Dealing With Competing and Conflicting Risks in Cancer Communication

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Applied research on cancer risk communication is sparse, and even less is known about effective communication under conditions of multiple risks. This paper briefly describes the need and rationale for cancer risk communication, then describes what is known and needs to be known about communication addressing multiple risks. Its focus is on two specific communication issues: 1) comparing different risks and 2) prioritizing between multiple risks. There is considerable unmet need in cancer risk communication for new knowledge and recommendations for best practices. Those professionals choosing to pursue this work can make a significant contribution to the field. [Monogr Natl Cancer Inst 1999;25:27–35]

Two fundamental assumptions underlie the recent emphasis on risk communication in cancer prevention and control.

Assumption 1: Many individuals lack a clear understanding of cancer risks in general and, more specifically, about their own personal cancer risks.

Assumption 2: By better understanding their own cancer risks, individuals will be better able to make informed decisions about screening and about adopting risk-reducing lifestyle changes.

A large body of empirical evidence and theoretical support is available for these assumptions. Much less is known, however, about the relative effectiveness of specific communication strategies designed to help individuals understand their risks. Moreover, what little research has been conducted in cancer risk communication has usually focused on one specific behavioral risk factor (e.g., smoking) or the risk of one specific type of cancer (e.g., breast cancer). The purpose of this paper is to explore what is known and what needs to be known about communicating cancer risk when an individual has multiple competing risks. As above, two basic assumptions drive this inquiry.

Assumption 3: Many individuals have multiple cancer risk factors or are nonadherent for multiple types of cancer screening.

Assumption 4: Health communication addressing multiple competing risks requires different considerations or approaches than communication about a single risk.

We will briefly present the evidence supporting assumptions 1–3, then present a more detailed discussion of assumption 4. In this latter section, we will focus on past research and future directions as they relate to two specific issues: 1) comparing different risks and 2) prioritizing between multiple risks.

ASSUMPTION 1

Cancer risk information is often misunderstood by the general public, including those at highest risk (1,2). Many Americans have misconceptions about causes of cancer and about effective prevention strategies (3). For example, as many as half of survey respondents have agreed that “there is not much a person can do to prevent cancer” and that “it seems like everything causes cancer” (3). In the case of breast cancer, many women—particularly those who are older, African American, or both—have inaccurate beliefs about the prevention, etiology, diagnosis, and treatment of the disease (4–11). In one recent study (12), nearly half of urban minority women believed breast cancer almost always led to breast removal, three quarters did not recognize family history as a risk factor, and more than 80% believed that bumping or bruising the breast could lead to breast cancer.

Although an abundance of health information is already available, current offerings may not adequately meet the needs of individuals and their families. For example, more than 1500 consumer-directed health and medical periodicals are listed in the Standard Periodical Directory (13). Many of these periodicals address cancer prevention and treatment and are in the public domain. However, information specialists have noted that such materials are often difficult to locate, frequently require “intermediaries” for interpretation, and often lack personal relevance for the individual reader (14). Moreover, many readers do not understand technical words used in patient education and cancer prevention materials (15,16). One study (17) has found significant misconceptions of even fairly common medical terms such as “virus” and “tumor.” Although discouraging, these findings are not surprising, given that patient education materials are typically written at a 12th grade reading level (18–21) and thus may exceed the capabilities of many members of the general population.

McCallum (22) summarized the need for more effective risk communication by saying, “nonexperts need access to information and need to gain knowledge, while technical experts and officials need to learn more about non-experts’ interests, values, and concerns.” At present, the public may not get enough clear information on which to base difficult, value-laden decisions about which personal health risks are acceptable and which ones are not (23,24).

Regarding personal health risks, many studies (25–35) have shown that people tend to have inaccurate perceptions of their risks. In most cases, people tend to underestimate their risk, an “optimistic bias” (29). However, a few studies (2,36,37) suggest that, when estimating personal cancer risk, just the opposite is true—people are as likely or more likely to overestimate their risk, a “pessimistic bias.” Whether these two risk perception biases are because of cognitive errors such as egocentrism (29,31), flawed mental models of information processing (38), or simply reflect a psychologically protective coping mechanism (39), both biases reflect a distorted understanding of personal risk. People with an optimistic bias about a particular health risk
(i.e., they perceive their risk to be low, but it is actually high) will have low perceived susceptibility (26) and are probably unlikely to make behavioral changes. At the other extreme, some people will have a pessimistic bias about their health risks, believing their risk of some condition is high when it is actually low. People with this type of belief—the so-called “worried well”—may suffer unnecessary concern and anxiety. Preliminary evidence suggests that they may also make more health care visits than those with optimistic or realistic perceptions of personal health risk (36). Ideally, effective risk communication should identify and address both types of bias, with the objective of moving individuals toward a more accurate perception of their own risk. If a person’s risk is high, he or she should know it is high. If his or her risk is low, he or she should know that, too.

