From the Schools of Public Health

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On Linkages

USING EXERCISES TO IDENTIFY SYSTEMS-LEVEL PREPAREDNESS CHALLENGES

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In recent years, many questions have arisen about the nation's preparedness for a range of disasters, including terrorism, weather-related catastrophes, and biothreats. Particular concern has focused on the ability of the public health and health-care sectors to cope with a large-scale public health emergency such as pandemic influenza.[1–3] To bolster their response capabilities, local and state public health officials across the nation have revised and updated many of their emergency operation plans, purchased new equipment, and enhanced their training programs. Many of these changes, however, have gone untested. Often it remains unknown whether public health personnel are appropriately trained in the new plans and procedures; how well new equipment such as communications or surveillance systems will function; or the degree to which these new plans are integrated with the capabilities of other emergency responders, such as law enforcement, fire services, emergency medical services (EMS), emergency management, hospitals, health centers, and others.

Exercises that simulate emergencies have frequently been recommended as a means to improve preparedness.[4–9] Broadly speaking, they can significantly help improve preparedness on two levels. At the individual level, exercises present an opportunity to educate personnel on disaster plans and procedures through hands-on practice, while offering constructive critiques of their actions.[10,11] On an institutional and/or system-wide level, well-designed exercises can reveal gaps in resources and interagency coordination, uncover planning weaknesses, and clarify specific roles and responsibilities.[12–14] While these theoretical benefits of exercises have been noted, few studies have documented the outcomes of such exercises and the specific challenges identified through such efforts.

The Harvard School of Public Health Center for Public Health Preparedness (HSPH-CPHP), established in 2002 and funded by the Centers for Disease Control and Prevention (CDC) under a cooperative agreement with the Association of Schools of Public Health (ASPH), is part of a national network of Academic Centers of Public Health Preparedness (Centers). The Centers are collectively charged with advancing state and local preparedness and response to public health threats. Within this network, HSPH-CPHP has specific responsibility for working with the public health workforce in Massachusetts and Maine to improve preparedness.

Responding to the demands of conducting preparedness exercises voiced by many of our public health partners, HSPH-CPHP launched an exercise program in 2005. In the program, HSPH-CPHP supplies the content expertise relevant to simulating a public health emergency; develops the exercise scenario, Master Scenario Events List (MSEL), and supporting documentation; creates the evaluation plan and instruments; and provides trained personnel to facilitate exercise play and evaluate collective performance.

Since 2005, we have conducted 21 exercises and have direct access to 14 after-action reports (AARs) produced. For this study, we conducted a content analysis of the AARs written following 14 exercises conducted as part of the HSPH-CPHP exercise program, to identify recurrent themes related to the systems challenges faced by the responders during the simulated emergencies. This article describes the most common challenges identified during our exercises, and illustrates how exercises can act as an innovative way for academic partners to collaborate with public health practitioners to improve preparedness.

Articles for *From the Schools of Public Health* highlight practice- and academic-based activities at the schools. To submit an article, faculty should send a short abstract (50–100 words) via e-mail to Allison Foster, ASPH Deputy Executive Director, at afoster@asph.org.

METHODS

To date, the HSPH-CPHP exercise program has reached more than 3,350 participants from 218 cities and towns at 21 events. Exercises conducted under this program include tabletop (discussion-based), functional (communications-focused), and full-scale exercises. The HSPH-CPHP personnel involved in the exercise program represent expertise in public health, emergency medicine, disaster medicine, prehospital care, hospital administration, and field disaster response. Several of these staff also hold positions within the state public health agency, regional homeland security councils, and regional EMS and hospital consortia. Further, the program is advised by members of the Scientific Advisory Council of the HSPH-CPHP, which includes epidemiologists, infectious disease experts, epidemic modelers, and others.

