Preventive Medicine 50 (2010) 63–67

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Integrating theory into community interventions to reduce liver cancer disparities: The Health Behavior Framework

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ARTICLE INFO

Available online 27 August 2009

Keywords:
Hepatitis B virus
Liver cancer
Cancer prevention
Theory
Community-based Intervention
Health behavior
Disparities
Asians
Ethnic minorities
Cancer screening
Conceptual model

ABSTRACT

Mitigating the unequal burden of cancer often involves conducting community-based trials to develop effective intervention strategies to promote cancer-related health behaviors. However, this is challenging due to the simultaneous influence of numerous factors, at multiple levels in the socio-ecological context, on health behavior. A sound conceptual framework can bring order to this complex environment and provide a roadmap for systematically addressing the multiple determinants of the behavior in question. This paper describes the application of The Health Behavior Framework, an integrative *conceptual* model, in an ongoing Program Project, "Liver Cancer Control Interventions for Asian-Americans." The Framework has been integral to shaping all aspects of the three component research trials from selection of the study designs to development of the interventions and data collection instruments. We advocate universal adoption of theory into community-based intervention research as a way to accelerate our ability to develop effective interventions and facilitate synthesis of study results across populations and behavioral outcomes: critical steps in advancing the field of health disparities research.

Introduction

It is widely recognized that an important approach to mitigating the unequal burden of cancer in certain segments of our population involves the conduct of community-based trials to develop effective intervention strategies. Many such trials focus on health behaviors such as cancer screening, healthy nutrition and sun protection practices. However, achieving health behavior change is a complex process. This is due to the fact that numerous factors at the level of the individual, the health care system and the broader geographic, social and political environment interact in complex ways to influence the behavior in question.

A sound conceptual framework can be a critical asset for achieving order in this complex environment, and can provide a roadmap for systematically addressing the multiple determinants of the health behavior in which change is desired. Theory-guided research has many advantages. It allows for a more systematic approach to building the knowledge base and increased comparability of results across studies, populations, and health behaviors. Integration of theory into research also allows for the development of testable hypotheses, the examination of complex connections and pathways among predictors and target outcomes, and can lead to a more orderly approach to intervention development.

This paper will discuss the value of incorporating a conceptual/theoretical perspective into community-based trials to reduce cancer disparities including the planning, implementation and data interpretation stages of research. The Health Behavior Framework (HBF), a *conceptual* model developed at the University of California Los Angeles (Bastani et al., 1999, 2001, 2007), will be used to illustrate these points. This framework is being utilized in an ongoing Program Project, *Liver Cancer Control Interventions for Asian-Americans* that includes three controlled trials designed to increase receipt of hepatitis B serological testing among Vietnamese, Hmong and Korean populations in California. We will utilize this example to illustrate the value of a theory guided approach in community trials.

Overview of the Health Behavior Framework

The Health Behavior Framework (Fig. 1) is based on the premise that we can only influence multi-faceted behaviors by using a multi-dimensional model derived from varying theoretical orientations. Thus, the HBF represents a synthesis of some of the major theoretical formulations in the area of health behavior, such as Social Cognitive Theory (Bandura, 1989, 2004), the Health Belief Model (Becker and

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doi:10.1016/j.ypmed.2009.08.010

