

Technological and Medical Advances: Implications for Health Psychology

Patrice G. Saab and Judith R. McCalla
University of Miami

Helen L. Coons
Women's Mental Health Associates

Alan J. Christensen
University of Iowa

Robert Kaplan
University of California, San Diego

Suzanne Bennett Johnson
Florida State University

Mark D. Ackerman
Veterans Affairs Medical Center, Atlanta, Georgia, and Emory
University School of Medicine

Edward Stepanski
Rush-Presbyterian-St. Luke's Medical Center

David S. Krantz
Uniformed Services University of the Health Sciences

Barbara Melamed
Mercy College

Behavioral telehealth, health informatics, organ and tissue transplantation, and genetics are among the areas that have been affected by advances in technology and medicine. These areas illustrate the opportunities and the challenges that new developments can pose to health psychologists. Each area is discussed with respect to implications for practice, research, public policy, and education and training; recommendations are provided.

Key words: behavioral telehealth, health informatics, genetics, transplantation

The issue of the *Journal of the American Medical Association* entitled Opportunities for Medical Research in the 21st Century addressed a vast array of topics ranging from the Human Genome Project (Collins & McKusick, 2001) to organ and tissue transplantation (Niklason & Langer, 2001) to biomedical imaging (Tempny & McNeil, 2001). With impressive advances in medicine and health technology, there are new frontiers and opportunities for the

discipline. What is surprising is that little mention was made of the potential contributions of health psychologists to research, clinical practice, and prevention efforts. This article outlines some representative issues associated with medical and technological advances for health psychologists. To illustrate opportunities and challenges, four areas are examined: behavioral telehealth, health informatics, organ and tissue transplantation, and genetics.

Patrice G. Saab and Judith R. McCalla, Department of Psychology, University of Miami; Helen L. Coons, Women's Mental Health Associates, Philadelphia, Pennsylvania; Alan J. Christensen, Department of Psychology, University of Iowa; Robert Kaplan, Department of Family and Preventive Medicine, University of California, San Diego; Suzanne Bennett Johnson, Department of Medical Humanities, Florida State University; Mark D. Ackerman, Veterans Affairs Medical Center, Atlanta, GA, and Emory University School of Medicine; Edward Stepanski, Departments of Psychology and Medicine, Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois; David S. Krantz, Department of Medical & Clinical Psychology, Uniformed Services University of the Health Sciences; Barbara Melamed, Department of Psychology and Behavioral Science, Mercy College.

We thank Cynthia Belar for her contributions to our discussions at the Future of Health Psychology Conference, Pittsburgh, Pennsylvania, March 2000.

Correspondence concerning this article should be addressed to Patrice G. Saab, Department of Psychology, University of Miami, P.O. Box 248185, Coral Gables, FL 33124. E-mail: psaab@miami.edu

Behavioral Telehealth

Although telehealth was pioneered over 40 years ago in mental health settings using rudimentary methods (Whitten, Kingsley, Cook, Swirczynski, & Doolittle, 2001), the past decade has brought wider application. The dawn of the 21st century has been associated with remarkable developments in engineering, computer technology, multimedia services, and telecommunications. Together with deregulation of the telephone industry, these developments allowed for broadband communications, thus permitting the fast transfer of data, images, and video and facilitating the emergence of telehealth applications. The promise of telehealth is that it has the capacity to deliver timely services to patients and participants in regions that are remote or have limited access to health-related services within the United States and throughout the world (Suleiman, 2001). Jerome and colleagues (2000) outlined telehealth applications in psychological practice and research. Behavioral telehealth appears to have considerable potential for

health psychology because it provides a means to intervene with and assess patients and participants at distant sites via the Internet and other telecommunications modalities (e.g., real-time interactive video conferencing and virtual reality). Procedures currently in use include online treatment programs (e.g., weight management, pain management, psychoeducational support for Alzheimer caregivers, and smoking cessation), self-help chat rooms (e.g., cancer), assessments (e.g., neuropsychology), adherence-enhancing strategies (e.g., e-mail reminders and Web-page-based appointments and follow up), and consultation services with various populations including school children, elderly persons, homebound persons, military personnel, and prisoners.

