expressed. This responsibility we alone must assume, with full regret and apologies if we have failed to profit from the counsel given us. The New York State Health Department kindly consented to extensive use, and at times virtual copy of certain sections of its manual on communicable disease nursing, for the preparation of which the junior author had been largely responsible. The members of our respective families and our colleagues on whom we have tried out various parts of the volume deserve special credit for their patience, understanding, and friendly advice.

In preparing this volume, it is our hope that it may be of value to other communicable disease control workers who, like ourselves, have often wished that the wealth of material in current periodicals might be abstracted and appraised as to its applicability to community problems.

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Part One

1. Historical Considerations

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Communicable disease control practices of any era depend upon the prevailing concepts as to the cause of these conditions and the manner of their spread. These concepts have varied from period to period under the changing influence of human thought and the degree to which man has placed a correct and practical interpretation upon his observations. These observations as to the circumstances under which illness occurs have therefore been the foundation upon which theories of the cause and prevention of communicable diseases have been built. Man observed that plagues and pestilences appeared under certain conditions as to season, weather, movements of people, floods, heat, and other variables and associated these observations with his current philosophy regarding these variables. Many of the theories that he evolved to explain these circumstances seem naïve and grotesque today; yet others represented correct observations of essential facts, though the explanations are inadequate and unsound in the light of modern bacteriology. An understanding of the growth of knowledge in this field is essential to a clear conception of present practices, for unfortunately much of the lore and mysticism of earlier philosophies persists in the public mind and hampers the application of modern scientific methods.

ERA OF RELIGION

A philosophy of life that we call religion is one of the basic characteristics of all mankind. The most primitive man observes some form of worship, though the object of his reverence may vary from a tangible deity associated with his everyday life to the invisible spirit of higher religions. Coincidental with the recognition of a good spirit, the deity, has been the concept of an evil force equally associated with tangible objects or vague spirits. To the former have been attributed those events and occurrences that exerted a favorable influence on human affairs; upon the latter have been blamed the unfavorable happenings. Primitive religion was a balance