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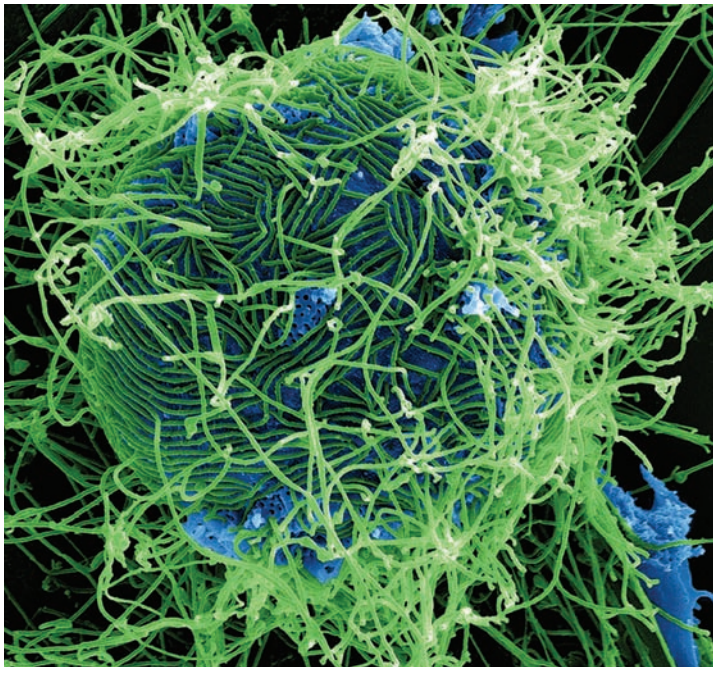

How Many Air Traffic Controllers Do We Need?

Report Calls for Overhaul of End-of-Life Care

Preparing for Ebola in the United States

A National Vision to Reduce Coastal Risks

Winter 2014
vol. 14 number 2

THE NATIONAL ACADEMIES
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THE NATIONAL ACADEMIES

Dying in America

REPORT CALLS FOR OVERHAUL OF End-of-Life Care

Dying is a topic few want to think about, let alone talk about. Yet, when asked, many Americans express strong views about the care they want to receive when they are seriously ill and approaching death. Despite strong feelings on the matter, the vast majority of Americans have not engaged in end-of-life discussions with their health care provider or family, partly because patients, families, and clinicians each wait for the others to initiate the conversation.

A recent report from the Institute of Medicine helped get the conversation started when it stated that the U.S. health care system is not properly designed to meet the needs of patients nearing the end of life and those of their families. The 21-member committee that wrote the report called for major changes to the health care system to improve care at the end of life. Such changes include more "advance care planning" by individuals; improved training and credentialing for clinicians; and for federal and state governments and private sectors to provide incentives for end-of-life discussions and to revise health care and social services payment practices to honor a patient's preferences.

"Patients can, and should, take control of the quality of their life through their entire life, choosing how they live and how they die, and doctors should help initiate discussions with their patients," said Philip Pizzo, co-chair of the committee. "It is important that the health care options available to individuals facing the end of life help relieve pain and discomfort, maximize their ability to function, alleviate depression and anxiety, and ease the burdens of

loved ones in a manner consistent with individual preferences."

The committee proposed a model for advance care planning, which encompasses the whole process of discussing end-of-life care, clarifying related values and goals, and seeing that written documents and medical orders embody patients' wishes. The committee's model suggests these discussions should occur throughout one's life and that a conversation about values and life goals should be held around certain mature milestones — turning 18, leaving

home, getting married, encountering an illness, or becoming eligible for Medicare.

In addition, clinicians should initiate conversations about advance care planning and integrate them into ongoing care plans. Too few clinicians are proficient in basic palliative care, however, and often they are reluctant to have honest and direct conversations about end-of-life issues. The committee called for improved training and certification — specifically regarding communication skills, interprofessional collaboration, and symptom management — for all clinicians who care for individuals with advanced serious illnesses.

"Individuals should have time with their doctors to discuss end-of-life issues, and clinicians should receive the training and financial incentives for such discussions," said Dave Walker, co-chair of the committee. "The U.S. health system is geared toward providing care aimed at curing disease, rather than providing compassion and the comfort care most people prefer at the end of life. Without adequate advance care planning, the default decision is for doctors to treat a disease or condition, no matter the prognosis."