A number of practice, research, public policy, and education and training implications are raised. With respect to practice objectives, traditional interventions need to be translated into telehealth interventions. Although increasingly creative applications are likely to emerge, first steps involve applying established interventions to those with limited access to services. This raises the obvious issue as to whether health interventions with established effectiveness, when delivered in a traditional context, remain effective when implemented from a remote site using Internet and telecommunications technologies. The challenge for researchers is to conduct studies to determine whether the effectiveness of the telehealth intervention is comparable with or exceeds that of the traditionally delivered intervention.

Conduct of research and practice certainly requires us to develop appropriate models for obtaining informed consent. Of similar note, utilization of behavioral telehealth procedures requires consideration be given to concerns regarding patient and participant confidentiality, information security, lack of research and practice guidelines, fee for services, provider competency and supervision, and the limitations on clinical practice associated with state licensure. Standards must be devised to address the unique aspects inherent in telehealth procedures. To this end, it is critical that health psychologists take the initial step of serving on institutional review boards and advisory committees. Furthermore, as a discipline, it is essential that health psychologists set standards in formulating, reviewing, and adopting ethical guidelines pertaining to the implementation of telehealth procedures in research and clinical practice.

Socioeconomic factors, including lack of access to computer technology and decreased computer literacy, may limit access to telehealth. A recent survey indicates that, although 58% of Americans use the Internet, nonuse is associated with being African American, residing in a rural community, having lower income and educational attainment, and older age (Lenhardt et al., 2003). Although the rates of Internet use are similar for English-speaking Hispanics and Whites (Lenhardt et al., 2003), language barriers among non-English speakers restrict access. From a public policy perspective, efforts directed at increasing access to technology and developing community outreach programs should be encouraged (e.g., availability of free Internet access in public libraries). As such, the discipline must structure technology and treatment protocols to meet the requirements of underserved populations with appropriate language and culturally sensitive methods.

The design and delivery of effective telehealth protocols require researchers and practitioners to acquire competencies to effectively implement telehealth interventions and gain experience with the necessary computer and video conferencing technologies.

These technologies are increasingly available and are currently used in several graduate programs. Additional expertise can be acquired by providing opportunities for continuing education (both traditional and online) for doctoral-level psychologists.

Health Informatics

Widespread access to the Internet has profoundly affected the availability of health information. Large databases can now be readily compiled from multiple sites around the globe, providing access to researchers. The Internet also gives providers and patients instant and unlimited access to health information. Providers are no longer sole distributors of health information. Rather, access to information on demand that is customized to patients' needs empowers patients and affects the way that they interact with their providers, changing health care practice. However, with upward of 15,000 health-related Web sites, coupled with an absence of standards for Web sites, and variable levels of patient health literacy, there is growing concern that patients may obtain inappropriate information. Inaccurate, misleading and/or inappropriate information may pose a risk by contributing to delays in seeking treatment and may undermine confidence in provider recommendations (Robinson, Patrick, Eng, & Gustafson, 1998). In addition, patients may require provider time to explain Web site information, a practice that is not likely to be well supported in the managed care arena. Furthermore, as the scientific literature exponentially expands and access to e-journals increases, providers are bombarded with vast amounts of information that are burdensome to digest.

Several objectives are outlined to respond to opportunities presented by these new technologies. For practice, consideration needs to be given to using information technology in general clinical practice to organize and monitor patient records and to reduce errors. This clinical practice objective can be addressed by the use of information technologies to obtain revisit information and has the potential to maximize the quality time patients spend with clinicians. Patients seeking specific health information can be directed to Internet guides by their clinician, and informed decision making can be facilitated. Health informatics also has the capacity to facilitate data collection with the use of interactive databases in clinical practice. Information technologies can revolutionize the manner by which patient records are managed. A benefit of information technologies is that they provide an environment in which errors and practices can be systematically investigated. The adaptability of information technologies to track health provider practices is illustrated by the American Psychological Association's PracticeNet. PracticeNet uses real-time behavioral sampling to track psychology practice with respect to client problems and service provision. Data obtained from such procedures can inform decisions and contribute to improved care from clinical health psychologists as well as offer insight into practice issues.

