Developing a Framework for Comprehensive Cancer Prevention and Control in the United States: An Initiative of the Centers for Disease Control and Prevention

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The Division of Cancer Prevention and Control, Centers for Disease Control and Prevention, is working with state health agency staff and other stakeholders to develop a comprehensive and integrated approach to cancer control. To help stakeholders visualize the approach, a graphic model was developed based on stakeholder input and a literature review of existing models. Phases of the model include setting optimal objectives (data driven), determining optimal strategies (science driven), establishing feasible priorities (capacity driven), and implementing effective strategies (outcome driven). The model currently is being validated through case studies of state-level cancer planning in six states.

Key words: *decision making, neoplasms, public health program, state health programs*

J Public Health Management Practice, 2000, 6(2), 67–78

Background

The mission of the Division of Cancer Prevention and Control (DCPC), National Center for Chronic Dis-

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The Division of Cancer Prevention and Control, Centers for Disease Control and Prevention (CDC), acknowledges the contributions of the many state health department staff and other key stakeholders who, through their thoughtful participation, have enriched the activities of the CDC comprehensive cancer control initiative. The division particularly thanks the following persons who provided written comments on the model: David Bourne, Arkansas Health Department; Lauren Holm, American Cancer Society (Massachusetts); Richard Hopkins, Florida Department of Health; Betsy Kohler, New Jersey Department of Health; Laurie Schneider, AMC Research Center, Denver; Randy Schwartz, Maine Bureau of Health; and Ralph Coates, Mary Kaeser, Nancy Lee, Julia Pruden, Jean Shapiro, Robert Spengler, and Gailya Walters, CDC.

ease Prevention and Health Promotion (NCCDPHP), Centers for Disease Control and Prevention (CDC), is to serve as a catalyst for nationwide cancer prevention and control and as a partner with state health agencies and other key groups.[1] The Division focuses its cancer prevention and control resources on five priority programs: (1) the National Program for Cancer Registries, (2) the National Breast and Cervical Cancer Early Detection Program, (3) the National Skin Cancer Prevention Education Program, (4) the Colorectal Cancer Control Initiative, and (5) the Prostate Cancer Control Initiative. Also housed within NCCDPHP and contributing actively to the comprehensive cancer control initiative are the Office on Smoking and Health and the Division of Nutrition and Physical Activity, whose primary prevention activities complement DCPC's cancer prevention efforts. Additionally, a number of CDC centers, institutes, and offices share with NCCDPHP an interest in cancer prevention and control and have participated in activities of the Division's initiative. These include the National Institute for Occupational Safety and Health, the National Center for Environmental Health, and the Agency for Toxic Substances and Disease Registry. Reflecting the categorical nature of most of DCPC's legislative mandates, most of these programs are categorical (i.e., cancer site or risk factor specific); the categorical structure of cancer funding and programming also predominates at state and local levels, where many DCPC initiatives are implemented.

In 1994, because of the rapid growth of cancer prevention and control programs at the state and local levels, DCPC formally began advocating a comprehensive approach that would coordinate and integrate cancer prevention and control programs across categorical boundaries. As defined by DCPC, comprehensive cancer control is an integrated and coordinated approach to reduce cancer incidence, morbidity, and mortality through prevention, early detection, treatment, rehabilitation, and palliation.

Although the concept may be perceived as an innovation in the United States in that it is a departure from the categorical status quo, comprehensive cancer control is not a new concept. In 1985, Stjernsward et al.[2] called for global comprehensive cancer control as a means to optimize the effectiveness of cancer control activities, especially in developing countries where the fiscal situation is more constrained. Researchers in a number of countries have written about the need for comprehensive cancer control programming within their own borders. Rennert, for example, prescribes comprehensive cancer control as a remedy for "the independent and noncoordinated efforts…invested by different governmental and voluntary health organizations in Israel in specific control measures."[3(p125)] The Canadian definition of cancer control also has comprehensive elements and is framed as encompassing "all activities that contribute to reducing the burden of cancer on the individual and the population."[4(p1141)]

In the United States, CDC is not alone in advocating comprehensive cancer control. Through the Data-Based Intervention Research (DBIR) program,[5–10] a number of states received funding and technical assistance in the late 1980s from the National Cancer Institute of the National Institutes of Health (NIH) to form planning coalitions and review epidemiological and scientific data on a variety of cancers before targeting and implementing high-priority interventions. Stjernsward et al.[2] and Rennert[3] offer recommendations for country-level cancer planning internationally and Alciati and Nasca[6] describe regional and local cancer planning efforts in the United States and suggest that comprehensive cancer planning can be adapted to various planning environments and levels.

During a series of activities between 1995 and 1998, DCPC explored with key stakeholders what comprehensive cancer control might look like if implemented in the United States. Among the stakeholders involved in the DCPC comprehensive cancer control initiative were representatives from state and federal health agencies, national health organizations, private voluntary organizations, professional associations, consumer groups, and the private sector. At the suggestion of the stakeholder participants, DCPC also undertook a literature review to identify worthy existing models on which to build. The model described in this document represents a harmonization of ideas and information from various sources—the experiences of stakeholder participants in the DCPC initiative, descriptions in the literature of actual comprehensive cancer planning in the United States and abroad, and existing models from the literature for cancer control planning and programming.