An additional benefit of advance care planning may be stabilizing total health care and social service costs, and possibly reduce them over time as compared to the status quo, the committee said. Opportunities for savings can occur by helping reduce preventable crises that lead to expensive and unwanted acute care services — such as 911 calls, emergency room visits, stays in intensive care units, and hospitalizations. Pain and other unmanaged symptoms prompt many of these visits. The committee said savings from reducing such acute care incidents could free up funding for relevant supporting services — such as caregiver training, nutrition services, and home safety modifications — that would ensure a better quality of life and support patients' families. — *Jennifer Walsh*

Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life. Committee on Approaching Death: Addressing Key End-of-Life Issues; Institute of Medicine (2014, approx. 630 pp.; ISBN 978-0-309-30310-1; available from the National Academies Press, tel. 1-800-624-6242; $74.95 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18748.html>).

The study was co-chaired by **Philip Pizzo,** David and Susan Heckerman Professor of Pediatrics and Microbiology and Immunology and former dean of medicine at Stanford University, and **Dave Walker,** former U.S. comptroller general.

COMING OF AGE

Young Adulthood Is Not What It Used to Be

For those ages 18 to 26, achieving independence as an adult may seem pretty hard. These feelings are not unfounded, according to a recent report from the Institute of Medicine and National Research Council that calls for more attention to the circumstances and needs of today's young adults.

Economic and social forces — such as the rebuilding of the economy, widening inequality, increasing population diversity, and evolving changes in technologies — have altered the landscape for young adults. In previous generations, the path for most young adults was predictable: graduate from high school, enter college or the workforce, leave home, get married, and start a family. Today's pathways are often less predictable and extended due to the increasing cost of college and burden of college debt, a deficiency of well-compensated entry-level jobs, and the high cost of living independently. An estimated 17 percent of young adults ages 16 to 24 are neither attending school nor working. Many of these idle young adults are not just unemployed but have dropped out of the labor force altogether in response to the lower wages and fewer benefits available to those with high school-level education or less.

Moreover, young adults are surprisingly unhealthy. As adolescents age into their 20s, they are less likely to eat breakfast, exercise, and receive regular medical checkups, and more likely to eat fast food, contract sexually transmitted diseases, smoke cigarettes, use marijuana and other drugs, and binge drink. The current generation of young adults is also at the forefront of the obesity epidemic and more vulnerable to obesity-related health consequences in later years. Mental health among young adults is also a cause for concern; along with substance use, mental health disorders are the greatest source of disability among young adults in the U.S.

The committee that wrote the report recommended that young adults should be viewed as a separate subpopulation in policy and research, because they are in a critical period of development when successes or failures could strongly affect the trajectories of their lives. Providing more educational, economic, social, and health supports — especially for those at risk of experiencing the greatest struggles — could promote equal opportunities, reduce disparities, and enable them to embrace adult roles. Public and private sectors should improve policies and programs that address these needs, including raising completion rates for those in high school and postsecondary institutions and ensuring that attained skills and credentials are ones rewarded in the labor market.

— *Jennifer Walsh*

Investing in the Health and Well-Being of Young Adults. Committee on Improving the Health, Safety, and Well-Being of Young Adults, Board on Children, Youth, and Families, Institute of Medicine and National Research Council (2014, approx. 440 pp.; ISBN 978-0-309-30995-0; available from the National Academies Press, tel. 1-800-624-6242; $77.00 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18869.html>).

The study was chaired by **Richard J. Bonnie,** Harrison Foundation Professor of Medicine and Law and director of the Institute of Law, Psychiatry, and Public Policy at the University of Virginia in Charlottesville. The study was sponsored by the U.S. Department of Health and Human Services' Health Resources and Services Administration and Office of the Assistant Secretary for Planning and Evaluation, Robert Wood Johnson Foundation, Annie E. Casey Foundation, and the U.S. Department of Defense.

MISTAKEN IDENTIFICATION

Improving the Accuracy of Eyewitness IDs in Criminal Cases

In 1984, college student Jennifer Thompson was raped in her apartment in Burlington, North Carolina. Based on a composite sketch of the rapist created with Thompson's help, the police picked up a local man named Ronald Cotton. Thompson was shown six photos, from which she chose two. One was of Cotton. "I think this is the guy," she said, pointing to Cotton. "You're sure?" the lead detective asked, and she responded, "Positive." Thompson asked, "Did I do ok?" The detectives responded, "You did great." She then was shown a live lineup, in which Cotton was the only person repeated from the prior photo array, a fact that would make him more familiar and may suggest he was the prime suspect. After hesitating between him and another man, Thompson told the police that Cotton "looks the most like him." Again, the detectives reinforced her decision, telling her it was the same person she picked from the photos.

At Cotton's trial, Thompson said she was "absolutely sure" he was the rapist, and Cotton was sentenced to life in prison. But after he had served 10 and a half years, DNA tests exonerated him, instead implicating Bobby Poole — a man who had been presented to Thompson at a post-trial hearing, but whom Thompson

did not recognize. Cotton and Thompson have since written a book together describing the case and their experiences.

