Regionalizing Emergency Care: Workshop Summary

Ben Wheatley, Rapporteur; Institute of Medicine

ISBN
978-0-309-15151-1

166 pages
6 x 9
PAPERBACK (2010)

FUTURE OF EMERGENCY CARE

REGIONALIZING EMERGENCY CARE

Workshop Summary

Ben Wheatley, *Rapporteur*

Board on Health Care Services

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, N.W. Washington, DC 20001

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

This study was supported by Contract No. HHSP233200800008T, Task Order #21 between the National Academy of Sciences and the Emergency Care Coordination Center, part of the Office of the Assistant Secretary for Preparedness and Response in the Department of Health and Human Services; other contributors include the American College of Emergency Physicians and the Society of Academic Emergency Medicine. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the workshop participants and do not necessarily reflect the view of the organizations or agencies that provided support for this project.

International Standard Book Number-13: 978-0-309-15151-1
International Standard Book Number-10: 0-309-15151-1

Additional copies of this report are available from the National Academies Press, 500 Fifth Street, N.W., Lockbox 285, Washington, DC 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area); Internet, http://www.nap.edu.

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Printed in the United States of America

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Suggested citation: IOM (Institute of Medicine). 2010. *Regionalizing Emergency Care: Workshop Summary.* Washington, DC: The National Academies Press.

"Knowing is not enough; we must apply.
Willing is not enough; we must do."
—Goethe

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JEFFREY S. UPPERMAN, Director of Trauma, Children's Hospital Los Angeles

Study Staff

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ASHLEY McWILLIAMS, Senior Program Assistant
ROGER HERDMAN, Board Director

[1] IOM planning committees are solely responsible for organizing the workshop, identifying topics, and choosing speakers. The responsibility for the published workshop summary rests with the workshop rapporteur and the institution.

Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this report:

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the final draft of the report before its release. The review of this report was overseen by **MEGAN McHUGH,** Health Research and Educational Trust. Appointed by the Institute of Medicine, she was responsible for making certain that

an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the author and the institution.

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Overview

In June 2006, the Institute of Medicine (IOM) concurrently released three reports on the Future of Emergency Care in the United States Health System. The reports focused on hospital-based emergency care, prehospital emergency care, and pediatric emergency care. Although considerable progress has been made in emergency care since the release of a National Academy of Sciences report in 1966 that galvanized national attention to strengthen the emergency care system, numerous challenges remain. These include widespread emergency department crowding, frequent boarding of admitted patients in emergency department hallways, diversion of inbound ambulances due to lack of capacity, a serious and worsening shortage of on-call specialty coverage, and persistent financial challenges. All of these problems are exacerbated by a fragmented delivery system and lack of clear lines of responsibility for oversight and policymaking.

One of the central recommendations of the IOM's Committee on the Future of Emergency Care was that the nation should develop a "regionalized, coordinated, and accountable" system of emergency care. Regionalized systems would help to promote cooperation among competing local providers and ensure that emergency patients receive "the right care at the right place at the right time." Historically, regionalization has entailed categorizing the capabilities of each local hospital facility and instructing ambulances to bypass nearby hospitals when necessary to ensure that patients receive optimal care. Early trauma systems were built on this model.

The 2006 IOM reports recommended that the federal government fund demonstration programs to promote the development of regionalized, coordinated, and accountable emergency care systems across the country.

Legislative language to provide funding for this effort has been included as part of the health reform bills debated during 2009-2010. The proposed demonstration program would be broad in scope but would focus on learning more about the development, day-to-day operation, and maintenance of regionalized emergency care systems.

A nationwide effort to establish regional systems of emergency care was also undertaken in the 1970s. Two federal departments, the Department of Transportation (DOT) and the Department of Health, Education, and Welfare (DHEW, now Department of Health and Human Services [HHS]) administered grant programs that provided assistance to states and regional systems. The DHEW program established 303 contiguous emergency care regions across the country. Some of the regionalized systems established by this program survive to this day; others withered when federal funding was folded into state block grants in 1980. As a result, fragmentation of care remains a persistent problem in many parts of the country.

One of the key Committee recommendations in the 2006 reports was the establishment of a "lead federal agency" within the Department of Health and Human Services to provide overall coordination of federal activities to strengthen emergency care. While regionalization often centers on the important role of states, patient transports frequently involve crossing state lines and these can highlight deficiencies in areas such as communication, coordination, and performance measurement. Some argue that accountability at the regional system level may require leadership from the federal level, while others see this as a state responsibility.

The concept of a federal lead agency in emergency care was advanced by Homeland Security Presidential Directive-21 (HSPD-21), which was issued in October 2007 and directed that an office dedicated to emergency care be created within HHS. In January 2009, Secretary Michael Leavitt signed the charter establishing the Emergency Care Coordination Center (ECCC) in the Office of Assistant Secretary for Preparedness and Response, within HHS. When the Obama Administration took office, it affirmed its support of the nascent ECCC. Since that time, the Center has engaged a variety of federal agencies in joint problem solving through the creation of a federal Council on Emergency Medical Care (CEMC). This interagency working group has focused on strengthening hospital-based emergency care and has also worked in conjunction with the Federal Interagency Committee on Emergency Medical Services (FICEMS), which serves a similar role in strengthening prehospital EMS care.

During 2009, the newly formed ECCC sponsored three IOM workshops to examine the U.S. emergency care system and assess the progress made since the release of the 2006 reports. The first workshop, held in May 2009 in Washington, DC, focused on the Emergency Care Enterprise, the joint effort between FICEMS and ECCC to improve prehospital and hospital-

based emergency care in the United States. The second workshop, held in June 2009 in Washington, DC, addressed medical surge capacity with particular emphasis on the emergency care system's capacity to respond to catastrophic health events, including disasters and large-scale acts of terrorism. This report summarizes the final workshop, which was held on September 10-11, 2009, in Washington, DC, and which focused specifically on emergency care regionalization.

The final workshop was convened to bring stakeholders and policymakers together to discuss the concept of regionalization from a wide range of perspectives, to review past efforts to promote regionalization, and to identify future challenges that must be addressed to achieve the IOM's vision. The workshop had three primary objectives:

1. Foster information exchange among federal and state officials, key stakeholder groups, and experts from around the country who are involved in developing, managing, or evaluating regionalized systems of care.
2. Learn from past experiences and current efforts.
3. Hold discussions with federal partners regarding policy options to inform future federal action.

Attendees included national thought leaders, as well as policymakers from the various federal, state, and local agencies involved in emergency care. A concerted effort was made to identify and involve key stakeholders from the health care community. These included experts from a wide range of disciplines, including nursing, Emergency Medical Services (EMS), specialty physicians and surgeons, public health officers, and hospital and health system administrators.

As is expected in an IOM workshop, the participants expressed a wide array of perspectives and opinions, sometimes differing sharply from each other. Various philosophical perspectives were expressed as well, ranging from strong support for market driven solutions to equally strong support for highly regulated systems with substantial government oversight. Some advocated models organized around major academic medical centers, others envisioned more decentralized approaches knitted together by information technology. IOM workshops are designed to elicit discussion and give voice to divergent points of view. Although readers of this summary may encounter statements and positions that are at odds with each other, this is not a weakness of the process, but a strength.

An IOM workshop has a different purpose than an IOM consensus committee. Consensus committees are expected to draw conclusions and make recommendations about the issues raised by the study's statement of task. Committee members are carefully vetted in order to balance oppos-

ing views and screen out potential conflicts of interest. None of these rules apply in the case of an IOM workshop. Members of the audience who attend the workshop have not been screened for bias or conflicts, have not been charged with making any formal recommendations, and do not constitute an official IOM consensus committee. Consequently, the views they have expressed in this workshop summary do not represent the views of the IOM.

This particular workshop was structured to emphasize interactive discussion among panelists and participants. Instead of long introductory lectures, each panelist was limited to a 5-minute opening statement and a single PowerPoint slide. Following these introductory statements, the session chair opened the floor for discussion. This process ensured that every attendee was actively engaged in deliberations throughout the two-day workshop. It also stimulated rich interactive exchanges.

The purpose of this report is to summarize the proceedings of the workshop. The first four chapters summarize the speaker presentations and participant discussions from day one. Chapter 1 describes the trauma system model, which is the archetype for regionalized emergency care systems and has been in operation for decades. Chapter 2 examines emerging models that have extended the concept of regionalized care to other time-sensitive conditions, including acute stroke, out-of-hospital cardiac arrest, acute ST-elevation myocardial infarction (STEMI), and the care of critically ill and injured children.

Chapter 3 examines three large integrated delivery systems—the Veterans Administration health system, the military's Joint Theater Trauma System, and the Kaiser Permanente health system. These case studies illustrate how regionalization can be achieved within integrated health care delivery systems. Chapter 4 examines the potential advantages and possible pitfalls of regionalization. Workshop participants recognized that although there are likely to be many benefits of regionalization, it may also produce unintended consequences. Panelists and participants were challenged to identify and consider these in detail.

Chapters 5-9 capture presentations and discussions from the second day of the workshop. These chapters focus on the "nuts and bolts" of regionalization, and how it plays out at the local level. Chapter 5 addresses governance and accountability. It explores strategies to bring competing providers together to pursue shared objectives. Chapter 6 examines the many financial issues that regionalization raises, including the implications of bypassing one hospital in favor of another and the problems associated with transferring costly patients who are unable to pay for their care. Chapter 7 focuses on data and communications. As one panelist said, "Unless the pieces of the system are able to communicate with one another, it's not possible to be a system." Chapter 8 focuses on disaster preparedness (fitting, since the sec-

ond day of the workshop was the eighth anniversary of the September 11, 2001, terrorist attacks). Discussants considered how day-to-day emergency care fits (or does not fit) within disaster response scenarios. Chapter 9 summarizes the responses of the workshop's federal partners—officials from the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) Office of EMS, the Department of Homeland Security (DHS) Office of Health Affairs, and the ECCC, located within the Department of Health and Human Services. Each discussed what they would take away from the 2-day workshop and how it would inform their upcoming initiatives.

Workshop Introduction

Arthur Kellermann, workshop chair and an original member of the 2006 Institute of Medicine (IOM) Committee on the Future of Emergency Care in the U.S. Health Care System, opened the workshop with a welcome and introduction.

He noted that the workshop had succeeded in attracting many of the top minds in the emergency and trauma care community from around the country. He reminded them that they had come to Washington, DC, at a time of heated debate about health care reform and that the outcome of that debate could determine the future shape and configuration of the American health care system. He observed that a number of representatives from the federal government were in attendance and would be participating in the discussions. He said that the workshop discussions could "immediately and directly influence the efforts of the federal government and state governments as they engage and promote regionalization."

Kellermann informed the attendees that "our task, and our opportunity, is to define regionalization more clearly, detail how it might be advanced, discuss what some of its potentials and pitfalls are, and determine whether it might improve the health and wellbeing of our fellow citizens."

He said that the three IOM reports released in 2006 received substantial attention at the time, and continue to be discussed on Capitol Hill and elsewhere. He noted that the reports have had a real impact on decision making, policies, and organizational strategies throughout the U.S. government.

The 2006 IOM committee, Kellermann reminded attendees, had four goals: (1) examine the emergency care system in the United States; (2) explore its strengths, limitations, and future challenges; (3) describe

a desired vision for the system; and (4) recommend concrete, actionable strategies for realizing that vision.

The 2006 committee identified many challenges and problems with the existing system:

- Emergency department crowding and frequent EMS diversions.
- Fragmentation of care—not only geographically, but across disciplines, in the continuum of care, and within levels and agencies of state and federal government.
- Inadequate disaster preparedness.
- Deficiencies in the care of children.
- An inadequate base of emergency care research.
- Serious challenges to emergency care financing, including the liability environment, and workforce issues that threaten the long-term viability of our nation's emergency and trauma care system.

The 2006 IOM committee offered a number of concrete, actionable recommendations (see Appendix C). Kellermann highlighted five:

1. Establish a lead federal agency in the Department of Health and Human Services that would ultimately be accountable for promoting and advancing emergency care.
2. Promote strategies to advance and strengthen pediatric emergency care, not only in pediatric hospitals, but across the U.S. health system, both in prehospital settings and through hospital-based emergency care.
3. Improve the organization and funding of emergency care research.
4. End the practices of boarding and EMS diversion.
5. Regionalize the delivery of emergency and trauma care throughout the country, drawing on past successes with trauma care systems but extending the concept in other dimensions.

"The committee's vision, then and now, was of a 'regionalized, coordinated, and accountable emergency care system'" Kellermann said. "Our task is to flesh out what this concept means and how it can be actualized at the state and local level, within geographic regions, and across the nation. The attendees at this conference have the opportunity to help inform and advise the federal government as they set out to achieve this vision."

A number of questions remain, Kellermann pointed out. "What does regionalization entail? Is it simply transporting patients to higher-level hospital facilities? Is it diffusing knowledge throughout a region? Is it identifying specific institutions with the expertise to handle specific patient problems? Is it always about the most severely ill or injured? How does

regionalization work during a large disaster or mass-casualty event? Is it different in rural areas than in urban or large metropolitan areas?" He said that over the next 2 days attendees would cover any number of permutations and manifestations of the regionalization concept.

Kellermann reminded attendees that an IOM workshop is quite different than an IOM consensus committee. "There will be no showing of hands" he said, "and it will not produce a consensus statement at the end of the meeting. IOM workshops are designed to promote free-wheeling discussion and to facilitate an open exchange of ideas." The final product, the workshop summary, will provide a compilation of divergent opinions exploring the topic, not an explicit set of new recommendations.

He noted that the participants may feel a tendency at times to advocate for their particular discipline or specialty or hospital system's interests. He said, "Please try not to do that. You are not here to defend turf. You are here to help us advance the issues, the cause, and the field. Each of you was purposefully sought out and recruited for your expertise and your knowledge. You are not here to serve as an advocate. You are here to serve as experts." With that overview and challenge, the workshop sessions began.

1

Regionalized Trauma Care: Past, Present, and Future

A. Brent Eastman, a founder of the San Diego trauma system and a member of the 2006 Institute of Medicine (IOM) committee on the Future of Emergency Care in the United States Health System, chaired the workshop's first session. The session examined past experience with regional trauma systems in the United States, and what lessons they might offer to future regionalization efforts in emergency care. Eastman noted that true trauma system integration means that no matter where in the United States a trauma occurs, the patient is assured expeditious transport to the level of care that is commensurate with their injury, whether that is 10 minutes or 10 hours away. He argued that we should constantly remind ourselves this is an inclusive system, representing an entire continuum of care, not only the Level I trauma centers where the most critical patients go. He emphasized that Level I centers are an important part of the continuum, but they are only a part. "Regionalization is not synonymous with centralization," he said.

Each of the four presenters offered a 5-minute opening statement, accompanied by a single PowerPoint slide that summarized their key takeaway points. Following these presentations, the session chair opened the floor for an extended and in-depth discussion with the audience.

EMERGENCY CARE REGIONALIZATION IN THE 1970s

The session's first speaker was David Boyd, who led the U.S. government's drive toward regionalized emergency care during the 1970s as the national director of the Office of Emergency Medical Services Systems within

the Department of Health, Education, and Welfare (later Health and Human Services). This office was created by the EMS Systems Act of 1973.

Boyd started by saying, "Regionalization is a verb. It's what you do, [and] how you do it." He described his effort to organize a coordinated system first at the state level in Illinois. The effort brought public health, hospitals, surgical personnel and all the components of the emergency and trauma care system together under an organized plan. The state established a lead agency within the Department of Health which aided in breaking the state down into regional groups and organizing the available hospital capacity. However, he said there were many emergency care-related functions in public health, transportation, and other parts of the government that were not under lead agency control, but should have been. He stressed that a lead agency is essential for coordinating an effort as complex as this.

Describing the activities of the federal lead agency at DHEW-HHS in the 1970s, Boyd noted that regional systems are not all the same across the country. His department determined at that time there are at least three basic socio-geographic regional models. The first is an urban-suburban model, including cities such as New York and Chicago. These regions, he said, are medically affluent—they have organized, all advanced life support (ALS) emergency medical services systems and, often, too many hospitals competing for special designations.

Second, there is a rural-metropolitan model. Boyd said this model applies virtually anywhere there are trees—from the west coast to east coast. It includes towns such as Peoria, Illinois; Spokane, Washington; and Memphis, Tennessee—towns that have adequate medical capability in their centers (if they are able to consolidate and organize it), and rural areas nearby.

The third model, wilderness-metropolitan, "is found in large, open areas where there are no trees," Boyd said. This includes parts of New Mexico, Texas, and Alaska where, he said, "you are really talking about a very bleak rural system." These are areas with long transport distances and essentially no specialty care.

Boyd said that these regional divisions were used in tailoring the different types of technical assistance offered by the federal government to regional areas. The categories also became part of the federal funding mechanism and the grant process. Boyd said that regional context and socio-geographic mix were important in differentiating the kinds of solutions that might work in a given area.

THE STATES' PERSPECTIVE

The panel's second speaker was Bob Bailey, former director of the North Carolina State Emergency Medical Services (EMS) program and past presi-

dent of the National Association of State EMS Directors. Bailey said that he had been on the receiving end of the federal program undertaken in the 1970s. He acknowledged that the federal initiative was able to jump-start a tremendous number of EMS trauma systems across the country. However, he said for a time federal funding was going directly to regions, which in some cases created conflicts with states that held different views on how best to develop systems.

When the federal grant program ended, some regional systems were not able to survive. Others survived but on a much smaller scale than before. Bailey said systems that had done their homework were able to sustain themselves. However, he added, many state programs suffered from the loss of the federal monies because the resources for personnel and other system components were no longer there.

Bailey's takeaway points were that (1) states must play a key role in establishing any regional system in order to ensure consistency and sustainability; (2) states should provide legal authority for regions to exist. This provides them with more clout and a greater ability to raise additional money; (3) states should facilitate, coordinate, and designate regional systems and make sure that quality assurance improvement programs are in place and functioning; and (4) there has to be sufficient funding in place to allow states to do their job and to ensure regional sustainability.

CENTRALIZED AUTHORITY

In introducing the next speaker, Eastman noted that he had just conducted a survey of the American College of Surgeons Committee on Trauma (ACS-COT) state chairs. The survey asked whether, from the chair's point of view, the state had a trauma system in place. The finding was that 54 percent of the chairs believed they had something resembling a trauma system. However, the survey showed that 100 percent of the state chairs believed they had a funding problem.

The next speaker was John Fildes, national chair of ACS-COT. Fildes said that the trauma system is the "oldest, best-studied, and best-validated example of a regionalized emergency care system." He added that the system is designed to ensure that if a person suffers a life-threatening injury or other emergency anywhere on the map of the United States, they will quickly move through a system of care that provides them with standardized and optimal care services.

He said the Committee on Trauma came into being in the 1920s and began writing quality standards for ambulances. It was writing standards for in-hospital care even before the EMS movement of the 1960s and 1970s, he said. The professional organizations were seen as content experts, and the College of Surgeons embraced the notion that they could write standards for trauma.

COT established an ambulance inventory list and created courses on topics such as advanced trauma life support and prehospital advanced trauma life support. It also examined the question: "What equipment does a hospital need to have besides oxygen and electricity to treat patients?" COT also addressed the issue of how care should be standardized to ensure good outcomes, and developed trauma registries and performance improvement strategies. Fildes said the organization has experimented and learned how to set up effective systems, and now is able to offer trauma system consultations.

Fildes expressed concern that as we go forward and begin to expand the regionalization model to other time-sensitive illnesses and injuries, if there is not a governmental authority to provide leadership, the result will be chaos. The effort will be driven by the profit motive and the institutions that are able to cobble together a sustainable business model, rather than by the best evidence and the best medicine.

In the United States, Fildes said, 45 percent of states do not even identify themselves as having a system of care. There is no interoperability across boundary lines, and there is very little standardization. He said "the Committee on Trauma is able to say what materials, personnel, processes, and guarantees need to be in place to deliver quality regionalized care. But as a professional organization, it is not an authority, so when a state comes to COT with a problem, COT has no authority to act." Fildes concluded that "without this type of authority, regionalization is going to be very hard to put in place correctly. More likely," he said, "it will become a free-for-all."

TRAUMA SYSTEM LESSONS

Ellen MacKenzie, chair of the Department of Health Policy and Management at the Johns Hopkins Bloomberg School of Public Health, said she had five takeaway messages to offer. First, we have very good evidence that trauma centers make a difference. They reduce the risk of dying and, for certain types of injuries, they can impact functional outcomes. More recent information shows that, although trauma center care is expensive, when you look at the cost compared to effectiveness, treatment at trauma centers are indeed cost-effective compared to other interventions.

Second, if you compare where we are today against where we were in the 1970s, it is clear we have made incredible progress. This is easy to forget because there is still so much to be done, she said. But nearly every state now has the legal authority to designate trauma centers. Also, the percent of the population living within 45 minutes to an hour of a trauma center nationwide is 70-80 percent, which is very good. However, this level of access differs quite dramatically across the United States, and few states have implemented trauma centers based on population needs, which is critical.

MacKenzie said we still need to define what regionalization is and what the characteristics of good regionalization are. We don't know which trauma system models work better than others. She said we need to determine what the optimal number of trauma centers is and what their optimal configuration is, not just in terms of access but also in terms of volume, because the evidence is fairly strong that higher volume correlates with better outcomes. Therefore, increasing the number of trauma centers to increase access runs the risk of reducing volume at the verified or designated trauma centers and worsening outcomes. So these concerns should be balanced.

Third, MacKenzie reiterated the point that, with respect to care delivery, "Regionalization is not centralization." She observed that when trauma system development began, there was so much focus on ensuring that the most critically injured got to Level I/Level II facilities that we lost sight of the fact that the trauma system needs to meet the needs of all trauma patients, from the very minimally injured to the most critically injured. She said we have to design systems that meet the needs of all trauma patients, and not run the risk of pushing all the trauma cases into a limited number of facilities.

Fourth, she said, designation of trauma centers as Level I, Level II, etc., is essential, but it is not enough. There also needs to be a coordinated EMS and referral system to direct patients to those facilities. This means developing the trauma system, not just the trauma centers per se. Also, she said, there is a big difference between the percentage of people who have access to trauma care (i.e., the percent who live within a certain distance or time factor from a trauma center), and how many people actually get to trauma centers. Those figures can be quite different across the states.

Finally, "we need to do a better job of accountability," MacKenzie said. "We need to develop systems and then we must hold those systems accountable for performance. In order to do that, we need good metrics. . . . We've done a good job of designating trauma centers. We've done a great job in developing standards for trauma center care. But we haven't done as good a job of developing metrics to evaluate the performance of trauma systems. Better metrics can also help the public in understanding the systems that are out there and what is missing. This can aid us in advocating for greater trauma system development across the United States."

