

DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF NURSING RESEARCH

Spring Science Workgroup:
Increasing Nursing Research Opportunities in Biodefense

Minutes of Meeting
May 14-15, 2002

The National Institute of Nursing Research (NINR) convened its Spring Science Workgroup on Increasing Nursing Research Opportunities in Biodefense on May 14-15, 2002, in Chevy Chase, Maryland. Dr. Hilary D. Sigmon and Dr. Elaine Larson presided as co-chairs.

PANEL MEMBERS PRESENT

Hilary D. Sigmon, PhD, RN (co-chair); Elaine Larson, PhD, RN, FAAN, CIC (co-chair); George J. Annas, JD, MPH; John Carny, PhD; Debra Clair, MSN, RN, CNS; Colleen Conway-Welch, PhD, RN, FAAN; Kristine Gebbie, PhD, RN, FAAN; Christopher J. Gordan, PhD; Elin Gursky, ScD; Joany Jackman, PhD; Petra Miletova, PhD; Michele L. Pearson, MD; Erica R. Pryor, PhD, RN; Leslie Ritter, PhD, RN; Pamela Johnson Rowsey, PhD, RN; Joan Shaver, PhD, RN, FAAN; Terri Simpson, PhD, RN; Stephanie J. Woods, PhD, RN; Janice M. Zeller, PhD, RN, FAAN

FEDERAL EMPLOYEES PRESENT

Nell Armstrong, PhD, RN (NINR); Mary Demory, (ORD); Patricia A. Grady, PhD, RN, FAAN (NINR); Carole A. Heilman, PhD (NIAID); Karin Helmers, PhD (NINR); Mary Leveck, PhD, RN (NINR); Susan Solomon, PhD (OBSSR); Melinda Tinkle, PhD, RN (NINR); Claudette Varricchio, DSN, RN, FAAN (NINR).

OPEN MEETING

I. Welcome and Call to Order

Drs. Sigmon and Larson called the meeting to order. Dr. Patricia A. Grady, NINR Director, welcomed the participants and presented the workgroup's charge, which was to highlight current knowledge in biodefense; uncover opportunities for nursing research in biodefense; and propose research questions to address clinical responses and biobehavioral consequences after exposure to chemical and biologic agents. The workgroup members combined their expertise in infectious disease, medicine, nursing, microbiology, immunology, psychiatry, telehealth, and ethics to fulfill this charge.

II. Discussion of Research Needs and Opportunities

The workgroup considered the threat and effects of bioterrorism and biodefense on health, ongoing nursing research relevant to biodefense, and research training to strengthen nursing research in biodefense.

A number of toxic biologic agents pose a threat to civilian populations. As defined by the Centers for Disease Control and Prevention, these include category A agents (e.g., smallpox, anthrax, plague, botulism, ebola), category B agents (e.g., encephalitis, typhus fever, brucellosis), and category C (or emerging-threat) agents (e.g., Nipah virus, hantavirus). Chemical agents are also a threat and could be deployed. Many agents can be disseminated easily, cause high mortality, and could have a major effect on public health. The workgroup noted that a civilian attack is likely to be sudden and unexpected and may cause social disruption and panic among the public. Public health systems, which include but are broader than emergency medical teams, need to be prepared and ready to take special action to counter any attacks.

Researchers are already addressing a broad range of issues relevant to the nation's biodefense from the perspective of nursing science. They are conducting basic research to develop rapid diagnostic methods to assess infections (e.g., from pulmonary pathogens); identify biomarkers for particular microorganisms and chemicals; and elucidate the effects of various conditions (e.g., fevers) on immune function in animals. In biobehavioral studies, nurse researchers are studying, for example, the reaction of children to trauma; the relationships among stress, sleep, and health; and the physiologic, immunologic, and psychosocial changes that occur with posttraumatic stress syndrome (PTSS).

In addition, nurse researchers are analyzing the planning and response capacities of hospitals and public health facilities; identifying the appropriate competencies for nurses and other members of interdisciplinary health teams; and facilitating the education of nurses about mass-casualty incidents to improve their response to these incidents. To enhance research training in biodefense, nurse researchers are developing innovative approaches for Web-based training of clinicians; establishing postdoctoral programs to develop clinical researchers with expertise in infectious diseases; and incorporating biodefense issues in institutional training awards and centers supported by NINR.