Information technologies expand research options. They also provide the opportunity to use large databases to study health outcomes. With the National Institutes of Health's current policy on data sharing, information technologies can facilitate examining behavioral outcomes in existing databases. Furthermore, large databases offer a means to study behavioral and psychosocial predictors of health outcomes in samples that are likely to be more representative than those collected by individual investigators. As such, health psychologists need to foster collaboration among

researchers nationally and internationally to benefit from these important developments. Moreover, research directed at determining the effects of health informatics and information technologies on patients and the public is warranted. Such research is vital to address whether access to health information predicts healthy behavior and self-care.

Health informatics research also has significant public policy implications. Rigorous guidelines must be developed and implemented to evaluate the use and impact of health informatics and information technologies (Robinson et al., 1998). An additional public policy objective advocates the use of information technologies to improve patient outcomes. Health psychologists in the policy arena can lobby for greater access to accurate, understandable health information in multiple languages (e.g., Spanish). Another policy action promotes the development of national databases on health outcomes. This will be affected by the Health Insurance Portability and Accountability Act that took effect April 14, 2003. The Health Insurance Portability and Accountability Act regulations allow patients to examine their computerized medical records, to correct mistakes, and to seek action against misuse of records.

Health informatics postdoctoral training is currently available at a variety of government agencies and universities. Although training programs do not self-identify specifically as health psychology in focus, they offer opportunities for professional advancement and development not generally available in health psychology predoctoral training programs. Depending on the program, postdoctoral fellows may receive training in traditional health informatics, database design, and computerized health record development. They may also be trained to examine information obtained through surveillance and outbreak investigations and to design networked communication systems to facilitate the exchange of health information among health professionals at local, state, national, and international levels.

Organ and Tissue Transplantation

With medical advances, living organ and tissue donation and transplantation is a common approach to treating an increasing number of devastating diseases. Progress in surgical techniques, organ preservation, and improved methods to decrease graft rejection, including advances in histocompatibility testing and immune tolerance, have contributed to successful outcomes (National Institute of Allergy and Infectious Diseases, 2000; Niklason & Langer, 2001). In light of the marked disparity between the available donor pool and the need for organ and tissue replacement, primary goals have been preserving organs prior to transplant and maximizing organ and patient survival while maintaining quality of life (Niklason & Langer, 2001).

Given the shortage of available organs and tissue for replacement, the clinical literature addressing transplantation suggests that psychosocial considerations often play a role in transplant patient evaluation, screening, and decision making (Christensen, Raichle, Ehlers, & Bertolatus, 2002; Olbrisch, Benedict, Ashe, & Levenson, 2002). Although some normative data are available on various psychosocial measures for transplant candidates (Streisand et al., 1999), there is considerable variability across transplantation programs in measures used and in domains assessed (Olbrisch et al., 2002). The interrater reliability and validity of specific psychoso-

cial factors in the determination of who should and should not receive an organ also require further investigation (Olbrisch et al., 2002). Health psychologists are well suited to address the practice objective that demands clarification for, empirical support of, and standardization for the role that psychosocial information plays in transplant patient selection and screening. The challenge is to develop and implement empirically supported psychosocial assessment protocols to guide the clinical recommendations made by health psychologists to multidisciplinary treatment teams.

To date, little is known about factors influencing donation decisions or the effects of donation on the health and well-being of the donor (Stukas, Dew, Switzer, & Simmons, 1999). Although it is recognized that healthy living donors are vulnerable to various medical risks, less is understood about the psychosocial risks. A central objective of health psychology research should be to establish a knowledge base concerning the effects of living organ tissue donation on donors' physical and emotional well-being. Research addressing the characteristics and motivations of donors as well as the influences on and effects of donations on donors needs to be undertaken (Olbrisch et al., 2002). To the extent possible, health psychology research should incorporate existing psychological theory pertaining to judgment, decision making, altruism, and quality of life. Further research is necessary to develop strategies to enhance donor awareness and to effectively address donor reluctance, particularly among ethnically diverse groups.