AUDIENCE DISCUSSION

Following the brief opening presentations, members of the audience participated in the discussion. Michael Handrigan, acting director of the Emergency Care Coordination Center, said that Boyd's initial comment that regionalization is a verb may be grammatically incorrect, but it is right on point. Handrigan said regionalization is not about centralization and it's not about designating certain facilities as the place to go for anything. It's about

how to structure the utilization of resources in any one location, given that one area will be very different from the next. The aim, he said, is to get the right resources to the right patient at the right time, which may not even involve moving the patient. It can also mean moving resources, personnel, or simply knowledge.

Fildes agreed that regionalization is a verb, and said it's one that involves utilizing resources and creating a hierarchical system that pulls together all elements as they exist in a community in order to optimize what they can do. Noting that the 2006 IOM committee envisioned an emergency care system that is regionalized, coordinated, and accountable, he said that coordination must be established by someone, otherwise market forces will drive it. Finally, he observed, accountability requires not just data and quality measures, but also an enforcement arm to make sure that people are doing what they're supposed to be doing. The professional organizations have fallen short on that, and they are probably are not appropriate for that particular duty, he said.

Richard Hunt of the Centers for Disease Control and Prevention (CDC) posed a fundamental question: "What is a region?" He said that the answer will dictate who receives funding and a greater allocation of resources. Is the region a jurisdictional boundary? A state? A county? Another type of geographical region? A trauma system with its Level I trauma center as the base for its catchment area? Hunt observed that there are probably many different answers to that question, but the issue is centrally important and we should spend time discussing it (see also Chapter 5). Eastman added that in the same vein we want to better define the term regionalization (see Chapter 2 for further discussion).

Based on his experience in the 1970s, Boyd answered that there are 303 regions and at least 3 different types, as he described earlier. "They're geographically contiguous . . . nobody's outside a region." They receive public monies and accept public responsibilities. "They are configured by the states. They were negotiated by the states. They weren't strong-armed by me [the federal government]."

Federal Lead Agency

Jeffrey Upperman, director of trauma at Children's Hospital in Los Angeles, asked Fildes to specify who should have the authority to oversee regionalization, as he mentioned in his presentation. Upperman discussed the biology of systems and asked, "Who should manage that biology going forward, as needs fluctuate and populations change over time?"

Boyd asserted that "if no one is in charge, then the fools are at play." He also noted that just having standards does not discipline the system. For example, you can have trauma centers that are trauma centers at 2:00 in

the afternoon but not at 2:00 in the morning. "You have to have discipline in the system," he said.

This discipline comes from a lead agency, Boyd said, and from the person who can assume the role of a czar. This will be someone who is concerned about the system as a whole and is actually empowered to address problems.

Boyd said that in some cases he was able to impose discipline on the system simply by bringing certain situations to public awareness. In those cases he didn't have to regulate, or even criticize. For example, when hospitals' capacity was unavailable at certain inconvenient hours of the day, this would simply be brought to the public's attention.

Somebody has to be in charge, Boyd said, and their authority has to come from an authoritarian base. This is the role of the lead agency. Then you have to fill the leadership position, and he believes this person has to be a physician. He said that emergency physicians have now assumed this role very nicely in many places. He emphasized that the person has to be a critical thinker and has to be willing to make tough calls.

Fildes added that we need to look forward and think about the big-tent goal, which relates to emergency care overall. The big tent includes trauma, children's issues, disaster issues, women's issues, injury, time-sensitive illness—all sorts of things are included under the umbrella of emergency care, he said. There needs to be a top-down hierarchical approach to this with standardization at the state level and driven down into communities to make sure that emergency care functions across the entire continuum of prehospital and hospital care. He said the Emergency Care Coordination Center may be the group to take on that function.

Eastman pointed out that the military's trauma system may be instructive because "obviously, it is built around hierarchy and authoritarianism." He said "the best trauma system I have ever seen is the U.S. joint theater trauma system."

Governance of Regional Capacity

Stephen Epstein, emergency physician at Beth Israel Medical Center in Boston, and previous chair of the American College of Emergency Physicians' National Report Card Task Force, argued that regionalization is, to some degree, an issue of distribution of hospital and medical capacity. He asked whether distribution is best done at the state level, where trauma systems are governed, or at some other level?

MacKenzie agreed that to some extent it is a distribution issue, but she said it's not just about distribution of trauma centers, it's also about structuring the utilization of EMS resources, communication capabilities, and so on. With respect to governance, she said, it depends on the state.

Larger states like California might prefer more regional governance, while smaller states like Vermont might prefer to maintain authority at the state level. She noted that Maryland has a statewide system that has worked very effectively. She added that if there are regionalized systems within a state, those systems have to be coordinated and have effective communication.

Kenneth W. Kizer, who was central in designing the standards for the California EMS system in the early 1980s, said he was continually reminded of how challenging the issue of governance is. He noted that a county like Los Angeles is larger than the state of Connecticut and has a population greater than that of Michigan. "This underscores the need to have a balance between state and other." Governance is a difficult issue, he said, because it involves a great deal of politics and economics that go well beyond the medical model.

Eastman noted that cross-border relationships are important in terms of patient transport decisions. He said, "Just because you're in north-central Wyoming, that doesn't mean that you go to the trauma centers in Wyoming. You may well go to Billings, Montana." He cited the role of helicopter transport in remote locations.

Boyd argued that, in terms of distribution of resources, "a Rand McNally state map is more important than epidemiologic data, because you can see where things are and what their relationship is to something else." (However, MacKenzie later asserted that what is needed is "Rand McNally plus epidemiologic data.") On the issue of governance, Boyd noted that Arkansas, for example, was a weak state at the time because they did not have physician leadership. "That was the issue," Boyd said. "Wherever we had physician leadership—first it came from surgeons, then from emergency physicians—this lead agency concept came into play."

Boyd said that the successful states were ones that maintained the lead agency concept. Maryland, he said, is truly one of the strongest in the country, and it offers transferable lessons. He also noted that Eastman "runs a very strong and tight county-plus regional system" in San Diego.

Boyd continued: in these cases, what do you have? "You have some authority that is recognized by the public as being responsible for this complex, multiplistic, changing thing called emergency care. Somebody is in charge." However, he said deciding who that person is, or what that agency will be, is a challenge. He suggested: "this is where democracy has to work. You have to select somebody who represents the health interests of your community, and he or she (or it) is given the authority to manage this."

Determining Adequate Capacity

Rick Niska, an emergency physician with the CDC's National Center for Health Statistics, raised the issue of redundant capacity in the case of

disasters. He asked, "Is that too much of a luxury to expect while regionalization is in its infancy, or should redundancy be part of the planning for regionalization from the get-go?"

Eastman noted that over-designating or having too many trauma centers dilutes the higher volumes that are needed to improve performance and outcomes. "That's really the dilemma that you have, [and] this issue is brought up every single time. How many Level I centers do we need? Do we know the equation?"

Boyd argued, "You've got to have one in Peoria, [and] you've got to have one in Springfield. The trick is to have one in each of those towns and not two. That's a political battle." He added that "in Chicago you need 9, you don't need 18." He charged that "part of that second 9 are pretenders anyhow. They are the 3:00 p.m. trauma centers, but not 3:00 a.m. trauma centers." How do you weed these out, he asked? "They all met the standards. They all put in the application and they all got blessed by the Health Department." The answer, he said, is through the czar, who is the only one who can bring credibility to the process. "The czar has to be backed by the College of Surgeons and ACEP and everyone else. He has some authority and he has [a] methodology."

Boyd maintained that "the problem with standards alone is that almost anyone can meet them. I have seen more dishonest hospital-categorization schemes than anybody in this world. And when you call them on it, there's always some way out." You must enforce accountability right from the start, he said.

MacKenzie reinforced the point that "if you build in too much redundancy, then you're going to dilute volume. We know that volume and outcome are very closely linked. That would be my real concern."

John Holcomb responded that, "you can function on a day-to-day basis pretty well with that model, [but] every 18 months or 24 months there's a disaster that completely overwhelms the system and quality plummets because you're completely overwhelmed." He continued, "in a regionalized system, you must handle your day-to-day flow and you must have surge capacity for mass casualty. . . . It really is a balance."

Regionalization not Centralization

Richard Wild, an emergency medicine physician and a regional chief medical officer for the Centers for Medicare & Medicaid Services (CMS) said he was struck by the earlier statement that regionalization is not centralization. "We should make that a mantra," he stated. He regards this as a critical issue because, when talking about regionalized care, it is very easy to think only about Level I centers and forget about everything downstream.

Wild said that, in overseeing the Emergency Medical Treatment and Active Labor Act of 1986 (EMTALA), CMS often receives complaints that involve disagreements between Level I trauma centers and other non-Level I hospitals that may have the capability and capacity to handle cases such as minor penetrating trauma (e.g., stab wounds to the belly), but maintain that they must be seen at a trauma center. EMTALA was passed in 1986 to prevent hospitals from refusing to serve uninsured patients and "dumping" them on other hospitals. EMTALA imposed a mandate on hospitals, as well as physicians who provide emergency and trauma care, to provide a medical screening exam to all patients and to stabilize them or transfer them to an appropriate facility if an emergency medical condition exists. Wild argued that second- and third-order protocols are crucial in driving a regional system, because otherwise utilization will be "top-heavy," i.e., skewed toward the Level I providers.

MacKenzie said she agreed completely. From a research perspective, she said, there is still not a lot of good evidence regarding what the models of referral and coordination should be, and more needs to be done in that area. But, she added, systems should be based on need, whereas historically they have developed on more of an ad hoc basis.

Eastman said he had recently been involved in a state trauma system consultation. The state "had defined an inclusive trauma system as: everybody who wants to be a trauma center, raise your hand." He said the site team's recommendation to the state was not that they needed a certain number of trauma centers. Rather, it was that they should conduct a needs assessment study and base the decision on the population base and the available evidence, as MacKenzie has suggested. Fildes added that as you move forward in establishing a regional system, there has to be a means of identifying and directing people in a way that is tiered and hierarchical.

Building Inclusive Systems

Eastman noted that the respondents to the ACS-COT survey are threatened by the politics of regionalization versus centralization, which often involves a battle between the haves and the have-nots. Boyd said we have to make sure the Level IIs and IIIs are still part of the system. A lot of the trauma centers, he said, have decided they want to be better than their neighbors and they want to gain a lot of resources. "But they have lost what I thought was really their real responsibility . . . that they are the supervisors, they are the guiders for their region . . . and they are the big brother of the smaller hospitals." He continued, "That has to come back. I think it has to come back for clinical reasons, political reasons, and public health reasons." He concluded that "a lot of the mystique around centralization" will need to fall away.

Holcomb agreed, saying "you can have two different kinds of systems, and one is where you have a Level I trauma center and everybody goes there. That doesn't work." He said that model means training no longer happens at the outside hospitals, and so the personnel taking care of trauma patients at those facilities "are no longer capable, whether they are attendings, nurses, or residents."

Holcomb noted that in Houston during Hurricane Ike, one of the three Level I trauma centers shut down, leaving two Level I centers to serve a city of 5-6 million. Admissions at his facility increased dramatically. "We had a meeting shortly afterwards, and we said, 'Look, we must have the Level IIIs step up; we must have them.'" He said that they did step up and it has resulted in positive changes. By changing the prehospital triage criteria and by getting the Level IIIs to do more, diversion rates at the Level I trauma centers are now down. He said this illustrates that a regional system of care must have hierarchical levels of care that function on a 24/7 basis.

Eastman said that he had an opportunity to visit India and meet with a surgeon who had been at the hospital that received all of the casualties from the Mumbai massacre. Eastman said, "In Mumbai they did it all wrong." All the patients were essentially taken to one hospital, and there were 25 other hospitals right there . . . who had surgeons, emergency physicians, nurses, blood, and they didn't get it."

Brendan Carr, an emergency physician from the University of Pennsylvania, observed that "people here today have talked about inclusive systems, but many times when we talk about getting the [Level] IIIs into the game, we're getting the [Level] IVs into the game." He observed that "panelists have said we know what resources we have for emergency care, but then immediately went back to describing [what] we do know about Level Is and IIs." He pointed out that "a third of all injured patients and a quarter of all severely injured patients show up in a non-trauma center. So they show up at a place where we don't know anything about who's staffing it, what resources are available, or what subspecialties are available."

Boyd responded that "we have forgotten about the Level III and the Level IV trauma centers. We have forgotten about how to relate to them and bring them into the system, and I think that's what we have to do."

Instituting "Air Traffic Control"

Andrew Bern, liaison to the American College of Emergency Physicians' Task Force on Regionalization, said that if regionalization means getting the right resources to the right patient at the right time, it requires knowing what those resources are and where they are. Right now we do not have that information. He recommended a national mandate establishing an ongoing, dynamic, real time needs assessment mechanism that provides

answers about what is going on. This would provide information on hospital resources as well as all other emergency care resources.

MacKenzie said we know a fair amount about what resources we have—certainly with respect to trauma centers and where they all are. But she said that we do not have a good handle on how those resources are being used, and we have to do a better job of understanding that.

Fildes said we pretty much know where each of the emergency departments is, each of the hospitals, each of the helicopter pads, each of the trauma centers, each of the children's hospitals. We pretty much know where they're physically located. The problem, he said, is that "there's no air traffic controller in the tower." MacKenzie agreed.

Robert Neches of the University of Southern California said that there is a military concept called real-time situational readiness, which is supported by information technology. He said that this concept could be applied to track the status of patients and the medical forces responding. It is at least theoretically possible, he said, to know the moment-by-moment readiness of each medical facility to treat a patient or accommodate a patient surge.

Eastman said that in San Diego we know the status of every trauma center in the city: how many beds they have, whether or not they are on diversion, how many ICU beds they have available, and so on. But he said it's a baby step toward addressing multiple-casualty disaster scenarios.

Fildes said "it is sad to acknowledge that Holiday Inn has a better idea of how many beds they have available than the U.S. hospital system [does]." As we move forward, he said, it will be essential to know which facilities have the capacity to treat a given patient at any given moment in time. He said that information technology has to be one of the underpinnings of a regionalized system, where a key consideration is how patients transition among and between resources. Neches underscored that it is possible to know not just how many beds are available, but how many ambulances are heading towards that facility.

Greg Mears, medical director of North Carolina's Office of EMS, said that there are now many satellite hospitals and freestanding emergency departments. Patients with a multi-system trauma may be treated at a trauma center but then be transferred to an outside specialty center for orthopedics, for example. He asked, in this regionalization approach, how do we deal with these "splinterized" hospitals where resources are scattered across campuses and are functioning in multiple regions?

Fildes responded, "It comes down to again who's in charge. We could promulgate a standard that says those transfers are not optimal, but there's no effector arm, no disciplinary arm, because there's no air traffic controller in the tower."

Holcomb noted that his Level I trauma center recently accepted a lip laceration case from an outlying hospital. He said there are at least two

reasons why a transfer like this might occur: "one, the doctor doesn't feel comfortable, or two, the facility is not capable. Either way, they determine the patient is better handled elsewhere." Holcomb argued this is why lower level facilities should be required to maintain a 24/7 level of care and this should be a defining element of regionalization. Also, redirecting less serious cases to lower-level centers could help free up subspecialists during peak times. Neurosurgeon Alex Valadka noted that "most neurosurgical centers get overwhelmed by cases that probably don't need to be there, but could be safely managed at a Level III or a Level IV facility."

Implications for Training and Residency

David Sklar of the University of New Mexico and ACEP commented that, if we were to regionalize other care systems in the way that we have for trauma, there would be major implications for medical student training and residency. For example, residents might not get the experience they need for their training. He said that, in trauma systems, because of the way that Level I trauma centers were designated, residents for surgery, emergency medicine, and others continue to get the experience they need. However, that might not be the case with other kinds of illnesses.

John Fildes responded that, as you move forward into a regionalized system, what you find is that the patient cannot be taken apart. In the case of a patient who has an epidural hematoma, a pneumothorax, a ruptured spleen and a femur, it's not possible to send the patient's brain to the neurosurgery hospital and the femur to the orthopedic hospital and the spleen to the general surgery hospital. What happens is there will be an overlay where these specialties stack up. This will create ideal training environments for emergency medicine, surgery, and other specialties as well, he said.

Fildes acknowledged that creating an inclusive trauma system that is not overly centralized in the hands of large facilities is essential because if every patient is sent to only one place, then all the other places would lose their ability to perform those functions. This gets down to the issue of patient triage. Rather than moving all patients to one "megacenter," patients should also be sent to other nodes where they can be treated perfectly well and where training can take place. Fildes said it is "very, very important to keep this anti-centralization theme out front and to make sure that there is an inclusive treatment system that allows adequate access of trainees for residencies."

Boyd said that something that is very helpful to regional development is to have training within regional systems. He said spending a week to train in critical care, in the emergency department, and in other parts of a hospital has a powerful binding effect on the regional system. This can be part of the glue that holds the system together, because it strengthens the team concept and aids regional development.

Bailey added that EMS is also part of the system and need to be included in training plans. He said it is the delivery mechanism to the trauma center in most instances. The training that takes place should also address the hospitals that patients should be directed to.

Kizer added that the impact on training centers should not be underestimated. Having been involved in trying to regionalize a number of different types of services, he observed that "the major opposition to this consistently comes from academic health centers or academic university training programs because of the impact it can have on [their] training programs."

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Emerging Models of Regionalization

Bob Bass, executive director of Maryland's Emergency Medical Services (EMS) and trauma system and past president of the National Association of State EMS Officials, as well as the National Association of EMS Physicians, chaired the second panel. He said the first panel highlighted the methods of regionalization that have evolved in trauma care over the past three or four decades and provided a number of important lessons.

He noted that an integrated and coordinated approach—not to be confused with a centralized approach—can help in ensuring that the right patient gets to the right hospital at the right time and receives the right care. Accountability can be promoted through systems of verification, he said, and through data that examines processes and outcomes to ensure that the components of the system are working as they should.

The second panel focused on a number of time-critical conditions that may lend themselves to the same sort of regional approach that has been taken by trauma systems. These conditions include ST-elevation myocardial infarction, out-of-hospital cardiac arrest, acute stroke, and care of seriously ill and injured children.

ACUTE STEMI CARE

The first panelist was Joseph Ornato, cardiologist and emergency physician from the Virginia Commonwealth University in Richmond. Ornato said that the story of STEMI (ST-elevation myocardial infarction) dates back about as far as the trauma centers story—into the late 1960s, early 1970s. But he said it was not until about 1980 that we started to figure out what

was causing the majority of heart attacks. Before then, mortality if you had an acute STEMI was about 40 percent. Today, mortality in most cities is under 10 percent and usually it is in the 4 to 6 percent range. Clearly, he said, "we have made incredible progress."

Over the past 30 years, we have learned that there are two major ways to open heart vessels: chemically or through mechanical means (percutaneous coronary intervention, or PCI). PCI is the current state of the art in treatment, but only one quarter of U.S. hospitals now have the capacity to provide it.

What has become obvious over the past 30 years, Ornato said, is that time is critical for patients. Just as "the golden hour" became a mantra in trauma care, "time is muscle" became the mantra for acute myocardial infarction (MI) care in the mid-to-late 1980s. Since then, we have really tried to better understand the trauma center model and apply its lessons to acute MI. A number of models have emerged, including Boston EMS, Minneapolis Heart Institute, and others. Now, the American Heart Association—analogous to the American College of Surgeons in this case—has helped identify the key components of a successful STEMI system and has launched a nationwide program called "Mission Lifeline."

While a successful STEMI system has many similarities with trauma centers and regional systems of trauma care, Ornato continued, "There are also some very harsh differences." Most general medical service hospitals rely upon cardiovascular care to stay alive financially. Therefore, a very important piece of the puzzle has been to ensure that we carve out an important role for medical centers that are not PCI centers—the functional equivalent of a Level I trauma center. "Non-PCI centers must be included as part of an integrated network," he said, "and we have sought to strike a delicate balance, such that patients are not being diverted to PCI centers when it is not medically necessary."

CONSIDERATIONS IN REGIONALIZING CARDIAC ARREST

Lance Becker, professor of emergency medicine and director of the Center for Resuscitation Science at the University of Pennsylvania, discussed cardiac arrest and related topics such as hypothermia and post-resuscitation care. Becker noted that there is wide variability in survival rates for cardiac arrest in communities in this country, ranging from 2 to 18 percent; however, we do not understand the causes of that variability. One goal of regionalization should be to aid in reducing variability.

Becker noted that cardiac arrest differs from most conditions, because about half of the cases in the United States take place inside hospitals. Moreover, it is a very time-sensitive illness. In some of the treatment modalities used for cardiac arrest, survival rates have been shown to differ based on

as little as 10-second intervals of time. "We're not talking about a golden hour here," he said. "We're talking about a golden couple of minutes." The regionalized system must be sensitive to that.

But Becker said that we need to get a handle on just what we mean by the term regionalization. One version, which he calls the Mecca model, involves bringing patients to a facility that has tremendous medical capacity. Another is to distribute some of that capacity out to the places where the patients are, and where they need them. A third model—virtual regionalization—involves distributing the expertise required to care for cardiac arrest cases so that local providers can provide the care in local facilities. In many cases the expertise needs to be brought to the patient, he noted, because in cardiac arrest we do not have the luxury of moving the patient to the Mecca.

Becker observed that while the procedures used to care for cardiac arrest patients are simple to perform (e.g., "thumping on a chest [hands-only CPR] is not difficult"), orchestrating an entire episode of cardiac arrest treatment is extremely difficult. "If you want to embarrass yourself sometime, just go to a mock code and run that code and you will be embarrassed." He said that a lot of people "would be shocked" by the real quality of the care that is taking place in many cases.

An unintended consequence of a regionalized system of care, according to Becker, is that some centers become very very good, but others become less good, "i.e., really bad." That should be taken into consideration. He argued that what is needed are several good demonstration projects to help figure out where regionalization's pearls and pitfalls will turn out to be.

THE EMERGENCE OF STROKE AS AN EMERGENCY

Arthur Pancioli, professor and vice-chair of emergency medicine at the University of Cincinnati, said stroke is the leading cause of adult disability. There are almost 800,000 strokes per year in America, and statistically every member of the audience has a family member with stroke. "It is an enormous disease process," Pancioli said.

However, until about 15 years ago, he said, stroke didn't even rate as an emergency in most places, because nothing could be done about it. In fact, back then stroke was a viewed as a Level V triage by many ambulance systems—the same as a toothache. Now, primarily because of the emergence of an effective acute treatment, stroke has come to be viewed as an emergency condition.

Pancioli described stroke as a diverse disease process which truly requires a multidisciplinary approach. Even in the case of the simplest stroke, care that is well-coordinated at a local community hospital can make an enormous difference. The majority of stroke patients are cared for at the

equivalent of a Level III, IV, or V trauma center, and actually this is where they belong, he said. The personnel there have access to effective guidelines and can obtain support through communication.

In the case of patients whose conditions are a little more complex and who are a little bit sicker, Pancioli said, many do not need specialized procedures. The local physician just needs to be on the phone with an expert physician for guidance; commonly this is facilitated by having the expert review the imaging. Then there is a fairly small percentage of patients (possibly in the single digits) who need more extensive treatment and who should be seen at the most comprehensive stroke centers.