ASSUMPTION 2

Informed Decision Making

More and more individuals are facing difficult decisions about cancer screening, testing, and treatment. Ideally, individuals should understand not only their cancer risks but also the relative harm and benefit associated with each possible course of action that they might choose (40,41). This understanding involves two important steps: 1) knowing which risks are small and which ones are large (i.e., a “quantitative assessment” of risk) and 2) considering more thoroughly the multitude of factors that may influence those risks or result from them (i.e., a “qualitative assessment” of risk) (41,42). Traditionally, discussions of such trade-offs have been lacking in medical encounters between physicians and patients (43,44). Because little is known about how to communicate personal risk information in ways that will facilitate informed decision making, this aspect of risk communication has been identified as a priority for behavioral research in cancer prevention and control (42,45,46).

In the area of cancer screening, a wide range of procedures and tests is now available for early detection of cancer and cancer risk. But, because the risks and benefits of some of these tests are mixed, it is probably more appropriate to promote informed decision making than to indiscriminantly prescribe these tests (47). Supporting this approach, one study (48) has shown that nondirective counseling to enhance informed decision making can significantly increase a woman’s perceptions of the limitations and risks of BRCA1 gene testing, yet not diminish her interest in being tested.

Of particular interest in this area are yet unanswered questions related to risk communication about genetic testing. For example, although a positive genetic test result can indicate a very high relative risk of getting a particular disease, uncertainty remains about when or if such disease may occur (49). In addition to introducing a serious health threat and uncertainty about the future, genetic testing may also bring on psychological distress related to the new knowledge that one could pass on to his or her offspring or increased risk of certain cancers (50). Several studies have reported that those patients receiving positive results of genetic testing may experience a range of responses, including test-related psychological distress (51), troubling thoughts (52), anxiety, and depressive symptoms (53). Less is known about how best to communicate the results of genetic testing in ways that promote informed decision making or behavioral change but also minimize possible adverse psychological effects. In one study (54), smokers who received biomarker feedback about lung cancer susceptibility as part of a cessation counseling intervention had increased perceived risk, perceived quitting benefits, and fear arousal compared with smokers who did not receive this information but were no more likely to have quit smoking at a 2-month follow-up. Heightening risk perception without adequately addressing specific methods or building self-efficacy for risk reduction is a formula for behavioral inaction (55). With the potential psychological effect of screening also to be considered, the task of effective genetic risk communication is clearly a complex one.

Lifestyle and Behavioral Changes

Most theories (56–58) of health-related behavior change identify perceived risk as an important factor in explaining the behavior change process. According to these theories, when individuals perceive their risk of some adverse health outcome to be high, they are more likely to take preventive action to reduce the risk. When perceived risk is accompanied by favorable beliefs about the benefits of that action, the likelihood of change occurring is further enhanced. To illustrate this relationship, in a recent survey (59) of Missouri farmers, those who expressed personal concern about skin cancer and felt it was preventable were more likely to use skin protection (sunscreen, hat, long sleeves, or other protective clothing) than farmers who were not personally concerned about it or did not think it was preventable. In practice, the relationship between perceived risk and behavior change can be more complex. For example, perceived susceptibility, a central construct in the health belief model (56), appears to be a stronger predictor of preventive health behaviors than it is of sick role behaviors (60,61), yet, even among preventive behaviors, perceived susceptibility has been shown to be associated with some practices (e.g., mammography) but not others (e.g., breast self-examination) (62).