Each exercise developed by the HSPH-CPHP conforms to the standards of the Homeland Security Exercise and Evaluation Program (HSEEP),[15] and is consistent with the principles of the National Incident Management System (NIMS).[16] When creating the scenarios, we adhere to the following principles established at the inception of the HSPH-CPHP exercise program, designing exercises that are: (*1*) focused on response to a specific public health threat; (*2*) realistic to the greatest extent possible and based on up-to-date knowledge of disease transmission dynamics, preventive measures efficacy, and health outcomes; (*3*) multidisciplinary and include representatives of public safety (i.e., fire, police, EMS), emergency management, government, and other response agencies whenever possible; (*4*) regional, involving adjacent municipalities and/or jurisdictions whenever possible; and (*5*) structured to simultaneously assess and improve performance. Moreover, all exercises are planned in conjunction with local, regional, and state partners, to increase buy-in from key stakeholders and ensure that the event addresses the unique structure and needs of the participating region.

During each exercise, HSPH-CPHP deploys facilitators who moderate participants' discussion to focus on the salient issues, and evaluators who assess and document all communications initiated/received, public information issued, strategic decisions made, and resources requested/deployed. Following the exercise, HSPH-CPHP collects structured feedback from the evaluators, facilitators, and participants. All observations are compared, and any discrepancies are resolved during an evaluator debriefing. Designated HSPH-CPHP personnel then transcribe all observed actions and evaluator comments onto a master integrated timeline to reconstruct all exercise events, and write the AAR. HSPH-CPHP employs an AAR format consistent with HSEEP guidelines,[17] including sections detailing the exercise overview, design summary, analysis of capabilities, and recommendations for improvement. AARs are then distributed to the exercise participants, who are expected to create an improvement plan (IP) based upon the comments and proposed action items reported within the AAR.

In this qualitative study, we conducted a content analysis of the 14 AARs authored by HSPH-CPHP. The context was "the public health system response to large-scale emergencies." The key question and purpose of the analysis was to describe the systems-level challenges faced by the public health system in responding to a large-scale emergency as described in the AARs. The analysis was performed in the following steps.

First, a Modified Delphi identified the most important specific domains that should be considered when evaluating public health agencies' capabilities to respond to a large-scale emergency. Within these domains, we performed a content analysis of the AARs to identify systems-level themes and subthemes within the text. Specifically, key phrases were extracted from the texts that related to the study questions according to the identified domains. The authors discussed how to label subthemes and themes to obtain as distinct descriptions as possible. Themes, subthemes, and supporting quotes were analyzed several times and arranged in a database for further analysis. Finally, the results were organized in a table reporting the frequency of each theme and a description of a selection of subthemes and supporting text quotes.

RESULTS

We identified the following domains of emergency response: leadership and management, communication, surveillance and epidemiology, disease control, and mass care. Content analysis of the compendium of AARs then uncovered several categories of recurring systems-level challenges. A detailed description of the themes, subthemes, and supporting text quotes is shown in the Figure. Within the leadership and management domain, four themes were extracted: (*1*) errors in understanding of individual and agency roles and responsibilities (including insufficient knowledge of the capabilities and assets of responding partners); (*2*) inconsistent coordination among responders; (*3*) operational and ethical challenges faced in the decision-making process with significantly limited integration of public health expertise into the response community's decision making; and (*4*) ability to identify strategies to reduce staff absenteeism.

Within the communication domain, we identified the following themes: (*1*) limited communications capabilities, especially with regard to sharing information about