Stakeholder Requirements for a Comprehensive Cancer Control Model

According to participants in the DCPC initiative, a comprehensive cancer control model should provide the following[11]:

1. a clear idea of what the comprehensive approach should accomplish ideally
2. a model of the comprehensive cancer control process that builds on information and experiences of state health departments
3. a clear indication of who will use the comprehensive approach
4. an approach that illustrates the importance of establishing, maintaining, and managing partnerships and of establishing networking mechanisms
5. an approach that allows cancer control planners to identify a range of program options and strategies for consideration by leaders at the state and local levels
6. an approach that is flexible enough to accommodate considerable variability among states
7. an approach that is practical in light of available resources

After the model is presented, these requirements will be revisited to determine whether the model fulfills them.

Initial Model Proposed by Stakeholders

One of the first graphic models to emerge from the DCPC comprehensive cancer control initiative was developed by Strategic Health Concepts, Inc., a DCPC contractor, on the basis of information gleaned from a series of telephone conference calls with 190 directors of chronic disease programs and other state-level cancer control staff.[12] Kean and Hohman depict "four fundamental elements of a comprehensive program…linked in a step-wise, systematic process"[12(p4)] (see Figure 1): (1) setting priorities (driven by data), (2) determining program components (driven by science), (3) defining roles (driven by capacity), and (4) implementing program activities (driven by outcomes).

Cancer Control Models in the Literature

Equipped with the initial model as proposed by participants in the DCPC initiative, staff of the Battelle Centers for Public Health Research and Evaluation, under contract to CDC, conducted a literature review in search of other relevant models. The models reviewed are described briefly in Appendix 1.[2–4,9,13–15] A harmonized model (see Figure 2) resulted from a blending of the initial model with models and descriptions encountered in the literature and with input received from participants in the DCPC initiative.

The Harmonized Model

The four phases of the harmonized model are described below.

Phase 1: Setting optimal objectives. In a comprehensive cancer control program, the health department engages with its partners in a data-driven, objective-setting process. On the basis of a needs assessment (or analysis of the cancer burden and risk factor prevalence in the state, especially among high-risk populations) and a capacity assessment* (or analysis of existing facilities, programs, and services), multiple objectives are identified to guide the design and delivery of cancer prevention and control programs. The goal of the capacity assessment in particular is to ensure that identification of existing cancer control components and programs occurs early in the planning process, to facilitate their subsequent coordination and integration.

Phase 2: Determining possible strategies. The strategies designed to attain the objectives set during Phase 1 generally comprise well-defined program components or interventions but also may involve infrastructural improvements or development of new data. This phase of the process is largely science driven, with interventions derived from state-of-the-art medical and behavioral science.

Phase 3: Planning feasible strategies. The planning of strategies feasible to implement in a state environment involves assigning roles to key partners or stakeholders in cancer prevention and control, including state health department staff. The roles to be played by the health department and its partners are capacity driven, that is, defined by assessing the ca-

*The capacity assessment may be documented as a formal resource inventory for dissemination in hard copy or electronic form, although compiling, maintaining, and updating such inventories is a formidable undertaking

Figure 1 Preliminary Framework for Comprehensive Cancer Prevention and Control

(Kean and Hohman, 1995)[12]