Pancioli observed that stroke is a very young disease process in terms of therapeutics, probably about 15 years behind acute STEMI. Stroke providers have been vastly less coordinated than providers of cardiac care, primarily because there has been a lot less money driving the process. Interventions are more cognitive-based than procedural. Pancioli concluded that "there has never been a disease that is more amenable to careful regionalization than stroke."

A HUB-AND-SPOKE WHEEL MODEL FOR CHILDREN

Joseph Wright, senior vice president at the Children's National Medical Center in Washington, DC, and member of the 2006 Institute of Medicine (IOM) committee on the Future of Emergency Care, pointed out that kids are not a disease process but they do account for about 20 percent of all visits to emergency departments in this country.

According to Wright, children are comparatively healthy overall and centers that can treat severely ill or injured children are relatively scarce. There are now about 90 freestanding children's hospitals in this country. Children typically flow through the emergency care system by way of a hub-and-spoke wheel model, Wright said. When a child is in need of tertiary care, typically they are seen at the edges of the spoke-wheel and then flow to the hub.

So with regard to the care of children, regionalization is a process that is already functioning daily, Wright said. Significant research has shown that children do better in regionalized systems of trauma care, especially systems in which there are pediatric trauma centers exclusively committed to caring for children.

Because the vast majority of children are seen at the periphery of the hub-and-spoke wheel, we need to ensure that all of the 4,000 emergency departments in this country—some of which see fewer than 10 children a day—are prepared for pediatric emergencies. There needs to be a standardized floor of readiness. Emergency departments should also be able to handle major surges in demand, such as will occur with the H1N1 virus.

Finally, Wright discussed the federal Emergency Medical Services for Children (EMSC) program and the performance measures it has established. One of the performance measures is aimed at identifying a system of categorization, so that particularly the prehospital community knows which hospital emergency departments are prepared and equipped to handle certain types of pediatric cases and which are not. Only four states—California, Illinois, Oklahoma, and Tennessee—currently have a categorization system like this in place. States that are receiving funding from the EMSC program are directed to develop a categorization system, and this, Wright said, should be a topic of discussion for us.

AUDIENCE DISCUSSION

Abhi Mehrotra, emergency physician at the University of North Carolina Hospitals and chair of the American College of Emergency Physicians' (ACEP's) Task Force on Categorization of Emergency Departments, said there seems to be a great deal of effort from specific disease islands—cardiac, trauma, stroke, and so forth—as opposed to the overall system of emergency care. He asked, how can we organize the models and categorize the components so that we do not duplicate efforts within each disease silo?

Bass replied that this is "a really, really good question." He said that some of the later sessions hopefully will drill down into that a little bit more. But he added, "I think our view in Maryland is that we are a system of emergency care." He said Maryland started with a trauma system, but evolved into a system of emergency care. The system is now able to incorporate "whatever comes along that is time-critical."

Bass said the same infrastructure applies across the board—communications, data, verification, regulations, everything. If any additional specialty-care area is needed, it is actually pretty easy for the system to add it, although it can be difficult politically. For example, it might just include adding a set of verification standards and another column for STEMI centers in their Web-based application that tracks the hospitals and their capacity.

Ornato added that when new treatments and new hospital product lines arise in this country, you may have a dozen facilities raising their hand—having never done the therapeutic intervention before—asserting their right to receive their share of the patients. There's no easy solution, he said, because we all understand the market forces. "We don't [have] an environment in which someone up above is going to look at a community and pick [who should provide the interventions]. That would be easy, but that's not reality." Consequently, he said, we have "a fundamental system problem."

Hospital Economic Incentives

David Seaberg of the University of Tennessee and ACEP focused on the economic incentives facing hospitals. He said the case for regionalization of traumatic pediatric burn care may be easier to make, because the profit margins on those cases are not very great. However, for cardiac, stroke, and other cases where the margins are more substantial, community hospitals will fight against regionalization—unless, of course, they might be recognized as the hospital to go to for that specific condition. Seaberg asserted that this reflects a truly inefficient system.

Ornato said a study in the journal *Circulation* illustrated the economic impact for a small community hospital, a medium-sized hospital, and an academic health center if community PCI centers were named, but that hospital was not included as one of them. The dollar losses ranged from about $150,000 per year for the small community hospital (which could be quite significant for a facility that size), up to at least $1 million for the larger facility. He said "this opened all of our eyes to the fact that, at least for STEMI, economics are really a very important consideration." However, he said, the first priority has to be what is best for patients.

Wright said that early experience from California showed that efforts to categorize emergency departments relative to the care they could provide for children proved difficult. Hospitals responded, "If you take away pediatrics from us, what does that mean for our OB service? If it is perceived that we do not or cannot take care of children, what does that mean for our other services?" One lesson from that experience was to get early buy-in from hospital associations and really demonstrate with data that some places do better than others.

Assessing Burgeoning Capacity

David Sklar from the University of New Mexico and ACEP said that all four panelists indicated the need for additional research to demonstrate that, for their time-sensitive conditions, care can be improved if it is organized in certain ways. Sklar asked how we can encourage that type of research. Pancioli added in response, "What industry can you imagine would start a new product line without an incredibly careful and rigorous study of the outcome of that sale? It would never happen." But he said he could imagine in medicine that we would design a very good regionalization system, but then not study the results. Why? Because there is an added cost in doing so that flows separately from the dollars that pay for care. Still, he said, not studying the results would be a serious mistake.

Becker said that in policy there is often an impulse to "just do something," rather than do research. He said that New York City is doing a large experiment right now with respect to hypothermia. They have

decided they will begin to bypass patients with out-of-hospital cardiac arrest to centers that are cooling centers. Now, 17 hospitals across New York City have suddenly decided to become cooling centers (previously, there were only 4).

Becker said this represents a large natural experiment that is now under way. However, it will be very difficult to sort out the results of this experiment and determine whether or not there has been an effect. He argued that we need good studies that can help inform what it is about a system, or about the concept of regionalization, that confers this ability to reduce variability and improve survival.

Pancioli pointed out that already at this meeting we have repeatedly heard the call for "metrics, metrics, metrics." He said, whatever we do with regionalization, if we don't build in counting mechanisms to look at the outcomes of our efforts, we will make changes and never know if they're good or not. He said, so now you've got 17 cooling centers. That could be great, or, due to the dilution of quality and expertise, "that may have been the worst thing in the world."

Pancioli added that the reason New York ended up with 17 cooling centers is that no one wanted to lose the correlatives. "The reason people can't stand the concept of strokes bypassing [their facility's] stroke center," he said "is because they're going to lose all the weak-and-dizzies and all the syncopal patients and all the Medicare patients who pay money." He continued, "If there is an economic incentive to do something, suddenly centers will pop up, and without metrics to measure their performance, there will not be a way to cull them back and get them focused back on what they should be doing."

He added, "We rely heavily on EMS and whenever we discuss regionalization, we should thank our lucky stars for the prehospital providers who go out there and make really hard decisions in cornfields and intersections with profoundly undifferentiated patients." He emphasized that "we need to educate them, give them good tools, give them feedback based on individual cases, accept overtriage and undertriage, and educate them toward the right level."

Bass said that we now have several decades of experience with the trauma triage algorithm for prehospital providers and the Centers for Disease Control and Prevention (CDC), and others have put as much science into it as we possibly can. But, as a system, we are still struggling with it for patients who have conditions such as acute stroke and STEMI. If you are in southern Maryland and you're 45 minutes from a PCI center but you're 5 minutes from an ED, what is the appropriate decision about where to go? What should the cutoff be? Bass said that those of us who have regionalized systems of emergency care at the state level are looking for more guidance on the stroke patients and out-of-hospital cardiac arrests. Obviously, he said, that is a huge emerging issue.

Maryland has an inclusive system in that every ED in the state has a role in the trauma system. But the state has wondered how best to centralize the care of patients who have serious injuries. The state has 9 adult trauma centers and 47 hospitals overall. Bass said, "When we put out a request for applications for stroke centers a few years ago, it just came with a flood. All of the hospitals were very interested in being stroke centers, which meant having the pathways, doing the training, putting in the expense, submitting to a verification process, following the standards, submitting data, etcetera—for all of them." He said at last count 35 of Maryland's 47 hospitals have been designated as stroke centers. He reported that the state has been looking at the data and has found "terrific" results with regard to reduction in mortality. "It seems to me a very different model than the trauma model," he concluded.

Sklar asked what might be learned from the experience of other countries. He said because the United States continues to struggle with whether health care should be considered a public good or a business, we face many political challenges that other countries do not. He said there may be lessons to learn from how they have addressed regionalization.

Ornato said that clearly these are global issues and the industrialized countries face very similar problems. He acknowledged that "some of our colleagues [in other countries] really are far ahead of us." For example, in Scandinavia, researchers examined a regionalized PCI model for patients with STEMI and demonstrated better outcomes at those centers that are geared up to provide the care 24/7, as trauma centers are, and have a critical mass of volume. The study found that the PCI centers that had ramped up quickly and gained a critical mass of experience over a short period of time proved to be far superior in their performance.

Regionalizing Expertise

Michael Sayre, chair of the Emergency Cardiovascular Care Committee for American Heart Association, said he would like to give Pancioli a chance to elaborate on the idea of decentralizing care and regionalizing expertise. Sayre argued that the stroke community has done a much better job than any of the other entities focused on here in spreading their expertise, both physically, by going to the referring hospitals themselves, or virtually through telemedicine.

Pancioli reiterated that stroke is a little more cognitive and a little less procedural than other diseases, though that is beginning to change. For the most part, though, stroke victims only need to be able to get to a hospital that is equipped with a phone or a telemetry device of some sort that aids communication. This is often the only technology that is needed to obtain assistance in making treatment decisions, such as whether thrombolysis or a more technical procedure is required.

Pancioli said that earlier in his career he had signed up for a stroke team, requiring him to be on call every fourth night serving an entire hospital system composed of 15 hospitals. Team members went to those hospitals—across Cincinnati and into adjoining areas in Kentucky—and still do. "We chose to do it on foot," he said. He and his team still go to these hospitals and treat about 20 patients per month with tPA.

But, he said, there are another one to two dozen hospitals that are farther away, out of reach, that call and ask for advice on patients. What do those centers, emergency physicians, or other practitioners need, he asked? They need assistance in reviewing the patient's clinical history and physical examination, and in reading the computed tomography (CT) scan. He said this is often done in the middle of the night without any problems by someone in Australia or New Zealand.

Pancioli noted that he is probably better in person than he is by phone, and is arguably better by videoconferencing than he is by phone (but not quite as good as in person). Still, he said, "We can do an awful lot of this just by bringing the expertise out there with technology. I don't have to lay hands on every single patient I see. [However,] I think there's a marginal difference. So when you can get into a center, you should." In general, however, he called stroke a wonderful opportunity to take expertise out to distant places.

The Role of Emergency Medical Services Personnel

David Stuhlmiller, an emergency physician at Westchester Medical Center in New York, said that most hospitals advertise that they can take care of their communities, and most EMS agencies want to bring community members to their own community hospital. It is familiar to them, but it is not necessarily the best option.

Regionalization involves delivering the right patient to the right hospital at the right time. But it has taken many, many years to convince EMS to deliver trauma patients past their local hospital to the trauma centers. He asked, is it also going to take 20 more years to convince them to drive stroke patients to stroke centers, cardiac patients having STEMIs to STEMI centers, or children to children's hospitals? How do we involve EMS in the decision to bypass the community hospital that wants these patients?

Bass said that in Maryland, it has actually been a task to hold EMS back. He said Maryland strives to make these decisions based on evidence, and sometimes it takes time for the data to settle in. But, he said, "Paramedics in Maryland are chomping at the bit to get patients to interventional centers." Candidly, he said, sometimes they jump the gun. But the Maryland EMS providers know who does primary PCI, they know where to take the patients in their community, and they do it. Maryland is trying

to follow up with a formalized designation process and standards to ensure there is an appropriate interface, he said, but EMS personnel are leading us, not trailing us, in that respect.

Pancioli said the key is to empower EMS and assure them that it is okay to make these decisions, because there are a lot of barriers. If they are a hospital-based transport system, their hospital will say, "don't you dare bypass us." But if you empower them and inform them that they may save a life by doing this, they will drive right by that hospital.

The truth is, Pancioli added, that there is a lot of negative pressure on them, much of it economic. Clinicians need to give them the decision tools they need (e.g., the Cincinnati stroke scale or 12-lead electrocardiogram [ECG] to detect AMI) and empower them to make these decisions. Bass reiterated that the challenge in Maryland has not been the EMS providers. It has been those with financial interests and political clout who sometimes get in the way of doing the right thing for patients.

Stuhlmiller said that there are 47 transporting EMS agencies just in the County of Westchester, where he is based. Many of these are volunteer and they are community-minded. They will not drive 55 minutes outside of their service area for one individual if that means leaving their community with reduced coverage. With respect to the advanced life support (ALS) providers, Stuhlmiller said, the state can come down and say, "This is a stroke patient—take him to the stroke center." Hopefully, they will say, "This is a STEMI patient—take him to a STEMI center." But for the volunteers, this is not the case. Bass replied that "that is why you need a system-wide approach and protocols," with everyone part of the same mechanism for designation, verification, and data collection. "It needs to be system-wide," he emphasized.

The Uses of Data

John Holcomb, former commander of the U.S. Army Institute of Surgical Research and trauma consultant for the Army Surgeon General, asked the members of the panel whether they had all published findings on the quality outcomes in their communities based upon implementation of the systems they had described. He said he found at the Department of Defense that capturing that kind of information and being able to show that soldiers fare better if a system approach is used, allowed money in support of the system to flow more easily. He wondered whether the same dynamic might occur in communities, putting the pressure back on the funders and the businesses to support this type of system.

Wright responded, "You're absolutely right. We have to be able to demonstrate these kinds of quality-of-life improvements in order to justify creation of these systems." He said there has been some research through

the EMSC program showing highly positive results for children who were treated at centers that were able to perform ALS procedures. However, he acknowledged, "we've got a volume issue"—this study is just one example of what needs to be done throughout the country.

Ornato said a number of studies now very clearly show that organized systems of care for STEMI do measurably improve survival outcomes, and the systems are cost-beneficial. He provided an illustration of the impact that numbers can have. He said that his medical center began cooling patients and providing post-resuscitation care in 2003 and, until 2008, they were the only one of 12 hospitals in Richmond that cooled. But each year they received only their fair share of 5-10 cases. However, the data showed their survival rates jumping from 2 percent to 10 percent and continuing to climb, while rates elsewhere in the city were essentially remaining the same.

In 2008, as the EMS medical director in Richmond, Ornato said he decided, after consultation with many colleagues, to have the paramedics bring patients to his facility exclusively. He said that survival rates citywide have now reached 18 percent, which he attributed to the fact his hospital is now doing 70 cases a year instead of 5-10.

But, he said, about two months ago every community hospital in town declared at a regional EMS council meeting that they would be introducing a hypothermia protocol within a month or two, and they demanded to receive all the patients in their catchment area. Their major concern was that EMS would preferentially bring STEMI patients with no cardiac arrest to the post-resuscitation center, because it would be perceived as providing better care (however, this has not happened based on objective data review). Ornato said that at this point in the negotiations, it looks as if Richmond may wind up with one or two other centers—the maximum that existing volume can justify.

David Magid of Kaiser Permanente said that, with respect to STEMI care, the preliminary literature on volume and outcomes indicates that there is a threshold for minimum volume, but the threshold is not very high. He said both small and large hospitals have shown tremendous improvements in door-to-balloon times; this improvement was not only observed in large-volume centers.

The Importance of Public Buy-In

Joseph Waeckerle, editor emeritus of *Annals of Emergency Medicine*, commented that the speakers had forgotten an essential component in designing centers of excellence, and that is the consumer and the public. Unless you have public buy-in, he said, you will have difficulty in your community, your region, and your state.

Waeckerle observed that the public understands the center of excellence

concept. They don't understand the science behind it, but they understand that they or their loved ones may have a better chance to live under this type of system, because these are perishable skills and you want to be able to go to a place that performs these tasks all the time. He cautioned, "When you design your systems, please don't forget the consumer, the public. If we don't educate them, we are going to fail." Bass agreed that the perception of the citizens is a key piece. He said, "It's a piece that we have to use to try to offset the political heat that we get when we try to do these things."

3

Lessons from Other Systems

Workshop chair Arthur Kellermann introduced the next session, entitled "Lessons from Other Systems." He said the previous sessions had explored the concept of regionalization primarily on the basis of conditions or diseases. This session shifts the frame and looks at regionalization from the perspective of systems of care, whether they are large geographic systems or integrated delivery systems.

Session chair Gregory Timberlake, director of the Department of Defense (DOD)/Department of Veterans Affairs (VA) Interagency Program Office and assistant deputy surgeon general for Total Force Integration, introduced the three speakers: Kenneth W. Kizer, former under secretary for health in the VA and former director of the California Department of Health Services; John Holcomb, director of the Division of Acute Care Surgery at the University of Texas Health Science Center at Houston and former trauma consultant for the U.S. Army surgeon general; and David Magid, director of research for the Colorado Permanente Medical Group.

REGIONALIZATION IN THE DEPARTMENT OF VETERANS AFFAIRS

Kenneth W. Kizer said that informal regionalization has been the norm in the United States for the simple reason that there is no health care system. He said if you're going to have formal regionalization, you have to have a system of care. A system can be either vertically or virtually integrated, but it requires that the different types of care facilities and other resources

be connected in a predictable and consistent manner, according to specified expectations. To date, this is something that the United States overall has not had.

However, he said, there have been a number of efforts to institute formal regionalization in the United States that date back many decades. For example, the VA decided to regionalize vision impairment and rehabilitation of the blind in 1948 and spinal cord injury in the 1950s. Other examples include the trauma care system regulations that he wrote for the state of California more than 25 years ago, and the development of Emergency Medical Services (EMS) systems that occurred throughout the 1970s.

Kizer noted that a major milestone for regionalization for non-emergency conditions was a paper by Hal Luft, Alain Entoven, and others that appeared in the *New England Journal of Medicine* in 1979 regarding the relationship between volume and outcomes in cardiac surgery. This, he said, has been a highly controversial subject ever since and is the basis for an ongoing debate about regionalization of cardiac surgery and surgery for a number of other infrequent conditions.

Kizer focused the rest of his talk on the efforts that have been made by the VA to regionalize a number of its services. He noted that the veterans health care system was established circa World War I and is the largest health care system in the country—albeit an anomaly in that it is a national, centrally administered, government-run, and government-funded care delivery system based on a moral or philosophical view that those who have served in the nation's armed forces should not be denied health care regardless of financial status.

He emphasized that the VA is not part of the military health care system—a common misunderstanding—but to be a VA patient you must have served in and been honorably discharged from the armed forces. He characterized the VA as very much of an academic system: 85 percent of VA hospitals are teaching hospitals and 70 percent of the physicians are university faculty members. The VA also has a $2 billion research program.

Kizer said that that many of the reforms that occurred in the VA in the latter part of the 1990s were predicated on the concept of regionalization. During that time, the VA's approximately 1,300 facilities of various types were organized into 22 networks, or regional veterans integrated service networks (VISNs), based on criteria about how to best use its resources to serve geographically defined populations of veterans. However, as mentioned above, regionalization of specific service lines within the VA dates back as far as the 1940s.

Kizer noted that most regionalized conditions in the VA employ a hub-and-spoke wheel model. For example, there are currently 24 very specialized spinal cord injury centers and 134 primary care spinal cord centers within

the VA. Overall the VA serves about 26,000 spinal cord-injured patients each year and it is the largest single network of spinal cord injury care in the nation.

Transplants are also regionalized. In 1995 the VA established a central registry for all transplant patients. To date, more than 15,000 patients have been entered into the transplant registry, producing a significant store of information. Kizer echoed comments earlier in the day regarding the importance of registries for quality assurance and other purposes.

More recently, cardiac care has been regionalized in the VA, and quite recently the system has adopted a regionalized approach to treating multiple sclerosis and Parkinson's disease. The VA has also regionalized traumatic brain injury in concert with both the DOD and the private sector. According to Kizer, stroke has been under consideration for regionalization for over 10 years, but for a variety of reasons it has not yet been formally regionalized. He said he expects it will happen.

Some clinical services are also regionalized, Kizer said, pharmacy being perhaps the best example. There are seven consolidated mail order pharmacies that serve the several million VA patients each year, and this is perhaps the only health care service anywhere that has been documented to consistently operate at a six-sigma level of excellence. Radiology and teleradiology support are also regionalized.

In general, he said, systems of care look to regionalize services for cases that are complex, have a high risk of death or serious disability, and require particularly high-intensity care, usually involving a multidisciplinary approach. Typically, the resources that are needed for these patients—personnel, technology, and other—are in limited supply. Regionalization is a means to optimize the use of those limited resources.

Regionalization can improve quality of care, and it can also be a means to control system costs. What is often found, Kizer said, is that control of cost and control of quality go hand in hand. For example, demonstrated economies of scale have come out of promoting mail-order pharmacies.

Kizer identified a number of issues and challenges that come with regionalization (see Box 3-1). He noted that information flow is often a challenge. This includes information needed to take care of an individual patient or deal with more systematic issues, such as the availability of beds and services and quality assurance. These problems can be difficult to manage, even with sophisticated electronic information systems in place.

Patient and family satisfaction is also a challenge. Regionalization means that not all services will be available in a local area, which means patients are more likely to receive care farther from home and families may have to travel longer distances to visit them. Patients requiring prolonged periods of care may have to stay outside of their usual social support systems for extended periods of time, which is a source of dissatisfaction.

BOX 3-1
Challenges Related to Regionalization

- Information flow
- Patient/family satisfaction
- Social support
- Reduced availability of services in some care settings
- Quality management of a system versus a facility
- Continuity of care in the community
- Impact on training programs
- Financial consequences
- Status and image issues
- Political and community impact considerations

SOURCE: Kizer (2009).

Another significant challenge is managing quality at the system level. System-level quality management, Kizer said, is very different from managing quality at a single facility or a single service within a facility. Data collection requires that data elements be standardized and that many different sources of information come together in a seamless manner, to be shared bi-directionally. Protecting the privacy of this sensitive information requires a more sophisticated and rigorous approach to information security than is generally found.

Kizer emphasized that the financial consequences of regionalization are real. He agreed with earlier comments about the need for a sustainable business model to support regionalization, pointing to the Los Angeles County trauma care system in its early days as perhaps a good example of failing to operationalize this understanding. Another good example of what can happen in this regard is the California Poison Control System that he initiated in the 1980s. This model statewide system is now being dismantled because of the budget situation in California and a lack of non-government support.

Also, he observed that the community perception of a facility that does not receive top-tier designation in a regional system (e.g., Level I trauma center status) can be damaged, and this is often a major concern of hospital directors or boards of trustees. This has implications for these facilities and for the delivery system.