With respect to public policy, a central goal directed toward organ allocation is to maximize the utility derived from allocation decisions. An objective relevant to health psychology is to utilize research concerning predictors of patient outcomes to inform health care policy concerning organ allocation. In this regard, health psychologists should be proactive in lobbying policy makers to explicitly consider empirically based psychosocial research findings in revising and executing organ allocation decisions.

Education and training needs to be directed at increasing the presence of health psychologists in transplant programs. This is best accomplished by educating physician colleagues about the role health psychologists can play in enhancing transplant patient outcomes. Outreach to physicians can be accomplished in a variety of ways including grand rounds and in-service presentations as well as publishing in medical journals.

Genetics

As work on the Human Genome Project progresses, genetic testing will be expanded, and more individuals will be exposed to information about their susceptibility to various diseases that have a genetic component. Although predictive testing is currently available to high-risk individuals for certain diseases (e.g., breast cancer and Huntington's disease), it is estimated that within 10 years, approximately 12 tests will be available for common medical conditions. This technological advance suggests that genetics will become a part of general medicine in the near future (Collins & McKusick, 2001). To date, little research has been done regarding the psychosocial effect of these results on individuals, their families, and society in general. Even less is known about the effect of these results on health behaviors, prevention strategies, and public policy. In addition, the advances associated with ge-

netic mapping raise concerns about the potential misuse of genetic information (i.e., insurance discrimination).

As pertains to practice, it is essential that individuals considering genetic testing be appropriately informed to understand the consequences of genetic testing, assisted in decision making, and provided with support to cope with and understand the significance of both positive and negative results (Lerman, Croyle, Tercyak, & Hamann, 2002). The clinical health psychologist can be instrumental in meeting these goals. To accomplish these objectives, collaborative strategies between health psychologists, genetic counselors, and treating physicians require development. Efforts should also be directed at educating the health care, research, and biotechnology communities about the importance of adequate psychosocial support and appropriate methods of informing persons about genetic testing. If individuals understand that medical intervention is available and that their actions will positively impact the course of the disease, they are more likely to be tested (Salkovskis, Dennis, & Wroe, 1999). Patients are better able to accept their positive test results under these circumstances.

As with any population, careful consideration of individual differences is needed. For example, psychological adjustment to test results is influenced by one's functioning prior to testing (Meiser & Dunn, 2000). Attention also needs to be given to how individuals will react to test results and make decisions regarding health behaviors. Research has suggested that predictive genetic testing does not markedly affect behavior (Lerman et al., 2002). People who receive a negative result may be relieved and less likely to engage in preventive health behaviors (contributing to increased lifestyle risk), whereas those who receive a positive result may feel as if there is no point in engaging in preventive behaviors or maintaining a healthy lifestyle. Cognitive-behavioral therapy approaches are effective in alleviating the distress associated with genetic testing and modifying distorted thoughts about genetic testing (Salkovskis & Rimes, 1997). Furthermore, many diseases are not caused by a single gene (e.g., coronary heart disease) but result from the interaction of a genetic component and lifestyle factors. As such, health psychologists can assist individuals in reducing risk by supporting behavior change, healthy lifestyle behaviors, and early detection.

The situation demands that health psychology research be broadly integrated in the clinical trials and genetic studies that will inevitably follow the mapping of the human genome. Health psychologists need to be included as members of multidisciplinary research teams studying genetically at-risk individuals. Given the paucity of behavioral, psychological, and social research that has been translated for physician and patient use, there are several fruitful research questions to pursue. The areas delineated are meant to be representative, rather than exhaustive. To illustrate this point, studies on patients' understanding of genetic risk information and its psychological, behavioral, and social impact on decision making and behavior change are needed. In this regard, it is critical to evaluate the psychosocial impact of genetic testing and to determine the duration of any adverse psychological effects (Lister, Rode, Farmer, & Salkovskis, 2002). Methodological rigor is essential to adequately characterize psychosocial response as many studies lack baseline information on the psychological functioning of their participants. Moreover, it is important to conduct studies aimed at improving patients' understanding of genetic-risk information, decision making, and coping and adaptation. It is also

vital to evaluate how decision making is affected by sociodemographic and cultural factors. In addition, behavioral, social, and environmental factors that lead to disease-related outcomes in genetically at-risk individuals demand investigation. Studies of factors relevant to patient participation in genetics related trials are also warranted.