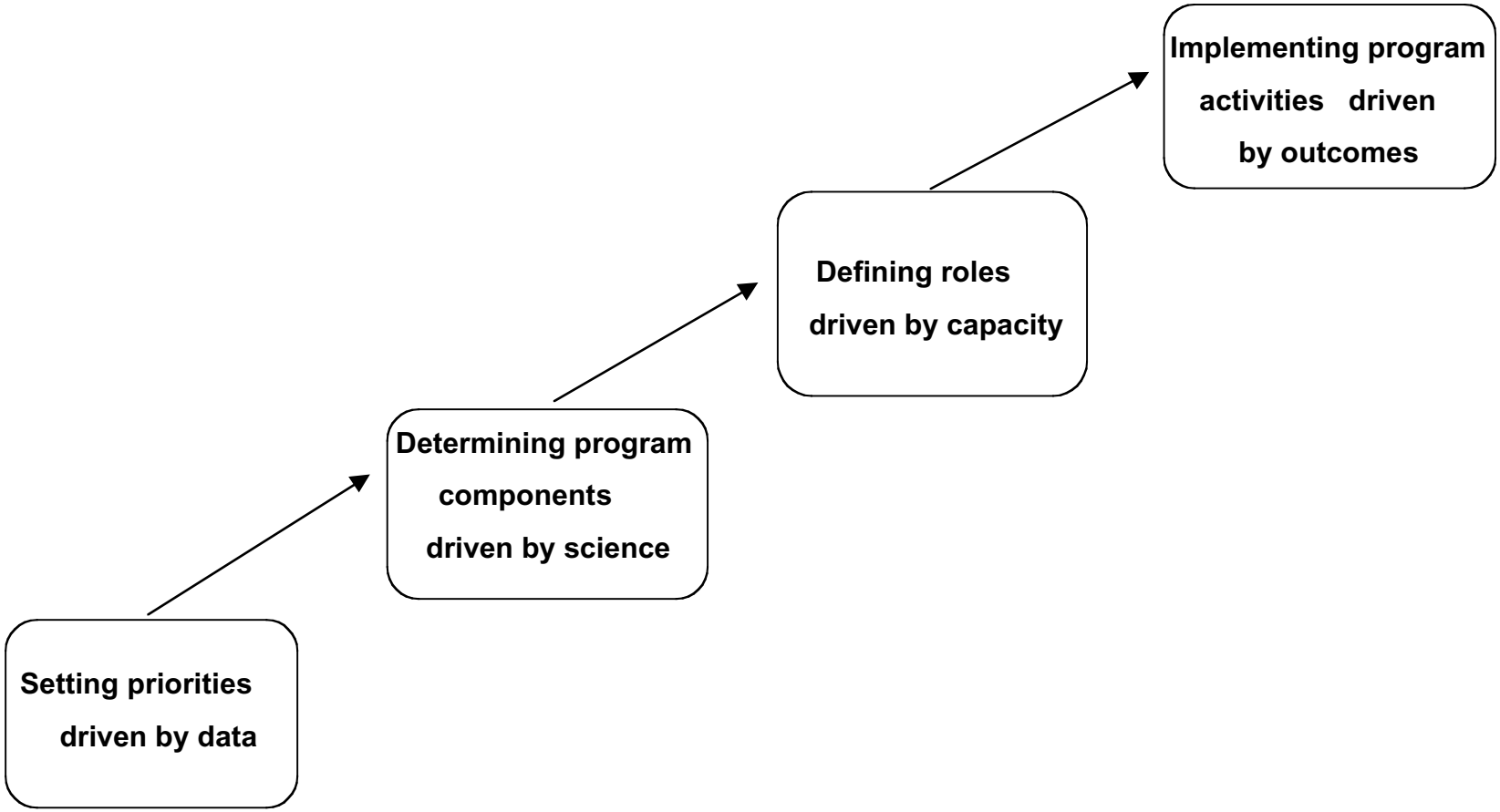
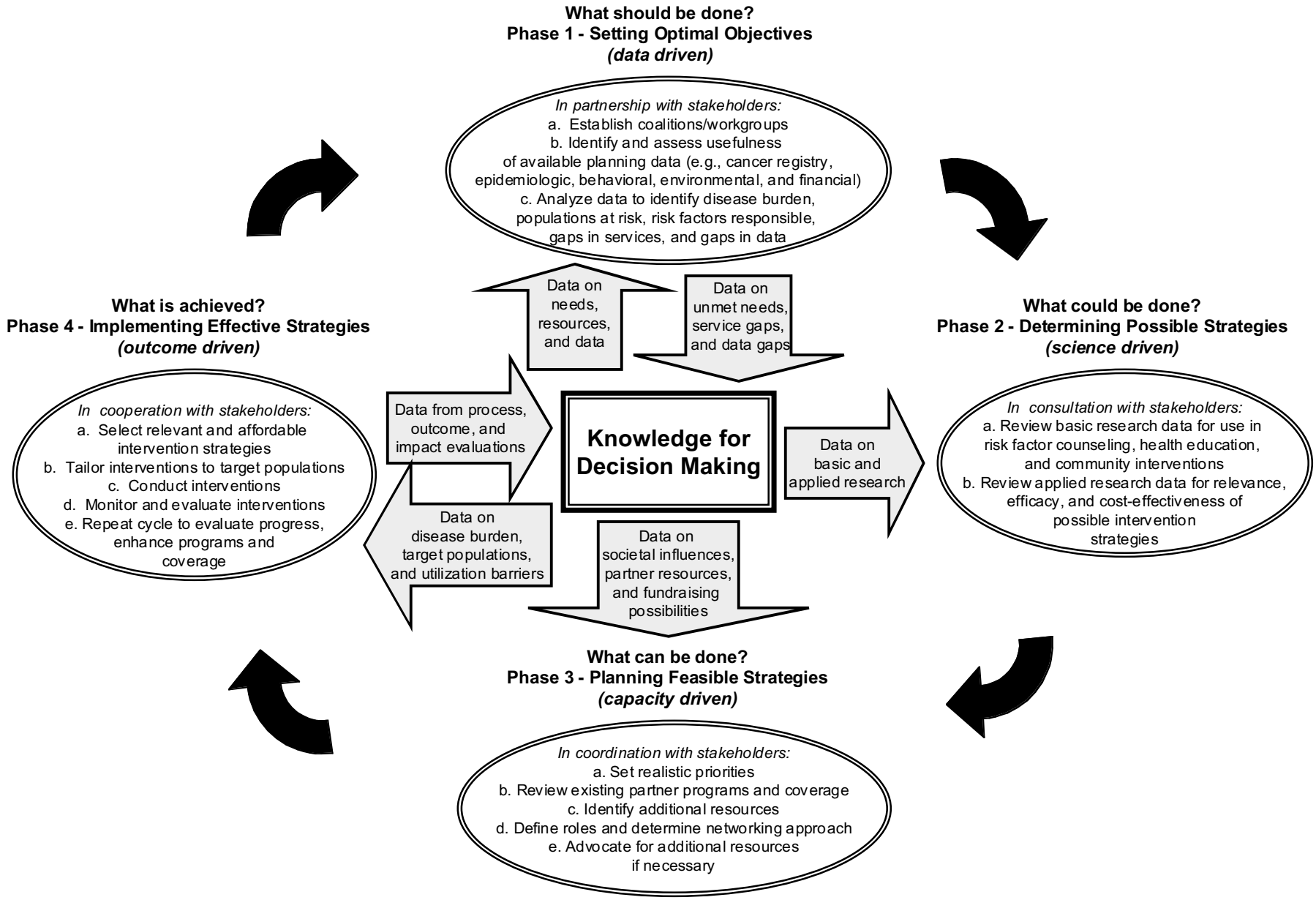


Figure 2 Framework for Comprehensive Cancer Prevention and Control



pacity of those organizations involved. Resources, experience, personnel, and existing programs and services define the capacity of an organization to carry out a role in a cancer prevention and control program.