Figure. Content analysis results: domains, themes, subthemes, and quotes

Theme (n)[a]	*Subtheme*	*Supporting quotes*
Leadership and management		
Understanding of roles and responsibilities (17)	— Use of the incident command system — Emergency planning	1. "When the incident commander was pulled away for a conference call or other engagement, the planning and implementation of activities simply stopped." 2. "In several occasions, the exercise illuminated gaps in emergency planning. For example, participants at the school/universities tables were uncertain of their specific responsibilities within the broader community's emergency response efforts."
Interagency coordination (3)	— Vertical coordination among local, state, and federal agencies	1. "Discussion regarding triggers for school closure spanned the state, regional, and local levels." 2. "Information about how to request resources and personnel support from state and federal agencies is needed as well as the length of time that it will likely take for resources to become available."
Decision-making process (3)	— Operations — Ethics	1. "There was an instance where a Local Emergency Management Team made a local decision to scale back operations to essential personnel in advance of such a directive from the Incident Support Team, and this caused some confusion among other teams." 2. "Concerns regarding ethical decisions involving life-sustaining resources"
Strategies to reduce staff absenteeism (4)	— Personal and family preparedness	1. "Lack of a plan to deal with the families of emergency response staff" 2. "The most notable barrier to notification was availability of staff."
Communication		
Information sharing among agencies (5)	— Vertical and horizontal communications — Time and accuracy	1. "Strategies are needed to keep clear channels of communication and cooperation within and across communities." 2. "Communication among public health responders and their associated public safety organizations appears to be a major concern. The dispersal of information from the public health departments to the police and fire departments is often outdated or insufficient. Public safety personnel should be informed of any and all possible pandemic outbreaks in order to properly protect themselves from the pathogen."
Health Alert Network (HAN) (7)	— HAN activation	1. "Some participants noted that not all communities or organizations, especially those within very small towns, directly receive HAN alerts. Once they are received through the various indirect channels, the information is either obsolete or obtained via media outlets." 2. "Participants from several municipalities expressed concern that they would not have received information about the pandemic until day 3 due to lack of subscription to the Maine Public Health Alert Network System and limited access to fax and e-mail. Additionally, several municipalities do not have centralized town offices, resulting in further limitations to communications."

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Figure (continued). Content analysis results: domains, themes, subthemes, and quotes

Theme (n)[a]	*Subtheme*	*Supporting quotes*
	Communication	
Issues in communication to the public (13)	— Community diversity — Time, accuracy, and consistency	1. "Further risk communication activities did not address issues of language or literacy." 2. "Participants expressed concern over the information that was being dispersed by the media involving the pandemic incident. The official public health, public safety, government, or hospital message could differ from that of the media. Panic and confusion could be easily created among the public by the media's exaggeration or aggrandizement of the events. Participants felt that more should be done in order to create a single common message that could be disseminated across the entire area's population."
	Surveillance and epidemiology	
Patient tracking (3)	None	1. "Local hospitals, medical centers, and public health departments recognized the need to keep accurate count and history information regarding the patients presenting with influenza-like symptoms in order to possibly curtail the situation early in the pandemic process."
Laboratory capacity (2)	None	1. "Local health departments and community health centers lack laboratory capacity for identification of novel influenza strains."
	Disease control	
Personal protective equipment (PPE) (6)	— Supplies — Efficacy	1. "A challenge observed related to infection control related to communication around availability of PPE." 2. "All municipalities were attentive to the need to protect emergency responders, though access to PPE varied across agencies and communities. Several towns were concerned about the adequacy of their stocks of PPE, but did not know who to contact to obtain information about PPE standards and the efficacy of improvised PPE."
	Mass care	
Surge capacity (15)	— Staff shortage — Volunteer credentialing	1. "Many hospitals and medical center resources (including staffing, medication, and PPE) were exhausted and alternate care sites would deplete the reserve even further." 2. "Absenteeism among hospital and medical center staff may be high and other individuals who are trained in health-care practices (including those who are retired, unaffiliated, or unlicensed) or untrained volunteers may wish to provide assistance. The credentialing of these individuals, however, may be difficult to perform, especially in a high-stress situation."

[a]Number of times the theme was extracted from the text

health risks among agencies; (*2*) challenges in communicating health risks to the public; and (*3*) insufficient activation of the Health Alert Network. Within the surveillance and epidemiology domain, we identified two themes: (*1*) limited ability to track patients and (*2*) limited laboratory capacity. Within the disease-control domain, concern about the efficacy and availability of personal protective equipment (PPE) was the most frequent extracted theme. Finally, surge capacity was the main challenge in the mass-care domain.

DISCUSSION

We documented a set of specific systems challenges and improvement items that have consistently emerged from our exercise program and its explicit requirement

of multidisciplinary and regional participation. This requirement forces participants to interact with other members of the community who are infrequently seen but critical for effective disaster response. Bringing such responders together to play through a fictional public health emergency pushes communities to identify required tasks not previously considered to be their responsibility, as well as tasks that require greater coordination to provide an effective response.

