A full report on the workshop has been published by the Office of the Assistant Secretary for Health and will be widely distributed through State maternal and child health and crippled children's services directors as well as through voluntary agencies.

I am confident that the workshop's eventual outcome will be better health care for a greater number —and a greater diversity—of children with disabilities. The Department of Health and Human Services has a strong commitment to improve services to disabled children and their families. We will be using a variety of techniques to continue the momentum developed at the workshop, and I will report back to you as we make progress toward achieving its goals.

C. Everett Koop, MD, ScD
Surgeon General

An Operational Classification of Disease Prevention

Three decades have elapsed since a working group under the Commission on Chronic Illness proposed the classification of disease prevention into the categories primary and secondary (*1*). An additional term, "tertiary prevention," has gained currency since, and the classification is now ubiquitous in textbooks of epidemiology and preventive medicine. These classes are summarily defined as primary—practiced prior to the biologic origin of disease; secondary—practiced after the disease can be recognized, but before it has caused suffering and disability; and tertiary—practiced after suffering or disability have been experienced, in order to prevent further deterioration. This classification stems from an era when biomedical research was almost exclusively the province of the laboratory scientist, and concepts of health and disease were principally mechanistic. In recent years, the growth and success of epidemiologic research on chronic disease have introduced a large body of nonmechanistic scientific knowledge germane to disease prevention. We are conversant with statistical associations between risk factors and clinical events and have accepted a battery of criteria for judging whether or not the association represents causation (*2*). The primary-secondary classification is attractive and simple, but it does not serve to distinguish between preventive interventions which have different epidemiologic justifications and require different strategies for optimal utilization. As the Department of Health and Human Services moves to focus attention on and increase its efforts in disease prevention and health promotion, it is appropriate to consider an alternative approach to classification that is more closely linked to the practical considerations that govern proper application of preventive interventions.

In the old scheme, the distinction between primary and secondary prevention depends on our identification of the biologic origin of disease. While the biologic origin of acute infections and injuries may be clear-cut, the same is not true of the chronic diseases that now constitute our major causes of disability and death. Does myocardial infarction begin with the first pain, or with the first arterial wall lesions which may have developed in youth (*3*)? Does cancer stem from the initiation event, or only from the occurrence of effective promotion (*4*)? As more is learned about multifactorial chronic diseases with long periods of latency, the concept of biologic origin of disease becomes progressively more diffuse. We also become entrapped by semantic distinctions that have more historical than rational scientific justification. Consider the three common clinical situations of asymptomatic but abnormal elevations of blood sugar, blood pressure, and serum cholesterol. They are logically identical in that none produces discomfort or disability, each has serious diagnostic significance for future clinical events, and each is susceptible to intervention. Yet we commonly call diabetes and hypertension diseases, but refer to hypercholesterolemia as a risk factor. Dietary management of hypercholesterolemia is often called "primary prevention of heart disease," but prescription of a diet for diabetes or a drug for hypertension is viewed as treatment, or possibly secondary prevention.

A second disadvantage of the 1952 scheme, in our opinion, is that the terms "primary" and "secondary" suggest an ordinal value. Although it was not the intention of the Commission to suggest that primary is preferable, and secondary is second rate, this impression may develop, particularly among lay persons who may have responsibility for important decisions that bear on preventive programs. Careful quantitative analysis of benefits, costs, risks, and effectiveness frequently reveals that a preventive intervention is best applied only to a high-risk group, the evidence of high risk being a finding that can be related to the biologic origin of disease. Though "secondary," this may well be the optimal preven-

tive strategy. This unintended side effect of the primary-secondary classification can be avoided by a choice of descriptive terms that differentiate qualitatively, but do not suggest a priority ranking.

The classification that we propose would restrict the use of the term "preventive" to measures, actions, or interventions that are practiced by or on persons who are not, at the time, suffering from any discomfort or disability due to the disease or condition being prevented. This distinction would serve to eliminate most of what is now encompassed in the old category "tertiary." Persons (patients) who feel current discomfort or disability are motivated to seek medical aid—both for cure and for prevention of further progression of the disease—by forces which do not apply to the asymptomatic individual. Provisions for their care do not have to emphasize persuading them to seek or accept the care that they need, nor does one have to estimate the probability that they will fall victim to the disease under consideration; the presence of the disease is already established.

Preventive measures—those which should be applied to persons not motivated by current suffering—can be operationally classified on the basis of the population groups among which they are optimally used. The most generally applicable type, which we shall call *universal,* is a measure that is desirable for everybody. In this category fall all those measures which can be advocated confidently for the general public and which, in many cases, can be applied without professional advice or assistance. Maintenance of an adequate diet, dental hygiene, use of seatbelts in automobiles, smoking cessation, and many forms of immunization would fall clearly into the universal category for which benefits outweigh costs and risks for everyone.