Phase 4: Implementing effective strategies. After the roles that the health department and its partners will play have been determined, specific interventions, program activities, infrastructural improvements, and data development efforts are implemented. This process is outcome driven, with activities driven by the need for successful outcomes. Monitoring and evaluating strategies that have been implemented are important means for determining whether desired outcomes are being achieved.

As depicted in Figure 2, the arrangement of the four phases is no longer linear as in the original model; rather, the phases are linked in a cycle running from the setting of objectives (Phase 1) to the implementing of strategies (Phase 4). After the full cycle has been completed, it begins again, with review of progress and revisiting of objectives.

Central to the model is a pool of knowledge to support decision making, an element adapted from the national cancer control model developed for Canada[4] and also building on Armstrong's[13] idea of the centrality of the cancer registry function. Different phases of the planning process not only draw data from the pool but also contribute data to it. When processed by the expertise and experience of the stakeholders involved in the different phases of planning, the data are transformed into knowledge that can be used for decision making.

State and community partners are active collaborators with state cancer control staff throughout the planning process and are invited into a cancer control coalition during Phase 1 to jointly review planning data and set objectives. These collaborators also help to evaluate basic and applied research data during Phase 2 preliminary to selecting intervention strategies; assist with strategic planning during Phase 3; and serve as co-implementers during Phase 4. (Personal communication, R. Spengler, Agency for Toxic Substances and Disease Registry, CDC, March 3, 1998.)

Although monitoring and evaluation are mentioned explicitly only in Phase 4 of the model, evaluation, like data and partnering, is a thread that ideally is woven into every step of the process. The process through which the strategies were designed and developed should be evaluated as well as the outcomes of implemented strategies. Lessons learned about what worked and did not work during the first planning cycle should facilitate improvements during subsequent planning cycles. Each of the four phases in the harmonized DCPC model is described in further detail below.

Phase 1: Setting optimal objectives

This first step in a comprehensive cancer control planning process uses data systematically to provide "a solid foundation for ensuring the limited resources are directed to areas of greatest need and support efforts with the highest probabilities of success."[15(p802)] Substeps within this process can include establishing coalitions and work groups, identifying available planning data and assessing data quality and usefulness, and analyzing data to identify needs and gaps in services as well as gaps in data.

Review of state-level cancer registry data as well as other surveillance, epidemiological, behavioral, environmental, and financial data offers a sense of all that should be done in the area of cancer prevention and control (although not yet what actually can be done). This stage of the planning process—setting optimal objectives—is critical for ensuring the state-specific relevance, flexibility, and feasibility of a state cancer prevention and control program. The *Healthy People 2000 Objectives for the Nation*, a national effort to focus and coordinate a wide variety of efforts to improve the health and longevity of the American people, included cancer objectives for the leading cancer sites, which account for more than one-half of all cancer deaths.[16] These objectives represent important national guidelines, but state health planners must nevertheless set their own state-specific objectives derived from a needs assessment of the particular state environment.

Lillquist et al.[15] observe that states have used the data gathered during this phase of the planning process in various ways. Some examples of the kinds of information generated include:

- mortality and incidence rates
- percentage distribution of different cancer types
- probabilities of developing specified cancers
- annual health care costs
- number of cancer-related hospital discharges and patient days

- years of productive life lost
- lost productivity costs
- cancer screening patterns
- risk factor patterns
- availability of health services, including providers, cancer centers, screening sites, laboratories, and so forth

Ideally, data should be generated separately for different cancer sites, population subgroups, and geographic regions.

After the above-mentioned data have been gathered, characterized, and reviewed for usefulness, a coalition or work groups of key cancer control stakeholders should analyze them in order to identify both needs and gaps in services at the state level. The data inputs into this phase of the planning process include needs assessment data (what is needed and where it is needed) and resource inventory data (what resources exist and where they exist). By comparing these types of data, planners can determine whether existing programs should be redistributed and what kinds of new programs should be developed. Data on needs and on gaps in services then become data outputs from this phase of the planning process.

Although state cancer control staff have found practical experiments with data-based cancer planning such as the DBIR project to be useful, numerous gaps in the availability of health planning data were identified by all states participating in the process.[7] Much remains to be done in the area of data generation and management before data available on cancer and cancer-related health services in the United States can be considered ideal for cancer control planning. In fact, reviewing and analyzing data for health planning becomes an excellent means of identifying gaps and inadequacies in available data, which then can be addressed as resources permit. Thus, data on data—that is, information on the availability and usability of various types of planning data—appear in the model as an input into this phase of the planning process while data on data gaps appear as a data output.

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All Phase 1 activities are done in partnership with stakeholders. In particular, efforts should be undertaken to enhance cooperation between data staff and program delivery staff, who often are housed in administratively and physically distinct organizational units. Gathering and analysis of data should be accomplished by mixed teams committed to working together to understand the cancer problem in their state. (Personal communication, B. Kohler, New Jersey Department of Health and Senior Services, March 31, 1998.)

