The Dose Makes the Therapy

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To ward off disease or recover health, men as a rule find it easier to depend on the healers than to attempt the more difficult task of living wisely.—Rene Dubos (1).

The control of tobacco use and the subsequent decline of tobacco-related diseases are one of the great challenges of preventive medicine. How public health actions can best contribute toward these ends is delineated in an excellent monograph prepared by the National Cancer Institute (2). The monograph is dedicated to the late Joseph Cullen, who is sorely missed both as a distinguished leader in this field and as a friend. The article by Pierce et al. (3) in this issue of the Journal deals with public service announcements as one approach to the prevention and cessation of tobacco smoking. While this type of effort is useful, it ultimately provides an insufficient therapeutic “dose” to have a significant public health impact. This article warrants a discussion of the important role of behavioral sciences in prevention and cessation of smoking.

When reporting on the role of cigarette smoking in the etiology of lung cancer in 1950 (4), we would not have believed that, 40 years later, tobacco-related cancers would still be contributing heavily to cancer mortality. Shopland, Eyre, and Pechacek (5) have estimated that, today, smoking directly contributes to 45% of all cancer deaths in men and 21.5% in women.

In spite of such knowledge, many health professionals are still not placing sufficient emphasis on health promotion activities in respect to the onset and cessation of smoking. Although cigarette smoking has declined, especially among educated men, smoking is still far too common, particularly among blue collar workers as well as Black American men, among whom some 40% are still smoking cigarettes. For young people of every background, but above all among high school girls and high school dropouts, cigarette smoking rates are unacceptably high.

What can we do further to reduce tobacco use in our society?

Prevention

In treating disease, success depends on the quality, dose, and intensity of the therapy. An ounce of prevention far outweighs the benefits of a pound of cure, as the saying goes. Yet, preventive measures too must be applied in sufficient dose that is made up of an amalgamation of (a) prevention activities directed at individual behavior (primary prevention and cessation) and (b) measures directed at the environmental, organizational, and societal behaviors (e.g., taxes, legislation, policy making, and advertisements).

Studies on brain development and early cognitive learning increasingly teach us that the largest window of opportunity is in the first 10 years, if not the first 6 years of life. An effective program, including that of the American Stop Smoking Study for Cancer Prevention, aimed at preventing the onset of smoking must begin in early childhood, followed by appropriate “booster shots” throughout the years of formal education. This effort is best implemented through a comprehensive health education program that teaches children the consequences of all risk-taking behaviors, including smoking, and empowers participants to assume responsibilities for their own health maintenance. In this way we can “socially immunize” children against most unhealthy behaviors and help children gain self-esteem. Most risk-taking behaviors interrelate. Drinking and smoking are correlated, as are smoking and high fat intake as well as smoking and early sexual relationships. These interrelationships underscore the need for multiple approaches to health education (6-8).

School-based programs should include periodic testing of children’s health status, student workbooks, teachers’ guides, and yearly evaluation for attitude, knowledge, and health behavior. In addition, they must be coordinated by a full-time health education teacher for kindergarten through grade 6. The program needs to be reinforced in higher grades by a health science teacher. As children learn, they may become teachers themselves, imparting knowledge as well as motivation for behavioral change to their parents or peers.

It needs to be emphasized, of course, that smoking prevention efforts directed solely at the classroom have had generally uniform short-term efficacy (9-11) and generally limited long-term efficacy. The explanation is usually believed to be the limitations of even the most effective school-based prevention approaches in the absence of strong supportive interventions in the surrounding community. Hence, the optimal dose must be a combination of school-based and other organization-based interventions plus community-wide interventions aimed at changing society as a whole, such as the Community Intervention Trial for Smoking Cessation Program. As part of this endeavor, we need prime-time exposure for positive health messages on television for adults in the early evening and for children on Saturday mornings. Coordinated interinstitutional approaches are needed for public health campaigns in tobacco control. The National Institutes of Health and voluntary organizations engaged in health promotion need to pool their resources and expertise. Smoking cessation and prevention efforts will benefit all who seek to reduce tobacco-related diseases.
As we measure the "dose" of preventive care to be administered to the children, we must consider adverse social forces, such as the dissolution of the family, inadequate housing, unemployment, unsafe neighborhoods, and the specific effects of tobacco advertising—all of which profoundly influence children's health behavior as well as that of adults.

Cessation

Even though cessation clinics have a success rate of only about 25%, the risk reduction achieved through them more than justifies their cost, when we consider the enormous expense inherent in treating tobacco-related diseases. Thus, hospitals, and especially every comprehensive cancer center, should provide smoking cessation clinics and a variety of opportunities for cessation. All physicians and dentists should admonish their patients who smoke and encourage them to keep records of their efforts to quit.

While cessation intervention has had a broad general effect on smoking, it has been less efficacious among heavy smokers because of the strong physical and psychological habituation associated with nicotine uptake (12). For prevention and cessation to succeed, broader intervention activities must be initiated at sites ranging from schools to hospitals to worksites to communities.