This story illustrates some of the pitfalls in eyewitness identification, along with the tragic cost of errors. It is not an isolated case; nearly three-quarters of DNA exonerations since 1989 involved at least one mistaken eyewitness. What causes these mistakes? Science in the past two decades has revealed much about the factors that can lead to mistaken identifications. This research is reviewed in a recent National Research Council report, which recommends best practices that law enforcement and courts should follow to improve the likelihood of accurate identifications.

Conditions during a crime such as dim lighting or stress can influence a person's visual perceptions, as can the presence of a distracting element like a knife or gun, the report says. Gaps in sensory input are filled by expectations based on an individual's prior experiences with the world. And our memories are not stable and reliable, like snapshots in a photo album. Instead, they are continuously evolving; as memories are processed, encoded, stored, and retrieved, many factors — such as a story in a newspaper or a comment made by a police officer — can compromise their fidelity to actual events.

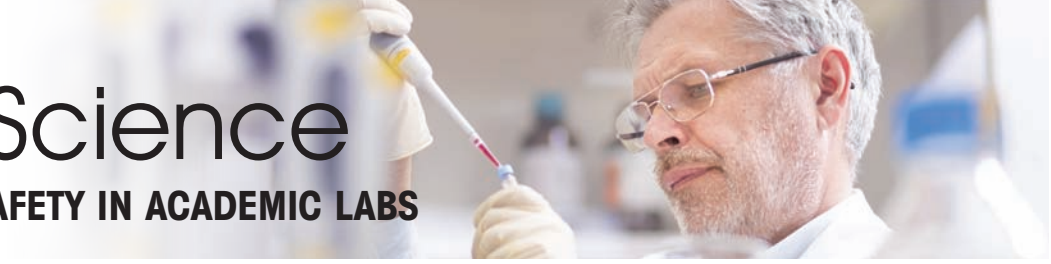
Given these inherent limitations, caution should be exercised when handling eyewitness identifications and relying on them in court, the report says. Police departments should use "double-blind" processes in which the administrator of a lineup or photo array does not know which person is the suspect — a step that will keep the administrator from unintentionally cueing the witness. Eyewitnesses should also be given standardized instructions. They should be told that the suspect may or may not be in the lineup, for example, and that the investigation will continue regardless of whether an identification is made. Witness's confidence levels at the time of the initial identification should be recorded verbatim, and lineup administrators should not offer feedback.

The report also recommends best practices for judges, who have an obligation to ensure the reliability of evidence presented at a trial. Judges should conduct a pre-trial inquiry about any eyewitness identifications — for example, about the procedures followed by law enforcement — to aid decisions about whether an identification is admissible. Judges also should use expert testimony or jury instructions to inform jurors about factors that could influence the accuracy of a particular identification.

Because more needs to be known about some aspects of eyewitness identification, a National Research Initiative on Eyewitness Identification should be established, the report adds. — *Sara Frueh*

Identifying the Culprit: Assessing Eyewitness Identification. Committee on Scientific Approaches to Understanding and Maximizing the Validity and Reliability of Eyewitness Identification in Law Enforcement and the Courts; Committee on Science, Technology, and Law, Division on Policy and Global Affairs, and Committee on Law and Justice, Division of Behavioral and Social Sciences and Education (2014, 170 pp.; ISBN 978-0-309-31059-8; available from National Academies Press, tel. 1-800-624-6242; $44.95 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18891.html>).

The committee was co-chaired by **Thomas Albright,** professor and director, Vision Center Laboratory, and Conrad T. Prebys Chair in Vision Research, Salk Institute for Biological Studies; and **Jed Rakoff,** senior judge, United States District Court for the Southern District of New York. The study was sponsored by the Laura and John Arnold Foundation.



Safe Science

PROMOTING SAFETY IN ACADEMIC LABS

Chemical hazards can be found in many academic fields and settings, including the physical and biological sciences, medical schools, engineering disciplines, and art studios. Recent serious accidents, some fatal, in research laboratories at U.S. universities have prompted government agencies, professional societies, industries, and universities themselves to re-examine the issue of safety in research that involves the use of chemicals.

While the availability and allocation of resources to lab safety varies across institutions, a constant commitment to safety organization-wide and an emphasis on identifying and solving problems are required, rather than merely sticking to standard operating procedures and assigning blame when they aren't followed, according to a recent National Research Council report. The committee that wrote the report used its behavioral sciences expertise together with an examination of successful safety systems from other industries, such as aviation and health care, to draw lessons that could be applied in academic settings.

Five groups have vital roles in supporting a strong safety culture at universities, the report says. First, presidents, chancellors, and provosts should demonstrate that safety is a core value of their institutions by discussing it frequently and publicly, as well as have in place a comprehensive risk management plan for lab safety that addresses prevention, mitigation, and emergency response.