Finally, there are political and community impacts of regionalization that are often not considered. Kizer said that hospitals are always among

BOX 3-2
Lessons from Previous Regionalization Experience

- More difficult and complicated than often expected
- Medical leadership crucial
- Financial impacts often misunderstood
- Quality of care benefits often overshadowed by loss of service concerns
- Importance of cultural issues generally underestimated

SOURCE: Kizer (2009).

the top three employers in a community. If care is regionalized, it will have labor and other implications that go far beyond medical care—and these implications are usually what gets politicians upset.

In summary, Kizer noted that regionalization of care is conceptually pretty straightforward. There are good evidence-based arguments for why it should be established for many conditions. However, in reality, regionalization is anything but straightforward. Regionalization of health care services is much more difficult and complicated than for most other types of services and certainly more complicated than most people understand (see Box 3-2). He added that many of the people in the audience probably have scars from doing this with trauma care, and these would help to prove this point.

Kizer concluded that strong and effective medical leadership is absolutely crucial for regionalization to occur. Regionalization is not going to happen unless there are physicians and other health care professionals leading the effort. The financial impacts are generally not well understood, but often they are what undermine a system. Also, in the public debate about regionalization of care, the potential improvements in service quality typically become overshadowed by the loss of local service.

THE U.S. ARMED FORCES JOINT THEATER TRAUMA SYSTEM

John Holcomb, former commander of the U.S. Army Institute of Surgical Research and trauma consultant for the Army surgeon general, discussed the Joint Theater Trauma System. He said that after visiting Iraq in 2003 to assess the military's trauma system, he briefed the Army surgeon, and told him: "Sir, we do not have a trauma system. Your helicopters are disconnected from your ground units. Your ground units can't talk to any

of the hospitals. Your big hospital can't talk to the little hospital. Nobody can talk to anybody. And when a patient flows through that, quote, system, nobody knows what happens to them when they leave and nobody knows they're coming when they get there." The guidance he said he received from the general was clear: "Go fix it."

He first went and listened to members of the civilian trauma system and asked specifically where they had failed so that the military could try to avoid those mistakes. At that time, the DOD did not have a trauma registry, and that became the initial focus. From the interviews they had learned not to try to capture too many data elements. "If you try to catch too much, then you won't catch anything," Holcomb said. So the system they implemented now tracks about 50 data elements. By 2005, Holcomb said, they had built a fairly functional system, and it has continued to evolve and mature.

Holcomb agreed with Kizer about the importance of information systems and data transfer. At the beginning of the war, he said, the military was relying on written notes on scraps of paper. Those notes were getting lost. People were writing instructions on the dressings of the wounded in order to communicate to the personnel at the next level of care.

Holcomb reported that that has been fixed. Before the registry was complete, medical staff was hanging thumb drives around soldiers' necks to pass information along to the next care facility. Now, the registry database has been instituted across all areas and has more than 25,000 combat injuries collected. "That allows us to do many, many things with a lot of fidelity," he said.

The military has been able to disseminate best practices as it learns what works best in the field. It does not provide prospective randomized data, but it works effectively in combination with experience and opinion. The military has also disseminated clinical practice guidelines and, more importantly, conducted weekly telephone conferences to review cases. These involve providers across the many levels of care, from Iraq and Afghanistan to Germany to facilities in the United States, including Walter Reed, Bethesda, the Air Force hospitals, "or wherever the patient happens to go." Holcomb said they are obviously not doing this with every patient, but "you have to be able to track [patients] and give feedback to people." Telephone conferences also allow the military to communicate best practices to individual providers.

At the beginning of the Iraq war, Holcomb said, the general officers were getting most of their data about care from *The Washington Post* and CNN. The colonels in the military did not have a way to deliver systems data to the admirals and the general officers to help them make good decisions. Holcomb said that within the past year they have added outcomes data to the system and now "We know exactly what happens to these guys." There

is a performance improvement system in place that has become "the feedback mechanism for everybody. That really is what makes this thing go."

Holcomb also described the other components of the military's system, ranging from prevention (better body armor and armor on vehicles) to research. Leadership and communication are extremely important, as is integration with prehospital care. Being able to modify training so that it addresses the issues being seen on the battlefield is also essential. The military is now modifying its training of surgery residents to address the system issues they are finding. "Whatever the issue is," he said, "our system data can inform training very nicely."

Holcomb also discussed the delivery system that transports the wounded from the theater back to the states (see Figure 3-1). An injured soldier goes by ground or helicopter to surgery teams that have been moved "pretty far forward," both in Afghanistan or Iraq. Whereas they used to have two big hospitals in theater, now there is just one.

One of the lessons learned has been to keep the conveyor belt moving and get patients out of the hospitals very quickly. So fairly quickly the wounded are put onto critical care air transport cargo planes and flown to Germany. "It's pretty amazing," Holcomb said, "we've transferred about 10,000 patients that way, with amazingly little loss of life in transport, much like you would expect in any ICU [intensive care unit]. We're able to do all

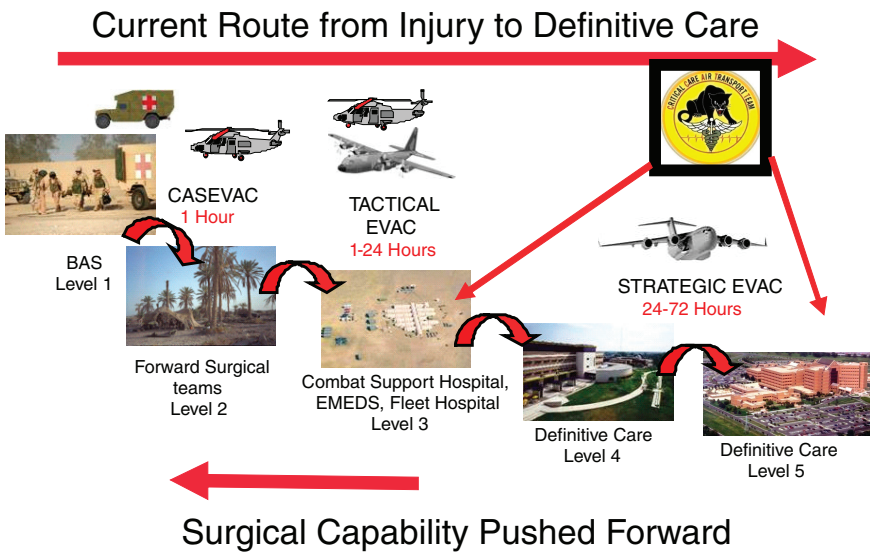

FIGURE 3-1 Care delivery in the military's joint theater trauma system.
SOURCE: Holcomb (2009).

the ICU care . . . that you can do in any civilian hospital anyplace." Patients are also transported by cargo plane back to the United States, "so it's across three continents that ICU care happens," he said.

Summarizing, Holcomb said, "The DOD has evolved an effective system of communication and regionalization of trauma care, which has become the standard of care on the battlefield."

ACCOUNTABLE CARE ORGANIZATIONS

David Magid, director of research for the Colorado Permanente Medical Group, discussed the need for improved systems of care. He referenced the 2001 Institute of Medicine's report, *Crossing the Quality Chasm*, which talked about how patients encounter multiple professionals across multiple different settings. Typically the quality of care provided is limited because of the lack of access to medical records and the poor communication and coordination among providers. As a result, patients often experience poor transitions, and these can increase rehospitalizations for patients with conditions like heart failure.

Magid cited Elliott Fisher, who has developed the concept of accountable care organizations. These are intended to foster shared accountability among providers, rather than dividing accountability among specific settings of care, such as inpatient or outpatient care. The idea, Magid said, is that shared accountability will also support the development of systems such as EHRs [electronic health records] and thereby improve quality and affordability overall.

Many examples of accountable care organizations currently exist, such as academic centers, county hospital systems with clinics, the VA, and integrated delivery systems such as Geisinger, Intermountain Health, and Kaiser Permanente.

Regionalization is something that has been supported for cases such as trauma, stroke, and critical pediatric patients. The data to support regionalization is not always good, but it is thought to improve outcomes and efficiency and reduce waste, Magid said. He proposed implementing regionalization through accountable care organizations.

In preparing for this talk, Magid said he spoke with representatives from 15 integrated care delivery systems across the country and compiled several illustrative patient scenarios based on their experience. He provided three case examples to illustrate the benefits of directing care to accountable care organizations.

He began with a hypothetical patient who was brought by EMS to Elsewhere General Hospital, which is not part of an accountable health care organization. He described the patient as an 80-year-old male with vomiting and confusion. The patient's medical records are unavailable. The workup

reveals the patient has a urinary tract infection and he is treated with IV fluids and provided Cipro. He returns to his baseline minimal status and is discharged. However, the patient returns one week later with an upper GI bleed resulting from an interaction between the Cipro and the Coumadin that he was also taking.

Magid said that if the patient had been brought to Accountable General Hospital, his medical records would have been available. The treating physician would have been alerted that the patient was on Coumadin for a valve replacement and instead of Cipro he could have prescribed a different antibiotic.

A second example is a 50-year-old female brought in with chest pressure. Again, the patient's records are not available. The patient is anxious. The physical exam for the patient is normal and the electrocardiogram shows nonspecific changes and initial troponin is normal. The patient is admitted overnight. She experiences chest pain and is treated in the cardiac catheterization lab. The results of the catheterization are normal.

Magid said had this patient been brought by EMS to Accountable General Hospital, medical records would have revealed that the patient has had multiple visits for chest pain. A stress test was conducted six months ago and the readings were found to be normal, and a catheterization had been performed three months ago and was also shown to be normal. Rather than admitting the patient, she is reassured and discharged with instructions to follow-up with her primary care physician.

The third case is that of a 45-year-old male with cough and shortness of breath. The patient is brought by EMS to Elsewhere General Hospital and a chest x-ray shows a left lower lobe infiltrate. A complete blood count (CBC) test reveals a hematocrit of 30 percent. The physician prescribes antibiotics appropriate for the community in which they practice and advises the patient to follow up with his primary care physician for evaluation of anemia.

The patient does not understand the explanation and never follows up. A year later the patient presents with weight loss and fatigue and is diagnosed with stage III colon cancer. He has surgery to remove the tumor and affected nodes and then is treated with chemotherapy and radiation.

Had the patient been brought to Accountable General Hospital, the physician might have noted the anemia and sent a priority message through the health record to the primary care physician. The patient might have then been scheduled to receive a colonoscopy within a month, where stage I colon cancer could have been revealed. That would have been removed and no other treatment would have been required.

Magid said that these types of scenarios happen every day in institutions across the country. He said he is hoping that part of what comes out of this conference will be an endorsement of the idea of patient transports to accountable health care organizations.

AUDIENCE DISCUSSION

Joseph Waeckerle, former senior advisor to the U.S. surgeon general, said that the three panelists each work within a unique, self-created system. The VA by its very design has been a closed regionalized system since its inception. The DOD has theaters of conflict which have created a need for regionalization. The Kaiser network is a proprietary system that starts with the insurance policy but has extended all the way through the continuum of care to wellness.

Waeckerle said that the panelists had been visionary and innovative, but "you still have closed systems [and] you had a head start on the rest of us." He said that taking those types of systems nationwide to 305 million people, who have a multitude of needs in different disease areas and extremely differential abilities to pay and insurance coverage, is challenging at best. The general health care system, he said, includes a public system and a private system, and there are rivalries among the proprietary systems within communities.

He asked how the panelists see their closed systems integrating into America's system and what lessons learned they could bring, given the advantages of the systems they have had to work with.

Kizer replied that the term "American health care system" is a misnomer. There is no system, and that is the crux of the problem. He said "the ability to do some of this within, quote/unquote, closed systems is really due to the fact that they were systems." It is not impossible to replicate, he added. He cited a neonatal intensive care system that he helped to establish in the private sector in California. He said this is a specialized area, but the system has been in place now for 25-30 years.

Kizer called the early days of the trauma care system in Los Angeles County a good case study of what not to do. When initially setting up its trauma system in the early 1980s, the Los Angeles County Board of Supervisors chose not to abide by expert advice. They allocated trauma center designations to essentially every hospital that wanted it and could meet key criteria. The hospitals appeared to believe that designation would result in a lot of new paying business. "Very predictably," he said, "things did not work out this way." Over the next decade, many of these hospitals found that they could not afford to continue to be trauma centers, and one by one they went out of the trauma business. There are now 12 trauma centers, down from 21. At the time we had said that about 11 would be needed. Kizer concluded that when you have a collage of facilities that are financially driven and are not part of a system, "it is a prescription for what we have today."

Holcomb noted that the DOD system was designed based upon what worked well and what did not work well in the civilian system. There are great lessons to learn, he said. Fundamentally, he observed that "data does rule, and quality is absolutely the bottom line."

He said that the system measures quality and presents the information through dashboards. He said those who run the hospitals and have the money really pay attention to those outcomes. "Politically," he said, "they cannot afford not to."

Alternatives to Centralization

John McKurson, an emergency physician at the University of Maryland, said he was struck by Colonel Holcomb's slide showing all the patients flowing to a central point outside of the theater that was able to take them all in. McKurson said that his institution is now overwhelmed with patients, to the point that staff have had to board patients in hallways. He argued, "if [patients are] always coming to a central location, you are really creating a system that may be overrun at that location, unless there is some design within that that allows you to push people back," for example through transfers back to the smaller hospitals once the acute condition has been treated. Also, McKurson said, "If you have it all flowing to the center . . . there may be some degradation of the outside resources if they are not supported." He asked, "How do you see the regionalization being able to support the areas that are referring to it and how are you going to flow the patients and provide for those other resources?"

Holcomb replied that "I could not agree with you more." He said, "you must maintain capacity across the system . . . if you take all the patients out of those hospitals, they may become non-functional and they can no longer help you take care of patients because they lose the capability—whether it's the nurses, equipment, or the docs. The administrators certainly lose the desire to admit those patients."

In the military, Holcomb continued, we actually did something similar where all the patients were coming out of Germany and landing on the east coast. We quickly decided that wasn't very smart, because it overwhelmed the receiving hospital. A lot of patients got redirected to some capable hospitals more in the center part of the United States.

Holcomb reiterated, "I could not agree with you more. You must maintain [other facilities] not just to offload from the central [location], but to make sure all the other sites remain capable not only on a day-to-day basis but in a surge capacity."

Post-Acute Trauma Care

Ellen MacKenzie, a panelist from session one, said we've shown we can save lives by regionalizing trauma care and we spent a lot of time this morning talking about that. But it's also important for us to remember that one major study showed that among 2,500 people who were working up

until the time of their injury, only a little over 50 percent got back to work within a year of their injury. We have not yet developed a regionalized system of trauma care that truly addresses the issues of continuity of care and post-acute care, or that addresses getting people back to work and having a good quality of life. So while we have developed great models of trauma care in the civilian world and even more so in military, we still haven't fixed the problem of what happens after patients leave the trauma center or the trauma system, she said.

Kizer noted that the VA system has nurtured vocational rehabilitation, job training, and other dimensions of care as a key part of their regionalized approach. MacKenzie acknowledged their work in those areas.

Reducing Overtransfers and Diversion Rates

Sabina Braithwaite, an emergency physician at the University of Virginia and a member of the Emergency Care Coordination Center (ECCC) staff, said that she is a clinician who has been on the receiving end of overtransfers from outside hospitals. She asked the panel how they would recommend decreasing some of the variability in the entrance points of the medical system. She said she can predict, based on who is working at the outside hospital, whether she can expect to receive every single one of their patients—even when the level of training is the same—or whether the person will be able to manage their own affairs.

Braithwaite asked whether we need a transfer center staffed by a physician to help facilitate these issues and a system to monitor outcomes to ensure that the patient gets married up with the right level of expertise.

Holcomb replied that in Houston what they've done is to go back to the individual hospitals and talk to the chief of staff and others. The problem, he said, is that many people moonlight in emergency rooms. It's hard to get at that added variable, but he said they are able to show the outcome of what is happening. If the referring hospitals send a bunch of patients and the receiving hospital says yes to everything, its diversion rate will increase significantly. Holcomb said they are able to demonstrate that. "We tell them, here's the outcome of what happens from a systems point of view. If there are 20 feeder hospitals, we show them that all they had to do was admit one more patient a day and the diversion rate changes from very high to very low. They understand that this means when they get a really sick patient, we will be able to take him."

Holcomb said that this approach has been effective. His facility's diversion rate has gone from very high to just 1 percent by using feedback, performance improvement measures, and a system approach. He added that the personnel in these other facilities are smart and they work hard. They face legitimate issues where they are, and these are different from the ones the receiving hos-

pital faces. But, he said, when you provide feedback and show the implications of their decisions, it is possible to modify their behavior.

Recommendations for Federal Dollars

Kellermann asked the panel if they had any specific recommendations for the federal officials in the ECCC who will be drafting the request for proposals (RFP) in support of regional programs across the country that hopefully will be supporting progress toward the IOM's vision of regionalized, coordinated, accountable emergency care systems. Specifically, he asked, how would you recommend that they make strategic investments to enhance and improve regionalization?

Kizer responded that the choice of terms is the right one: it's a fiscal issue and it's an investment. The government controls the purse and it is possible to radically change hospital and individual physician behavior based on how funds are allocated, even very small amounts of funds.

Holcomb agreed but said he would add the dashboard of quality concept. Those dashboards are extremely helpful when they contain specific, well thought-out, clinically driven, and vetted quality indicators, he said.

Magid noted that the issues he had raised are not really financial. He noted that Seattle has an extraordinarily well-coordinated EMS system across all of King County. Patients get to where they are supposed to go, because the system is not fragmented and ambulance transports are not tied to a specific hospital. He argued that if we could establish more well-coordinated EMS systems that are organized and implemented across entire metropolitan areas, the problems that we see in other areas would go away. We need better organization of the EMS system as a whole, he said, rather than a collection of fiefdoms.

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Regionalization: Potential and Pitfalls

Jon Krohmer, principal deputy assistant secretary and deputy chief medical officer of the Office of Health Affairs at the Department of Homeland Security, served as session chair for the final panel of day 1. The session focused on the potential and pitfalls of regionalization. He noted the landmark National Academy of Sciences publication *Accidental Death and Disability: The Neglected Disease of Modern Society*, published in September 1966, and cited the following quote: "The patient must be transported to the emergency department best prepared for his particular problem. Hospital emergency departments should be surveyed to determine the number and types of emergency facilities necessary to provide optimal emergency treatment for the occupants of each region. Once the required numbers and types of facilities have been determined, it may be necessary to lessen the requirements at some institutions, increase them in others, and even redistribute resources to support space, equipment, and personnel in major emergency facilities." Krohmer observed that we are still struggling with many of the same issues that were raised in that report over 40 years ago. "We have made some progress," he said, but "we still have a little ways to go."

FINANCING A REGIONAL HOSPITAL FROM A LOCAL TAX BASE

The first panelist was Ron Anderson, president and chief executive officer of Parkland Health & Hospital System in Dallas, a large regional hospital and a Level I trauma center that is funded by a local tax base. Anderson acknowledged that it's tough to explain to ad valorem taxpayers how they're funding an entire region. He indicated that there is a free rider

problem with other local counties, where the prevailing sentiment seems to be: "Why buy a cow when you can get the milk for free?" He noted that "we are surrounded by counties that don't have public hospitals any longer; they have sold them. The market really rules in Texas, and that's a big problem at times." His county commissioners often express interest in closing down the county's borders.

Parkland spends $125 million a year to fund a faculty, pay doctors, take on the high volume of low-income patients on a regional basis, as well as the low volume of high-cost patients (e.g., HIV and cancer), and absorb the cost of medical education and clinical research and development. Parkland's expense budget exceeds $1 billion. Anderson said it has been able to stay afloat because of volume—it has about 4,000 Level I activations per year. He noted they were recently named the best hospital in a cohort of 24 academic hospitals for trauma, based on severity-adjusted mortality rates.

"Planning" became a bad word in Texas years ago, he observed, when there was an effort to ration computerized axial tomography (CAT) scans and other health resources through a certificate of need process. Planning is now viewed as akin to socialism. But, Anderson argued, "We need to plan like we've never planned before to deal with border issues" (including county, state, and national borders). He said the local politicians don't realize that H1N1 flu won't read any stop signs or abide by any borders, nor will F5 tornadoes, or cases of major trauma. But, he said, the potential to work together and find better ways to organize is out there. "We could easily sew the state together in a quilt . . . and have regionalization fairly easily, if we had the desire to do so and the funding to do so, and if we weren't so dependent upon local taxation."

But, Anderson said, a real funding strategy is lacking. The counties have talked about establishing regional taxation at tiered levels to be able to handle stand-ready costs. Anderson said these costs are "very, very burdensome for us to deal with," because it means you have to be ready for whatever comes in the door, 24/7, whether you get patients or not." However, Parkland has now reduced its excess capacity to the point that it cannot take care of heavy surges in demand.

Anderson reported that there is also a lack of providers. Parkland is short on primary care doctors, trauma surgeons, orthopedic surgeons, and others. This is partly due to "huge holes" that exist in current Emergency Medical Treatment and Active Labor Act (EMTALA) rules, which allows providers not to take call in their subspecialty (although they can decide to come in for paying patients).

Letting the market decide is a "big pitfall," Anderson said. "If the market decides, folks, we are really in deep trouble." You may not trust your government, he said, but if you trust the market, or insurance companies, or other self-interested parties, "you are in worse trouble than you even know."

Anderson spoke of the "Friday-night syndrome," in Texas, referring to weekly high school football games between neighboring towns that are extremely competitive. In those cases, he said, "you don't work together, you're not collaborating at all, but you're competing a lot." A big problem is the need "to take down some of those parochial walls and work together for the good of our communities, rather than thinking we have to be the best in everything. Somebody has to be a Level II," he said, and "somebody has to be a Level III. That's one of the biggest problems we have."

REGIONALIZING RURAL PREHOSPITAL CARE

Nels Sanddal, president of the Critical Illness and Trauma Foundation in Montana and a member of the 2006 Institute of Medicine (IOM) Committee on the Future of Emergency Care, discussed the provision of rural prehospital care. Sanddal said that in rural America, much of the prehospital staffing is provided by volunteers. In Montana, for example, about 85 percent of the 5,000 responders are classified as volunteers. Some may receive a degree of compensation, but by and large this is an avocation, not a vocation, for these people.

In rural America, Emergency Medical Services (EMS) is often subsidized through the tax base, but the largest subsidy, Sanddal noted, comes from volunteer labor. If you had to pay those people to ensure ambulance coverage 24/7, it would be costly. The inability to transition to a paid model is based on a fundamental flaw in the payment reimbursement system of the federal Centers for Medicare & Medicaid Services, which is that payment is based solely on patient transport. Payments are not made based on treatment provided or for recognizing that a transport may not be necessary.

The EMS Agenda for the Future, released in 1996, advanced the idea that prehospital providers could support public health and community health functions. That concept is taking hold in other countries, where prehospital providers are being asked to assist with services such as chronic disease management and public health services such as inoculations, rather than receiving a paycheck for sitting idle 90 percent of the time. However, Sanddal observed, these models wouldn't work under the current payment structure in the United States.