III. Action Plan to Strengthen the NINR Research Portfolio on Biodefense

Nurse researchers and practitioners have unique skills and perspectives that can enhance the nation's biodefense. The nursing community offers clinical and public health nursing skills; extensive experience in trauma settings and diverse communities (e.g., schools, public health hospitals, community clinics, corporate offices); translational and clinical research capabilities; a holistic biobehavioral perspective; an appreciation for multilevel, systems approaches; and leadership of multidisciplinary research and practice teams.

The heightened awareness of the need for biodefense presents excellent opportunities for expanding and focusing basic, applied/translational, and clinical nursing studies. To strengthen the NINR research portfolio in biodefense, the workgroup recommended research and research training in nine important areas, as summarized below.

Early Detection of Toxic Agents. In a civilian attack, the public health system, including emergency services, can be quickly overwhelmed. Exposures and infections must be detected and identified as soon as possible so that treatment and prevention can begin. Basic research is needed to improve detection (e.g., by biomarkers) of individual toxic agents. Clinical research to develop rapid diagnostic methods (e.g., breath analysis for pulmonary pathogens) that are accurate, widely applicable, and easy to use in the field is especially important. Nurse researchers also could

contribute to the development of novel strategies for epidemiologic surveillance and analysis (e.g., geographic spatial analysis).

Mechanisms and Effects of Toxic Agents. Basic research is needed to better understand the mechanisms of action of biologic and chemical agents and to document the short- and long-term effects of individual agents. This research could contribute to efforts to develop behavioral approaches to vaccine therapies.

Biobehavioral Responses to Threats and Injury. Individuals respond differently to perceived and real physical threats and injury. Interdisciplinary research on the interrelationships between physiology and behavior could improve understanding of host defense mechanisms; short- and long-term effects of environmental stress, toxicity, and trauma; individual vulnerability and susceptibility to poor responses; and the full constellation of symptoms involved in individuals' responses to bioterrorism. Animal studies and ethically appropriate clinical and retrospective studies are needed. The research could include variations in response by gender and age, across the lifespan, and across generations. It also could include variations in response among individuals, families, and communities, and by race/ethnicity and access to care and support.

A better understanding of biobehavioral responses is necessary for designing effective strategies and approaches to prevent and treat long-lasting effects within a population and, importantly, among the emergency and health care workers responsible for assuring the public's safety. This understanding also would be helpful for determining how best to communicate risk and to make decisions in stressful situations.

Evaluation Research. Retrospective research to evaluate the system-wide response to an emergency situation is lacking. This research must be undertaken to ensure effective biodefense in the future. Innovative approaches are needed for evaluating programs of preparedness and methods of emergency response. For this research, "virtual" disasters could be simulated and retrospective data (e.g., from the military and civil defense communities) could be used to model scenarios or demonstration projects and to test the health care system's response. The term evaluation needs to be defined clearly, and an evaluation component should be included in all applied/translation, clinical, and demonstration research projects.

Biodefense Planning and Response Capacities. The events of September 11 and the discussions since then highlight the need for a systems orientation to plan for biodefense and to respond to bioterrorism. The public's health will be better assured by shifting the capacity for biodefense from (limited) emergency services to the (system-wide) public health infrastructure. As a first responder, the nursing community has an important role to play in developing the comprehensive framework for a broad public health response. Nurse researchers could participate in analyses of past or "virtual" events; formation of policies at local, state, and Federal levels; design of effective protective equipment; development of tools for surveillance and information dissemination; the study and testing of methods (e.g., triage) to optimize care and survival; organization of interdisciplinary health care teams; planning for the deployment of skills at multiple sites; training for short-term and longer-term biodefense responses; design of reporting systems; and consolidation of community and regional response networks.

Assuring nurses' seamless interface with other first responders is an essential aspect of developing a unified command structure. The mobilization of all nursing personnel (e.g., retired, inactive nurses) will be important for community-based efforts.