In some common facets of public health emergency response, such as local community surveillance, epidemiologic investigation, and mass care and/or prophylaxis, we noted that participants often assume that others will perform duties that, according to state emergency plans, are actually their own. Local case investigation during an outbreak is another example. In still other facets of the response—most notably, assessment of health risks, selection of PPE, and risk communication—participants often made key decisions in isolation, without engaging the coordinated assistance and expertise of others in their community or region outside of their own discipline.

These results underscore the growing movement toward complementing community emergency planning with multidisciplinary, regional exercises to improve preparedness. A key lesson that was reinforced is the importance of personal relationships and contacts, as well as explicit face-to-face discussions of the assumptions behind agency-specific plans.

Schools of public health, and the Centers in particular, have much to offer to the community with respect to designing, convening, and hosting such exercises. Universities carry a convening authority that enables them to gather diverse groups from a relatively large surrounding geography. To benefit the community, schools of public health may best be able to assemble regional public health, public safety, municipal government, health-care, and other representatives required to participate. Many schools of public health employ faculty experts in public health threats, preparedness, and exercise design and execution. Some may need to develop expertise in the design, conduct, and evaluation of exercises through HSEEP or other federal training programs, or through partnerships with exercise leaders in local communities. The challenge of financial and logistical support of an exercise program can be addressed through federal or state preparedness programs, private funding, or the direct support of the university in the interest of strengthening connections between academia and public health practice.

A significant challenge in the conduct of public health preparedness exercise is the lack of adequate evaluation materials to assess performance and provide concrete feedback to participants. We have found the HSEEP Exercise Evaluation Guides to be better suited for operations-based exercises than for discussion-based exercises like tabletops, with relatively little of the content of the guides focused on performing public health functions or responding to public health emergencies. This may be because events of operations-based exercises involve responses that are easier to observe and occur in real time, and are therefore more straightforward to evaluate.

Because most public health emergencies occur over a longer time course and over a broader geographic area than traditional public safety emergencies, however, responses to these emergencies are exceptionally difficult to test in an operations-based exercise. As a result, public health emergencies are often simulated in a discussion-based format, such as a tabletop exercise. In this format, the participants' actions are more theoretical and it is more difficult to evaluate their abilities to actually perform the actions they describe. Further, the time course of events during the exercise is generally compressed, with participants discussing days or weeks of events in the course of a few hours of play.

These factors, among others, make accurate and reliable assessment of the participants' performance in discussion-based exercises more challenging. Over the past two years, our evaluation efforts have moved toward process evaluation and validation of instruments to refine the data collected from the exercise program; however, much more is needed to further the science of evaluating preparedness through performance in exercises.

To our knowledge, only nine other published studies have addressed the relationships between exercises and preparedness in public health, and relatively little of the focus has been on identifying methods of evaluating performance. Notably, Dausey and colleagues noted that exercises were useful to identify strengths and weaknesses among the participating agencies, but also recognized that more work is needed to develop more reliable metrics to gauge performance and to assess the impact of postexercise interventions.[4] Gebbie and colleagues have made an important step forward in improving exercise evaluation, identifying 46 criteria organized in nine groups to evaluate performance.[18] Our study is in agreement with the previous studies in that we find exercises to be useful in identifying systems-level challenges in preparedness. In addition, our analysis adds to this critical field by identifying consistently recurring themes within a set of domains and, therefore, presenting opportunities for intervention. Our study, although qualitative in nature, serves as a foundation for more quantitative analyses in the future.

CONCLUSIONS

Our content analysis of 14 AARs from exercises conducted by the HSPH-CPHP has identified a number of recurrent systems challenges, including: (*1*) lack of understanding of individual and agency roles and responsibilities, (*2*) inconsistent coordination among responders, especially among disciplines, (*3*) limited communications capabilities, especially with regard to sharing information about health risks, (*4*) significantly limited integration of public health expertise into the response community's decision making, and (*5*) insufficient knowledge of the capabilities and assets of responding partners. Implementing changes in response to these recurring challenges can advance the iterative cycle of preparedness improvement.