In addition, although the relationship between perceived risk and behavior change is typically viewed from the standpoint of the former causing the latter, the opposite can also be true (36). For example, once a smoker has quit, his or her perceived susceptibility to tobacco-related illnesses may be reduced. Thus, perceptions may change behavior or vice versa. This dynamic relationship between perceived risk and behavior may also be influenced by the nature of the risk under consideration. For example, people generally underestimate their risk of diseases they perceive as controllable or those that they have direct experience with, and they overestimate their risk of conditions that are less familiar and perceived as beyond their control (27,29,30,32,34,63), yet the specific roles of controllability and familiarity in people’s formation of perceived cancer risk are not always clear. For example, how would a woman with a family history of breast cancer (low controllability, high familiarity) be expected to perceive her own risk of breast cancer? Findings have been mixed as to whether this risk factor increases, reduces, or has no effect on perceived vulnerability (64–66). Some women may not consider or understand the possibility of inheriting such a trait, more vigilant others may believe they have reduced their inherited risk by making lifestyle changes, and still others may choose to ignore or deny this information (12,67). Whereas changes in perceived risk alone will seldom be sufficient to bring about changes in cancer prevention behaviors, they can be an important precursor to these changes.

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A person may have multiple cancer risk factors, multiple cancer screening needs, elevated risks for multiple cancers, or some combination of all of these. By using data from an intervention study (36) seeking to change inaccurate perceptions of health risks, the researchers examined the frequency of multiple overall health risks among 161 (out of 1131) adult primary care patients who had a higher than average overall cancer risk. In this study, cancer mortality risk was calculated as a composite measure of the 10-year mortality risks for cancers of the mouth, throat, esophagus, stomach, colon, rectum, pancreas, larynx, lung, skin, breast, cervix, uterus, prostate, bladder, and brain. Each individual cancer risk was computed on the basis of known risk factors (e.g., age, family history of cancer, tobacco use, alcohol consumption, menarche, and parity) and protective factors (e.g., hysterectomy and mammography), and a composite risk was derived from these factors. The methodology for this assessment has been described elsewhere (36,68). Among patients whose cancer risk was higher than average, 44% were also at higher than average mortality risk for either heart disease, stroke, or motor vehicle crash. Forty-two percent were at higher than average mortality risk for two of these additional health problems, and 4% were at elevated risk for all three. Only 11% of the patients with elevated cancer risk were at average or below-average risk for these other problems.

Because the mortality risk assessed in these data is composed of multiple risk factors (some of which—e.g., smoking—are common to more than one mortality cause), such composite analyses mask the fact that any one person may also have multiple risk factors. A person may have different risk factors for multiple diseases or multiple risk factors for the same disease. For example, in data collected from a different intervention trial (69,70) among adult primary care patients in southeastern Missouri, many participants had at least one behavioral risk factor for several different types of cancer. Among 101 smokers, more than half (52%) were also physically inactive or ate a high-fat diet. Specifically, 15% of all smokers were also inactive, another 21% ate diets too high in fat, and an additional 17% were inactive and ate a diet too high in fat. Nonadherence to cancer screening guidelines is also a type of risk factor. When data from a study of physician gender and screening among primary care patients (71) were examined, the prevalence of patients in need of multiple disease screenings was also high. About half (52%) of 2082 patients were in need of either a cholesterol test, mammogram, or Pap smear, based on current screening guidelines; of these, multiple screenings were indicated for more than one third (34%) of the population.

Alternatively, individuals may have multiple risk factors for any single type of cancer. For example, in previously published data from a multicenter screening program for breast cancer (72), a majority of 948 matched control subjects had more than one breast cancer risk factor. Among these 948 women, 3% had none of four risk factors [age at menarche <14 years, first live birth ≥20 years (3,20), more than one previous biopsy, or a mother or sister with breast cancer], and 28% had only one risk factor. However, 60% of women had two risk factors, and 9% had three or more risk factors. Although these latter numbers may be inflated because of the fact that the women participated in a screening program (i.e., they may have had raised consciousness about breast cancer—perhaps because of the presence of one or more risk factors—that led them to screening), the pattern is consistent.

Effectively communicating cancer risk is challenging even when addressing a single, well-known, and clearly understood risk factor. It is considerably more complex when multiple competing risks are present. This section addresses two specific issues related to communicating multiple risks: 1) comparing different risks and 2) prioritizing between multiple risks.