Guidelines for the conduct of genetic research require further refinement. In this vein, public policy objectives necessitate the implementation of procedures to ensure that the results of genetic testing are not misused to disadvantage the patient (e.g., violation of privacy, loss of health care, and job discrimination). The legal, ethical, and social implications of genome research must be addressed (Collins & McKusick, 2001) and misuse of results prohibited. Policy changes that provide for a safe environment will eliminate a major obstacle to testing. A second policy objective is to ensure that the public is adequately informed about testing. For this objective to be addressed, health psychologists should be involved in developing public education materials to assist patients with decision making. In addition, public access to health psychologists trained to assist with managing the psychological sequelae associated with genetic testing is needed.

It is clearly necessary to provide training within health psychology programs specifically addressing genetically relevant activities. Because this is a relatively new pursuit, there are few training opportunities for psychologists. This underscores the importance of developing collaborative education and training programs with relevant areas such as molecular genetics that lead to concentrations of study or joint degrees and to seek funding to support such programs (Lerman et al., 2002). Such programs could be offered at the doctoral or postdoctoral level. The Department of Psychology Graduate Training Program in Behavioral Genetics, at the Institute for Behavioral Genetics, University of Colorado, Boulder, is a representative program. This program emphasizes the association of genetics and environment on individual differences in behavior. It is a collaboration with the Department of Environmental, Population, and Organismic Biology and the Department of Molecular, Cellular, and Developmental Biology at the University of Colorado. Graduate programs in health psychology could take advantage of the blossoming interest in this area by offering courses in interventions for genetic testing. In addition, continuing education programs need to be developed to assist health psychologists in gaining the requisite expertise.

Conclusion and Recommendations

Medical and technological advances challenge current training models to prepare health psychologists to respond to new demands in research, clinical practice, and public policy. It is essential to meet this challenge by moving in the direction of developing interdisciplinary and collaborative teaching strategies, curricula, and research and clinical practice that will ensure expertise in biomedical, behavioral, and social sciences at the doctoral and postdoctoral levels. Given the constraints on graduate program curricula, advanced training in emerging areas will most likely be accomplished postdoctorally. As health psychologists continue to specialize, it is essential to devise strategies to assess competencies. In the research context, we are faced with implementing and standardizing complex protocols in the presence of rapidly evolving technologies, developing appropriate ethical means to obtain

informed consent, and disseminating knowledge. Practice issues challenge the discipline to address the increased complexity in decision making confronting patients, their families, and clinicians. In addition, health psychologists are likely to address the adverse psychosocial and physical iatrogenic effects associated with advances in medical technologies. Furthermore, it is essential to ensure that medical and technological advances are available to diverse populations. Equally important, progress comes with economic costs that might limit access and contribute to health disparities. In this regard, public policy efforts must promote access to medical technology at all levels (e.g., patient, community, and research funding). Moreover, health psychologists can assume a leadership role in translating knowledge of psychosocial and behavioral aspects of technology to public policy as well as lobby for the accuracy of health care information in the public domain.

Given the general interest in the American Psychological Association in psychology's contribution to health, the Division of Health Psychology and its members are uniquely positioned to assume a leadership role in evaluating existing models for training health psychologists at the doctoral and postdoctoral level. Supporting training opportunities such as the American Psychological Association Science Directorate's advanced training institutes represents one mechanism by which health psychologists can acquire postdoctoral training in emerging technologies and research methodologies. The continued professional development of health psychologists also requires a climate with continuing education opportunities that nurture clinical competencies necessary to respond to advances in medicine and health technology.

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