Vice presidents for research and deans should ensure that their institutions only undertake areas of research that they can carry out safely. Principal investigators and department chairs should lead by example by wearing personal protective equipment, demonstrating safe practices in the labs they oversee, ensuring researchers are properly trained before they begin any work, and encouraging open, ongoing dialogue about safety.

Researchers, including students and postdocs, should be encouraged to take on leadership roles, such as serving on safety committees and taking part in organized non-punitive, walk-through inspections of other laboratories. In turn, institutions should provide researchers with the equipment, training, systems, and support they need to work safely.

Lastly, environmental health and safety professionals should partner with administrators, faculty, and researchers to go beyond compliance and support these groups as they undertake actions to establish a strong, positive safety culture.

In addition to improving the organizational dynamics that drive safety practice, laboratories should conduct analyses to identify dangers before they cause any harm and report and collect data on near misses — situations in which a combination of unsafe conditions and/or behaviors could have led to injuries or other adverse outcomes. — *Dana Korsen*

Safe Science: Promoting a Culture of Safety in Academic Chemical Research. Committee on Establishing and Promoting a Culture of Safety in Academic Laboratory Research; Board on Chemical Sciences and Technology, Division on Earth and Life Studies; and Board on Human-Systems Integration, Division of Behavioral and Social Sciences and Education (2014, 128 pp.; ISBN 978-0-309-30091-9; available from National Academies Press, tel. 1-800-624-6242; $45.00 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18706.html>).

The study committee was chaired by **Holden Thorp,** provost and distinguished professor of chemistry and medicine, Washington University, St. Louis. The study was funded by the National Science Foundation, U.S. Department of Energy, National Institute of Standards and Technology, E.I. du Pont de Nemours and Co., ExxonMobil Chemical Co., and the American Chemical Society.

Looking to the Future

NAS Unveils Strategic Plan for Gulf Research Program

After a year of gathering input and identifying needs in the Gulf of Mexico region, a 25-member advisory group of the National Academy of Sciences' Gulf Research Program has developed a strategic vision that describes goals, strategies, and objectives for the program and laid out a plan to guide the first five years of work.

As part of agreements settling criminal charges against the companies involved in the 2010 Deepwater Horizon oil spill, the $500 million, 30-year Gulf Research Program was established to focus on human health, environmental protection, and oil system safety in the Gulf of Mexico and the United States' outer continental shelf. The advisory group decided that the program could make the most valuable contributions where these three areas intersect.

The program's duration and long-term perspective provide a unique opportunity for producing cumulative impacts and lasting benefits. Over its lifetime, the program will aim for a set of interconnected goals: to foster innovative improvements to safety technologies, safety culture, and environmental protection systems associated with offshore oil and gas development; to improve understanding of the connections between human health and the environment to support the development of healthy and resilient Gulf communities; and to advance understanding of this dynamic region to inform the protection and restoration of ecosystem services.

The advisory group identified six overarching strategies to steer the program's work. Activities should have a long-term, cross-boundary focus; explore the links among people, ecosystems, and energy development; serve community needs; synthesize and integrate data and information across disciplines; foster coordination and partnerships; and invest in leadership development and capacity building.

Starting small, thinking big

As the program receives its funds over the first six years of operation, it will initiate small, short-term activities before evolving to include a balance of short-, medium-, and long-term efforts that catalyze work across scientific disciplines, geographic borders, sectors, and perspectives.

In December, the program announced it would begin accepting applications for early-career and science policy fellowships as well as fund exploratory grants for projects that link ecosystem services related to oil and gas production to human health and well-being and those that investigate approaches for effective education and training of workers in the offshore oil and gas industry and health professions.

The program will also pursue a range of specific objectives in the first five years to support its overarching goals:

- partnering with industry, government, and academia to identify opportunities for enhancing the safety of offshore energy development;
- exploring decision support systems for safe and sustainable oil and gas development, disaster response, and remediation;
- providing opportunities for research that improves understanding of how social, economic, and environmental factors influence community vulnerability, recovery, and resilience;
- backing research to advance understanding of environmental conditions, ecosystem services, and community health and well-being;
- fostering the development of future professionals an leaders in science, industry, health, policy, and education;
- identifying opportunities for knowledge transfer between the Gulf of Mexico and other U.S. outer continental shelf regions; and
- supporting activities to improve understanding and use of scientific information by the public and policymakers.