Comparing Different Risks

Comparing One Risk to Another

When a person faces multiple cancer risks or when multiple screening procedures are indicated, health communicators may present a comparison of these risks to help the individual make well-informed decisions and take the most appropriate action. In such cases, the tendency of health professionals may be to establish priorities on the basis of the relative magnitude of each risk. But larger risks will not necessarily be perceived as more serious ones by the public (73). As Maibach and Holtgrave (74) have suggested, risk communication should not focus solely on risk probability alone but should also take into account the probability of gain and loss, benefit, and harm associated with a given decision or adoption of some risk-reducing behavior. For example, for a given woman over age 50 years, the attributable cancer risk because of nonadherence with mammography guidelines likely exceeds the risk of nonadherence with Pap testing recommendations. However, for this woman, the fear of finding cancer, losing a breast, feeling less attractive, and possibly losing her partner may be perceived as a substantial loss or harm that could result from getting a mammography. In this case, the health professional’s probability-based comparison may be a poor fit for the woman and is more likely to be rejected.

In addition to the magnitude of risk and the relative potential for it to result in benefit or harm, a multitude of other factors are well documented in the research literature that influence individuals’ perceptions of personal health risks. These factors should also be carefully considered in any presentation of comparative risk. They include the following:

- **Perceived characteristics of a risk.** Risks that are viewed as more controllable, less likely to have direct or immediate consequences, less likely to lead to catastrophic or devastating outcomes, more fairly distributed in the population, and more familiar to the target population are perceived as more acceptable (i.e., risks they are willing to take) (22,23,75–78).
- **Nature of risk exposure.** Risks that are taken on voluntarily are viewed as more acceptable (77).
- **Actual levels of risk.** Risk probabilities that are very small may be viewed as less credible or less certain (79), and lay people may have an especially difficult time understanding them (80).
- **Understanding probability and uncertainty.** Individuals who are more familiar with the concepts of uncertainty in risk assessment and uncertainty in science may be more likely to understand health risk information (79).
- **Presentation of risk.** Individuals may tend to overestimate the probability of risks presented in relative terms compared with those presented in absolute terms (81).
To address the wide range of factors that might influence a person’s perception of his or her own health risks, some researchers (74,82) have suggested a balance-sheet approach that considers not only risk probabilities but also the potential for resulting benefit and harm. Additionally, it would likely be helpful to understand how a person perceived a given risk (i.e., which if any of the above-mentioned factors were being used). This type of approach to risk communication would necessarily be highly variable from one individual to the next. In other words, the set of factors influencing person A’s perception of a given risk might be very different than the set of factors influencing person B’s perception. This strategy is already being used effectively in health behavior research in which computer programs can individually tailor intervention materials that promote a range of cancer-prevention behaviors (83).

The way a health risk or risk-reduction strategy is presented, or framed, can also influence a person’s decisions and behavior (84). “Gain” frame messages are those that emphasize attaining a desirable outcome (e.g., “If you get a mammogram, the chances are good that you will find out your breasts are healthy”) or avoiding an undesirable one (e.g., “If you get a mammogram, you will decrease your risk of having an undetected breast tumor that could cause cancer”) (85). In contrast, “loss” frame messages emphasize undesirable outcomes (e.g., “If you don’t get a mammogram, you will increase your risk of having an undetected breast tumor that could cause cancer”) or the avoidance of a positive outcome (e.g., “If you don’t get a mammogram, you will never find out if your breasts are healthy”). Effects of such message-framing strategies are well documented and appear to be highly variable from one individual to the next. In other words, the set of factors influencing person A’s perception of a given risk might be very different than the set of factors influencing person B’s perception. This strategy is already being used effectively in health behavior research in which computer programs can individually tailor intervention materials that promote a range of cancer-prevention behaviors (83).

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Even within the broad categories of screening and preventive behaviors, effectiveness of different framing strategies may be influenced by individuals’ existing beliefs about the particular risk or behavior. For example, one’s level of concern about a given health problem and his or her perception of personal risk for that problem may mediate the effects of framing (89,94). As our understanding of framing effects is still evolving, this area appears to be important for future research in risk communication.

The degree of emphasis placed on the uncertainty of a given risk can also influence a person’s perceptions of the risk. For example, messages can either call attention to the positive probability that a risk causes cancer (e.g., “It is probable that X causes cancer”) or to the lack of complete certainty (e.g., “It is not known for certain whether X causes cancer”) (95).