Also, Sanddal noted that as EMS systems evolved in this country, there was really no forethought or planning as to where EMS agencies would be located. In fact, these systems grew up organically—"they basically sprung up wherever somebody planted a seed," Sanddal said. Now, many of them are fighting just to survive. For most rural EMS agencies, the metric used to measure success, is: "Can I get an ambulance out the door tomorrow between the hours of 9 to 5 with a full tank of gas and two people on the vehicle?" Some of these agencies do not always provide service that

is in the best interest of the patient, he said. Sanddal observed, "Some of those agencies are clearly going to have to go away." But part of the way we can cover the geographic holes that may develop, he said, is through regionalization.

At a recent conference Sanddal attended, a person in the audience said she was from an agency that does just 12 EMS runs per year. She said that if they are able to get an ambulance out of the garage in 20 minutes, that would be a great response. But when asked whether they would allow that agency to shut down to allow for a regionalized response, she said they would probably reply, "we can't, we won't, because they're not going to care about our people the way we do, and it's going to take longer to get there." He said this is largely an issue of community identity.

Sanddal said that typically the word "regionalization" is equated with things being taken away. If you have a regional airport, or a regional train station, or a regional grain elevator, it means that the local stuff is gone. So regionalization of EMS or emergency care should emphasize an inclusive model.

Sanddal concluded that emergency care cannot be fixed until there is leadership at the top. Somebody has to say: we need EMS agencies at these locations, supported by regional advanced life support (ALS) and regional interfacility transfers. They will need to employ both carrots and sticks to make this type of system work.

DILUTING PARAMEDIC EXPERIENCE

Michael Sayre, associate professor of emergency medicine at Ohio State University and chair of the American Hospital Association Emergency Cardiovascular Care Committee, said that the various systems of critical care we have heard about today—percutaneous coronary intervention (PCI) for ST-elevation myocardial infarction (STEMI), trauma centers, stroke centers—all rely on the fundamental premise that we can improve clinical outcomes by having experienced providers take care of patients. That is, if we concentrate patients in a relatively small number of centers, clinical outcomes will improve, because when you do the same thing over and over again, you get better at it.

Contrast that with what has happened in EMS over the past 15-20 years, Sayre said. "We have dramatically ramped up the number of paramedics that we have taking care of patients." In fact, many communities now have all ALS systems and paramedics on every fire truck. However, he said, "We have some evidence that that may not have been the optimal way to design the system. Even in rural areas this is somewhat of a problem. We have providers who just aren't getting the kind of experience that we need them to get in order to provide optimal care for patients."

What is the optimal balance? Sayre said he viewed this as a curve. "If you get somebody [to respond] right away, but they don't have a clue about what they're doing, well, that is not particularly a good thing. And if you have to wait until tomorrow to get somebody who does know what they're doing, well, that's not a good thing either. So somewhere in there is the optimum. The trick is figuring that out."

He said a paper soon to be released shows that in King County, Washington, cardiac arrest outcomes are better if the care team consists of more experienced paramedics. King County paramedics are already more experienced than paramedics in most other places, because they have less than one tenth the number of paramedics per 100,000 population than other cities. But the study will show that senior paramedics with 10-15 years of experience have better patient outcomes. By then, they have taken care of hundreds, perhaps thousands, of cardiac arrest patients and the effect is observable.

Still, he said, we don't know what the optimal point is. We need to pay attention to this as we redesign the systems. We should track whether the EMS system is delivering care by providers who have enough experience, making sure the paramedics are kept relatively few, and the tradeoff that may occur with slightly longer response times.

ADDRESSING SUBURBAN ACCESS CHALLENGES

Dennis Andrulis, associate dean for research and director of the Center for Health Equality at Drexel University in Philadelphia, discussed regionalization in the context of the demographic and sociological trends affecting suburban America. Andrulis noted that some of the greatest population growth is occurring in the suburban areas surrounding large cities and that these areas are also seeing some of the greatest increases in poverty. These trends conflict with where the centers of excellence have been placed for regional emergency and trauma care centers.

Andrulis cited Houston as a good example. The city has 5 million people and two trauma centers, both located downtown. He asked, "What can be done to advance the care for those in the surrounding areas?" Some hospitals are expanding to more affluent suburbs, but access is much more limited in high-poverty suburbs. While 26 percent of the people live in the wealthiest suburbs, those wealthy suburbs have 60 percent of the Level I and II trauma centers, he said.

He argued that the issues around access are becoming more significant and they are affecting both the city and the greater metropolitan area. They have implications for exurbs (small, usually prosperous communities situated beyond the suburbs of a city) and rural areas as well, both in positive and negative ways—positive in that suburban capacity can be used to provide a link to these outlying areas, but negative in that, whereas there are

growing populations in these areas, hospitals are making market decisions to move to the rich suburbs in order to make money, essentially abandoning the poor suburbs and inner cities.

Andrulis suggested a number of steps to address the problem. Federal and state leadership is needed to support providers and communities in creating regional systems that connect and traverse these urban, suburban, and rural areas. A viable health safety net should be developed and maintained in underserved areas, since the suburban poor often face the longest distances to trauma centers and emergency care. As part of a broader regional strategy, suburban facilities should be explicitly included in transfer protocols, referral networks, and a centralized inventory of emergency capabilities.

With regard to emergency practitioner capacity, suburban specialists should be given financial or other incentives to participate in emergency care systems. In addition, the National Health Service Corps could encourage medical professionals specializing in emergency care to practice in these areas. Greater efforts should also be made to link the expertise, staff, and resources of urban emergency departments (EDs) and trauma systems with the facilities in suburban areas. For example, interpreter services and protocols, which are more established in central cities, are likely to be required in many of these outer areas, and so should be integrated into the greater regional network. That way, less experienced personnel can tap into and benefit from lessons learned and resources in central cities.

Finally, there should be recognition that emergency and trauma systems do not work in a vacuum. They should partner with public health, environmental health officers, and communities, to bring about change that is related to a range of issues, such as urban sprawl and transportation systems, that are likely to directly affect the patients who trauma systems and emergency care facilities will address. Andrulis recommended being proactive in addressing these issues.

DISTRIBUTION OF SERVICES TO OUTLYING AREAS

Stephen Epstein, a practicing emergency physician at Beth Israel Deaconess Medical Center in Boston, talked about geographic access and some of the distribution issues involved in regionalization. He said that in Boston there are now five Level I trauma centers—more than there are in many states—and the city is truly a medical Mecca. But there have been efforts to transfer some of that knowledge base and some of the procedural capabilities out to the surrounding communities and to the more rural areas of Massachusetts.

Epstein provided two examples: interventional cardiac catheterization and stroke centers, but, he said, these have been regionalized in very different ways. He explained that interventional cardiac catheterization was very

tightly controlled until about five years ago. To be authorized to do interventional cardiac catheterization, you also had to be able to do a coronary artery bypass graft (CABG)—but to do a CABG you had to be a major tertiary center. As a result, there was very little interventional cardiac catheterization being done in Massachusetts outside of the three major cities.

What the Level I trauma centers did was develop partnerships with some of the local community hospitals that were farther out. These are tightly controlled partnerships and backup catheterization is often only a half-hour away. But they have now been able to move interventional cardiac catheterization out to the suburbs and into the communities, thereby increasing the availability of this relatively high-tech procedure to a much broader group of people.

The approach taken for the stroke centers has been very different, since the diagnosis is not as procedurally based. In this case, all that is needed is a neurologist, a CT (computed tomography) scanner, and TPA (tissue plasminogen activator). Epstein said that of the 73 emergency departments in Massachusetts, 70 are designated as stroke centers. All of these have CT scanners and TPA, and, with telemedicine, essentially all of them have neurologists.

This allows stroke patients to receive TPA in a more timely manner. However, Epstein cautioned that post-TPA care for these patients typically takes place at tertiary centers, so that requires additional transport, more time, more money, and more care transitions. He said the care being provided now is probably better overall, but it is probably more expensive as well.

Epstein also brought up emergency department crowding. While the outflow of patients from the emergency department is the major contributor to crowding, he said that one of the things that we have thought about doing with regionalization is working on the inflow of patients. Massachusetts eliminated diversion as of January 1, 2009, and there has not been an ambulance diverted in the state since then. That may have caused some crowding in some hospitals. He asked whether diversion is necessarily a bad thing or whether it might be considered an important safety valve that should be more effectively managed.

Boston's 9-1-1 system is centralized—there is one ambulance service for the entire city. But he asked whether the service could be improved if, instead of those ambulances circling around the community trying to find a place to land, there was a real-time, centralized dashboard providing information about centers that are open for the specific diagnosis.

Finally, he argued that health care is a market failure. The people who demand services have no idea what the actual costs are. That is a good thing in terms of patient care, but it means that supply and demand do not work together, as they did in Economics 101. Attempts to regionalize hospital

services in Massachusetts are sometimes hindered by patients' desires to be treated at an academic medical center, which may be more expensive for procedures that might be commonly done in a community hospital. To attract patients, community hospitals often invest in expensive equipment (e.g., MRI [magnetic resonance imaging] scanners) that see relatively little use. So the government may need to take steps to restructure the market or it may need to reexamine the Medicare payment system, which currently reimburses providers based on the number of resources used, not the value of those resources.

A SURGICAL SPECIALIST'S PERSPECTIVE

Alex Valadka, chief of adult neurosciences at Seton Brain and Spine Institute, represented the perspective of surgical specialists. He said that they are not on the front line to the degree that nurses, paramedics, emergency physicians, and trauma surgeons are, but "at the same time, you need us," Valadka said. "The system is not going to function well without us." He observed that "We don't have to wade through 50 headache patients a day to find the one who has a ruptured aneurysm, but someone has to take care of that aneurysm when you do find that patient." Also, he noted that surgical specialists often cover multiple hospitals rather than just one, which can provide a different perspective.

While many people have said that medical facilities are not able to reach their specialists—the neurosurgeon, the orthopedic surgeon, the plastic surgeon—he said, "by and large, I think the system is working." Some have said that systems are being held together with spit and chewing gum, but most patients do receive care. He agreed with Anderson that it's hard to get specialists to work together in some places. But it can also be hard to get hospitals to work together. There are multiple turf issues among hospitals within communities, and they often seem intent on serving their own interests more than those of their patients.

Valadka noted that an earlier speaker mentioned that we have focused on Level I and Level II trauma centers almost to the exclusion of the Level IIIs and Level IVs, and Valadka agreed with the comment. "We don't need to fill up the Level I trauma center with every patient who's awake and alert with a tiny little bit of acute blood in his or her head," he said. "Yet that is what often happens." He said that in a perfect world that patient would show up at an outside emergency department, a CT scan could be viewed through telemedicine, there would be a discussion with the physician, and the patient would stay in the original location. If the patient were one of the few whose condition does deteriorate, he or she would be immediately transferred to the larger tertiary care center. "That is probably not going to happen anytime soon, but I think that is one goal we can all certainly keep

working towards," Valadka said. "We have heard that regionalization does not equal centralization, and I agree that we cannot dump everything on the main tertiary care center."

Effective regional coordination often "does not exist," Valadka added. He has seen the two trauma centers in Houston that Andrulis had mentioned when "one was just getting hammered with patients stacked up three deep in a hallway on stretchers." Meanwhile, "the place right next door was half-empty and there was nothing going on in the OR [operating room], and ICU [intensive care unit] beds were not being utilized."

In Houston it is commonly said that we need another Level I trauma center. His response is always "Why don't we get better use out of all the existing trauma centers we have before we try to build a third one?"

Regarding the problem that sending hospitals are pushing too many patients to tertiary centers, Valadka said that EMTALA and other laws were created because receiving hospitals often refused patients for not very good reasons (such as having no insurance). Now the situation has completely reversed itself, and tertiary and quaternary hospitals automatically take everything they receive because they know they're being policed. But, he said, "A lot of the stuff that is being sent is not really very appropriate."

AUDIENCE DISCUSSION

Session chair Jon Krohmer began the discussion period by asking the panelists to assess why it seems that regionalization has worked in some cases but not in others. Anderson noted that at the time Parkland became the first Level I trauma center in the area, many other hospitals "did not want certification or verification, they did not want to be a number two or a number three, and they didn't see a financial reason" for participating in a system. He said they were operating under proprietary business models and were not necessarily focused on the best interests of the community. Later, they began to see that it was in their interests to join a regional system but they were not going to be forced to do it. Their primary focus was on competition, not cooperation.

Anderson agreed with the earlier comment that regionalization is associated with things being taken away. One local physician had remarked to him, "I send people to Parkland, because you'll send them back. I don't send them close to Abilene, because they'll keep my patient." Anderson reiterated that for many people regionalization is something of a bad word.

Once the focus shifts to quality improvement and saving lives, Anderson said, then things can happen, and they happen quite naturally. But, frankly, he said, "it is not necessarily a very good business model."

Epstein observed that the United States has not adopted a model similar to single payer in Canada or the employer-based system in Germany. In fact,

reaching a consensus on a system here may be an unrealistic goal. The real challenge, he said, may be to develop a system of regionalization flexible enough to allow for variation. This gets to be very complex, he said, and it is a very challenging problem. But the bottom line is you either have to move the system to the population or the population to the system.

Regionalization is not black or white, Valadka said. It's gray and it's disease-specific. In the world of neurosurgery, patients are often de facto regionalized, because neurosurgery has become such a highly specialized area with a limited number of providers. Plus younger physicians nowadays have a focus on lifestyle issues that makes providing specialist coverage more difficult.

Responding to an earlier point, Valadka said that in some communities the problem is not holding on to the patients inappropriately, it's not being able to get rid of them. Often, there is no place for (non-resourced) patients to go. "On the other hand," he said, "if that same patient has resources, they're going to be in a rehab facility tomorrow, no question."

Sanddal said that he's had the pleasure to serve with the Trauma System Evaluation and Planning Committee and has examined more than 20 state trauma care systems from a high-level perspective. He said the systems that are the most mature have two or three outstanding features. First, they have strong medical leadership that is willing to stand up, take on criticism, and help resolve issues among the various facilities and agencies. In addition, they have legislative authorization, and this authorization is actually enforced. Many states have rules on the books, he said, but when it comes down to it, they are not applied.

Turning to the issue of financial self-interest, David Boyd, former national director of the federal Office of Emergency Medical Services System asked the participants to consider a public utility model. He said such a model has benefits and it should not be viewed as socialized medicine. It is grouping hospitals organizationally in a way that gives them a kind of quasi-governmental status. This can be used to leverage real effectiveness. What we have now, Boyd said, is a situation where hospitals can opt out at various times of the day or seasons of the year, or for various other reasons. He said, "Nobody can manage that. I don't care what kind of leadership you have, that is unmanageable." He argued that a public utility model can be self-regulatory and self-determining. Anderson supported the public utility concept.

Krohmer asked the panel whether the regional boundaries established by a state for its trauma system will necessarily be the same as the regional boundaries for cardiac, stroke, and pediatric care systems. He asked whether a state could potentially have six trauma regions, five cardiac regions (that cannot be superimposed), and four pediatric regions (that also cannot be superimposed).

Epstein said that procedural specialties for the more cognitive diseases,

such as stroke, can be greatly dispersed, but the procedural disease processes require a greater degree of centralization. He said there will naturally be some variation.

According to Valadka, the shape of regions will definitely depend on how they are constructed. These boundaries should be based on existing referral patterns and where the tertiary/quaternary centers are, he said. If the boundaries are determined politically, they may not bear any relationship to reality.

Which Services Should Be Regionalized?

Joseph Waeckerle, editor emeritus of *Annals of Emergency Medicine*, asked, "When you are talking about regionalization, what are you going to regionalize?" He said he presumes that the list includes trauma, cardiovascular disease, and pediatric disease, but what about neurosurgical disease, or ear, nose, and throat (ENT) emergencies, or behavioral health and psychiatric disease? "Are we going to have a center of excellence and a regionalization system for everything?" he asked? "If so, how are we going to justify that? Which should come first, the regionalization or the research? Then the question becomes, who will organize the regionalization? How is it going to be done and where is it going to be done?"

Waeckerle said the centers of excellence in his area are divided into public and private, and the private facility is "pretty damn proprietary. They don't want to be even talking to each other." When you start talking about integrating them with the university, you start to get into town-and-gown issues. Then there are some people in Missouri, who will have to go to other parts of the state, and some will have to go into Kansas—where we still have a border war from the Civil War.

Then, Waeckerle said, we have to deal with the physicians and the divisions that arise between the ivory tower university and the real world. There are the practical issues of how patients will be transported. Most rural communities are poor, and 60 percent of the EMS personnel are volunteers. They don't get paid. They often can't maintain their perishable skills. And it's a long ride from Sikeston, Missouri, to any medical center.

Waeckerle cautioned, "We ought to begin to consider these issues when we talk about regionalization." Regionalization is not going to work for every one of the 23 specialties and every type of disease there is, he said. "People don't want to go out of their communities. They don't want to lose their doc. They don't want to be away from their family. They don't want to go hundreds of miles and then have to figure out how they are going to do follow-up in the future."

Handrigan replied, "I think the questions you raised are exactly the right questions." If the framework is regionalization as centralization, he

said, "Your comments are right on. I don't think that [model] would work." However, he said, if we frame regionalization as partnership development at the community level and make it about finding ways to make the best use of existing resources, then we won't have patients traveling 50 or 60 or 200 miles for care. But "We do need to think about those things in advance," he agreed.

We need to find a way to regionalize emergency care services, Handrigan continued, without disturbing the existing safety net. In part, that means reaching out to the specialists and surgical subspecialists, but it also means reaching out to the primary care providers, because many people are utilizing emergency care services for primary care issues. We need to talk to primary care folks about what regionalization means to them and how we can all do this successfully together.

Anderson said, "I don't think you are going to find regionalization schemes that will work equally well everywhere. A lot of it depends upon relationships." He added that Parkland is becoming an integrated health care system of its own—for example, by putting primary care clinics and subspecialty clinics in high poverty areas and providing chronic disease management. However, he noted, there is also interdependency among the facilities in the region. Parkland performs 70 percent of the major trauma, but if others, such as Baylor and Methodist and Children's, didn't also do trauma there would be much too much for Parkland to handle. "So we work together and we collaborate." He said, "If something bad happens and we catch a cold, [then] they're going to get at least a cold too, [perhaps] pneumonia. So we've got to work together." Still, he said, regionalization is not easy and it cannot be applied to every disease.

Sanddal said if we can reach a conceptual agreement that we all live under a large emergency care tent, then the referral patterns for the specific diseases can be overseen, and quality can be assured through a larger process. One of the strengths of Maryland's system, he said, is that it manages everything out of this large tent model. He argued that trauma care systems made a critical error in their early years when they became exclusive systems. He said we now know that they need to be inclusive for many reasons, not least of which is the need to get buy-in from all the resisters, including other facilities and also EMS agencies that feed patients into those systems of care.

EMS Liability for Hospital Bypass

Andrew Roszak of the Emergency Care Coordination Center said that regulation of EMS is largely a state function and these regulations vary considerably across state. In cases where the nearest hospital is across the state line, EMS provider licenses differ in terms of what they allow. He observed that "a lot of the states have dealt with that issue but some have

not." Similarly with treat-and-release programs—there are a number of states that have not given proper legal authority for paramedics in the field to do this.

As we look at regionalization, Roszak said, there are liability issues associated with bypassing the closest hospital. If the closest hospital tells EMS to transport to the next town over, but then something happens to the patient en route, that could result in liability for both the ambulance provider and the hospital. Some states have addressed this in state law and have created some immunity provisions, but several states have not, so it is definitely an issue that needs to be examined. Roszak said there have also been troubling court cases dealing with EMTALA. If EMS personnel working for a hospital-owned ambulance company call to consult medical control and are told to take the patient to a different hospital, [then] that could be considered an EMTALA violation.

Finally, Roszak asked, if all of a sudden the standard operating procedures of transport to the hospital in your town change and EMS are instructed to transport to a facility that is an hour away, what happens if that fire department or ambulance service gets another call during that time? If there are no mutual aid agreements in place and a bad outcome ensues, will there be liability because the town was left exposed?

Sanddal responded, "I actually think that regionalization reduces liability." He said one of the reasons it does so is that it is driven based on best practice. He pointed to the National Highway Traffic Safety Administration's effort to develop best-practice strategies in the EMS environment and declared that if EMS are following those best-practice guidelines within a systemized regional approach to emergency care, "I think our immunity is much greater than it is if we're just doing whatever the doctor on the phone tells us to do today or tomorrow or the next day. Bass agreed, saying that for inter-facility transports for patients with time-critical conditions, EMS personnel are exposed to liability unless they make transport decisions based on clear, published guidelines for the region-wide system. Otherwise, they face tremendous liability exposure for long-distance transfers.

Workshop chair Arthur Kellermann closed the first day by saying he wanted to challenge the members of the audience to think about how we can narrow down the issues that had been discussed over the course of the day and figure out how to move the ball forward and make a difference. He asked: "What are the actionable, concrete strategies that we can develop to move this topic forward?" Noting that the problem is clearly very complex, he said, "We need to start pruning the tree back" and looking at things we can do to make a difference.

Kellermann emphasized that the boundary surrounding this topic is the expeditious management of time-critical emergency conditions. These conditions may have taken decades to develop, but they can unfold over

minutes. He asked, "Are there regional strategies that we can take to make a difference for that child, or trauma victim, or stroke case, or whatever it may be? How can we do that in the most efficient and effective way?"

EMTALA Regulations

Rick Wild of the Centers for Medicare & Medicaid Services (CMS) said that as a regulator, he is aware that EMTALA may have negative connotations for some providers. However he noted that when hospitals offer services and advertise that they are, for example, a neurosurgical center of excellence, or that they have surgeons on staff, but nobody is taking call, that is a problem and it is something that CMS can help address. He said that while CMS does not designate specific physician call schedules, they require that hospitals demonstrate that they have a system in place. The hospital board needs to ensure that that hospital has coverage for those specialty systems.

Wild said that CMS regularly reviews these issues. For example, to follow the point that Anderson raised, when CMS finds out that a surgeon is coming in to see their own patients in the emergency department but is not available for emergency call, that can present a problem. However he said they carefully examine each unique situation, because they understand that in some cases physicians may have to see their hospitalized patients but still do not take call.

EMTALA aims to ensure that capacity and capability are utilized in a rational way, with the right levels of capacity being available at the right times. He said that CEOs would prefer not to report each other, but "if one facility is getting dumped on all the time, we need to hear about it, because we will not routinely learn about these patterns from individual patient complaints." CMS' response in these situations, he said, is to conduct an investigation, and if non-compliance is identified, request a plan of correction. This generally does not involve monetary penalties, however CMS is required to propose termination of participation in the Medicare and Medicaid program if an acceptable plan of correction is not provided.

REFERENCE

NAS and NRC (National Academy of Sciences and National Research Council). 1966. *Accidental Death and Disability: The Neglected Disease of Modern Society*. Washington, DC: National Academy of Sciences.