Phase 2: Determining optimal strategies

Phase 2 involves determining the best possible strategies to achieve the objectives set during Phase 1. Substeps during this phase may include reviewing basic (or fundamental) research data for use in risk factor counseling, public education, and community interventions as well as reviewing applied (or intervention) research data to assess possible strategies for relevance, efficacy, and cost-effectiveness. (Community interventions were added at the suggestion of J. Pruden, Division of Nutrition and Physical Activity, CDC, received through a written communication dated March 13, 1998.)

Although the strategies identified during this stage of the planning process generally are specific interventions or components of cancer control programs, they also may involve such efforts as building infrastructure, developing data, or reporting procedures. For this reason, the more generic term "strategy" has been substituted for the term "program components" used in the original model developed by participants in the DCPC initiative.

This second phase of deliberation identified by state cancer control staff in their initial cancer planning model is confirmed by descriptions of actual state-level and national-level cancer control planning. Stjernsward et al.[2] note the importance of comparing alternative intervention strategies to find those most effective for a given situation or environment. Alciati and Glanz[7] point out that information on intervention components and their implementation and efficacy generally is to be found in the research literature. Rennert[3] refers to this type of data as "medical state-of-the-art data" on such things as proven modes of primary prevention, screening, diagnosis, and treatment. He agrees that these data are

readily available through the international research literature and do not need to be tailored to a specific country or region in the same way that epidemiological data should be (to determine the specific cancer burden of a nation and its different regions or subpopulations). However, according to Rennert, cost data on proposed interventions will vary from region to region within a nation (or state) and should be collected locally.

The National Cancer Institute of Canada,[4] describing the Canadian cancer control model, identifies two different types of data within the research category—data on fundamental research (i.e., basic research) and data on intervention research (i.e., applied research). Both are considered so critical that they are represented as two of the four key components in the Canadian model. However, the Canadian model is a national model, whereas the model presented here is a state-level model. Because state-level planners (as opposed to national-level planners) do not have primary responsibility for directing or coordinating either type of research, data from the two types of research are treated as data inputs contributing to deliberations about optimal interventions rather than as key model elements. This is not to say that state-level planners do not have a role to play in setting research agendas. States that have engaged in comprehensive cancer planning have found that further data gathering is sometimes required before sound planning decisions can be reached. Often these identified data gaps point to research studies that can be undertaken by clinical and academic partners in the planning coalition. Thus, the research agenda can be set along with the planning agenda. (Personal communication, S. Haviland, Cancer Section, Michigan Department of Community Health, April 2, 1998.)

Phase 2, like Phase 1, is conducted in consultation with stakeholders in cancer prevention and control. As Alciati and Glanz[7] point out, although the research literature contains a great deal of information on the medical state of the art in cancer control, applied research is less developed than its basic counterpart. Furthermore, both types of research literature require considerable effort and technological expertise to be compiled and interpreted. Fulfilling the demand for more and higher-quality applied research and preparing literature syntheses specifically geared to the needs of public health planners may be areas where CDC and other federal agencies can contribute. Federal agencies also can assist by promoting the importance of research-based intervention design among their grantees and by stressing the need for grantees to evaluate the interventions they are funded to implement. Through specifying the percent of federal monies that can be spent on service delivery versus the percent that can be spent for research and evaluation purposes, for example, government agencies can send strong messages to grantees about the relative value of these activities and may thus indirectly contribute to expanding the pool of intervention research available.

The roles of the state and federal governments in translating research to practice already has been discussed by Schwartz et al.[17] in relation to cardiovascular disease capacity for state health agencies; this topic is equally important in relation to cancer. Certain tasks in the model (e.g., Phase 2, determining optimal strategies, through a review of the literature on preventable risk factors and tests for early detection of cancer) might best be done at the national level and made available to state-level coalitions for further review and analysis within state contexts. (Personal communication, J. Shapiro, Division of Cancer Prevention and Control, CDC, April 8, 1998.) A review of the scientific literature can provide an assessment of the relative effect of the reduction of various risk factors on cancer morbidity and mortality, which then helps planners to set priorities for interventions. (Personal communication, R. Coates, division of Cancer Prevention and Control, CDC, April 8, 1998.) Community partners in academic or medical centers also may be willing to help state staff assess data obtained from the research literature.

Phase 3: Planning feasible strategies

Phase 3 of the process involves the planning of feasible strategies to address the objectives identified during Phase 1. Substeps during this phase may include setting realistic priorities, reviewing existing partner programs and coverage, identifying additional resources outside the partnership, defining roles and determining networking approaches, and advocating for additional resources, if necessary. (Personal communication, R. Spengler, Agency for Toxic Substances and Disease Registry, CDC, March 3, 1998.) Throughout these activities, coordination

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with partners is of particular importance.