Exercises that simulate public health emergencies can identify specific gaps in planning, resources, and/or assumptions for response that can be addressed and improved before an actual event occurs. Exercises that include representatives from multiple disciplines across a given region provide special benefits to identify specific types of systems-level challenges. Because it is often difficult for local communities to design, convene, execute, and evaluate a multidisciplinary, regional exercise program on their own, schools of public health may consider using their convening authority to do so. Using these lessons to prompt improvements in planning can advance the iterative cycle of preparedness to protect communities in the future.

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On Academics

PERSPECTIVES ON THE FUTURE OF ACADEMIC PUBLIC HEALTH PRACTICE

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The Center for Public Health Practice at the University of Pittsburgh's Graduate School of Public Health started in 1995, simultaneously with similar units at virtually every other Association of Schools of Public Health (ASPH) member school of the mid-1990s. It was a time when the academic public health community, motivated by the Institute of Medicine's 1988 report,[1] was attending seriously to the quality and dimensions of its relationships with the professionals, agencies, and organizations that made up the field of public health practice. Of the then 28 fully accredited schools of public health, all were conducting continuing education programs, student internships and practica, and faculty members' consultation services to the field.[2]

However, at that same time, academic approaches to meeting the needs of research, teaching, and service for professional practice were not very deeply institutionalized. Institutional funding for practice activities was rare; and, most often, such activities were left to the discretion of individual faculty members.[2] A high degree of variability in emphasis on professional practice existed among schools and among departments within schools. For example, well into the late 1990s, not all schools had been assessed for adherence to a new accreditation criterion requiring that students in the curricula of every master's degree in public health (MPH) have a directed practice experience.[3]

By 2005, much had changed. By then, the ASPH Council of Practice Coordinators had advanced standards for academic public health practice (APHP), defining it as the applied, interdisciplinary pursuit of scholarship in the field of public health.[4] The Council had also written about practice-based teaching[5] and practice-based research.[6] In 2005, deans of schools of public health recognized the centrality of practice to their schools' missions by organizing a Practice Committee within the ASPH governing structure. Much of the early vision for practice-oriented scholarship had been realized, and it was time to pause and reflect.

In October of 2005, the University of Pittsburgh's Center for Public Health Practice (CPHP) celebrated its 10th anniversary by hosting a one-day symposium titled "Perspectives on Transforming the Field of Academic Public Health Practice." The goals of the symposium were to: (*1*) reflect upon the history of academic public health practice; (*2*) identify the successes, experiences, considerations, and perspectives related to APHP; and (*3*) recommend ways of transforming it. The presenters were outstanding scholar-practitioners whose experience spanned national to local practice and whose affiliations included government as well as academia. This article is a synthesis of the themes and ideas that emerged throughout the symposium.

THE SYMPOSIUM

The symposium included reflections and reassessments for practice-oriented scholarship, starting with the roots of practice values in the first public health schools of the early 20th century, benchmarking examples of excellence in the present, and reaching for strategic directions to guide the future. The Figure shows the program of speakers, their titles and affiliations, and the topics of their presentations. A complete audiovisual record of the symposium may be played back at the CPHP website.[7]

Elizabeth Fee, historian of public health education,[8] opened the symposium by describing the dynamic tension between research science and professional education that had characterized the founding of the nation's first schools of public health and that continues to the present. At various points during this period, either research science or professional education emerged as a priority. For example, training for scientific inquiry was most prominent during the 1920s and again in the post–World War II period. Nevertheless, the 1930s—the time of the Great Depression, the Social Security Act, and the New Deal—was a period when public health services expanded and federal grants to states provided for public health training and hiring new public health workers. Dr. Fee suggested that federal funding continues to determine the research and educational priorities of public health schools. This influence appeared again when practice-focused education was revitalized from the threat of bioterrorism that followed September 11, 2001.[9]

Beth Quill challenged academicians in public health to recognize their membership in a "creative class," those who drive sweeping change within their fields and in the larger society.[10] She used this concept to introduce the four symposium panelists. Edward Baker, Jr., described the North Carolina Institute for Public Health as the service and outreach arm of the School