5

Governance and Accountability

Workshop chair Arthur Kellermann opened the second day of the workshop by noting that participants had done an excellent job of identifying the potential benefits and pitfalls of regionalization, as well as the many obstacles—political, economic, cultural, and other—that stand between us and the Institute of Medicine's (IOM's) vision of a regionalized, coordinated, and accountable emergency care system. He said that day 2 would focus on key strategies for moving the idea of regionalization forward, and doing so in a way that is effective, sustainable, creates a more efficient and resilient health care system, and improves patient outcomes.

The second day began with a presentation by Ricardo Martinez, M.D., former administrator of the National Highway Traffic Safety Administration (NHTSA) and in Dr. Kellermann's words, "a driving force behind the creation of the Emergency Medical services (EMS) Agenda for the Future and many other contributions to emergency and trauma care in the United States."

REGIONALIZATION IN THE MARKETPLACE OF IDEAS

Martinez began by asserting that the regionalization model will be adopted if it solves people's problems. If it doesn't, it won't. It is the model itself that drives the rate of adoption. The market embraced iPod, Google, and other products, he said, because they worked very, very well. Great business models come out all the time, but you see a lot of them fall apart because they don't actually solve a problem.

Martinez said the historical view that drives regionalization is getting

the right patient to the right place at the right time. "That's a laudable goal. In fact, that is a goal that I have pushed for many, many years." But this model has also driven a lot of what we see today, which is a surplus of resources at the top end of the scale, he said. For example, approximately two-thirds of physicians work in the tertiary, urban environment. Specialists and specialized interventions are increasingly concentrated there. At the other extreme, about 32-35 percent of emergency medicine physicians are non-board certified, and they are more likely to be in smaller hospitals in rural and suburban areas—facilities that have far fewer resources.

Martinez said that the intent of the regionalization model is to identify a certain number of patients in the EMS environment and move them to higher-level facilities. But he said this raises two structural questions. First, does this help a narrow group of patients or a broad group of patients? He would argue that the system helps a small number of emergency care patients quite a lot. However, he estimates that 95-98 percent of emergency care patients get no benefit from this system. While he is a strong believer in having the trauma system focus on those who need it most, the question becomes: what about all these other patients? "We are not focused on those patients right now," he said.

Second, does this model help or hurt the facilities that participate in regionalized systems? He said he works with 150 emergency departments and many of them are suffering because of what he called a "one-way valve." Because they have no way to work with the top-end facilities (through telemedicine or other means), a significant number of patients are transferred out. "In fact," he said, "there are a lot of hospitals where their transfer rates are actually higher than their admission rates." However, these hospitals only make money on admissions, and "so what is happening is they are dying off." All those patients who are sick are transferred up, he said, not just for trauma, but often for evaluations, second opinions, and that type of thing. It is really a huge economic shift. "So what's happening is, we are actually killing the access to care for [a] percentage of the population."

Martinez asked whether this model is sustainable. Does it help everyone? Does it help just a little bit? "This is what we are putting in the marketplace of ideas." It is a great idea to get the right patient to the right place at the right time. But the model has been "out there in the market for 30 years. Who is picking it up? Who is saying, 'This works for me. This is great. I want this'?"

Martinez concluded that if you can't change the market, and you can't change the basic funding issues, "maybe what you need to do is change the model, so that all the other players see the benefit." We are talking about emergency care coordination and emergency care patients, "yet we have been focusing [only] on a small part of that. Maybe we are missing a bigger opportunity."

A key question, he said, is why can't these lower-level hospitals take care of these patients, and what is the system doing to assist these hospitals? There are lots of opportunities in this area, Martinez said. Resources come in two categories—fixed or mobile. Equipment and technology are typically placed in fixed locations. Patients must be moved to them. Procedural skills are also often fixed (this is where the specialist is). Again, the patient has to be moved to the proceduralist. But he said, with the information technology infrastructure we have, cognitive skills can be moved to the patient.

In fact, he said, "we have an infrastructure that now allows us to think differently. It's like us talking about telephone systems in the 1980s. It wouldn't be the same conversation today, because things have changed." For example, electronic collaboration is occurring more and more. Doctors needing a quick consult can send a picture and a note to another doctor and ask their opinion. He said, "The technology is already there. We just haven't adapted it to our use." Electronic medical records could easily include images. Remote consults could occur through text messaging; everything would be recorded as part of the patient record and would be reimbursable. That would be easy to do, and it would meet a currently unmet need.

He observed that in the medical home model, providers are being paid for integration and collaboration. "I would argue that these emergency care systems do that." But, he added, emergency care and emergency physicians are currently excluded from the health information technology money. "We chose not to be involved," he said. "But I'm telling you, these systems are all about integration and collaboration. It's cutting off your nose to spite your face not to participate in that. That money should be used to build the systems we need in emergency care, without a doubt."

In the past, Martinez said, system development was about getting the right patient to the right place at the right time. But he believes the focus should be: get the right resource to the right patient at the right place at the right time. "Just a small change [in wording]," he said, "but what it does is it opens up greater good to more patients."

Rather than everything moving from community hospitals to referral centers, this re-envisioned model can go in both directions (see Figure 5-1). "You can start in one spot. Begin to develop nodes. Those nodes connect, because you can connect them, to become clusters, and clusters become networks. It doesn't have to be top-down." He said, "The reason why people opt out of these things is because there is nothing in it for them. CEOs say, 'These people just take my patients and I never hear from them again. I get no financial value from it.'" Martinez declared, "We can change that."

The goal should be to do the greatest good for the greatest number. Drive value through measurable quality for the entire system, so all of the players play with each other and there is something in it for everyone. Do no harm to those in the network.

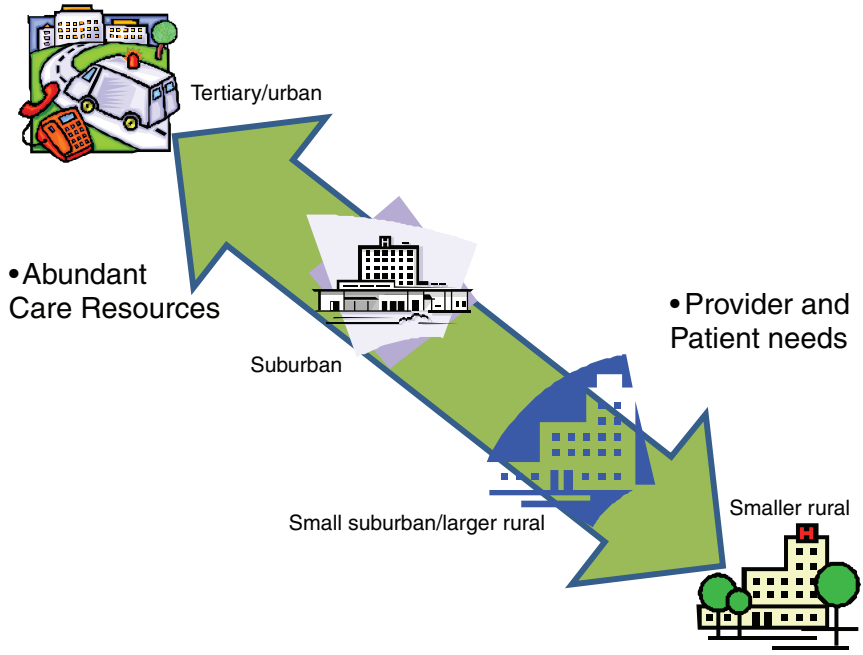

FIGURE 5-1 A more inclusive regionalization model.
SOURCE: Martinez (2009).

Martinez added, "I don't even like the word 'regionalization,' because it has a lot of baggage." He said, "Just change the name. ValuJet became AirTran. Change the name and start over—bring new people into the fold and begin to do things differently." He proposed using the term "Integrated Networks of Care."

THE STATE'S ROLE IN REGIONALIZATION

Bob Bass, executive director of the Maryland Institute for EMS Systems, said that grant programs were initiated to promote regionalization at the old U.S. Department of Health, Education, and Welfare (DHEW) and the Department of Transportation (DOT) in the 1970s. However, the consensus is that this approach to regionalization was not successful. Many of the regions failed.

An after-action report on the DHEW program completed in 1980 pointed to the critically important role that states played in legally empowering, funding, and coordinating regions. Bass said that in the cases where

states did not play that sort of role, regions struggled and generally were not successful.

After the demise of the DOT and DHEW grant programs, the DOT program continued, but without a significant grant component. There were efforts around the country to continue with a regionalized approach. Some were successful, but many were not, Bass said. Generally speaking, there was a lot of state involvement in the cases that were successful.

The 2006 IOM report on the Future of Emergency Care pointed to the need for coordinated, accountable regions where care is integrated. Bass said the IOM was really saying that there needs to be regionalization, which means the patients get to the most appropriate facility. But in some cases regionalization might be nothing more than a hospital declaring itself as a specialty center and telling EMS, "Bring your patients to us." You really don't have a system, he said, until you have the components that were presented in the IOM report. "It means that hospital and prehospital systems are integrated; that they are categorized; there are protocols and clinical pathways and standards of care that are uniform across the region; there is interoperable communications and data; and the system is legally empowered, funded, and publicly accountable."

There have been varying degrees of success, he said, with respect to regionalization efforts. But he would argue that, based on history, it is critically important that states play a role. This helps to ensure that rather than just regions or regionalization, there is a systems approach that includes all of these elements, which are critically important to success and good outcomes.

OPERATION REGIONALIZATION

Dia Gainor, chief of the Emergency Medical Services Bureau for the State of Idaho and past-president of the National Association of EMS Officials, said that governance and accountability are "the core issue at hand" when considering what would be necessary to achieve regionalized and accountable emergency care systems. A unified sense of mission and purpose and a coherent strategy need to be deployed nationwide. This program and policy should be "military-like" in its cohesion and should perhaps have the title "Operation [Something]."

Demonstration projects are definitely in order, Gainor said, but there needs to be some common thinking about the kinds of systems that we are referring to, and the terminology that is used to describe them. There is a difference between the words "regionalization," (whether it is used as a verb or not), and "systems" or "systemization."

It is "very, very important," Gainor continued, that we establish an extremely high degree of accountability, whether it's in the planning pro-

cesses, the demonstration projects, or the long-term program. There will have to be multiple levels of ownership and multiple desks that bear the sign: "the buck stops here." Someone needs to be held accountable for the performance in each of the various systems. With respect to performance assessment, we need to actively measure, quantify, and understand how systems are performing and hold them accountable for that performance.

Ownership and turf is an issue that affects hospitals, but also local EMS systems, she said. She said that after 17 years as state EMS director, she has the scars to prove that this can be a very dangerous crowd. "So understanding what their motivations and needs are is very important."

This comes into play not only with respect to governance, but also with respect to sharing resources. She asked, "Is it really possible for the fire department to share personnel, equipment, devices, or data-reporting processes with the neighboring—if not competing—hospital-run ambulance service? Can that really be done?"

Ultimately, she said, there are some things that we should not tolerate—differences that occur when we cross a state line or a county line. There is a minimum standard that we should not allow to be lowered, as in the case of aviation standards that are applied by the Federal Aviation Administration. EMS is something that local elected officials, the public at large, and others need to regard as a public utility—as trustworthy as flipping a switch to turn on the lights in the house or clean drinking water. Those are expectations that we have, and it is what is owed to citizens.

To fully realize this vision, great effort will need to be placed on reviewing and overhauling state EMS laws throughout the nation. Many are now 35 years old, and health care has evolved dramatically over that time. With only a few exceptions—notably, North Carolina and Illinois—states by and large are focused on individual agency regulation rather than combinations of agencies or systems. Few consider their performance within regions.

WHAT'S IN IT FOR US?

Ed Racht, chief medical officer and vice president of medical affairs for Piedmont-Newnan Hospital in Georgia, said that 2 years ago he had attended a meeting in Austin, Texas that brought together hospital CEOs, cardiologists, and interventional cardiologists to discuss regionalization and ways to improve ST-elevation myocardial infarction (STEMI) care. They discussed prehospital transmission, intervention, and how patients would be distributed.

Racht said one of the hospital CEOs stood up and asked the toughest question he had heard in his career: "if revascularization in the shortest period of time is our goal and it's the best thing we can do for our patients. . . . If we commit that every single STEMI patient you bring us

will be revascularized within 20-30 minutes after they enter our facility, will you commit to bring every STEMI [patient] in the region to our hospital?"

Racht said, "It's the first time I have ever heard sphincters slam shut in an entire group of individuals." Everyone had agreed that getting patients revascularized was the goal and it was why they were all there. Having one facility put the cardiologists in the hospital and in the catheterization lab and provide 24/7 staffing for whatever was needed would be very costly. But they said they would only do it if they received every eligible patient—a strategy that would deprive all other hospitals in the region of the revenue from these cases.

Racht said "the governance and accountability piece really gets to the heart of who is in charge, who is accountable, who makes the decisions." Players have different motivations and different fears. Every CEO, chief medical officer, every director has the view: I'm in charge of my world. If someone else is going to try to come in and be in charge of my world, "I'm going to have to sort out whether I want that to happen or not, because I have decisions that I'm personally accountable for."

People only collaborate, Racht said, if they feel like it will have value for them. Efforts to regionalize stroke care, for example, will be met with questions centered on "what's in it for us?" But everybody should be at the table.

Efforts to promote accountability require additional transparency, and transparency is extraordinarily threatening to some, he continued. "You can see what our mortality is and I can see what your mortality is. . . . You can read all of it in *USA Today* and anywhere else you want to read it. There is generally a fair amount of discomfort." But transparency is central in driving change, Racht maintained.

The current reimbursement model does not promote "systemness," Racht said, and the regulatory structure is not ideal. He noted that paramedics can't be placed in the operating room to learn intubation skills—depending on state and local regulations. However, there are opportunities for improvement, such as the efficiencies that collaborations and innovative approaches can provide.

BUILDING "SYSTEMNESS"

Greg Mears, medical director for the North Carolina Office of Emergency Medical Services, said that North Carolina's trauma system was born out of the 1966 National Academy of Sciences publication *Accidental Death and Disability: The Neglected Disease of Modern Society* and the 1973 EMS Act. The system is now very mature, he said (see Box 5-1).

It was originally developed through state legislation in a very top-down

BOX 5-1
Lessons Learned in North Carolina

- **Systems of Care**
  - — Trauma
  - — STEMI
  - — Stroke
  - — Pediatric
- **Implementation**
  - — State
  - — Regional

Lessons Learned

- **What Is NOT Successful**
  - — One Size Fits All
  - — Top Down Mandate
  - — Unfunded Mandate
  - — Putting an I in Team
- **What Is Critical to Success**
  - — Relationships/ Collaboration
  - — Data Systems
  - — Transparency
  - — A System One Patient at a Time

SOURCE: Mears (2009).

approach. Mears said "we have done very well with our trauma system, but we certainly have a lot to learn from the non-trauma systems of care." Also, while the state has 122 hospitals, only 12 are trauma centers. They now must move to an inclusive approach where all hospitals participate in the trauma system at some level.

Mears said North Carolina has taken a different approach with respect to STEMI, stroke, and now, pediatric systems. With stroke, there was an initial attempt to replicate the more top-down trauma approach, using a legislative template from the American Heart Association (AHA); however, that model "had issues [and it] created some division among the health care community." He said "the stroke legislation was successful once we started from a local perspective and built up to a regional approach, instead relying on a top-down model." He noted that North Carolina's STEMI system of care is now used as a model by the AHA and has been very successful using a more regional approach. These programs are very similar conceptually, Mears said, but one has grown up locally, one regionally, and one from the top down at the state level. He said North Carolina has sought to implement a system approach instead of promoting individual silos. For example,

North Carolina is one of the few states in the country that requires counties to group together all of their EMS resources, write a plan, and operate as a system, instead of operating as individual EMS agencies.

In North Carolina there are 540 EMS agencies, but they operate as 100 systems. "That has made a huge difference in how we approach individual patient scenarios and how we structure the entry point to regionalization." This approach "allows us to coordinate and be much more reactive," Mears said.

The state requires a "high level of accountability," Mears said, but regions "have been given a lot of latitude to develop," based on their individual needs. One size certainly does not fit all. North Carolina has been able to push forward with data systems and performance measures to establish metrics for optimal patient care. Transparency and benchmarking have helped to pull everyone on board, Mears said. For those health care entities with measures that aren't equivalent to their peers, they are still in a better position to improve than those who have not provided measures at all, since missing information is likely to generate even more questions. The transparency piece has pulled in many of the larger health care facilities and EMS agencies that weren't initially interested in participating.

The other thing is that money doesn't buy everything. "It is certainly possible to throw a lot of money at a lot of projects and still not be successful," Mears said. Instead, "we have put a lot of effort into building collaborative relationships. The data systems we have developed promote the concept of linkage," he said. Rather than focusing on parameters that capture door-to-treatment endpoint, they prefer parameters that focus on initial health care contact-to-treatment. "That encourages everybody to work together, where each component of a patient's care is dependent on another. They have to communicate. Information has to flow well." Measuring performance improvement, increasing transparency, and peer pressure all drive the concept of "systemness." But system-building still occurs one patient at a time, Mears said.

AUDIENCE DISCUSSION

Neurosurgeon Alex Valadka said it seems clear that one of the major lessons here is that there needs to be a combination of strong leadership with collaboration and buy-in—people willing to work together.

But to follow up with Racht, he asked what happened in that room when the CEO proposed to pour in tons of resources and take every STEMI patient, alienating the other providers in the region. How was that resolved?

Racht said, "Interestingly, nothing happened in that room. The question wasn't answered." But, ironically, two things did come up after that,

he said. First, one of the cardiovascular groups said that in that case, they would be looking into every single case to make sure the care had been done right. And second, some requested to see an organizational chart of the local EMS system to see who had the authority to make that kind of change. So, he said, it was all about, "who is in charge here?" Who can force us to do X, Y, or Z?

Martinez commented that the model was wrong. The business proposition was, "You send me everything. In return, I'll take everything you have." Instead, the model should be: "You send me everything, and with this resource I'm creating, I will give you access to cardiology consultations and other resources, so you can keep all the [other] patients who don't need to come here." Racht commented that a proposal that did come up later was about rotating that function, on a calendar basis, through the various facilities and cardiovascular groups so that the patient load would be shared.

Defining Terms

Panel chairman Bob Bailey asked if someone on the panel would clearly define the terms region, regionalization, system, and catchment area. Bass said that regionalization is the concept of getting patients to the most appropriate facility, based on their condition. A region is simply a geographic area. It could be one county, two counties, or less than a county. Typically, it has an administrative lead entity that is responsible for coordinating regionalization within that area.

A region is very different from a catchment area, Bass continued. A catchment area is something Maryland has examined a lot, through geographic information system (GIS) mapping and color-coding, to look at patient distributions on a statewide basis. Those patients cross a lot of regional and, sometimes, state lines. Sometimes they end up going from one region to another, because a specialty-care resource is not available within a particular region.

Bass said that a regional system is not simply a region in which regionalization occurs. It is much more comprehensive. "You have additional capabilities, beyond simply saying you are going to take a patient to a particular hospital. Your resources are integrated. The care is integrated. It's a continuum of care, from prehospital to hospital care. The care is integrated and coordinated. The prehospital people work together and the hospitals work together. You have EMS protocols that require that patients be taken to hospitals that are most appropriate for their care—in some cases, bypassing other hospitals—and transfer protocols and guidelines along the same lines."

Bass elaborated further: "You have uniform clinical pathways for, let's say, stroke care within the hospital. If you are taking a patient for stroke care to a hospital, regardless of which hospital you are taking them to that is a stroke center, they are going to have the same clinical pathway, the same quality of care. You have interoperable communications, where you have real-time situational awareness, where you know what's happening in the system, who has capacity, what is happening day-to-day, or during a mass casualty incident. You have data that is interoperable, exchangeable, and addresses a continuum of care—not just prehospital, not just hospital, but care in its entirety—the concept that [Racht] raised and that others have raised. It's not about just door-to-balloon; it's initial patient contact in the field or, in an ER [emergency room] that is not PCI-capable [percutaneous coronary intervention-capable], to when that patient gets revascularized. It's accountability, meaning that we have the data, we look at it, and what is happening is transparent. It's the legal empowerment that is necessary to ensure that all of those things can occur and the funding exists to make them happen," Bass concluded.

Gainor said that, structurally, a system is an area within which multiple fixed, mobile, and human resources operate within a universal boundary, with a single body of governance. Most often this is state-based, with one or more regions, she said.

Valadka said that an explicit part of the definition of regionalization has to be efficient use of resources. He said this will become a much bigger issue in the future, as the population continues to age and the number of physicians, and especially nurses, lags behind. "We are not going to be able to dump everything on the local Mecca," he said, "so we need to be much more efficient in how we do this."

However, Valadka observed that the Committee on Trauma takes "a very loose approach" to defining a region. He said they have surveyed entire states, such as Wyoming, which are geographically large but thinly populated, and they have surveyed parts of states, such as San Diego.

Some of the most interesting areas are those that jut up against several states, such as Memphis, Tennessee; St. Louis, Missouri; and Kansas City, Missouri. The Cincinnati regional area includes three states—Ohio, Kentucky, and Indiana. Discussions about how to define and govern a region often seem to follow along natural political lines—a state boundary or parts of states. But in these areas, the dividing lines are not as clean. Valadka asked Bass to describe how Maryland, Virginia, and the District of Columbia [DC] work together.

Bass said that that was a sensitive question. Looking back over his career, one of his most significant failures has been the inability to create interoperability between Northern Virginia, DC, and Maryland, particularly

as it relates to mass casualty incidents, but also just the day-to-day exchange of data that would enable them to gain situational awareness and be aware if one area is overloaded and spilling over into the other state.

"It has been a challenge," he said. "I probably had a concussion for the first five years that I tried to do that, just beating my head against an immovable object." He noted that "the laws in the three jurisdictions are very different. The liability exposure is very different. They are very siloed."

Still, he said, "We share a catchment area." We recognize that from a catchment standpoint, we have to cross those boundaries. On a day-to-day basis, in terms of regionalization, "we do okay." But, he acknowledged, "We certainly don't have all the tools at our disposal that we would like to have, to make sure that the system in that area of our state and DC and Northern Virginia is better integrated. But I'm not going to give up. We are going to keep trying."

Variable State-Level Leadership

David Stuhlmiller, an emergency physician at Westchester Medical Center, noted that regionalization already occurs across the country in certain situations. But it's very haphazard. State leadership is inconsistent across the country. Not every state is interested in trying to regulate what hospitals do, and especially what inter-facility transports occur and who is providing the care in those inter-facility transports.

Bass replied that states were late getting into the game in the 1970s, but eventually did get in. By the late 1970s, many states were engaged. He agrees that if you go look at what happened to those state offices of EMS over the last two or three decades, there is great variability. "There is great variation state to state [and] great variation region to region."