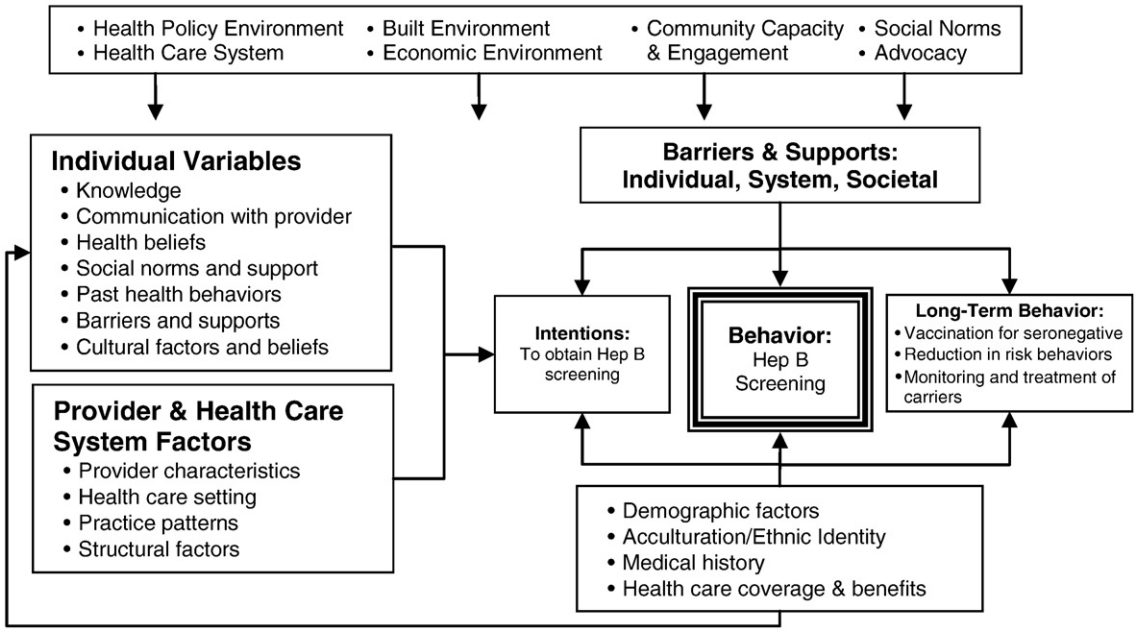


Fig. 1. Health Behavior Framework.

Maiman, 1974), the Theory of Planned Behavior (Ajzen 2002, Madden et al., 1992, Ajzen and Madden, 1986; Fishbein and Ajzen, 1975), the Transtheoretical Model of Change (Prochaska and DiClemente, 1983; Prochaska, 1992), and Social Influence Theory (Greer, 1988; Lomas and Haynes, 1988; Mittman et al., 1992). In addition, the model considers the context within which the desired behavior and behavior change are enacted, including characteristics of the provider and the health care setting (Wagner, 1998; Zapka and Lemon, 2004), as well as larger community and societal influences (Ponce et al., 2005; Babey et al., 2008).

The HBF assumes that individual variables and provider and health care system factors influence behavioral intentions which in turn influence health behavior. Intentions do not automatically translate into behavior. Rather, this connection depends on the absence of barriers and/or presence of supports which may function at the level of the individual (e.g., cultural beliefs), the health system (e.g., practice patterns), or society (e.g., impoverished neighborhood). Supports and barriers may also bypass intentions and exert direct influence on health behaviors. In addition, the model considers the broader context within which the desired behavior and behavior change are enacted. These are the broader socio-ecological conditions under which people lead their lives and include the health policy environment, community capacity and engagement, social norms, social deprivation, discrimination, and physical environmental influences. For example, community capacity which refers to characteristics of communities that affect their ability to identify, mobilize, and address social and public health problems can moderate the effect of health care system factors on the desired health behavior.

It is useful to categorize model constructs as either mutable or immutable. Mutable factors are particularly important as they represent potential targets for intervention. For example, individual-level interventions may attempt to promote health behaviors by increasing knowledge or reducing barriers. Mutable provider-level factors such as practice norms or structural barriers are another common intervention target. Although factors at the macro-level such as the health policies and community characteristics are theoretically mutable, they are unlikely targets for community-based trials in which they generally function as immutable. However, immutable factors at all levels are important, should be conceptualized, and when possible assessed. At the individual-level, immutable factors such as demographics can be used to target or tailor intervention content (e.g., crafting messages specific for certain ethnic or age groups). Immutable factors may also serve to moderate the effect of the intervention (e.g., the intervention is more effective among inner city versus suburban residents).