Ultimately, disease control is a task for all segments of society, families, schools, worksites, media, health care providers, government, and the insurance industry. Only by working together can we provide the social support that leads to better health habits for all members of society. As health professionals, we are aware that behaviors are closely linked with social environment. If we are to succeed in improving these behaviors, we must also be involved in attempts to enhance all people's belief in their future.

It is gratifying that behavioral sciences are receiving recognition comparable to the biomedical sciences at the National Institutes of Health. To reach the ultimate goal in prevention and cessation of smoking demands the best of all health professionals. Reducing the risk from tobacco-related cancers not only will alleviate untold human suffering but also will enhance our nation's productivity. Our success in this field will determine whether we will reach the goals we have set to reduce the incidence of cancer by the year 2000. We know what we have to do to reach our ultimate goal of eliminating self-induced diseases. What needs to be done is to apply preventive measures in sufficient dose.

References

The proper surgical technique cannot be evaluated without simultaneously considering the role of breast irradiation. It is obvious that biopsy-only procedures require radiation if eradication of local tumor is to be achieved. On the other hand, it is far less obvious that extensive operations such as quadrantectomy need to be combined with radiation in order to achieve permanent local tumor control. A clinical trial comparing quadrantectomy with and without irradiation is now being conducted at the National Cancer Institute in Milan. Between the two extremes of biopsy-only and formal quadrantectomy is the middle ground of margin-controlled, limited excision. Is radiotherapy needed if a pathologically margin-negative lumpectomy has been performed? This issue is addressed by Clark et al. (11) in a multicenter trial performed in Ontario, Canada, and published in this issue of the Journal.

Their findings are consistent with the results of other similar studies: the addition of local radiotherapy significantly reduces the number of local breast relapses. With a median follow-up of only 43 months, the absolute rate of local breast relapse was reduced from 25.5% to 5.5% with the addition of radiation ($P = 0.00001$). There were no differences in survival between the two groups of patients. In the National Surgical Adjuvant Breast and Bowel Project (NSABP) trial B-06, with a median follow-up of 9 years, the actuarial local relapse rate was reduced from 43% to 12% by breast irradiation (12). A Swedish trial that studied tumors of less than 2 cm in diameter, with a shorter median follow-up time, showed less of a difference in recurrence rate between the irradiated and nonirradiated groups (3% versus 10%)—the difference not quite reaching statistical significance ($P = 0.06$) (13). The data appear clear: Breast irradiation significantly reduces the chance that a local breast relapse will occur. If mastectomy continues to be the standard treatment for local breast relapse, then breast irradiation is an important, perhaps indispensable, part of the treatment plan.

Two subjects deserve special attention with respect to the issue of mandatory breast irradiation. The first concerns trying to put patients into subsets to find groups that may do well without added radiation therapy. The Clark et al. study reported here (11) found that women who were over 50 years of age with tumors of 2 cm or less had the most favorable outcome in terms of rate of local breast relapse following lumpectomy alone (13.5%). Clark et al. conclude that this failure rate is too high to recommend a no-radiation policy. Certainly, one could argue this point. A slightly lower (10%) rate of local relapse was seen in the Swedish study (13), and the conclusion drawn by those investigators was that breast irradiation might be avoidable in their patients. Some women with local relapse may have a good chance at ultimate breast preservation if they were treated again by lumpectomy followed by radiation. Since local breast relapse appears to have little impact on overall survival (12), the subset of patients in whom radiation therapy could be deferred until time of local recurrence needs additional evaluation and study. As their study population is followed further, Clark et al. will have data on nonirradiated patients who developed local recurrence and who were then treated with either mastectomy or re-lumpectomy and radiation. The ultimate outcome in that group of patients will yield some of the most interesting and important results from this clinical trial and should help in determining whether a favorable subset of women can be followed without radiation therapy and still maintain a high rate of breast preservation.

A second important issue concerns alternative treatments that are intermediate between observation only and full breast irradiation. The NSABP is testing whether tamoxifen alone is a suitable treatment following lumpectomy for small, completely excised tumors. Others (14,15) are studying the use of an interstitial implant to treat only the tumor bed. These treatments, if successful, may give us other measures to use in selected low-risk patients that would avoid the 5 to 7 weeks of external-beam radiotherapy and save health-care costs and resources.

A common theme in oncologic treatment is to prove the efficacy of a particular therapy and then to spend the next several years learning how to preserve the high success rate while decreasing the severity, complexity, and cost of the treatment in low-risk patients and intensifying and improving treatment in high-risk patients. The therapies for testicular cancer, Hodgkin's disease, and childhood leukemia are examples of this type of progression. In the systemic treatment of breast cancer, studies are under way to identify subsets of node-negative patients who need no adjuvant treatment and to test whether more aggressive therapy in some subsets of node-positive patients will be of benefit. There may yet be subsets of breast cancer patients whose disease can be locally controlled with an acceptable cosmetic result using surgery alone or surgery combined with less demanding, costly, and time-consuming therapy. Research into identifying these subsets is of value and importance. But until such groups can be identified, in the absence of mastectomy, the standard of care in the treatment of localized breast cancer continues to be wide local excision followed by whole-breast irradiation, with or without a boost to the tumor bed.

References


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