But, "You sort of get what you pay for," Bass said. In some states, some state offices of EMS are down to two and three employees. In some states, these offices don't even license EMS providers and are relegated to a coordinating/planning function.

So many states are really not up to the task today, Bass said. "They don't have the funding. They don't have the resources. In certain circumstances, as you point out, they don't have the motivation." Sometimes that is because they are strained by what they are already trying to do. "For many offices of EMS, their principal function is to license ambulances, it's not about building a system."

But in places like Maryland, North Carolina, and Idaho, Bass noted, "the state offices have managed to hang in there and have been appropriately supported by their states and have created an environment in which this regionalization can occur, with a systems approach, with all of these different elements."

Mears agreed that "the state EMS offices certainly have to be leaders." When you look historically at regionalization in any state, Mears said, it typically occurred because there was some enabling legislation or law. Prior to that law and the regulatory ability it brought, there was a lot of collaboration, advocacy, and behind-the-scenes work. "In order to manage anything, you have to have information." Once you have information, then you can empower the process. "I think [that] is the future for state EMS offices," Mears said.

He said an example of a cross-state solution that was worked out by a local region in North Carolina related to STEMIs. An EMS agency could take a patient by helicopter to a facility in the center of the state or they could take a patient the same distance and reach a facility in a neighboring state. If they took the patient into the other state, they could not obtain any outcome information on the patient or get feedback on the quality of care. This out-of-state-hospital was not willing to share their door-to-balloon times or any related information. But if EMS kept the patient in state, they could get that information.

Essentially, the EMS agency told the out-of-state hospital, "If you want us to continue to bring patients, we need this data, and until we start seeing it, all of our patients will be transported to the facility that is willing to provide information and partner in the system of care." Within 30 days, data was flowing both ways from the out-of-state hospital and the system of care was functional, Mears said.

So, he concluded, part of this can be worked out locally. "But you have to have the information. You have to have the performance measures." You can drive that at the state level, he said.

Regionalization of Pediatric Services

Jeffrey Upperman, from Children's Hospital in Los Angeles, asked Mears if he would expand on his earlier comments about pediatric regionalization. In pediatrics, Upperman said, resources are typically focused on the 0-4 or 0-5 age range (especially relating to congenital anomalies). For a host of reasons, it has been "hard to get folks to focus on the medically injured population."

Upperman said the unintended consequence of our system—or our environment—has been that, "if you want to take care of all these kids, you have to take care of everything. If we are taking some of those neonatal cases and those other cases and not giving back to other facilities, they will say, you can go ahead and take this 10-year-old [with a] runny nose and other cases like that. So now we have capacity issues—we don't even have beds for the high-end things that supposedly we want to help them with." He said, "My view is we're all in this together, let's share." But there had

been unintended consequences in terms of flow and resources and he said it might be helpful to hear more about North Carolina's experience.

Mears said that "the concept we try to promote in developing these systems is to start from the bottom up." EMS agencies are grouped into systems at the county level. The next layer is to require that system to communicate with all of the hospitals in their referral area and with their specialty centers, including the trauma centers, PCI centers, and stroke centers (the state has no pediatric trauma centers). They then pull together and work out a plan that says, if we have a patient that meets specific criteria, here are these facilities that we have identified that have the resources and the patient will be taken there. So the transports are based on specific patient parameters and the resources that are in the area. "It's not a complete bypass perspective," Mears said.

"That has, in general, worked well," Mears added. We have gotten through this on the STEMI side and the stroke side. For pediatrics, trying to identify the patients has been more challenging. They have used some of the Illinois criteria and other approaches.

Fundamentally, though, Mears continued, "the concept is collaboration." It relies heavily on data. "We have 100 percent of our EMS data [and] 100 percent of our emergency department data," plus quarterly hospital inpatient data. This provides "a pretty good picture" which can be used to evaluate results. He said this approach has worked much better than they had anticipated.

Building Comfort with Telemedicine

Linda Cole, from Children's Healthcare of Atlanta, said that a lot of the ED overcrowding problem stems from people who are transferred from outlying facilities. She said the hospital has started looking at tele-trauma, tele-emergency department visits. They have visited other states to learn from their experience and have consistently heard one thing: you can get the consultants to the table, but the real fear lies with the referring physician. The hospital CEOs want to keep those patients, because that's the livelihood of their hospital. But it's the ED physician or the specialist in the ED that wants to get the patient out and doesn't particularly want to go into the telemedicine consult. She asked if the panelists had any advice on helping these physicians feel more comfortable and supported in the process, aside from education and a lot of handholding.

Racht agreed that even when a seasoned clinician says "you're good, you're okay," the referring physician may still be uncomfortable and may still have liability concerns. "If I'm on the ground, I still feel like it's my responsibility," Racht said. "Frankly," he said, "tele-consultation and telemedicine is such a new and odd concept, it's going to take some time to say

that it's just like having your consultant buddy right beside you, except he or she is electronic." If the referring physician is uneasy, he or she will say "I'm not comfortable with what you are giving me. Can you help me move [this patient] to the next level?"

Replicating Successful State Models

David Sklar, from the University of New Mexico Health Sciences Center, said "Yesterday we heard a lot about how regionalization has improved care in a variety of areas and also how there are multiple barriers to overcome. As Kellermann said, our challenge for today is to figure out how to come up with some solutions to these barriers." Sklar added, "It seems we will not all be able to replicate Maryland or other states. What we need to do is identify the problems—whether it be in trauma care or pediatric care or sepsis care—and then realize, along with the public, that if we do things differently, it will make a difference. We can then present that to states or regions or community groups and give them the responsibility to solve the problem in the way that they can with the resources they have."

Bass agreed, saying, "I don't think you can take Maryland, or Idaho, or North Carolina, or Texas, and transpose that. . . . The approach that we use in Maryland would never work" in certain other places. But he said, "I think we know the building blocks." We know "the functions and components that have to be there." Most importantly, the goal has to be to get the right patient to the right hospital in the right time with the right care.

Bass agreed that each state and region will have to find solutions that are suited to (and realistic for) that local area. But he added, "In my heart of hearts, I believe that you need a strong state. Not just a regulator, but a resource, somebody who can help facilitate." Mears observed that many regionalized approaches exist in different branches of state government, but they don't communicate with each other. The states that have been successful are the ones that talk and have collaborated, even within state government.

John Fildes of the University of Nevada and the American College of Surgeons said, "I'm increasingly uncomfortable with the tone of the discussion this morning, about people wanting to fall back, people saying we couldn't possibly emulate the best practice of one state in another state, that we couldn't possibly emulate the best practice in IT, because we just can't do that. I think what we need to do is catch this train, or it's going to leave us behind." He said we need to "move forward and find a way to get it done."

"We are here," Fildes continued, "because there was a report in 2006 that said emergency care is in crisis, and one of the steps in remedying that might be regionalization, which . . . means IT support, access, and quality." He noted that we have challenges in each of these areas. There are quality concerns stemming from specialty surgical and specialty care shortages and

from poor IT infrastructure and poor IT support, and there is legislative and regulatory language that actually binds our hands from doing the right thing, he said. We have access problems because we have limited manpower or manpower that is now distributed, particularly for time-sensitive conditions; we have barriers, because many people we serve are uninsured or under-insured. There is defensive medicine because of liability, which prevents us from bending the cost curve down. We are being asked to look forward and come up with some solutions to move us out of this position.

Bass said we have general agreement on what needs to be in place, but that we all can't take the same road in terms how it is implemented. "There has to be variation." But, he said, "I would hope that we are all in agreement that regionalization of care, a systems approach to providing care for people with time-critical conditions, is something we are all committed to."

Gainor agreed that "clearly, no cookie cutters would work." But, she added, "At the same time, uncontrolled, random variation is dangerous."

Generating Political Will

Nels Sanddal, president of the Critical Illness and Trauma Foundation, said that trauma systems seem to have four different kinds of challenges relating to governance—in particular, to statutory and administrative authority. Three of these are fairly easy to make recommendations on, but the fourth is more challenging.

For those who don't have a statute or any authority—"that's easy, get some," he said. For those who have statutory authority and we aren't using it well—"that's easy: do some more, do it better, refine it." For those who have statutory authority, but don't have the financial or human resources to implement it—"that's easy. Get some financial resources."

But the final one is harder: we have the authority and we have the administrative structure, but we don't have the political will. Even if we can demonstrate clearly that that lack of political will is killing patients, it's not enough. Sanddal asked the panelists, "where does that political will come from? How can it be engendered?"

Bass responded that Maryland has struggled recently with respect to STEMI care. He said this has been "a wake-up call," because earlier efforts with regard to perinatal, eye/hand trauma, and stroke were much easier. He said "we are pretty good at bringing stakeholders together, [and] building consensus. We are flexible. We have been successful."

But he said that for the last two years he has been stymied on the STEMI issue. There have been three drafts of the regulation and each one has received a strong political reaction, including letter-writing campaigns to the leaders of the House and Senate, the governor, and every key committee

chairman. "It's clear to me that it's nothing short of a buzz-saw if we walk through it, and so we [had to] regroup."

Bass said that they plan to continue their efforts. "We will talk to the stakeholders, put out the data, show how this makes a difference, and then seek to develop some transparency. The key is to put the information out there and let the public know. In the end, as a little state agency, we are going to get torn up if we try to go against this. But I think if we use the power of information and work with stakeholders and the public will, we can show that this, in fact, will save lives. That's how we are planning to continue to tackle this issue."

Mears said, "We have no state regulation for a STEMI system at all. But we have great data and great transparency." This has driven large hospitals in the state to participate. "I think there are many ways that you can bring a system of care together," he said. Certainly it's nice to have the legislation and the authority, but you get into the issues you mentioned: "Do you have the manpower to enforce it? Do you have the political ability to enforce it?" Transparency with data systems and performance measures is "a big soother of all that."

Bailey added that, historically, "it also helps to have an outside-the-bureaucracy champion. They can have more clout than a state EMS director who is part of the bureaucracy standing by themselves and trying to push that issue forward," he said.

Gainor asserted that there are some things that are too important to leave to political will. She said "none of us have to worry about whether there is sufficient political will in communities or a county about whether stop signs should be red and octagonal, with white letters of this font and size. It's too important to leave to geopolitical variation. There are times like that where . . . a judicious level of higher common denominator needs to get implemented nationally."

But Racht added, "The most important reference material for an elected official is the morning paper. . . . The *Newsweek* article with the guy floating in the pool probably did more for systems implementing out-of-hospital hypothermia . . . than anything we can publish in *Resuscitation*." Bass agreed, saying, "It's not only important for an elected official, but it may be even more so for an appointed official."

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Financing

This session explored financing issues as they pertain to regionalization. Ricardo Martinez, executive president of medical affairs at The Schumacher Group, served as session chair. In his opening remarks, he said he has observed over the years that "form follows finance." That was quite evident to him during his tenure at Stanford when their payment structure moved over time from discounted pricing to per diems, to capitation-based diagnosis-related groups (DRGs).

SAFETY NET HOSPITALS

Lynne Fagnani, senior vice president at the National Association of Public Hospitals and Health Systems (NAPH), said that her organization represents approximately 140 hospitals across the United States. They constitute about 2 percent of the hospitals in the country, but provide about 20 percent of the uncompensated care. These hospitals also tend to be providers of essential community services, including Level I trauma care, burn care, and other emergency department care, and they also play an important role in local disaster preparedness efforts.

Financially, she said, these institutions are "very fragile." Their profit margins are only about one-third to one-half of those of the other hospitals in the country. This is largely because about 70 percent of their revenues are derived from governmentally-funded patients (principally Medicare and Medicaid). As in commonly known, she said, these public payers underpay for services.

These hospitals are able to keep afloat financially, Fagnani said, because

of cross-subsidies from commercial payers and supplemental payments they receive from Medicaid disproportionate share (DSH) and upper-payment-limit (UPL) programs, which compensate them for about 25 percent of their unreimbursed care. Without these payment streams, she said, "These providers would have minus 10 percent margins. They would be completely unviable as organizations."

In a brief analysis of emergency department (ED) and trauma care financing and profitability, Fagnani said she examined data from the University HealthSystem Consortium (UHC), which shares about 30 members in common with NAPH. She was very surprised to learn that trauma patients tend to have a higher commercial payment mix (33 percent) than regular ED cases (26 percent). However, she said, this depends heavily on provider location. Areas that receive more penetrating trauma (e.g., knife and gunshot wounds related to violence) compared to blunt trauma (mostly caused by motor vehicle crashes or falls) have a very variable payer mix that ranges from 7 to 62 percent commercial payment. Regarding ED visits, she said that commercial payment ranged from 5 to 51 percent. Not surprisingly, she said, there were significant profit margins on the commercial patients and significant losses on treating patients covered by Medicare and Medicaid and, in particular, the uninsured.

Fagnani said that the hospitals she represents would clearly stand to benefit from regionalization, because "payer class would not be a consideration if you are regionalizing based on patient need." But then, she added, there are also issues regarding these major trauma centers and whether they have the capacity to handle more of the higher-level trauma and emergency cases.

She said that her members are focusing on these issues and making improvements on ED throughput. Many have been participating in a study by the Commonwealth Fund on that topic. She added, "There are clearly things [that are] within the control of these systems [in] addressing their capacity issues, but then there are other things that aren't in their control, such as discharge issues with uninsured patients needing long-term care and the availability of on-call specialists—all the kinds of things that the IOM study pointed out" in 2006.

NETWORK OF COMMUNITY HOSPITALS

Jane Englebright, chief nursing officer and vice president of the Clinical Services Group at the Hospital Corporation of America (HCA), described HCA as an investor-owned heath care company with 163 hospitals, 109 surgery centers, and almost 400 physician practices. Most of the hospitals are community hospitals, although they have one regional burn center, three Level I trauma centers, and three critical access hospitals. By

most measures, the company provides about 3-5 percent of the inpatient care in the United States.

The HCA network has a total of 172 emergency departments, 14 of them freestanding. One of every six ED visits is uncompensated, which amounts to more than 1 million uncompensated visits annually. However, last year 56 percent of HCA's inpatient admissions came through the ED, and for some hospitals the figure was as high as 80 percent. Englebright said that five years ago, local hospital CEOs tended to view the ED "an important community service, but a financial loss leader." Now they tend to see things differently. The company has found that "all of our important service lines have a significant number of their patients come through the ED." With the exception of neonatal and rehab, "every single service line has a significant portion of their patients coming through the ED, including urology and ENT (ear, nose, and throat) and other patient populations that you wouldn't normally expect."

"We have started to think of the ED as the front door to the hospital," she said. "It is a source of stable volume across all payer classes during times like this. The other big financial stability factor for community hospitals is elective surgery. We are not having as many of those right now as what we had. So the ED has become very important for us in terms of maintaining financial stability as we go forward."

Englebright said that HCA has "participated in a lot of different types of regionalization." In the nonclinical area, it has regionalized things like warehousing and payroll, and it is beginning to move into the clinical area as well, following the example of the Veterans Administration, with pharmacy services and regional labs. HCA has also participated in community-based angioplasty. Its hospitals are beginning to experiment with having the skilled team rally to where the patient is, rather than having the patient move to meet them. They have also been conducting stroke telemedicine.

A REVISED MODEL FOR EMS REIMBURSEMENT

Kurt Krumperman, clinical assistant professor at the University of Maryland, Baltimore County, and chair of the finance subcommittee of the National Emergency Medical Services (EMS) Advisory Council (NEMSAC), discussed EMS financing and how it fits into the discussion about financing integrated, regionalized emergency care systems. He said that the finance subcommittee took the IOM recommendations from 2006 seriously and it has used the concept of regionalization as the basis of a draft EMS financing model.

Krumperman said this financing model must address several key issues. First, he said, is the cost of readiness. That means the capacity for EMS systems to respond reliably, at all times, with clinically meaningful and

consistent response times. It is also evidence-based, meaning that there is a distinction between the types of cases that require clinically meaningful response times and those that don't. Underlying all of this, he said, is this notion of providing the right care at the right time by the right clinicians in the right place. He agreed with previous speakers who said that the right place isn't necessarily a centralized trauma center or other specialty center.

Another issue that has to be addressed in EMS financing is surge capacity in the case of disasters. Krumperman noted that the Federal Emergency Management Administration (FEMA) is currently meeting to discuss targeted capabilities, including triage and prehospital care in the disaster setting. They are beginning to define targets for surge capacity, which, he said, would provide something to aim for. Krumperman stated that surge capacity has to be built into the system; it won't just materialize from nowhere.

Currently, most reimbursement for EMS either is tax-based or fee-for-service. He noted that fee-for-service has transport-only incentives and there needs to be discussion about whether that model should be changed. He advocated that the medical dispatch and medical oversight functions be financed through a population-based tax-supported approach, similar to the way fire department and police departments are financed. He said this method would also fund the cost of readiness for ambulance service.

He also pointed out that some savings are likely to be produced by implementing a regionalized system. For example, implementing regional call centers that integrate nurse triage with 9-1-1 service would help ensure that patients are transferred to the right place, whether that is a specialty center, a primary care physician's office, a clinic, or other location. Moreover, regional call centers would help identify cases where EMS response is not necessary at all. These changes would produce downstream savings that could be used to help pay for medical dispatch, the regional call centers, and system surge capacity. Instituting treat-and-release protocols would also help ensure that patients are treated in the setting most appropriate to their case.

To bring about these changes, Krumperman argued that we need to move away from the fee-for-service, transport-based funding mechanism and toward a capitation model, similar to the British EMS model or perhaps a U.S. public health model. This would be designed to realign incentives so there is a system-wide incentive to ensure that patients receive the right care at the right time at the right place—rather than having individual entities responding to the incentives of fee-for-service charges. "Those kinds of principles need to be included in the regionalization concept," he said.

TRAUMA CARE RESOURCES

Harry Teter, executive director of the American Trauma Society, described the need to increase the amount of resources devoted to the U.S.

trauma care system. He noted that he began in EMS and trauma in 1969 with the Appalachian Regional Commission. At that time, he noted, the commission had an enormous amount of money and, more importantly, an enormous amount of political clout.

Teter said that one of the big problems in Appalachia at that time was emergency medical services. The service area was about the size of California and had very few major cities. There were no major hospitals, only small rural hospitals. It was critical to keep them funded and to keep them going. The commission decided that "to take care of the people of Appalachia, regionalization [was] imperative."

Teter observed that we have come a long way in 40 years, but there are still sizable gaps in the trauma care system. On the American Trauma Society website there are maps that show which areas of the country do and do not have access to a trauma center within 60 minutes through air or ground transportation. Looking at the maps, he said, it is obvious "how absolutely essential it is that we look at this problem in a regional way."

He said that these pictures are helpful in lobbying Congress and others about the importance of the trauma system. "When you go to a legislator and you talk about [trauma care] and the lifesaving work that is done, then you pull up a map, the first thing they want to know is, 'Where's my house? Am I covered?' It works," he said.

He said these maps are essential in advocating for additional trauma system money. He believes this is a shared financial responsibility and noted that the Appalachian Regional Commission was a federal, state, and local partnership. "Everybody had some skin in the game and some responsibilities," he said. However, "today people seem to be pushing off the responsibility to somebody else."

He believes these problems are not insurmountable, but may require better salesmanship. Also, trauma and EMS need more friends in the legislature. Fundamentally, he believes that "EMS and trauma deserve a far bigger piece of the pie than they get."

A HEALTH PLAN'S PERSPECTIVE

Rodney Armstead, senior vice president for Western Regional Plan Operations for AmeriChoice, a UnitedHealth Group company, provided the health plan perspective on regionalization. He said that the hope and ultimate goal of UnitedHealth Group is to ensure that we have a system of emergency care in which "services are patient-centric, consistent, dependable, high quality, and ultimately affordable for everybody."

Currently, Armstead noted, there is extraordinary variation in services, unit costs, and care. We know a lot of that is driven by patients who decide to utilize the emergency room as a point of entry, rather than urgent care or their primary care office. The company's internal data suggest that

15-20 percent of their patients account for close to 100 percent of the emergency room (ER) utilization.

There is also extraordinary variation in service intensity provided to patients with the same diagnosis—differences that are not explained by case mix. "We don't understand it, but we do know that it exists," Armstead said. He said that this affects the capacity that is available downstream to deliver real services, particularly time-sensitive services.

UnitedHealth Group supports the development of best practices to "truly standardize" the hospital care provided to patients with STEMI, stroke, and a variety of other clinical conditions. They have worked with the cardiovascular society and clinical providers and have been successful at moving those groups into the "northeast quadrant," where they provide the highest sustained quality, based on clinical database metrics. United-Health Group has also just created a premium designation program, where providers can be reimbursed more for providing care that may increase front-end costs but is likely to significantly reduce unnecessary downstream services.

In general, Armstead said, "we think that the direction that emergency services is going in the context of regionalization is good." Actually, he said, they support broadening the effort, since UnitedHealth Group has 1,400 hospitals contracted in its overall network and there is a need to bring more consistency to them.

From their perspective, regionalization and the topics being discussed at the workshop should enhance service predictability and patient care. They acknowledge that some institutions are going to be the best for particular types of time-sensitive services. Those then should become part of the standardized procedures and protocols.

He also said that evidence-based guideline measures should be formally incorporated, and UnitedHealth Group would like to support and advance that effort. They think these measures will lift performance and lower service variation within the community hospitals, rural hospitals, and other facilities that are critical to continuing to provide the right kinds of services. We think, he concluded, that there has to be an alignment of incentives and reimbursement that rewards quality, efficiency, service, and cost-effectiveness.

AUDIENCE DISCUSSION

Workshop chair Arthur Kellermann said it is ironic that at a time when we are all very excited about the concept of the patient-centered medical home and the incentives it brings for coordination of care and chronic disease management, there is no discussion of giving these medical homes incentives to provide prompt and timely access to care. "Unless and until they do," he said, "patients will continue to come to the emergency depart-

ment." Consequently, payers will continue to struggle with the issue of high-cost, emergency care services used for primary care treatable (e.g., sore throat) and/or primary care preventable (e.g., asthma exacerbation and hyperglycemia) problems.

David Boyd, administrator of the EMS Act of 1973, said back then the federal government had tried many different approaches to try to decrease the flow of patients into emergency departments—public relations spots on TV, focus groups, and so forth. "None of them worked, anyplace in the country," he recalled.

So, he asked, "what do you do?" He noted that this issue is arising again with the arrival of the H1N1 virus. He concluded flatly, "you will not stop the public from accessing the emergency department. They are conditioned to do so. They have a high regard for the emergency department, until they get there. So you have to figure out mechanisms to safely divert nonemergent cases to other settings. People are seeking professional contact and professional consultation. Where they know it exists now in America is in the emergency room, around the clock, and they expect it to be there." He added, "We really painted ourselves into that corner. There has been no way shown to diminish that in any way. I think it's the paradigm that we are dealing with today."

Community Engagement and Education

Andy Bern, of the American Emergency Medicine Association, said that "in regionalization, the component that is really not talked about at all is outreach and educating the public." He said the experts can't even come to a single definition of many of the terms that we are using, and there is even more confusion in the community.