There are many measures, however, in which the balance of benefits against risk and cost is such that the procedure can be recommended only when the individual is a member of a subgroup of the population distinguished by age, sex, occupation, or other obvious characteristic whose risk of becoming ill is above average. These measures we shall call *selective.* Examples would be active rabies immunization for veterinarians, annual influenza immunization for the elderly, use of safety goggles by machinists, and the avoidance of alcohol and many drugs by pregnant women. As with universal preventive measures, most of these actions which should be utilized among selected groups depend primarily on the motivation of the individual who is being protected either to carry out or to seek out the preventive measure, so that public education, in this case directed at the high-risk group, is an essential aspect of the strategy for optimal public health practice.

The third class of preventive measures, which we propose to term *indicated,* encompasses those that are advisable only for persons who, on examination, are found to manifest a risk factor, condition, or abnormality that identifies them, individually, as being at sufficiently high risk to require the preventive intervention. The majority of these measures have been called secondary under the classical scheme, since in most cases the observable indication is related to the biologic origin of disease. Preventive measures that fall into this category, not surprisingly, are usually not totally benign or minimal in cost. If they were, the balance in the cost-benefit analysis might favor their wider application, including segments of the population at lower risk of disease, and they would tend to move into the selective or universal classes. The identification of persons for whom indicated preventive measures are advisable is the objective of screening programs, and the cost, risks, availability, and effectiveness of the preventive measure must be carefully weighed before a decision to initiate screening is made. Preventive interventions in this class include control of hypertension, dietary measures to reduce hypercholesterolemia, antituberculous drugs for recent skin test converters, the use of uricosuric drugs by persons with asymptomatic hyperuricemia, and frequent, careful reexamination of persons from whom a basal cell skin cancer or a colonic polyp has been removed. Indicated prevention is most commonly applied in the clinical setting, as the indication is ordinarily one discovered through medical examination or laboratory testing, and many of the preventive measures require professional advice or assistance for optimal results. The word "treatment" is often used in connection with these efforts but, on consideration, it will be apparent that the "treatment" of an asymptomatic, clinically demonstrable abnormality is justified only if it will result in the prevention of some later, anticipated symptoms or disability. It is also evident that a different approach to securing patient compliance is required with indicated prevention than with treatment which is immediately therapeutic. We believe, therefore, that the distinction between indicated prevention and treatment can reasonably be made and

that the distinction is useful in considering how best to utilize these measures.

In summary, we propose to define prevention as measures adopted by or practiced on persons not currently feeling the effects of a disease, intended to decrease the risk that that disease will afflict them in the future. Prevention is classified into three levels on the basis of the population for whom the measure is advisable on cost-benefit analysis. Universal measures are recommended for essentially everyone. Selective measures are advisable for population subgroups distinguished by age, sex, occupation, or other evident characteristics, but who, on individual examination, are perfectly well. Indicated measures are those that should be applied only in the presence of a demonstrable condition that identifies the individual as being at higher than average risk for the future development of a disease. Preventive measures in each of these classes share many features that determine optimal strategies for promoting acceptance by those persons in the population for whom they will do the greatest good in preserving health.

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References

1. Commission on Chronic Illness: Chronic illness in the United States, vol. 1. Published for the Commonwealth Fund by Harvard University Press, Cambridge, Mass., 1957.
2. Smoking and health. Report of the Advisory Committee to the Surgeon General of the Public Health Service. PHS Publication No. 1103. U.S. Department of Health, Education, and Welfare, Washington, D.C., 1964.
3. Enos, W. F., and Beyer, J.: Coronary disease among U.S. soldiers killed in action in Korea. JAMA 152: 1090–1093 (1953).
4. Carcinogenesis — a comprehensive survey, vol. 2. Mechanisms of tumor promotion and cocarcinogenesis, edited by T. J. Slaga, A. Sivak, and R. K. Boutwell. Raven Press, New York, 1978.

LETTER TO THE EDITOR

"Asbestos in Colorado Schools"—Erratum

It has come to my attention that there is an error in my article "Asbestos in Colorado Schools," which appeared in the July–August 1982 issue of Public Health Reports (pages 325–331). The error is on page 330 in the conclusion. In the first sentence, third line, it stated that ". . . 380 [public schools] (38 percent) may have asbestos sprayed on ceilings." That should read ". . . 480 (38 percent) may have asbestos sprayed on ceilings."

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