The framework depicted in Fig. 1 is a generic representation of the relationships among the various constructs. The model recognizes that various mediating and moderating relationships and multiple pathways will lead to the health behavior in question. The HBF is dynamic rather than static in that the constellation of predictive factors and their interrelationships is expected to vary depending upon the particular subject populations and health behaviors in question. Despite some differences, our extensive experience with the HBF (Bastani et al., 1999; 2001; 2007; Glenn et al., 2006; Maxwell et al., 1998a, 1998b; Taylor et al., 2004) and utilization of its constructs in other cancer screening research (Schueler et al., 2008; Beydoun and Beydoun 2008; Zapka 2008; Zapka and Lemon 2004) has shown that the major drivers of behavior tend to be similar across populations. For example, "barriers" are one of the strongest predictors of a wide variety of health behaviors in different populations, although the specific barriers in question may vary (Beydoun and Beydoun, 2008; Janz and Becker, 1984). Although some may consider it a limitation, the model by intent is broad to permit its use in studies targeting a wide variety of populations and health behaviors thus allowing for important comparisons regarding the various model predictors and their relationships with behavioral outcomes.

Description of the program project

Liver cancer disproportionately affects Asian Americans in the United States, reflected in incidence and mortality rates that are eight times higher than those among non-Hispanic Whites (McCracken et al., 2007). Among Asians, over 80% of liver cancer is etiologically related to chronic hepatitis B viral infection, which is endemic in Asia (Beasley, 1988; Blumberg & London, 1982; Chen et al., 1997) and therefore also very highly prevalent among Asian immigrants to the United States (Tong and Hwang, 1994). Although universal vaccination of newborns is a promising strategy for future eradication of

chronic hepatitis B and liver cancer, it does not benefit adults already infected with the virus. The 2007 Guidelines of the American Association for the Study of Liver Diseases recommend hepatitis B serologic testing of adult immigrants from highly endemic areas such as Asia as the first step in the control of hepatitis B infection and associated morbidities including liver cancer (Lok and McMahon, 2007). Serologic testing will identify the vulnerable (uninfected) who may benefit from vaccination, allow triage of the infected to appropriate treatment or surveillance, and provide opportunities for counseling infected individuals to reduce vertical and horizontal transmission of the virus to close contacts (See Lok and McMahon, 2007). Therefore, the goal of the research projects comprising the Program Project is to increase hepatitis B serologic testing among three Asian populations that have among the highest rates of hepatitis B infection in the world. The first project employs a community-level media-based intervention among Vietnamese in northern California. The second project evaluates the effect of an in-home patient navigator educational intervention among Hmong in the Sacramento area and the third project evaluates a small-group discussion intervention among Korean church attendees in Los Angeles.

Application of the Health Behavior Framework in the Program Project

Project inception

Once a decision to target the selected groups was made, the HBF provided a comprehensive overview of factors that could influence hepatitis B screening. It is generally not feasible for community trials to intervene at all or multiple levels of the HBF due to resource constraints and research design considerations. We therefore made a decision to implement individual-level interventions based on our knowledge of how our target communities are organized and where they obtain their health care. For example, the wide dispersion of the Korean population in the Los Angeles region (societal factor) would have required a provider-focused intervention to target hundreds of physician offices and other health settings, making it impractical. Instead, our knowledge that over 85% of Koreans attend church regularly (social norms) helped us to select Korean churches as the venue through which to deliver our intervention.