The program's areas of emphasis, research themes, and specific activities will undergo periodic review and evolve over time. It will not undertake or subsidize restoration activities or determine the impacts of the Deepwater Horizon spill, but rather look to the future, toward helping to prevent such disasters, minimizing adverse impacts of offshore energy production, and ensuring that the Gulf of Mexico and its surrounding communities are resilient to high-impact events and long-term changes.
— *Lauren Rugani*

Gulf Research Program: A Strategic Vision. Advisory Group, Gulf Research Program (2014, 76 pp.; ISBN 978-0-309-31306-3; available from National Academies Press, tel. 1-800-624-6242; $19.95 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18962.html>).

The advisory group was chaired by **Barbara A. Schaal,** dean of the Faculty of Arts and Sciences at Washington University, St. Louis.

A Different Approach Needed to Reduce Coastal Risk

An increase in population density and property development along the East and Gulf coasts of the United States, combined with sea-level rise and other impacts of climate change, have contributed to a dramatic rise in economic losses from coastal storms and natural disasters.

The financial burden associated with these events falls primarily to the federal government, with the vast majority of funding provided only after a disaster occurs and very little dedicated to mitigation, preparedness, and planning. In addition, builders and developers bear almost none of the risk of developing hazardous areas, and local and state governments have few incentives to limit initial development or post-disaster rebuilding.

This misalignment of risk, reward, resources, and responsibility has led to inefficiencies and inappropriate incentives that ultimately increase the potential for storm-related hazards to adversely affect lives, infrastructure, and social, environmental, and cultural resources in coastal communities, a recent National Research Council report finds.

The report calls for a national vision to reduce coastal risk, which should incorporate long-term, regional solutions rather than piecemeal approaches. Risk management strategies can include both natural and built infrastructure — such as dune building and beach nourishment, coastal wetlands, seawalls, and/or levees — as well as policy-based approaches that move people and property out of harm's way.

The report says that historically, most risk-reduction projects have focused on fortification of property against a storm, with minimal efforts to limit redevelopment in safer, lower-risk areas.

However, the range of strategies differs in their benefits, costs, and impacts on the ecosystem. For the past 30 years, federal decisions on coastal risk reduction investments have been based largely on the economic benefits with little consideration of environmental or social benefits. The report recommends an approach to risk reduction that emphasizes investments to optimize net benefits, including environmental and social benefits, but also puts constraints on what is considered "acceptable risk" in terms of human fatalities and cultural and social resources.

To achieve a national vision, the federal government needs to work with states to conduct an assessment of coastal risk, including an inventory of present and future coastal conditions in light of long-term sea-level rise projections, the report says. The results of an assessment would show geographic patterns of lives, property, and infrastructure at risk from coastal storms and could help identify which areas are most in need of targeted risk reduction interventions. — *Lauren Rugani*

Reducing Coastal Risk on the East and Gulf Coasts. Committee on U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning: Coastal Risk Reduction; Water Science and Technology Board and Ocean Studies Board; Division on Earth and Life Studies (2014, 208 pp.; ISBN 978-0-309-30586-0; available from National Academies Press, tel. 1-800-624-6242; $55.00 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18811.html>).

The committee was chaired by **Richard A. Luettich Jr.,** professor of marine sciences at the University of North Carolina, Chapel Hill. The study was funded by the U.S. Army Corps of Engineers.

A NEW KIND OF SPACE RACE

The Potential of Space-Based 3-D Printing

Additive manufacturing is consistently breaking the mold of how products are made. More commonly known as 3-D printing, the technology is starting to be used to create things as diverse as heart valves and President Obama's official bust. The availability and affordability of these systems is rapidly changing manufacturing processes in almost every sector, but some of the expectations for the technology's use in space are exaggerated, according to a recent report from the National Research Council.

Replacement parts, solar panels, and even simple spacecraft represent the breadth of how 3-D printing technology could one day be applied to space operations. The use of additive manufacturing in space has the potential to create a whole new architectural landscape that would be free of Earth's design limitations, such as this planet's gravity, the restrictive dimensions of rockets, and the strength required to withstand the rigors of being launched into orbit. However, the committee that wrote the report explained, realizing the full promise of 3-D printing in space is still decades away without greater understanding of both manufacturing processes and material performance in space.

Additive manufacturing systems use three-dimensional model data to lay coats of a material such as a polymer or metal one at a time in very particular patterns. The process is then repeated until the desired product is achieved. Because material is added instead of subtracted, very

little waste is created during production. This detail is one example of the economic and efficiency incentives 3-D printing in space can offer. Other economic benefits include a reduction in raw material costs, lighter payload sizes for transport into orbit, as well as lessening the overall need for launching materials into space. While the committee recognized space-based manufacturing can provide many efficiencies, it emphasized the technology is far from being mature enough to fully take advantage of these opportunities.

