

# What Is Preventive Medicine?

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## SUMMARY

The aim of preventive medicine is the absence of disease, either by preventing the occurrence of a disease or by halting a disease and averting resulting complications after its onset. Preventive medicine can be practised by governmental agencies, primary care physicians and the individual himself.

In the past, many diseases have been conquered by doing things for the individual. The present challenge of preventive medicine is to motivate the individual to practise his own prevention. Possible means of achieving this motivation are described and many require the active participation of the primary care physician.

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**M**OST PEOPLE will agree that prevention, in medicine as in anything else, is better than cure – but what is prevention? What kinds of things can be done about it and what kind of people can undertake it?

If you ask healthy people what they want most, you will get as many answers as there are people. Ask a man when he is ill or has an inkling of premature death and you will get the truth. He wants more than anything else to be healthy. This leads to the question: what is health? In spite of the World Health Organization's definition, to most people health is the absence of disease. The real aim of preventive medicine is to achieve this absence of disease. To accomplish such prevention does not imply that less effort should be spent on making people well once they are ill, but that additional effort is required to keep people well. The world runs on healthy people, yet the healthy are not health conscious or aware of their need to be free of disease and therefore it is difficult for the majority to realize the value of preventive medicine.

Huxley outlined the importance of prevention in his novel *Island* during a conversation between two of the characters on his island, Pala: "So you think our medicine's pretty primitive?"

"That's the wrong word. It's 50 percent terrific and 50 percent non-existent . . . Fantastic operations – but when it comes to teaching people the way of going through life without having to be chopped up, absolutely nothing. And it's the same all the way along the line. Alpha Plus for patching you up when you've started to fall apart but Delta Minus for keeping you healthy".

## Primary and Secondary Prevention

Preventive medicine includes all measures which limit progression of disease at any stage of its course. A

distinction is usually made between 'primary prevention', in which measures are applied to prevent the occurrence of a disease, and 'secondary prevention', where a disease or its complications are halted or averted at any point after the onset of disease. Primary prevention comprises the manipulation of man's environment, his water supply, the air he breathes, and also the manipulation of man himself by such measures as immunization against infectious disease. Secondary prevention includes therapy to prevent the spread of disease to non-affected individuals, identification of those in the early stages of a disease process when treatment should be most effective, and lastly the prevention or delay of the consequences of clinically advanced disease by both therapy and rehabilitation. This last item is sometimes considered separately as 'tertiary' prevention, since there has been a failure of primary or secondary prevention at some earlier stage in the disease process.

## Epidemiology

From these definitions it is evident that preventive medicine depends on knowing how disease begins and how the individual proceeds through the normal to the diseased state. Therefore preventive medicine demands new facts and the efficient application of known ones, both of which are epidemiologic processes. Epidemiology is the basic science of preventive medicine. The word epidemiology is derived from the Greek words for "upon" and "people". An epidemic is something that happens to a number of people; epidemiology is the study of the things that happened, whether it be a disease or another factor. The object of epidemiological study is to establish the cause of a condition or the association of a condition with particular characteristics of the affected individuals or their environment.

Epidemiology can find causes, show priorities and evaluate activities. Epidemiologic research is essential to preventive medicine, since one cannot deal with an end product like disease while ignoring its causation. Cancer is probably preventable but at present we do not know enough to prevent it. We have to find its cause, yet most research efforts in cancer are concerned with cure rather than prevention. Historically this seems a poor bet, since most of the diseases which used to plague society have been removed by prevention, not cure – for example, smallpox. A safe cigaret appears a better target than a cure for lung cancer. Minimizing the effects of any disease by treatment seems less attractive than preventing its occurrence in the first place.

No matter what new information is obtained by research, it can be of no value unless it is acted upon. In current industrial research it is accepted that few radical innovations are likely to be accepted in less than ten years, and 20 is probably a more realistic figure. The same delays occur in preventive medicine:

1. *Car accidents*. Installation of compulsory seat belts – five years.
2. *Diphtheria*. Immunization – ten years.
3. *Lung Cancer*. Warnings about tobacco – ten years.
4. *Motorcycle accidents*. Compulsory crash helmets – 20 years.
5. *Dental caries*. Fluoridation of water supplies – 25 years.
6. *Ophthalmia Neonatorum*. Silver nitrate – 60 years.