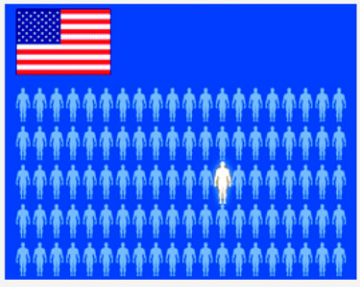
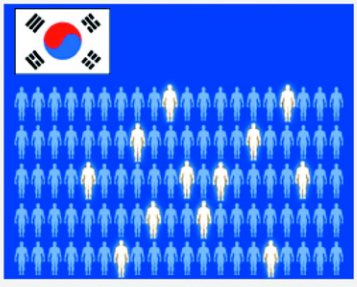
Intervention selection

The HBF also served as a guide for selecting an intervention format appropriate for each of our target groups. For example, our previous research indicated that the Hmong faced major concrete barriers (e.g., lack of transportation) to accessing health services, and that social norms did not favor discussing private health matters in public settings. Therefore, the Hmong intervention adopted an in-home, patient navigator format that would provide privacy and allow for assistance with scheduling and transportation. Among Koreans in Los Angeles, data suggested that social norms favored group discussion about health matters and that the church was a preferred venue for receipt of health information. Therefore, this project adopted a small-group discussion intervention, delivered on-site at churches, to influence social norms and reduce stigma regarding hepatitis B. In the Vietnamese project, a mass media and social marketing intervention was selected given the reliance of the community on ethnic media, the wide availability of ethnic media outlets, and the concentration of the Vietnamese population in Northern California in a well defined ethnic enclave (social structure).

Intervention content

The framework was integral in determining the specific content of our interventions and we provide illustrative examples below and in Table 1. All three interventions aim to influence health beliefs as pictured in the model including perceived susceptibility to hepatitis B, perceived severity of the infection, and beliefs about the efficacy of serologic testing in controlling liver cancer. For example, pilot work

Table 1
Selected Health Behavior Framework factors addressed by the liver cancer control interventions.

Individual Variables	
Knowledge	Hepatitis B prevalence rates within target populations, routes of transmission, consequences of chronic infection, benefits of testing (all projects).
Communication with provider	Peer navigator provides coaching on how to raise issue of blood test with provider (Hmong project). Subjects encouraged to share hepatitis B booklet with physician as way to open discussion regarding testing (Korean project).
Health beliefs: Perceived susceptibility	Graphics display prevalence of chronic hepatitis B infection in the U.S. and in Korea (Korean project).
	 
Social norms and support	Discussion group format among peers establishes positive social norms and social support for testing (Korean project). Peer navigators are community members who convey positive social norms and serve as role models (Hmong project)
Barriers and supports	Lack of health insurance: Media campaign highlights clinics, providers, or events where low-cost or free testing can be obtained (Vietnamese project). Language barrier: Peer navigator offers to interpret at the appointment (Hmong project).
Cultural factors & beliefs	Delivery of in-home intervention through peer navigators to respect privacy (Hmong project) Testing and vaccination is framed as another way to keep body healthy, similar to traditional medicine or "han yak" or "bo yak" (Korean project).
Provider & Health Care System Factors	
Practice pattern	Mailing of hepatitis B testing guidelines to members of the Vietnamese Physician Association of Northern California (Vietnamese project).

indicated that Koreans were not aware of their elevated risk for hepatitis B compared to the general U.S. population. Therefore, the intervention stressed that rates of chronic hepatitis B infection are twelve times higher among Koreans compared to the general U.S. population. We also attempted to enhance perceived control over developing the disease and increase self-efficacy to be tested in all projects by explaining that testing only involves a simple blood test that can be performed at a physician's office. All three studies also focus on the empowerment of community members to ask for the hepatitis B test versus relying on a provider to initiate testing.

Our pilot work revealed that cultural factors such as low value placed on preventive health care utilization and the belief that blood tests can deplete the body of energy may function as barriers to testing. Therefore, intervention content was developed in consideration of these factors. For example, many Koreans rely on traditional medicine for preventive health purposes but do not view Western preventive medicine procedures as important. Therefore, we framed hepatitis B testing as a form of "Han-Yak or "Bo-Yak" (traditional Korean medical concepts) and another way to keep the body healthy.