The lack of gravity and a reliable source of energy are two unique factors that have to be addressed in the development of space-based additive manufacturing. Cooling and printing processes are affected in zero- or low-gravity environments. Additionally, 3-D printing is a very slow and energy-intensive process. Some power systems are available to operate in the space environment, but their reliability and suitability to meet the requirements of complicated, high-energy projects is still uncertain.

The International Space Station (ISS) could not only provide a platform for the experimentation and study of the effects space has on manufacturing processes, it would likely become a customer for the production of on-demand replacement parts. There is limited time to take advantage of this setting, however, as the space station is currently slated to be decommissioned in 2024. The report recommends NASA identify and develop 3-D printing experiments that can be tested aboard the ISS in this relatively short time period.

The committee stressed that space-based manufacturing is an area where cooperation and joint development between NASA, the Air Force, and commercial firms should occur. Improving communication among multiple stakeholders will allow 3-D printing in space to develop in a timely and cost-effective manner. Furthermore, both NASA and the Air Force should establish roadmaps with short- and longer-term

goals that clearly define their needs for the technology. While autonomous production of complex robots using 3-D printing in space is many decades away, the technology may eventually change the way we approach basic functions and repairs in space. — *Christina Anderson*

3-D Printing in Space. Committee on Space-Based Additive Manufacturing, Aeronautics and Space Engineering Board and National Materials and Manufacturing Board, Division on Engineering and Physical Sciences (2014, 106 pp.; ISBN 978-0-309-31008-6; available from National Academies Press, tel. 1-800-624-6242; $50.00 plus $5.00 shipping for single copies; also on the Internet at <www.nap.edu/catalog/18871.html>).

Robert H. Latiff, president and consultant of Latiff and Associates, Alexandria, Va., chaired the committee. The study was funded by the Air Force Space Command, the Air Force Research Laboratory, and NASA's Space Technology Mission Directorate.

THE FRONTLINE OF SAFE SKIES

Air traffic controllers are the frontline operators of the nation's airspace, safely and efficiently keeping aircraft separate from one another and the terrain. The Federal Aviation Administration employs about 15,000 air traffic controllers, at a cost of approximately $2.8 billion a year or 18 percent of the total FAA budget.

But what is the right number of controllers needed to ensure safe and cost-effective services nationally and at each of FAA's 315 facilities? There are many difficulties in determining this, including the lack of definitive methods for relating staffing levels to safety.

A recent report from the National Research Council took a look at FAA's staffing models and found them suitable for developing initial estimates of the number of controllers required at terminal facilities, but the models used to estimate staffing levels for the centers that control air traffic between airports can be improved. FAA also should analyze a wide range of data, such as accident and incident reports and voluntary reports by controllers in order to pinpoint relationships between staffing and safety.

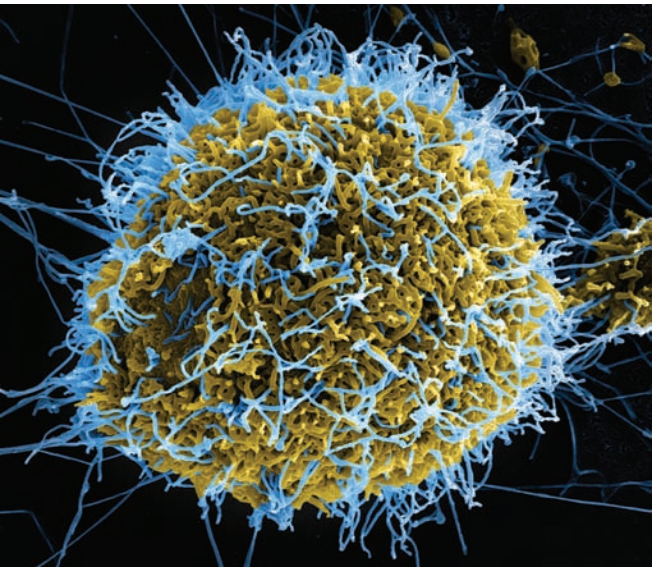
In addition, shift schedules that contribute to fatigue — especially those in which controllers work five eight-hour shifts over four consecutive days, the last one being a midnight shift — are of particular concern, the report says. Although the schedule is popular among controllers because it allows them 80 hours off afterward, it likely results in severely reduced cognitive performance during the midnight shift due to fatigue. FAA established a fatigue risk management program, but recent budget cuts eliminated the program's capability to monitor concerns proactively and to investigate whether initiatives to reduce fatigue risks are providing the intended benefits. As a matter of priority, FAA should collaborate with the National Air Traffic Controllers Association to develop and implement an enhanced tool for all facilities that is capable of creating efficient work schedules that incorporate fatigue mitigation strategies.

FAA's headquarters provides no consistent guidance or tools to local facilities to help them develop their operational schedules. As a result, each facility develops its own schedule independently of FAA's staff planning process, which may not be the most efficient or incorporate best practices in fatigue risk management.