Until this point in the planning process, cancer control planners have been operating in the best of all possible worlds. State staff have determined what should be done (Phase 1) and what could be done (Phase 2) if an optimal allocation of time, staffing, and financial resources exists. Even if resources are limited severely, it is important that health planners maintain this initial openness to optimal possibilities so that a complete picture of needed programs and services is obtained.[2] Only such a complete picture allows priorities to be set realistically and provides supporting data should it become necessary to advocate for additional resources. Participants in the DCPC comprehensive cancer control initiative expressed a similar idea when they called for a strategic vision accompanied by a tactical plan, a broad idea of where one is headed along with practical, feasible steps describing how to get there.[18]

Rennert[3] also stresses the need for both a strategic and a tactical perspective on cancer planning, using the terms "optimal health policy" and "final health policy." According to Rennert, health planners ultimately must be cognizant of societal, political, and economic considerations that will influence their ability to implement their optimal policies or objectives. Yet even without these types of pressures, no cancer budget can possibly support all that needs doing in the area of cancer prevention and control. Stjernsward et al. write, "It is virtually impossible for any country to undertake all the cancer control activities that might be effective in preventing or curing cancer,"[2(p163)] and offer as a remedy a systematic process for setting priorities. Such a systematic priority-setting process is advocated here.

Resource limitations are a fact of life in public health and the threat of sudden and unpredictable resource redistribution perennially hangs over the heads of public health planners, ready to disrupt the best laid plans as political priorities shift. But far from representing a reason not to plan at all, this widely recognized fact of public health life is rather a compelling reason to plan comprehensively and with a broad range of partners. By developing a varied set of strategies, the planning body—with a credible group of state-level partners behind it—acquires the flexibility to phase in each implementation at an opportune time, that is, when the political will is optimally supportive. Furthermore, partners may be able to help forestall loss of public support for key initiatives through consistent and coordinated advocacy.

Phase 4: Implementing effective strategies

Phase 4 involves implementing the strategies reviewed during Phase 2 and selected during Phase 3 to meet the objectives set during Phase 1. To enhance effectiveness, these strategies should be well targeted and tailored to high-risk populations. Substeps during this phase of the process may include selecting relevant and affordable intervention strategies, tailoring intervention strategies to target populations, conducting interventions, monitoring and evaluating interventions, and repeating the entire planning cycle to evaluate progress, enhance programs, and enhance coverage.

According to Greenwald et al.,[19] cancer control is "the reduction of cancer incidence, morbidity, and mortality through an orderly sequence from research on interventions and their impact in defined populations to the broad, systematic application of the research results." Of necessity, then, cancer control involves an intervention, whether a screening technique, preventive strategy, medical treatment, or rehabilitation technique. Although health department staff are called on increasingly to branch out into the less familiar territory that lies outside program delivery, implementing interventions—particularly among underserved populations—still is a central program activity for most current state-level cancer control efforts.

State and community partners likely will be major players during this phase as they have been in earlier phases and close cooperation among them is paramount to the success of implementation. Participants in the DCPC comprehensive cancer control initiative were aware that comprehensive and inclusive

cancer control planning is as key to improving program implementation as it is to improving the process of deciding which programs to implement. The data-based decision making and the coalition building that are an integral part of comprehensive cancer planning and programming will not only build a supportive community infrastructure but also will become a means for influencing the political process on which the implementation of cancer control programs ultimately depends.[12]

The implementation phase of cancer control efforts has data inputs (e.g., data on data on disease burden, target populations, and service utilization) as well as data outputs (e.g., monitoring and evaluating data that state staff need to document program effectiveness and undertake midcourse corrections where necessary). If carried out more often and more consistently than is currently the case, monitoring and evaluation activities could begin to build the applied research that has been found lacking by cancer control planners.

Periodic Review of Progress and Objectives

According to Lillquist et al., "Decision making needs to be flexible and responsive to fluctuations in resources, changing public health needs, new scientific advances, and state and local priorities."[15(p802–803)] Thus, after the planning and implementation cycle is completed, it begins again, this time building on the information and experience accumulated during the previous cycle. For example, the coalition building, when done, requires ongoing maintenance and occasional enhancement or restructuring for increased effectiveness. The baseline data compiled during the earlier Phase 1 can be used subsequently to measure progress resulting from intervention implementation during Phase 4. In addition, the continuing cycle can build on the monitoring and evaluation data gathered during Phase 4. The latter represent locally generated applied-research data that can be added to the national and international applied-research data collected, reviewed, and analyzed during Phase 2.

The data identification and review process is most difficult during the first cycle. During subsequent planning cycles, initial databases must be updated, but this is less labor intensive. Time and resources permitting, coalition members may want to consider expanding the existing database by developing additional data sources found lacking during the earlier data identification process.

Preliminary findings from the DCPC-sponsored case studies of comprehensive cancer planning and implementation in six states, as well as input received from staff with experience in cancer planning who reviewed a draft of this article, suggest that this process is highly iterative and that the periodic review described here is ongoing. As one participant in the DCPC initiative expressed it, "This model must indeed be circular, or evolving, because we constantly are building on a base, adding more information about cancer, risk factors, and program interventions. Also, these factors will change over time, creating new priorities and new interventions." (Personal communication, B. Kohler, New Jersey Department of Health and Senior Services, March 31, 1998.) Another participant likened the feedback loop inherent in a comprehensive cancer control approach to the continuous quality improvement process. (Personal communication, R. Schwartz, Maine Bureau of Health, March 31, 1998.)