Figure. Symposium presenters, affiliations, and topics

Speaker	*Title and affiliation*	*Topic*
Elizabeth Fee, PhD	Chief, History of Medicine Division, National Library of Medicine, National Institutes of Health, and Professor, History of Medicine and Health Policy and Management, The Johns Hopkins University	A History of Public Health Practice in Academia
Beth Quill, RN, MPH	Associate Professor, Division of Management Policy and Community Health, and Associate Director, Center for Transforming Public Health Systems, School of Public Health, University of Texas at Houston	Transforming Public Health Systems: Renaissance, Revolution, or Both?
Edward Baker Jr., MD, MPH, MSc	Research Professor of Health Policy and Director, North Carolina Institute for Public Health, School of Public Health, University of North Carolina at Chapel Hill; formerly Assistant Surgeon General and Director of the Public Health Practice Program Office, Centers for Disease Control and Prevention	The North Carolina Institute for Public Health: Serving Our State, Leading Our Nation
Bobbie Berkowitz, PhD, CNAA, FAAN	Alumni Endowed Professor of Nursing, Department of Psychosocial and Community Health, School of Nursing; Adjunct Professor, Department of Health Services, School of Public Health and Community Medicine; and Director of the Center for the Advancement of Health Disparities Research, University of Washington. She is also Director of the Turning Point National Program Office of the Robert Wood Johnson Foundation	Transforming Public Health Through Turning Point
Kristine Gebbie, DrPH, RN	Elizabeth Standish Gill Professor of Nursing and Director, Center for Public Health Policy, School of Nursing, Columbia University. Formerly Senior Consultant on Public Health Initiatives to the Office of Public Health and Science, U.S. Department of Health and Human Services, and HIV Policy Advisor to President Reagan	Perspectives on Public Health Practice in Academia
Bernard Turnock, MD, MPH	Clinical Professor and Director, Division of Community Health Sciences, School of Public Health, University of Illinois at Chicago. Formerly Director of the Illinois Department of Health, and State Program Director for Maternal and Child Health and Emergency Medical Services	Seven Things Public Health Academics Shouldn't Say in Front of Practitioners

of Public Health of the University of North Carolina at Chapel Hill, whose mission is to bring together public health scholarship and practice communities to inform and stimulate scholars and to empower practitioners for the common purpose of improving the public's health and human well-being.

Bobbie Berkowitz based her presentation on experience with the Turning Point Initiative, funded by the Robert Wood Johnson Foundation and the Kellogg Foundation in the mid-1990s. Turning Point provides examples of how public health can collaborate with communities and other fields to improve the health of populations.

Kristine Gebbie's remarks came from perspectives in nursing and from studies of numerous individual health professions and of the public health workforce as a whole. She offered insights based on comparisons of education in public health and those other professions.

Bernard J. Turnock, having led a state health department and a public health school, challenged conventional academic wisdom about the infrastructure, financial resources, and conceptual framework for public health practice.

Throughout the five symposium presentations were themes that, taken together, suggest ideas and directions for academic public health in the years ahead. The panelists all reflected on professional education and the qualifications of university faculty, partners, and collaborators for the academic enterprise, and directions for teaching and service in the years ahead.

Theme 1: Teaching for the public health profession

Quill stressed the need for new strategies to teach and nurture the public health professionals of the future, and the four panelists all offered specific ideas. Educational insights come from professional experience as well as research-based evidence, and students training for public health careers certainly need both. However, the public health faculty member with practice experience is a rare commodity.

Gebbie noted that high proportions of public health faculty are classic academics with PhDs whose scope of experience is research, publishing, and academic conferencing. Turnock warned such faculty members against assuming expert status in all matters relative to highly experienced senior public health practitioners. Berkowitz observed that practice could be an important source of new energy for faculty, noting that the Turning Point Initiative team had come entirely from public health practice, but had gone on to academia to create, facilitate, and lead the Initiative.