An intuitively appealing but as yet untested approach involves the use of qualitative versus quantitative statements of risk probability (74). Considerable research has been conducted linking numeric probabilities to verbal statements expressing probability. The premise behind this research is that people think and talk about the probability of future events every day, but they seldom use the kinds of quantitative estimates (e.g., statistics and numeric proportions) with which most health professionals are accustomed to communicating to the public. For example, the likelihood of event A occurring might be seen as “doubtful” while event B is viewed as “almost certainly” going to happen. If numeric values could be associated with these probabilistic expressions, risk communication might be more effective. Mosteller and Youtz (96) reviewed 20 studies of this sort and from them derived a table of 52 probabilistic expressions and the average quantitative probability associated with each. Condensed versions of these findings (97,98), such as that shown in Table 1, have been subsequently suggested. Although this work has also been criticized for its use of relative adjectives and adverbs (e.g., “frequent” and “rarely”) without defining an implied referent (99), this potential limitation is less problematic if the expressions are used to compare two or more defined risks, because the referent is then quite explicit. However, epidemiology—presumably a major part of the basis for such probabilistic judgments—is not particularly adept at distinguishing different small risks from one another (100); thus, some such ratings of personal risk could be inherently flawed.

Sometimes the comparison of multiple risks is itself a technique for communicating risk information. That is, its purpose is not so much to promote informed decision making as it is to emphasize the importance of a particular risk over another or to create awareness of some lesser known risk by comparing it with a more familiar risk. This process of this comparative risk assessment (CRA) has been defined as “juxtaposing disparate risks for the purpose of declaring which one is the ‘larger’ or the ‘more important’” (73). Although insufficient empirical evidence is available to recommend this approach as a major intervention strategy, a number of researchers have identified important issues to consider in CRA and communication. According to Persson (80), the chosen referent for risk comparisons must be relevant. For example, comparisons of voluntary risks to involuntary ones should be avoided, as should comparisons of risks that are dissimilar in terms of when and where their consequences may appear. Contrary to this recommendation and similar to ones from others (101), Roth et al. (102) have noted that people may actually prefer comparisons in which the health risk of interest is compared with an unrelated but familiar risk (e.g., lightning strikes). From a methodological standpoint,

### Table 1. Range of probability and probabilistic statements*

<table>
<thead>
<tr>
<th>Range of probability</th>
<th>Probabilistic statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00–0.05</td>
<td>Almost never</td>
</tr>
<tr>
<td>0.05–0.15</td>
<td>Seldom</td>
</tr>
<tr>
<td>0.15–0.25</td>
<td>In frequent</td>
</tr>
<tr>
<td>0.25–0.35</td>
<td>Sometimes</td>
</tr>
<tr>
<td>0.35–0.45</td>
<td>Less than an even chance</td>
</tr>
<tr>
<td>0.45–0.55</td>
<td>Even chance</td>
</tr>
<tr>
<td>0.55–0.65</td>
<td>More often than not</td>
</tr>
<tr>
<td>0.65–0.75</td>
<td>Often</td>
</tr>
<tr>
<td>0.75–0.85</td>
<td>High probability</td>
</tr>
<tr>
<td>0.85–0.95</td>
<td>Very high probability</td>
</tr>
<tr>
<td>0.95–1.00</td>
<td>(Virtually) certain</td>
</tr>
</tbody>
</table>

*Source: see ref (97).
Fischhoff et al. (41) have reported that, although many people have a generally accurate sense as to the relative probability of different risks occurring, perceptions of absolute risk can be greatly influenced by the magnitude of the comparative risk selected. In addition, potentially serious miscalculations can arise when the uncertainty inherent in any two distinct risk estimates considered is not taken into account when the two are being compared (73).

Comparing One Person’s Actions to Another’s

Weinstein (31) suggests that underestimation of risk, or “optimistic bias,” is in large part a function of cognitive errors. One error studied by Weinstein is egocentrism—an individual’s assumption that other people of similar age, sex, and general situation are not taking the same degree of precautionary action as she is. In a study (31) testing the effect of information designed to counteract egocentrism by offering subjects information about the precautionary actions of others, optimistic bias was reduced. An unexpected finding of this study was that subjects in a group instructed to simply describe their own risk factors (with no feedback about others’ risk factors) had the greatest level of optimistic bias. It is possible that consideration of one’s own risk factors (or lack thereof) actually increases egocentrism and, therefore, optimistic bias.