DCPC has simplified the planning process considerably in order to present it coherently. In actual operation, comprehensive cancer planning is not a linear progression from Phase 1 through Phase 4 nor do all the members of the planning body necessarily work on all phases of the process. For example, knowledge of the state of the art in prevention or intervention assembled during Phase 2 may be needed to help define objectives in Phase 1, meaning that work on these two phases must proceed simultaneously, possibly with a different team of members involved in each activity. (Personal communication, J. Shapiro, Division of Cancer Prevention and Control, CDC, April 8, 1998.) Multiple subcommittees focusing on specific areas (such as breast cancer or primary prevention) perhaps may work independently through Phases 1 and 2 to develop sets of priorities in each area based on data and science. Yet before proceeding to implementation (Phase 4), the subcommittees may pass their recommendations to a broader committee for a refined prioritization based on the availability of resources (Phase 3). This was the case with the Michigan Cancer Control Initiative, where five site-specific advisory committees and two cross-cutting work groups (for primary prevention and systems change) determined priorities and strat-

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egies within their individual areas. These then were sent to the parent body, the Michigan Cancer Consortium, for further prioritization. The top 10 priorities from a total of 120 identified will become the focus of consortium efforts for the next few years. Priority setting will occur yet again as action plans are developed for each of the top priorities and teams of consortium partners determine the order in which they wish to initiate proposed activities.

Planners also may revisit earlier phases several times as their understanding grows. An initial look at incidence and mortality data may help determine which cancers or risk factors represent a disproportionate burden in a given state, but a closer look into each particular type of cancer is required to determine the factors responsible for that burden and the populations at highest risk—and these may be different for each type of cancer.

It is thus important to view this model as a general framework for a comprehensive approach to cancer prevention and control rather than as a step-by-step recipe. Reliance on this framework will—and should—result in implementations as varied as the environments in which they occur.

Summary of the Proposed Model

In adopting a more comprehensive approach to cancer prevention and control, state health agencies and their community partners are not being asked to undertake anything particularly new or startling, but rather to formalize an approach that many already have adopted in whole or in part. Articles documenting the DBIR process[5–10] and case studies conducted by Battelle for DCPC[20] demonstrate that state health department staff and their partners have considerable experience with many of the steps in this process. They have formed coalitions around important health issues, used data of various kinds to support planning and programming decisions, incorporated scientific findings into the design and implementation of strategies to improve the public health, and developed programs that integrate efforts across organizational boundaries.

The model described here is not only feasible to implement at the state level but also addresses some of the initial concerns raised by state staff regarding a comprehensive cancer control approach. Below, the authors summarize the fit of the proposed model with requirements established initially by the stakeholders who assisted with its development.

- **The approach provides a clear idea of what comprehensive cancer control should accomplish ideally and builds on information and experiences of state health departments.** This model is based on a vision of comprehensive cancer control as expressed by participants in the DCPC comprehensive cancer control initiative, existing cancer control models in the research literature, and actual experiences with broad data-based cancer planning by the 22 DBIR states. As such, the model synthesizes vision, theory, and experience in a generic graphic form that can serve a wide range of states with a variety of different demographic, health, and political environments.
- **The approach provides a clear indication of who will use the comprehensive approach and illustrates the importance of establishing, maintaining, and managing partnerships and of establishing networking mechanisms.** Although state cancer control staff clearly can serve as facilitators of the comprehensive cancer control planning process, they do not work alone; rather, they form broad-based coalitions early on and maintain active participation by coalition members and other stakeholders throughout.
- **The approach allows cancer control planners to identify a range of program options and strategies for consideration by leaders at the state and local levels.** Extensive analysis of state-based data provides a state-specific basis for targeting populations or regions in a given state, identifying barriers to cancer control, and influencing policy makers and the public. From a list of optimal objectives and possible intervention strategies, state health agency staff and their

partners select those most feasible to implement and most likely to produce a significant impact on health.

- **The approach is flexible.** Although many of the general planning procedures, data sources, data limitations, and analyses will be relatively consistent across states,[6] the outputs of the comprehensive cancer planning process in each state will reflect individual and coalition preferences as well as differences in data availability, analysis capacity, and resources within that state.
- **The approach is practical given resource allocations.** Although the comprehensive cancer control planning process begins with an optimal set of data-based objectives, it also allows for subsequent review of capacity considerations that scale the optimal objectives down to what is feasible to implement given available resources.

Anticipated beneficial effects of a comprehensive and inclusive decision-making process include enhancement and expansion of state resources through partner contributions as well as some less tangible effects. Alciati and Glanz write of the DBIR experience that "the process of pulling this [cancer control] information together and involving working groups and coalitions in state decision-making about cancer prevention and control was as beneficial…as the data themselves."[7(p171)] According to Alciati and Glanz, the process enabled a more complete characterization of the cancer problem at the state level than previously had been possible while providing a forum for working with and involving important partners in the planning process.

A similar planning model subsequently was used by several DBIR states to address other health issues such as heart disease. Stakeholder participants in the DCPC initiative frequently underscored the many parallels between strategies for the control of cancer and those for the control of other chronic diseases, especially in prevention, and in these parallels saw opportunities for better coordinated action. To achieve an efficient use of public resources, "a comprehensive cancer control strategy needs to explicitly acknowledge the many areas of commonality between cancer prevention and prevention of other diseases." (Personal communication, R. Hopkins, Florida Department of Health, March 30, 1998.) Clearly, part of a comprehensive approach to cancer control is beginning to build such links through coordinated planning and programming in which cancer control occurs as part of an integrated approach to chronic disease and to public health in general.