Significant prevention frequently depends on large scale government organized activity, requiring legislation. In addition to the above, legislation has been passed to limit air pollution and to implement safety regulations in industry.

### Reduction of Hazards

While it is important to deal with the agents and environmental factors causing disease, we must also focus on the action people can take for themselves. Violence or automobile accidents, drowning and suicide, the major killers in the young, give way in middle age to the diseases of indulgence, heart attacks, lung cancer, chronic bronchitis and cirrhosis of the liver. We must reduce the hazards associated with driving, boating, swimming, smoking, eating, the use of alcohol and the use of drugs. However, the individual wants to do things which are passively convenient; he is not interested in anything requiring discipline such as eating less or driving safely. He expects the government or other agencies to find a solution to his problems. Nevertheless the individual may resent any interference by the government to protect him from certain health hazards. Many motorists resent the interlock system on the 1974 cars which prevents the engine from starting until the driver and all front passengers have buckled their seat belts. Impressed by the volume and vehemence of constituent mail on the subject, the members of the United States House of Congress voted in August 1974 an amendment that would kill the requirement that cars be

equipped with an interlock system and also the annoying buzzer that sounds when a seat belt is unfastened. Instead only a warning light on the dashboard would be required.

This demonstrates the fact that a great deal still needs to be done to motivate the public on the necessity of preventive measures. It is not sufficient to try and reduce the deaths and disabilities from automobile accidents by providing safer options on cars – there must be some means to motivate people to use these options. The same reasoning applies to water deaths. Few people will wear life jackets either sailing or water skiing and few follow the water safety rules published by the Red Cross.

Prevention of sports injuries should be based on sound epidemiologic data. Such data are difficult to obtain. Snowmobiling typifies the problem. The number of deaths from snowmobiling is increasing, but this is meaningless since it cannot be related to the number of participants. Only figures on the sale of snowmobiles and various licensing regulations give any indication of this sport's popularity; therefore the estimation of the number of participants is gross. Thus a potentially dangerous sport cannot provide even the first requisite of an epidemiologic study – the rate of injury – which would allow the development of a safety program.

### Passive Prevention

Apart from government action, prevention of disease is a function of both the physician and the individual. Most preventive medicine practiced today is performed by the primary care physician, not by the various public health authorities or professors in university departments of preventive medicine. Exceptions are the prairie provinces and British Columbia where the bulk of immunization procedures, one of the more obvious forms of prevention, are carried out by health units. In other provinces immunization is principally undertaken by the primary care physician. This is a passive type of prevention for the individual: he merely has to present himself for the injection.

Even in this easy field of prevention there has been a slackening. Vaccination against smallpox is no longer mandatory, even though this disease could easily be reintroduced into Canada with increased air travel and the large number of immigrants. Also, many immigrants to Canada have not been immunized against diphtheria and the incidence of this disease in Canada is expected to increase.<sup>1</sup>

### Annual Checkups

The annual physical examination has long been advocated as the basic tool in the practice of preventive medicine. Each patient should stay with one physician who knows his family background, his economic circumstances and any emotional and environmental influences. This allows the family physician to attempt prevention of psychiatric problems by counselling teenagers, couples planning families, patients approaching retirement, etc.

The annual physical examination is an excellent opportunity for the family physician to begin education in certain basic areas, such as the necessity for exercise and adequate nutrition. It is possible when seeing a young male or female for a physical examination to estimate cardio-respiratory fitness by having the patient mount a box-step 20 times per minute for five minutes, and estimating his pulse rate which should not be greater than 160 at the

completion of this exercise. A family physician colleague of mine, finding a young male or female with an inadequate level of physical fitness, will often hand out a copy of *The New Aerobics*<sup>2</sup> in the hope that the patient will assess his own physical fitness by measuring the distance that he can cover in 12 minutes, thus becoming motivated to improve his level of fitness.

In addition Health and Welfare Canada publish a booklet "Get Fit – Keep Fit" and Participaction in Toronto also put out a manual for the general public.