The report adds that FAA should ensure that staffing continues to be appropriate as it implements the new air traffic operations environment associated with the Next Generation Air Transportation System, a modernization initiative to shift air traffic management from ground-based radar to a satellite system. — *Dana Korsen*

The Federal Aviation Administration's Approach for Determining Future Air Traffic Controller Staffing Needs. Committee for Study of Federal Aviation Administration Air Traffic Controller Staffing; Transportation Research Board, and Board on Human-Systems Integration, Division of Behavioral and Social Sciences and Education (2014, 138 pp.; ISBN 978-0-309-29513-0; $41.00; available from the Transportation Research Board, tel. 202-334-3213; also on the Internet at <www.trb.org/main/blurbs/170870.aspx>).

The study committee was chaired by **Amy Pritchett,** David S. Lewis Associate Professor of Cognitive Engineering, Georgia Institute of Technology, Atlanta. The study was funded by the Federal Aviation Administration of the U.S. Department of Transportation.



Preparing for Ebola

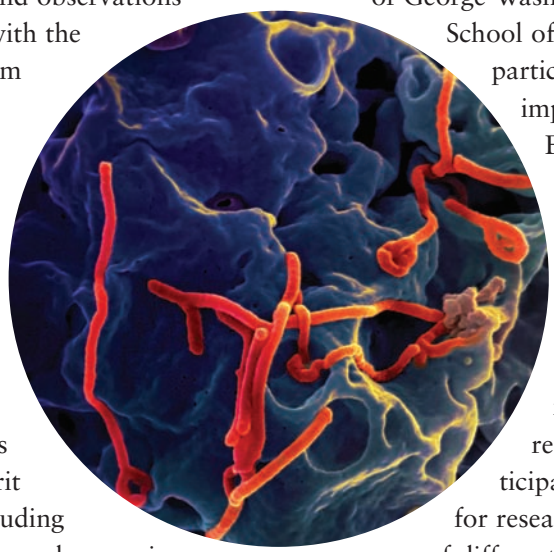
Workshop Explores Research That Could Aid U.S. Efforts

In the fall, as parts of west Africa struggled with the worst outbreak of Ebola in history and the disease made its first appearance in the United States, hospitals and public health officials in the U.S. grappled with how best to respond and prepare for any future cases that emerge. At the request of three agencies in the U.S. Department of Health and Human Services, the Institute of Medicine and the National Research Council hosted a workshop in early November to discuss priorities for research that would give U.S. public health officials, health care providers, and the public the most up-to-date information about transmission and steps that should be taken to prevent the disease from spreading.

"The emergence of Ebola is a wake-up call for the importance of having a robust preparedness, public health, and hospital system," said IOM President Victor Dzau in welcoming over 250 participants who attended in person, along with over 500 who listened to the webcast. "In addition, it is important to ensure that guidance and actions are based on up-to-date scientific evidence. Only then can we rest assured that we are doing our best for our patients, for the providers, and for society. There are still many unknowns regarding Ebola virus, and we must put enormous effort into research that addresses them."

An overview of Ebola in the U.S. context was offered by James LeDuc, director of the Galveston National Laboratory in Texas. Available data confirm that patients start to "shed" virus in bodily fluids at the time they start to show symptoms, and that the concentration of virus gets

greater as the disease progresses, peaking upon a patient's death, he said. LeDuc also explained some lessons learned from the Ebola cases in Dallas, such as the importance of safe donning and doffing of personal protective equipment. Additional presentations covered the existing research landscape on Ebola and observations from Africa's battle with the virus that could inform future research.



In four breakout sessions, workshop participants took a more focused look at several areas. During one session, individual participants identified questions about the virus's transmission that merit more research — including whether transmission can happen in the absence of symptoms, how much virus is present in bodily fluids during different phases of the disease, whether Ebola could be spread through particles or droplets in the air, and how to safely handle the bodies of those who die from the disease.

Another breakout group discussed the need for research on how long the virus survives and is infectious outside of the body. Participants pointed to questions such as whether the virus can be spread through household surfaces and other materials, how it can be rendered noninfectious, and what the virus's definitive incubation period is. During an earlier session, C.J. Peters of University of Texas Medical Branch had observed that it's possible a small number of people could surpass the 21-day incubation period before showing symptoms. Additional breakout sessions identified research questions related to personal protective equipment and waste management.