It is not the authors' intent to minimize the barriers to comprehensive cancer control. Chief among these is a tendency in the United States toward categorical funding, which in turn leads to categorical programming. However, a number of states already have devised ways to think, plan, and act comprehensively, even in a categorical environment, and it is efforts such as these that have been given a graphic form.

Next Steps

Comprehensive, state-level data-based cancer control planning, when it has been used successfully, has not emerged spontaneously but has been purposely supported by agencies managing federal funds. The DBIR process, for example, depended on a national infrastructure that provided financial resources, sources of data, and scientific literature from federally supported research on cancer-related behaviors and their determinants as well as intervention efficacy.[7] The national infrastructure that already has provided support to cancer control planning in some states must be strengthened and expanded if the national vision of comprehensive cancer control is to become a reality. As discussed thus far, the proposed model appears primarily geared to guide state health agency staff and their partners in developing a comprehensive approach to addressing the cancer burden in specific states. However, there is clearly a role to be played by federal agencies such as CDC and the National Cancer Institute and by national stakeholders such as the American Cancer Society in promoting and facilitating a comprehensive approach.

There are numerous ways for national-level organizations to nurture the process. One of these is to model comprehensive cancer control at the national level through the ways they conduct their own cancer control activities and through the support they provide to their state-level counterparts. The American Cancer Society, for example, is working on a number of fronts to enhance coordination of their cancer control "silos" (or autonomous programmatic units), which it believes will operate more effectively with an overarching cancer control coordinating function in place. (Personal communication, L.

Holm, Vice President for Planning and Evaluation, American Cancer Society, March 30, 1998.) DCPC, for its part, currently is engaged in a number of activities to facilitate comprehensive cancer prevention and control in the United States. A series of descriptive case studies have been conducted to develop a picture of state-level cancer control planning and programming in six states and to identify the types of support necessary to promote comprehensive cancer control on a broader scale. DCPC also is sponsoring a second project that will follow and provide technical assistance to six states as they embark on new comprehensive initiatives for cancer control planning.

In turn, lessons learned from these two efforts will be used to design guidance documents for other states interested in engaging in their own comprehensive planning initiatives. In addition, DCPC recently awarded cooperative agreements to assist five states and one tribal organization that have already developed comprehensive cancer control plans with implementation of their plans. Through these and other projects, DCPC hopes to catalyze the diffusion of a comprehensive approach that is designed to enhance, not replace, existing programs for the prevention and control of cancer that are cancer-site and risk-factor specific.

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Appendix 1

Cancer Control Models in the Literature

Stjernsward et al.[2]**:** The Stjernsward et al. model, representing the World Health Organization (WHO) guidelines for cancer control at the national level globally, has no graphic form but consists of four major steps: (1) assessing the current situation, (2) defining health objectives, (3) evaluating possible strategies, and (4) setting priorities on the basis of quantitative assessments.

Rennert[3]**:** Rennert's model, developed for national-level cancer control efforts in Israel, has three phases. Planning inputs include epidemiological data, financial data, and medical state-of-the-art data. Output 1 is an optimal health policy and Output 2 is the final health policy. Acting on the optimal health policy to produce the final health policy is what Rennert refers to as "societal influences," among which he includes values, political forces, and economic interests.

National Cancer Institute of Canada[4]**:** This model has as its central component an element called "knowledge synthesis and decision making." Feeding into that component are four additional elements: (1) fundamental research, (2) intervention research, (3) surveillance and monitoring, and (4) program delivery. All of these elements are embedded in a context of accountability, empowerment, efficiency, and ethics and tend toward the outcome of reducing the burden of cancer.

Armstrong:[13] Armstrong argues for increased centrality of the cancer registry function in cancer control. In designing the ideal clinical cancer control unit within a comprehensive cancer center, he places the cancer registration program at the same level with other programs such as cancer epidemiology and prevention, clinical epidemiology, cancer services research, cancer control planning, and cancer information.

Alciati and Marconi[14]**:** Alciati and Marconi review the historical role played by state health agencies in the United States in preserving the health of the nation and draw conclusions about an appropriate role for these agencies in national cancer control efforts. They posit three driving forces (scientific advances, public support, and partnerships) and three functional roles (assessments, policy development, and assurance) for public health agency action, with the goal of the action being a public health impact.

Goodman et al.[9]**:** Goodman et al. present a composite model of the National Cancer Institute-funded Data-Based Intervention Research (DBIR) program, implemented in 21 states and the District of Columbia. The model has four phases: (1) identifying and analyzing relevant existing data, (2) reviewing data by local experts to develop a state cancer plan, (3) implementing interventions for high-priority areas, and (4) evaluating the interventions in terms of both process and outcome. Near- and end-term results included participating in meetings and workshops; conducting routine review of cancer-related data sources by state health agencies; increasing the ability of state health agencies to consider cancer research; appraising the effectiveness of interventions; disseminating findings; and reducing cancer incidence, morbidity, and mortality.

Lillquist et al.[15]**:** Lillquist et al. describe in considerable detail the first phase in the cancer control planning process, based on New York's DBIR experience. This phase begins with the establishment of "necessary planning consortia and working groups," whose members then proceed to identify available data, define data characteristics, assess data quality and usefulness, and analyze data. Two outputs from this process are defining the cancer burden and identifying needs for additional data.