### Nutrition

Nutrition is another area where Canadians require considerable education. Nutritionists have known for a long time that Canadians in general have poor eating habits. As a race we don't like liver and don't eat much fish. Canadians love to snack, stopping at ice-cream stands and take-out restaurants. We eat less and less fresh produce and what we do eat has been shipped long distances and stored for long periods, as well as being subjected to an array of processing and preserving techniques.

Physicians do not know enough about nutrition. It is not a subject emphasized at medical schools. Yet one of the major problems in the world in the next few years will stem from malnutrition, either from lack of food, or in the developed countries like Canada, from lack of knowledge on which foods are nutritious. Patients therefore need advice about balanced diets and sensible eating habits. People can eat less food more intelligently. The affluent in our society eat too much and their diet contains too much animal fat. Chemical manipulation of food by food preservatives and additives could well create new disease problems in the future. An interesting hypothesis is that the removal of antioxidants from food, which occurs in the refining of flour and other cereals, may have contributed to the present epidemic of ischemic heart disease due to the development of an abnormally vulnerable myocardium.<sup>3</sup>

### Prevention Begins Early

The family physician has an opportunity to influence the child's nutrition at an early stage. He can advise the pregnant mother about adequate intake of milk, iron, etc. and the limitation of smoking so that the baby is born without nutritional defects. The family physician can also encourage the mother to breast feed the baby. Breast feeding is psychologically and physiologically beneficial to the mother, besides providing a better immunity for the child than artificial feeding. In addition the late introduction of cow's milk may well make children less susceptible to allergic problems.

Parents must be advised about adequate diet for their children, and should encourage them to snack on fruit and fresh vegetables rather than on candies and other foods high in sugar. A diet low in refined sugar and animal fat should also be encouraged. Children can readily develop a preference for two percent or skimmed milk instead of homogenised. Lunches for teenagers are often merely a can of pop and a dish of french fries with ketchup or gravy. Parents who do provide their children with a nutritious lunch to take to school may find on questioning that it has been thrown into the garbage while the child joined his friends for a doughnut or french fries. A readable book on nutrition<sup>4</sup> will soon be available and with a program of education by concerned family physicians, it should be possible to educate the present generation of small children

to choose healthful food. Teenagers, who will be the next generation of parents, can be educated to reject the foods empty of everything but calories. As the mother of three small children I would also like to see a reduction in the advertising of refined cereals and similar items on television programs aimed at these young audiences.

It should be remembered, in the whole field of nutrition as in anything else, moderation is the key. There are those who become health food fanatics and they also can develop nutritional problems due to the lack of essential minerals and vitamins.

Physician counselling can also improve our present abortion rate. The routine medical history should include questions on patients' future reproductive plans in addition to past history of child bearing. The question 'do you and your husband plan on having more children?' could follow the history of present pregnancies. An affirmative answer could be followed by the question 'when?' and the physician could then discuss contraceptive methods for spacing pregnancies. If the couple desire no more children, a discussion of permanent methods of contraception can reduce the number of abortions, hysterectomies and tubal ligations performed on married women who had considered their family to be complete and had not realized that their current means of birth control were fallible.

How can the physician help the individual prevent development of specific diseases at a future date? Human beings want easy magic answers, but some of the most important medical discoveries on prevention require people to change their lifestyle. We have made very limited progress in convincing our population not to smoke, although smoking has been established as a risk factor in heart disease, cancer, and chronic lung disease. The mortality of British physicians has improved where cancer of the lung is concerned, in comparison with the British population as a whole.<sup>5</sup> Evidence shows that this is because physicians have stopped smoking in a higher proportion than the general public. Physicians realize the importance of cigaret smoking in disease causation and they can have an impact on the population if they become more vigorous in their efforts to educate and motivate.

Any program of health education, anti-smoking or otherwise, requires evaluation. School children don't seem to respond to anti-smoking propaganda. Perhaps this is due to the influence of parental smoking habits, which outweighs any campaign waged in the schools. It is difficult for anti-smoking programs to compete with the professional advertising campaigns waged by the tobacco industry, but these could be limited by government action.