Bioethical Issues. Patients' relationships with health care providers and informed consent procedures may change as a result of the September 11 events. As first responders, nurses will have to interface among scientists, care providers, and the public, to communicate medical information, introduce interventions, assure individuals' privacy, and gain acceptance of interventions and preventive measures. Nurses may need to obtain informed consent for investigational new drugs developed to treat pathogens but not yet proven to be effective, and they may need to make difficult triage decisions.

To explore these and other bioethical issues now, nurse researchers can organize, facilitate, and participate on interdisciplinary research teams that include broad community involvement. Researchers will need to consider scenarios, develop models of interaction, and possibly refine bioethical principles and procedures to accommodate different emergency situations that may arise in biodefense.

Research Training. A comprehensive effort is needed to build nursing science in biodefense. The framework for nursing research should include biologic, behavioral, and health systems research and be applied to research training. Emphasis would be given to developing a cadre of doctorally prepared nurse researchers (e.g., clinicians with expertise in infectious diseases) through programs that include community linkages, mentored research, international liaison, and advanced practice arenas. To foster research training in biodefense, the programs would incorporate core capacities of public health preparedness (e.g., information systems, epidemiology/surveillance); clinical research training (e.g., on the constellation of symptoms related to biodefense); principles of learning; and use of information technology, informatics, and Web-based training, to translate information from basic science to clinical research.

NINR could capitalize on current training mechanisms by incorporating biodefense into existing institutional training awards and centers. NINR might also leverage its resources to fund the participation of nurse researchers at academic sites receiving funds for research and training in emergency preparedness and to support inclusion of nursing research in distance-learning Websites. Evaluation of research training programs, for their ability to improve preparedness and biodefense, is essential.

Education and Information Dissemination. Public health nurses are the single largest professional group in public health practice and often are the only public health contact in local communities. They must be ready and prepared to glean, update, and disseminate accurate and appropriate information before, during, and after an emergency situation, to both the public and care providers in a variety of settings (e.g., schools, communities, worksites). Communicating accurate information about ongoing risks while under duress is a particular challenge in biodefense.

Nurse researchers have a responsibility to develop, translate, and disseminate research information (e.g., on biobehavioral responses, communication of risk, bioethics) to the practice community; design and implement effective biodefense training programs for public health nurses; and foster an adequate response system through capacity building in communities and facilitation of linkages and networks among nurses and other care providers. Nurse researchers can identify and promote core

competencies (e.g., communication skills) for public health nurses (employed, inactive, or retired); develop information technology-based programs for nursing curricula and emergency room nurses; devise innovative ways (e.g., Web-based training) and training modules to help nurses maintain currency of seldom-used biodefense skills; develop good drill scenarios for simulated training at regular intervals; and design and implement pilot studies and demonstration projects.

Research on the science of learning and behavioral change, particularly under conditions of stress, and on capacity building in communities needs to be conducted and applied. The overall aims are to gain the understanding needed, translate research information effectively, and achieve sustainable training through a telehealth approach that would promote biodefense nationwide.

Partnerships in Funding and Research. The funding for biodefense will be robust, but efforts to improve the nation's biodefense will not be optimal without integration into a comprehensive response network. Partnerships in funding and research need to be fostered and promoted. NINR is participating in NIH's new initiatives to accelerate biodefense research, and the NIH research effort complements other agencies' roles in surveillance, training, regulation, and mobilization of state and local responses. Nurse researchers must identify potential partners in funding and research and proactively seek new partnerships to strengthen their contribution to biodefense. Promotion of interdisciplinary research that involves clinicians and communities at all stages of the research will be important. The NIH General Clinical Research Centers offer a good mechanism and venue for the support of this research. Additional mechanisms, for example, to structure partnerships among nurse researchers in academia and civilian and military research institutions (including the Department of Veterans Affairs), need to be considered and developed.

IV. Conclusion

As nursing research expands its focus to include and emphasize biodefense, it must remain clinically relevant and diverse. Nursing research traditionally includes biologic, behavioral, and health systems research, which spans the continuum from molecular approaches to health care systems. The broad systems viewpoint that nursing research offers is especially relevant and needed for effective biodefense. NINR support of this research is integral to NIH's strategic plan on biodefense, which highlights basic research on microbes and host defense mechanisms and applied/translational research on new and improved diagnostics, vaccines, and therapies.

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