In one of the closing sessions, Dzau and workshop chair Lynn Goldman, dean of George Washington University's School of Public Health, asked participants to identify important aspects of Ebola response that were not addressed by the workshop. Many participants said that communicating with the public is an important area for research. One participant pointed to a need for research on the effectiveness of different quarantine options, while another suggested research on how best to care for patients who show up at hospitals with "undifferentiated symptoms" — symptoms that might be either Ebola or something else. — *Sara Frueh*

Videos of workshop sessions can be found at <www.iom.edu/Activities/PublicHealth/EbolaTransmissionResearch/2014-NOV-03.aspx> and a summary is available from National Academies Press <www.nap.edu/catalog/19004.html>.

New Initiative Seeks to Use Evidence to Build Community Resilience

Typically the National Research Council conducts its expert studies and leaves it to government agencies and other organizations to implement the recommendations.

But a new initiative is taking the Research Council's recommendations and scientific expertise and putting them to work, partnering with American communities to build resilience to disaster.

The National Research Council's Resilient America Roundtable brings together experts from many sectors to advance discussion about resilience, conduct outreach to communities, and incubate ideas and projects. A major thrust of the roundtable's work involves working closely with different U.S. communities as on-the-ground pilot projects. In September, the roundtable announced the first two pilot project communities — Charleston, South Carolina, and Linn County/Cedar Rapids, Iowa. Over an initial two-year period, roundtable teams will work with decision makers, local organizations, businesses, and citizens in Charleston and Cedar Rapids to better understand the risks the communities face and help them design resilience strategies for those risks.

Lessons learned in each of the pilot communities will be shared broadly with other communities across the nation. "These pilot projects offer us an exciting opportunity to bring science into communities to help them build their own community disaster resilience strategies," said Lauren Alexander Augustine, director of the roundtable. The initiative's work is grounded in the Research Council's 2012 report Disaster Resilience: A National Imperative, which identified steps communities and the nation should take to bolster their resilience to natural and human-caused disasters.

— *Sara Frueh*

More information on the pilot projects and the Resilient America Roundtable can be found online at <resilientamerica.nas.edu>

Publications

For documents shown as available from the National Academies Press (NAP), write to 500 Fifth St., N.W., Room 360, Washington, D.C. 20001; call tel. 202-334-3313 or 1-800-624-6242; or order on the Internet at <www.nap.edu>. Documents from a specific unit of the National Academies are available from the source as noted.

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Nuclear and Radiation Studies Board, Division on Earth and Life Studies (2014, 34 pp.; available only online from NAP).

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Laboratory Assessments Board, Division on Engineering and Physical Sciences (2015, 76 pp.; ISBN 978-0-309-36735-6; available from NAP).

An Assessment of the National Institute of Standards and Technology Material Measurement Laboratory: Fiscal Year 2014
Laboratory Assessments Board, Division on Engineering and Physical Sciences (2015, 84 pp.; ISBN 978-0-309-36740-0; available from NAP).

Building Health Workforce Capacity Through Community-Based Health Professional Education — Workshop Summary
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Bulk Collection of Signals Intelligence: Technical Options
Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences (2015, approx. 80 pp.; ISBN 978-0-309-32520-2; available from NAP).

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Board on Population Health and Public Health Practice, Institute of Medicine (2014, 374 pp.; ISBN 978-0-309-31242-4; available from NAP).

Career Choices of Female Engineers — A Summary of a Workshop
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Forum on Drug Discovery, Development, and Translation, Board on Health Sciences Policy, Institute of Medicine (2014, 150 pp.; ISBN 978-0-309-31000-0; available from NAP).

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Committee on National Statistics, Division of Behavioral and Social Sciences and Education (2014, 196 pp.; ISBN 978-0-309-30725-3; available from NAP).

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Science and Technology for Sustainability Program, Division on Policy and Global Affairs; and Board on Agriculture and Natural Resources, Division on Earth and Life Studies (2014, approx. 360 pp.; ISBN 978-0-309-31644-6; available from NAP).

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Forum on Medical and Public Health Preparedness for Catastrophic Events, Board on Health Sciences Policy, Institute of Medicine (2014, approx. 190 pp.; ISBN 978-0-309-31330-8; available from NAP).

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National Cancer Policy Forum, Board on Health Care Services, Institute of Medicine (2014, 74 pp.; ISBN 978-0-309-31270-7; available from NAP).

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Roundtable on Population Health Improvement, Board on Population Health and Public Health Practice, Institute of Medicine (2014, approx. 120 pp.; ISBN 978-0-309-31422-0; available from NAP).

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Forum on Promoting Children's Cognitive, Affective, and Behavioral Health, Board on Children, Youth, and Families, Institute of Medicine and National Research Council (2014, approx. 90 pp.; ISBN 978-0-309-31316-2; available from NAP).

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Committee on Population, Division of Behavioral and Social Sciences and Education; and Board on Health Care Services, Institute of Medicine (2014, approx. 80 pp.; ISBN 978-0-309-36706-6; available from NAP).

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