One of the problems with health education is that although it is available to all, the upper social classes utilize preventive measures to a greater extent. New advances in medicine are always recognized first by these people, who are often not those in the high risk category. In cervical cancer, some of the high risk factors such as low socioeconomic status, high parity etc. are associated with failure to attend for screening examinations. The usefulness of screening itself, either by the Pap smear in cervical cancer or by mammography in breast cancer, is problematical. There are those that are not convinced of the benefits of either procedure, and epidemiological research is in progress to evaluate the situation. There is no point in diagnosing the disease earlier by screening if by so doing you merely prolong the disease backward in time but do not prolong life forward.<sup>1</sup>

The key to modern preventive medicine is motivation of the individual. He must learn discipline and self motivation to control those risk factors which are reversible and will affect his health. The physician must assist his patient in these efforts. Prospective medicine attempts to identify an individual's changing risk of disease and to recognize his earliest deviation from the state of health. The earlier the approach is undertaken, the greater the opportunity to reduce the risks.

### Health Hazard Appraisal

Risks to health can be defined as a person's chance of death or disability from illness or accident as determined by the expected death or disability among a large group of individuals of similar age, sex, and race. Identification of risk factors gives the patient the responsibility of reducing the risk. Patients have been found to cooperate better when risk data are clearly displayed and discussed. This individualizes problems, points out personal risks and presents a specific goal of risk reduction. Such a means of displaying the individual patient's personal risk has been developed by Dr. Louis Robins and his colleagues at the Methodist Hospital of Indiana in Indianapolis.<sup>6</sup> The system is known as Health Hazard Appraisal and is being tested by the Health Protection Branch of the Department of National Health and Welfare.

Health Hazard Appraisal uses information about a person's age, sex, medical history and health risks to predict his or her chances of dying during the next ten years of life. It then goes a step further, suggesting that if a person can alter certain risks, he or she can join a group which has a predicted lower mortality experience. The latter may be considerably lower than the average because the average allows for the population's drinking, smoking, driving and exercise patterns. Mortality data are used because they are more available than morbidity data, but it must be remembered that death is only a fraction of any illness.

The Health Hazard Appraisal system has been adapted to the computer. Canadian mortality data are used in conjunction with risk factors developed from studies in the United States. The current form was developed for use by physicians; medical interpretation and guidance is desirable for each individual case.<sup>7</sup>

Health Hazard Appraisal relies on the following type of information: personal behavior characteristics such as smoking and drinking habits, use of seat belts and miles driven; physical status such as weight, blood cholesterol and blood pressure; inclusion in or exclusion from a risk group through recent screening examinations such as those for

breast, cervical and rectal cancers, and family or personal history of disease. These characteristics can be classified reversible or irreversible; for example, an individual can do very little to alter a family history of heart disease.

The ultimate value of Health Hazard Appraisal as a predictive or motivational tool has not been proven and it is still very much an experimental technique. Although evidence points out the value of driving more carefully, stopping smoking etc., there is less evidence for the value of altering other long standing risks. Research is underway to learn more about the value of risk alteration. The present aim of the Federal Government is to test the value of Health Hazard Appraisal as a motivational tool. If it does not serve this purpose, the investment of time and money is probably not worthwhile. Hopefully Health Hazard Appraisal helps people understand the idea of risk-taking behavior and that how we live often determines when we die. It also demonstrates that diseases such as heart attack have several contributing causes; the risks interact and are either additive or multiplicative. It makes health hazards personally relevant and hopefully motivates the individual to prevent the onset of disease.

Modern preventive medicine, therefore, is not confined to doing things *for* people by ensuring them safe food and water, or doing things *to* them by immunizing them against infectious disease. These are functions of government, its agencies and the primary care physician. In the final analysis, preventive medicine requires action taken by people for themselves. They must be motivated to undertake such action – how to achieve this motivation is one of the exciting challenges of preventive medicine today. ◀

### References

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### QUOTE

The aim of medicine is to prevent disease and prolong life, the ideal of medicine is to eliminate the need of a physician.

William J. Mayo (1861-1939) in  
*National Education Association: Proceedings  
and Addresses, 66:163, 1928*