Most risk communication does not provide feedback regarding the health habits of others. Rather, its focus is on the individual and his or her health habits. Based on the Weinstein (31) study, it seems possible that this focus might actually create unintended egocentrism. Recipients of some cancer communications addressing multiple risks may pay particular attention to risk factors they did not have or ones they had never considered previously. For example, a person may focus on the fact that he or she eats lots of vegetables, rather than on the fact that he or she smokes cigarettes. In such a case, risk communication may be inviting egocentrism by presenting risk estimates in terms of absolute rather than relative risk. In other words, although population estimates provide the basis for many risk estimates, risk communications often do not consider this information when formulating risk messages for individuals. In a study of four health risk appraisals (HRAs) administered by Avis et al. (25), feedback from only one HRA was found to have an effect on perceived risk. This HRA specifically informed people that, compared with others, they are at above-average, average, or below-average risk for developing heart disease. This finding would support the hypothesis that optimistic bias is a function of egocentrism, which can, in turn, be countered by comparison with others.

Prioritizing Between Multiple Risks

In the presence of a single modifiable behavioral risk, the course of preventive action is fairly clear—modify that behavior. However, addressing multiple risk factors at the same time can burden and confuse individuals, and many will be unable to make changes in multiple risk-related behaviors (e.g., quitting smoking, reducing dietary fat intake, exercising, and reducing alcohol intake) simultaneously (103–105).

In the previously described intervention study seeking to change inaccurate perceptions of health risks (36), patients received feedback indicating that their 10-year mortality risk was higher than average, average, or lower than average for each of four health problems: cancer, heart disease, stroke, and motor vehicle crash. It is interesting that patients who initially overestimated their cancer risk (i.e., a pessimistic bias) and subsequently received feedback explaining that their risk of not only cancer but also heart disease, stroke, and motor vehicle crash were all below average were the most likely to alter their perceptions of personal risk toward a more accurate viewpoint. However, a similar change in risk perception was not found for those who initially underestimated their cancer risk. These patients were no more likely to alter inaccurate perceptions of risk if their feedback indicated four higher-than-average risks or only one higher-than-average risk. In other words, receiving consistent feedback that a person is at lower-than-average risk for multiple different diseases seems to influence perceptions of susceptibility, but receiving consistent feedback that a person is at higher-than-average risk for multiple different diseases does not. This finding may reflect a kind of defensive avoidance reaction when people are faced with threatening information (39).

Given this pattern of risk perception, risk communications and other intervention materials should prioritize among competing risks when multiple risk factors are present. At least five specific criteria could be used to establish such a prioritization: 1) epidemiologic risk, 2) readiness to make behavioral changes, 3) self-efficacy for making behavioral changes, 4) objective difficulty of making behavioral changes, and 5) gateways to behavioral changes. Each is discussed in detail below.

Epidemiologic Risk

Some types of risk communication, like HRA feedback, have traditionally done a good job of implicitly prioritizing between competing risks by quantifying the unique contribution of specific risk factors and risk behaviors to a projected overall risk estimate like “risk age” or an equivalent metric. Some HRA feedback has also taken the next step, describing the extent to which risk age could be reduced by changing various risk factors. Setting risk reduction priorities based solely on an epidemiologic criteria (e.g., attributable risk) would mean that cancer communication would encourage individuals to focus their efforts on whatever factors contributed most to their risk. If successful in getting people to change, this approach would yield the greatest reduction of population risk. However, if users are not interested in changing their “most important” risk factor, they are highly unlikely to do so even with intervention (106).

Readiness to Make Behavioral Changes

As first suggested in the research design of Kreuter and Strecher (107), the focus of supplemental behavior change feedback provided with health risk information can be determined by a person’s readiness to change different risk behaviors. Rather than automatically selecting the person’s greatest health risk (i.e., epidemiologic, or attributable, risk), this approach would select whichever risk an individual was most interested in changing. This approach should yield the greatest probability of change occurring because the intervention will be helping the person make changes he or she is already considering. For example, the recipient of a risk communication might be a cigarette smoker, eat a high-fat diet, and consume excessive amounts of alcohol. If this person was thinking about reducing his or her dietary fat consumption (i.e., in the contemplation stage for this behavior) but not thinking about quitting or cutting down on his
or her tobacco and alcohol consumption (i.e., a “pre-
contemplator” for these behaviors), his or her risk information
might initially focus on helping make the dietary changes he or
she wants to make.