Given the faculty members' dependence on knowledge derived from research it is no surprise that, in most public health degree programs, students' practical experience tends to trail at the end of curricula. Gebbie asked what it would mean if public health took seriously the demands of a truly professional education. She noted that other health professions have recently adopted the professional doctorate as their educational standard, including advanced nursing practice (doctor of nursing practice [DNP])[11] and pharmacy (doctor of pharmacy [PharmD]).[12] This model would have the public health doctorate (doctor of public health [DrPH]) replace the MPH degree and would emphasize practice experience throughout the curriculum of DrPH programs.

On the other hand, the panelists recognized that public health professionals need continuous learning along with practical experience throughout their careers, and schools remain the providers of such education. Moreover, the current public health workforce is aging rapidly with almost half becoming eligible for retirement in the next three to five years.[13] Simply increasing the number of public health schools and the number of their graduates is not enough, according to Turnock. He urges attention to continuing, worksite-based training that concentrates on assessed learning needs and immediate applications of knowledge. Baker cited examples from the North Carolina Institute for Public Health's numerous programs including executive degree programs and an "emerging leaders" initiative for underrepresented minorities.

Theme 2: Outreach to partners, collaborators, and the public

Quill observed that the ecological model of public health suggests that academics need a wide array of partnerships and collaborations with business, education, government, health care, and the media. These partnerships would position public health practice for engagement in sustainable development, human development, economic development, and community development.[14]

The panelists pointed to some current examples. At the North Carolina Institute for Public Health, according to Baker, the mantra is: "Relationships are everything; all else is derivative." In its programs to enhance the effectiveness of local health departments, the Institute sponsors public health incubators—a set of voluntary partnerships between groups of health departments that come together to address regional public health issues. As part of its Active Living by Design Initiative, the Institute is actively engaged in increasing physical activity through community design by engaging community partners. The program is designed to improve the environment and focus on ways in which communities can become physically active and determine ways to eat healthily.[15]

The Turning Point Initiative, according to Berkowitz, was also about the relationships: how to create them, sustain them, and have them yield desired outcomes. Turning Point's state grantees had pursued collaborations outside of traditional public health organizations and had engaged citizen representatives. Collaborations and partnerships were seen as creating shared value among participants, including providing new financial and other resources to support public health initiatives. This thinking is in line with the tenets of community-based participatory research, which emphasizes participation by and influence of nonacademic researchers in the process of creating knowledge.[16]

Theme 3: Breaking with tradition

Quill emphasized creative transformation in how we educate and train for the profession and in how we design, build, and fuel public health systems. The panelists gave examples for developing sustainable systems for health and well-being through new approaches to the traditional academic pursuits of research, teaching, and service.

First, if public health practice should be more evidence-based, as many authorities now advocate,[17–19] then public health research should be more practice-based. Berkowitz specified the need for research on public health systems: How do characteristics of the public health infrastructure—workforce, technology, and organizational systems—affect health outcomes of the population? How can financial resources be leveraged from new sources and in new ways to serve the public's health? What information do policy makers need, and how should messages be tailored and directed to assure their effectiveness? What outcome measures will encourage continuous quality improvement in the performance of individuals and organizations?

Second, teaching for the public health profession needs to be broader both in concept and in acces-

sibility. Quill stated that a radical change in public health education would develop individuals who are knowledgeable and proficient in multiple fields. Strategies to teach and nurture this ideal would emphasize interdisciplinary and transdisciplinary approaches. Fee, Turnock, and Baker all recognized that innovative methods must make continuing education more easily available in homes and offices rather than in classrooms alone.

Third, service programs—including but not limited to continuing education—should no longer be viewed as charitable contributions but as revenue generators. Turnock rhetorically asked what funding sources would support the innovations needed for the future, clearly pointing away from the traditional academic revenue streams of grants and tuition. Baker noted that the North Carolina Management Academy for Public Health is self-financing and that the Institute for Public Health conducts many programs on a fee-for-service basis.

CONCLUSION

The 10th anniversary symposium of the CPHP celebrated the collective progress of APHP nationally. The speakers recognized that public health schools are grounded in a dynamic tension between the demands of expertise in research and the need for experience from practice. Six outstanding scholar-practitioners pointed to new directions for the future. The authors of this article hope to stimulate others to publish their own examples of progress and innovation.

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