Our interventions attempted to increase hepatitis B testing by reducing barriers including concrete barriers (e.g., transportation assistance provided by patient navigators in the Hmong study) and psychosocial barriers such as stigma, low perceptions of risk and fear of a positive finding (through intervention messages conveyed in all three studies). Barriers were countered both proactively such as through the use of media stories or social marketing in the Vietnamese project, and in response to specific barriers raised by individuals through interactions with the patient navigator in the Hmong project and in small group sessions in the Korean project. All three studies also provided specific information about resources for low-cost or free testing in the respective communities (reducing concrete barriers).

Instrument development

The HBF was utilized to develop common baseline and post-intervention follow-up instruments for each of the studies (see Maxwell et al., 2010). The instruments focus on the major mutable and immutable factors in the model and include common items to assess the outcome of interest, receipt of hepatitis B serologic testing. Extensive community input, qualitative data collection and examination of existing instruments were vital in developing final instruments. The use of common items across the three projects will permit comparisons of the prospective predictors of screening across the three ethnic groups and also allow us to examine the pathways through which our interventions were able to achieve their effects. If our interventions are not successful in increasing hepatitis B testing receipt our instruments will allow us to examine theoretically based mediating factors that we may have failed to influence through our interventions.

Data analysis and interpretation

Use of a conceptual framework is also very helpful in hypothesis generation and in the data analysis and data interpretation phases of community trials. As mentioned above, assessment of theoretically defined predictors at baseline and follow-up will allow for examination of potential mechanisms through which the interventions have their effects (mediators) as well as determining for whom the interventions were most successful (moderators). For example, in the Hmong and Korean studies we hypothesize that, in part, the intervention will have its effect by reducing specific barriers (mediator). Therefore we would expect to see a change from baseline to post-intervention in the reporting of these barriers and a corresponding increase in serologic testing rates. In the Korean study, we hypothesize that acculturation will function as a moderator in that the intervention will be more effective among individuals with higher versus lower levels of acculturation. Baseline data in the Vietnamese study suggested that, contrary to expectations, non-Vietnamese speaking community members were much less likely to have obtained serological testing (moderator). Therefore, several intervention components are specifically targeted to this group and a comparison with post-intervention data will help us to assess whether we were indeed able to effectively reach this segment of the Vietnamese population with our messages.

Assessment of model constructs at baseline can provide a snapshot of where a population is starting from and also allows for comparison of the intervention and control groups on important predictors of the outcome besides demographic factors. It also allows for comparison of predictors across population groups. If the broad categories of predictors are similar across populations, as we have hypothesized in our program project, the field can begin to move in the direction of utilizing existing interventions and common interventions across multiple populations with slight modifications versus the inefficient approach of creating new interventions de novo for specific subpopulations.

Conclusion

Decades of prior research have demonstrated the considerable challenges involved in effecting health behavior change. This is due to the simultaneous influence of numerous factors, at multiple levels in the socio-ecological context, on health behavior. Comprehensive and multidimensional theoretical models can bring order to this complex environment in which heath care is received and health behavior enacted. The HBF is one such integrated model which is being utilized in our program project on reducing hepatitis B and liver cancer disparities among Asians. Integration of theory into community-based trials can play a critical role in developing practical and effective interventions. Theory can also guide the development of data collection instruments to ensure that, in addition to assessing intervention effectiveness, studies measure changes in mutable factors that underlie behavior change. Careful assessment of these influences will help to understand the mechanisms through which our interventions work and for whom they are most effective. Universal adoption of theory into community-based intervention research to address disparities will accelerate our ability to develop effective interventions, and facilitate synthesis of study results across populations and behavioral outcomes: critical steps in advancing the field of health disparities research.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

Acknowledgments

The preparation of this paper was funded in part through grants from the National Cancer Institute Center to Reduce Cancer Health Disparities (U01 CA 114640) and P01 CA109091-01A1 funded jointly by the National Cancer Institute and the National Center on Minority Health and Health Disparities.

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