Self-Efficacy for Making Behavioral Changes

Efficacy expectations, or “self-efficacy,” are beliefs individu-
als have about their ability to enact a particular behavior (108).
They have been found to be strong predictors of a person’s
success in modifying a range of lifestyle behaviors (109). Be-
behavior-specific self-efficacy could be assessed in conjunc-
tion with risk assessments and used as criteria for determining which
among multiple risk factors would receive priority attention in
risk communication or other educational and behavioral inter-
ventions. For example, a person might be very confident that he
or she can eat fresh fruit more often, but not at all confident that
he or she will be able to give up a lifelong smoking habit. This
particular example points out the greatest potential limitation of
this approach. Failing to intervene on his or her smoking and
instead focusing on fruit and vegetable consumption may seem
like shifting deck chairs on the Titanic. However, self-efficacy
theory suggests that establishing early successes—even if they
are not directly related to other behaviors—can enhance a per-
son’s self-efficacy for future prevention activities (108).

Importantly, both the “readiness” and “self-efficacy” priori-
tization approaches must directly involve individuals in the de-
cision-making process. This approach will probably result in a
greater “buy-in” or commitment on the part of the individual
(110), which is an important aspect of any intervention involving
joint goal setting (111). Moreover, it need not be limited to these
two constructs. Tversky (112) describes how people use a simi-
lar process, “elimination by aspect,” to select from alternative
risks or behaviors. Given several alternatives to choose from,
people are likely to focus on specific desirable (or undesirable)
aspects of each alternative, not the alternative itself. For ex-
ample, if a high level of effort is viewed as undesirable in se-
lecting a behavior change to attempt, some alternatives will take
more effort, and they may be eliminated. What is left after
multiple rounds of elimination will be the most likely candidate
for change.

Objective Difficulty of Making Behavioral Changes

Generally speaking, not all behavior change is equally diffi-
cult to accomplish. A smoker can spend 10 minutes one time in
his or her life installing a smoke detector and 2 minutes each
year checking the battery and will effectively reduce his or her
risk of mortality in a house fire. However, behaviors that follow
long-time, deeply ingrained patterns and cultural norms (e.g.,
diet) or behaviors characterized by a strong physiologic depend-
ence (e.g., tobacco use and alcohol consumption) are often
more difficult to modify. On the basis of this observation, a
person might choose to prioritize between competing risk fac-
tors, based on the objective difficulty of changing those behav-
iors.

Gateways to Behavioral Changes

For many individuals, different health-related conditions and
behaviors are closely linked to one another. For example, en-
gaging in physical activity is associated with eating a healthier
diet and with various psychological outcomes (113,114), and
smoking is associated with a poorer diet, injuries, and alcohol
consumption (115–117). The presence of certain health prob-
lems can also make it more difficult, if not impossible, for a
person to modify some health behaviors. For example, certain
types of physical activity will be limited by low-back problems,
and sustained cessation is associated (negatively) with depres-
sion (118). Left unchecked, depressive symptoms would likely
be a substantial barrier to a person quitting smoking or, for that
matter, to making any serious attempt to change other health-
related behaviors (119,120). But smoking cessation programs
that include a mood management intervention appear to be es-
pecially effective among depressed smokers (121). Thus, it
would seem important to address these “gateway” problems so
that other behavioral intervention attempts will stand a better
chance to succeed. It may also be possible to better facilitate
behavioral changes by introducing new “gateway behaviors,”
such as physical activity, that if adopted may increase the like-
lihood that other lifestyle changes are also made (114).

Combinations of Criteria

Naturally, these criteria are not mutually exclusive. Advanced
computer technologies make it possible to consider multiple, or
even all of these, criteria in a single prioritization algorithm.
From a behavioral science standpoint, the key evolutionary step
this prioritization offers is movement away from solely risk-
based criteria to a more systematic consideration of users’ in-
terests, beliefs, and general life circumstance.

SUMMARY

Applied research on cancer risk communication is sparse, and
even less is known about effective communication under con-
ditions of multiple risks, yet risk communication-based inter-
ventions would seem to be a critical part of strategies to promote
adoption of healthy lifestyle behaviors and informed decision
making. This paper sought to raise issues for consideration in
developing and testing such cancer risk communication and to
provide some initial suggestions for guiding that work. There is
considerable unmet need in this area for new knowledge and
recommendations for best practices. Those professionals choos-
ing to pursue this line of work can make a significant contribu-
tion to cancer risk communication.

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