Bern said that South Florida, where he practices, has hospitals that are centers of excellence and that talk a lot about their resources and capabilities. This leaves the public with the idea that they are mecca hospitals, and they'll show up for things the hospitals are not actually prepared to do. For example, one of the hospitals is a Level II trauma center, has PCI (percutaneous coronary intervention), capabilities, and is a neurosurgical center. But it does not have any licensed pediatric beds. He said, "we see kids in the emergency department, but if they are sick, we transfer them to our sister hospital. We can't really do anything once they come to the door because of federal regulations."

Bern said that "the hospitals do a very poor job of outreaching to the community and saying, 'This is what we have resources for; this is what we don't have resources for, so go somewhere else.'" He observed, "I have never heard a hospital say, 'go somewhere else,' for anything. That leads to confusion."

"EMS does a great job," he said. "But the vast majority of patients come to the emergency department without using EMS. If we don't focus on that [other] component, we are missing a large part of the patient population that comes to us."

Fagnani of the National Association of Public Hospitals and Health Systems responded, "I think most people assume any hospital has the capability to do whatever they need. It's a very good question."

Armstead of AmeriChoice said, "This is a heartburn issue for me, because we have so many of our patients that utilize the ER as a first stop." He said he has never seen a "game-breaker" that changes how people think regarding what the purpose of an ER is. "We need to do something . . . that trumps federal regulation." He added "I think one of the things that we haven't seen is a very focused and sustained campaign . . . in improving people's behaviors as they consider utilizing emergency services."

Triaging Patients Through the 9-1-1 System

Richard Hunt of the Centers for Disease Control and Prevention (CDC) said that he and Kurt Krumperman had talked about the idea of utilizing 9-1-1 call centers as triage units more than 10 years ago, but that the idea has never taken hold. Why is it that, collectively, we have not moved this idea forward? he asked. Is it because of legal barriers? Are the business models not there? Is it just that we haven't made it a priority? He argued that we may need to resurrect this idea and focus on it again.

Krumperman said that the answer is easy: yes to all of the above. He said he does know of a couple of places where it is happening, however. Richmond, Virginia, has incorporated triage into their 9-1-1 center. Charlotte is about to implement such a system and will also be conducting research on it. So, he said, the concept is there. They just hadn't approached it in a scientific way and hadn't done the research necessary to validate it. But we may be entering a new period where we can examine this and really see what the effect is (hopefully from a clinical perspective and also a systems perspective).

Englebright of HCA noted that in the United Kingdom if you have febrile illness you don't get into the car and drive to the ER. You pick up the phone and a caregiver comes to evaluate you. They prefer that you don't come to the ER waiting room and share it with others. She said this idea has come up in discussions regarding this flu season, as has the idea of drive-by hospital visits where the patient doesn't get out of the car.

Fagnani added that "some of our members have used nurse call centers just to decompress their EDs, and it has been very effective. I know they have done that in Denver and other places. If you provide a place for someone to call rather than spend eight hours waiting in the emergency department

for something that they don't need to be there for—a nurse call center can be very effective."

Creating Value for the Community

Joseph Waeckerle, chief medical officer in the State of Missouri Office of Homeland Security, said that in seeking to regionalize health care, "one of the things we have forgotten is the patient, the community." He argued, "We need to make them our advocates." To do that, he said, "The community has to win something."

Englebright said that HCA had experience in buying smaller hospitals that were financially troubled and had low-volume programs, and has gone through the process of trying to close a program, or move a program, or combine two small hospitals and make them one. She said, "When you sit and look at the numbers, it makes absolute rational sense, but when you go to the community, it's not really a rational discussion that you get into."

Something HCA has tried, Englebright said, that has helped has been to refocus these conversations. They now focus on issues such as what the facility could be used for. Maybe it's not a full-service hospital, maybe it's an urgent care center with an observation unit. For the clinicians working there, the financial rewards and the rewards in terms of career satisfaction are definitely different than in a full-service hospital. So the question is, how we can convince everyone of the value of those preventive, stabilizing, and referral activities? They need to be seen as very important parts of the overall system and critical to taking care of a small community. It just won't necessarily be a place where a full trauma response team needs to be waiting on standby.

Teter said that a community without an EMS/trauma system is like a community without fire service or police service. Would we dare risk that? Surveys have shown that the public expects to have high quality trauma care and EMS and, in fact, they are critical. Fagnani said there is definitely community support for those systems. She said if you look at initiatives around the country where her members have sought to generate additional income, she said that hands-down the most persuasive argument for additional revenue is the trauma argument. Communities value that over any other thing that her members talk about.

Disincentives for Integration

Alex Valadka, a neurosurgeon from Texas, said that when patients arrive at a facility in an integrated health care system, the clinicians are able to access that patient's records and history and do not waste a lot of time repeating workups or ordering medications for which there is a

known adverse reaction (see Magid presentation, Chapter 3). However, in an unintegrated system, he said, the patient parachutes in, the physicians do not have any of the records, and "they reinvent the wheel every time."

This "has got me thinking that perhaps hospitals actually generate substantial revenue from repeating a lot of tests that would not be necessary if they were more integrated," he said. "In other words, if we integrate and information is much more transmissible, is it going to decrease a hospital's bottom line?"

Fagnani said that what health reform is all about the incentives. Fee-for-service incentives are all about consuming resources, not managing patients well. She added that the hospitals she represents see a large number of uninsured patients, and so the incentives there are to be as efficient as possible and not use resources inappropriately. "But," she said, "You are raising a good point. The incentives [for integration] aren't there in the current reimbursement system."

Englebright said that in a community hospital setting, ED physicians order the diagnostic tests. "The ED physicians want the data that they need to take care of their patients," she said. "If it's already there for them from a previous provider, that's fine. If they can't find the information quickly and easily, they are going to order the tests done again." She concluded, "I don't think in the emergency care situation, there is an incentive to order unnecessary or duplicative tests."

Martinez asked whether it was fairly common for payers to deny claims for tests because they are not considered medically necessary, even if ordered by a physician. Englebright stated that HCA has a large staff devoted to arguing with insurance companies over these decisions. She said that evidence-based protocols that are agreed upon in advance might offer a solution to this problem.

Bundling Payments to Regions

Stephen Epstein, an emergency physician from Boston, also inquired how we might be able to use financing methods to reduce duplication of services. In Boston, he said, there are five Level I trauma centers in a city that probably requires only two. He said this problem stems from the fact that the market fails to compete on price. When the government sets a price for an episode of care—for example, bundled payments for STEMI procedures—there is no competition based on price when another center comes in and wants to offer the same services. The competition that exists is essentially based on hospital reputation, primary care provider recommendations, and (perhaps eventually) quality data.

Epstein said that bundled payments are meant to reduce some of the perverse incentives from fee-for-service payments and the tremendous varia-

tion in cost that occurs by region. He asked whether it might make sense to make bundled payments to regional systems for episodes of care. Essentially, the payers would predict epidemiologically that a region with a certain size population would have a specific number of STEMIs. They would then say, "We don't care how you take care of them. Here's the money. You figure it out." Epstein asked the panelists whether that would be likely to reduce some of the duplication in services, or whether they had heard of similar ideas.

Krumperman said he has talked about organizing payers on some sort of regional basis, so they are also integrated into the regional system. He said he's not sure how to do that, but it's a similar concept. Systems that have the capacity to provide the care would receive money up front, and then would figure out how best to make the arrangement work. Patient outcomes would then be measured by the payers.

Adding Capacity

Martinez asked the panelists representing hospitals how payment, competition, and capacity issues play out for them. Englebright said that for the most part, "We are not competing for patients, we are competing for physicians." She explained, "We have to have the latest toys to get the surgeon to come work at our hospital. The fact that there is already one robot on one side of town and we really don't need one on the other . . . if that's what it takes to get the good neurologist in our shop; we'll go buy another robot." She continued, "I think the lack of alignment [between] the physician and the facilities that exists in the community is a cause of a lot of that duplication, particularly on some of the high-end, high-cost toys."

Fagnani said "our hospitals aren't looking to duplicate services as a money-making venture. They are doing it to take care of the patients that they have that come to their doors."

Valadka said that it's an oversimplication to say that hospitals need to have fancy toys just to get doctors to go there. This is an important issue, because we all know that health care technology is one of the biggest drivers of increasing costs, he said. Actually, he said, he knows of many physicians who practice at facilities that have fewer toys, because the overall experience is much better at those facilities. For example, neurosurgeons want to take some of their elective cases to the local trauma hospital, which is not as highly regarded and does not have all the toys as one of the larger facilities, because that hospital has a better operating room, better nursing care in the ICUs (intensive care units), and better follow-up care, so it's better for the patients.

Prehospital providers are often in the same situation, Valadka said. They could go to the hospital that advertises all the bells and whistles, but they choose to go to the place that is not as fancy but where they believe

the patients will be seen more quickly, the triage is more efficient, and the overall care is better.

Valadka acknowledged that "toys" also matter to patients. He noted, "Every day I get families wanting more CT [computed tomography] scans and MRI [magnetic resonance imaging] scans and brainwave tests and blood tests. I usually say, 'No, we don't need to do that, because I [already] know what's going on. It's not going to give us any more information. If something changes, we can get those tests.' But, I'll come out and tell them, 'If I have to order this because you want it, even though it's not needed, you will have to pay for it out of your own pocket.'" He said, "I usually don't get asked that question again."

7

Data and Communications

Drew Dawson, director of the Office of Emergency Medical Services at the National Highway Traffic Safety Administration (NHTSA), served as the session chair for the panel on data and communications. He noted that the central recommendation from the 2006 Institute of Medicine (IOM) report on the Future of Emergency Care was to establish a "coordinated, regionalized, accountable system." Specifically, the report stated that "the emergency care system of the future should be one in which all participants—from 9-1-1 to ambulances to EDs [emergency departments]—fully coordinate their activities and integrate communications to ensure seamless emergency and trauma services for the patient."

"We have talked about the need to have regionalized systems in their response to a variety of specialty care areas," Dawson observed. "The item that remains constant in all of these is the emergency medical services system. The prehospital Emergency Medical Services (EMS) system is needed to respond to almost everything, including the specialty areas that have been discussed."

He pointed out that there are not different EMS systems for each patient condition. "We don't have a 'stroke EMS system.' We don't have a 'cardiac EMS system.' [W]hat we really [need] is a system that is well-structured, well-resourced, [and] adaptable to responding to a variety of needs and emergency conditions."

Dawson noted that NHTSA's initial involvement in emergency medical services was centered on preventing people from dying after automobile crashes. But their response was to develop an emergency medical services system—not just a prehospital trauma care system—that is capable of responding to all emergencies, regardless of etiology.

There are some core elements that run through every emergency medical services system, Dawson said, regardless of specialty. For example, each EMS system has core needs relating to infrastructure. Dawson presented a slide that shows "what an emergency medical services system is all about" (see Figure 7-1). He said it starts with notification through 9-1-1, and continues on through response, specialization, responding to specialty care patients, rehab, and public education. Dawson noted that this panel's charge was to focus on a couple of the infrastructure elements listed on the slide, in particular communications. Communications are central to achieving the IOM recommendation of a coordinated system. In addition, the panel will focus on data and data collection, which are essential to measuring and improving the system.

EMS COMMUNICATIONS CHALLENGES

Kevin McGinnis, former emergency medical services director for the state of Maine and consultant to the National Association of State EMS Officials, said that he has been involved with building EMS systems since 1974. A lot has changed about EMS in the last 35 years, he said, but one constant has been its communication system, with its almost total reliance on voice communications with some telemetry and other data thrown in. The result is an aging and challenged infrastructure.

McGinnis said there is an immediate call for action in this area. A Federal Communications Commission (FCC) mandate for narrowbanding—which means making the small pipes smaller—has a drop-dead date of January 1, 2013, at which point many of the systems in use today will become illegal. McGinnis said this is one of the biggest EMS communications challenges in 35 years. In some places, it will mean wholesale replacement of radios—a costly proposition in a cash-strapped field. In other places, radios will need to be reprogrammed. Exquisite choreography among hospitals and ambulance services will be required to make this transition simultaneously.

The second area of challenge (and opportunity), he said, is technology. Done properly, this can substantially contribute to the regionalization effort. As a number of associations have begun planning around the communications capabilities that will be needed in the next 10 years, it has become clear that EMS will need to transition from about 90 percent voice to some mix of voice and data, perhaps 60/40 or 50/50. Otherwise, voice communications will become a bottleneck in communications between the field and the hospital, not a facilitator.

McGinnis predicted that as the physicians in emergency departments who provide online medical direction get busier, and as medics adopt diagnostic and other technology that provides much more information about the patient, changes will be needed. We'll need to be able to take a lot of

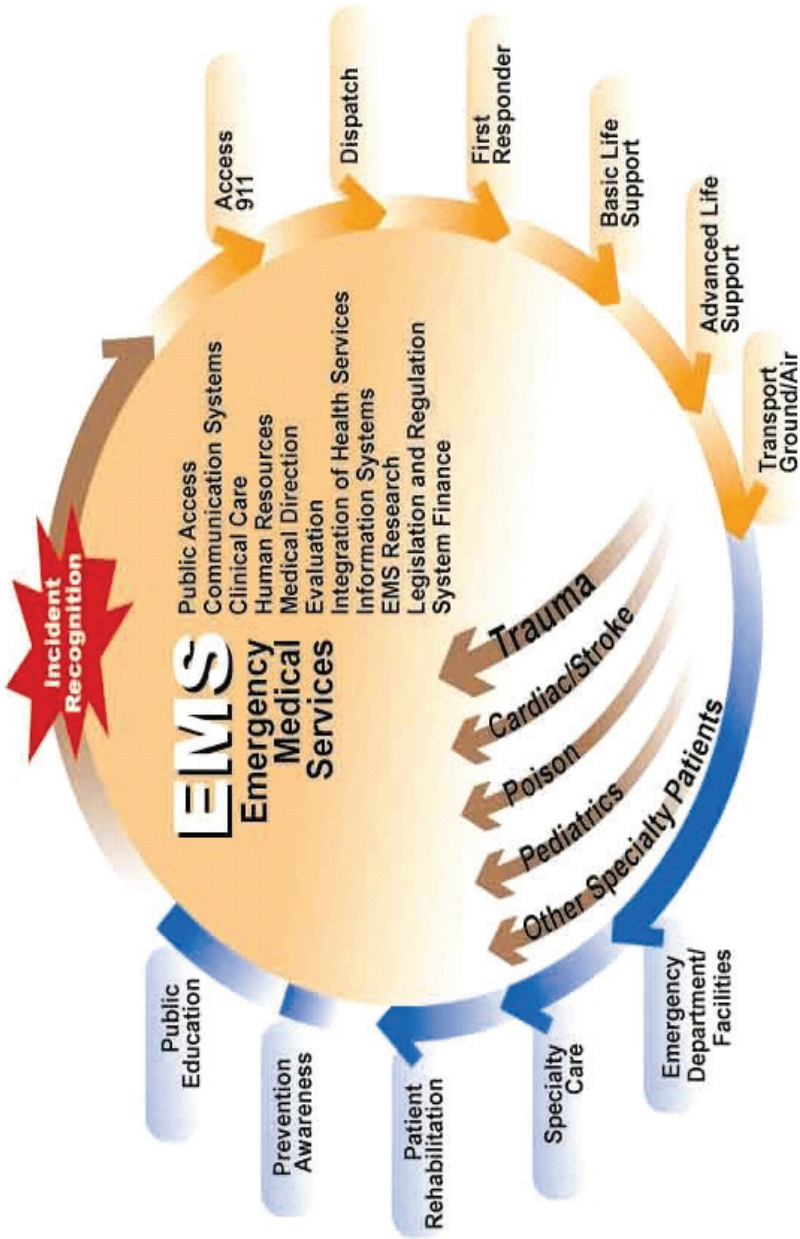

FIGURE 7-1 Core elements of emergency medical services systems.
SOURCE: Dawson (2009).

that data and push it someplace and park it, so that when the physician is ready to consume the information, he or she can pull it in, consume it, and react to it. "That's something we simply don't do today. It's a foreign concept."

Technology will create the need for better communications in a number of areas, including multi-vital signs transmission capabilities, EKG (electrocardiogram), and capnography, he said. There will be more use of video, for example in aiding decision making in long rural transports. There will also be technology that will be able to transmit patient medical records to and from the scene in real time.

The use of CT (computed tomography) and FAST (focused assessment with sonography for trauma) scans to get the patients going in the right direction to the right centers are all technologies that will increase the need for different kinds of communications. The current system of communications is narrowband and too slow to support that. So we are going to need broadband access all over, especially in rural areas. Unfortunately, these are the hardest places to get broadband, McGinnis said.

STANDARDIZING EMS DATA COLLECTION

N. Clay Mann, professor in the Department of Pediatrics at the University of Utah School of Medicine and principal investigator for the National Emergency Medical Services Information System (NEMSIS) Technical Assistance Center said, "Systems can't really exist without communication. [T]he same can be said for data. Data is paramount to the existence of a system, regardless of what system of care we are talking about regionalizing."

However, system of care data "is really a slippery fish," Mann said. There are only rare instances where this type of data exists. For example, probably 80-85 percent of the evidence evaluating the effectiveness of trauma systems uses survival during hospitalization as the outcome measure. So, Mann pointed out, even in these instances where we are attempting to evaluate systems, we miss deaths that occur in the field (such as before EMS arrives or while EMS is there) and deaths that occur shortly after hospitalization. With that larger picture of injury-related mortality in mind, he said, "[valid] efforts to evaluate systems are very, very hard to find."

Mann went on to describe the NEMSIS project and provide an update on its data collection activities, and also share some of the benefits and pitfalls of trying to develop data systems that can evaluate systems of care.

NEMSIS was born out of the events of September 11, 2001 (8 years ago to the day), Mann said. It has had two primary goals. First, standardize the data collection efforts of all EMS agencies in the country, including language and definitions. Second, and importantly for regionalization of care, provide a standard to ensure that all data exported from EMS agencies is uniform.

Mann said that he is working with states to help standardize their EMS data collections. Twenty-three states are now participating and sending data to the NEMSIS Technical Assistance Center. Eight more are expected to join this year. "It has been a bumpy ride," he said, "but we [now] have approximately 7 million records in the national data set." The portion of EMS agencies that are participating within a state varies from about 30 to 100 percent. Timeliness in receiving the data also varies. Some states are sending in their data daily, others quarterly.

Mann said that the data that comes in needs to provide not only denominator data, but also patient-level care data. He said that NEMSIS has attempted to do that, and the data results are available for viewing on the system's Website (www.nemsis.org).

One barrier that NEMSIS has encountered in collecting data, Mann noted, is that EMS systems are not oriented to the importance of providing quality care. NEMSIS has also had a hard time collecting data that is nonclinical. He said, "We need to reeducate our EMS folks on the importance of collecting data that would support evaluation and improvement of systems."

Mann said EMS officials would like the NEMSIS data system to be able to link to associated data sets, such as automated crash-notification data, 9-1-1 call center data, and police data. He said, "These need to be able to talk together." However, there are barriers to providing seamless interoperability. NEMSIS has been working with HL7 to become a national standard for EMS data collection, but the many other public safety data-collection systems have not standardized their data processing, data definitions, and data export procedures. Mann noted that one big success has been linking with the American College of Surgeons Committee on Trauma (ACS-COT) National Trauma Data Bank (NTDB). He said "ACS-COT accepted and integrated the back [end] of NEMSIS into the NTDB, so those two are well connected. As a result, trauma care data can be collected in real time and moved between these two data sets in real time."

LINKING WITH AUTOMATIC CRASH NOTIFICATION

Richard Hunt, director of the Division of Injury Response at the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC) said, "I think all of us in this room would probably agree that an approach to regionalization really needs to begin with some data." One of the approaches that we have taken at the Injury Center, in collaboration with many of you in the audience, and many national organizations and federal partners, he said, is to capitalize on the data that came out of Dr. MacKenzie's trauma outcomes study, demonstrating a 25 percent decrease in mortality if you are severely injured and land in a Level I trauma center.

Hunt continued, "Indeed, it really matters where the EMT [emergency medical technician] or the paramedic turns the wheel of the ambulance. It really matters. So, we wondered, how are we going to get them to turn the wheel and get them to the right place?" Hunt said the CDC and NHTSA collaborated with the American College of Surgeons' Committee on Trauma, which had laid much of the foundation regarding triage of injured patients. Our organizations, he said, came out with a report called *Guidelines for Field Triage of Injured Patients: Recommendations from the National Expert Panel.*

These experts agreed that vehicle telematics is a promising approach and included recommendations on the use of advanced automatic collision notification for triage of the injured patient. This includes General Motors' OnStar system, but also versions produced by Ford, BMW, and emerging technologies from Honda, Toyota, the European Union, and China.

The expert panel's findings showed that these technologies show promise in improving outcomes in severely injured crash patients by predicting the likelihood of serious injury following a crash with greater precision, decreasing response times, aiding field triage decisions regarding destination and transportation mode (ground versus air EMS), decreasing time to definitive trauma care, and hopefully reducing deaths and disabilities.

Hunt said that OnStar generates a terabyte of data—a lot of data—regarding the exact time, location, and mechanics of the injury, and they can provide some predictability about likely injury severity. So, he said, "we have the data. We have the technology." One of the expert panel's recommendations is to make sure that the Division of Injury Response at CDC merges with NEMSIS and with the NTDB and other systems, because "without that data, we are flying blind with mechanism of injury." He said, "I think we have a real opportunity to do it."

This will be a challenge, though, because the automotive industry is in disarray due to the recession, governments are rapidly changing policies, and medicine is changing by the second. But, he said, "We are working hard to try to make it so that indeed these [ACN (automatic crash notification) technologies] can form an integrated system."

THE BIRMINGHAM ALABAMA REGIONAL SYSTEM

Joseph Acker, executive director of the Birmingham Regional Emergency Medical Services System (BREMSS) and former Tennessee emergency medical services director, said "when you have [seen] one regionalized system . . . you have [seen] one regionalized system. What works for us in Birmingham may not work elsewhere." But Acker said he wanted to present an overview of the Birmingham regional system, a model of a low-cost, high-impact approach to managing regional data.

BREMSS, part of the University of Alabama at Birmingham Health System, provides system coordination and education. The region encompasses 7 counties in central Alabama and stretches from Jefferson County (with 42 municipalities, including Birmingham), to Winston County (mostly rural) and includes 19 hospitals.

BREMSS has developed, instituted, and operates acute-event coordination systems. These events include trauma (which they have been doing since 1996 and are now expanding statewide), stroke (since 2000), and STEMI (just starting). The system manages about 4,000 transports per year.

The way the system works, Acker explained, is that when a paramedic responds to an incident, if he or she finds a patient who meets the entry criteria for one of these three conditions, the medic calls the Trauma Communication Center (TCC), which is staffed 24/7/365 by EMT-Ps [emergency medical technician-paramedics].

Every hospital in the region that is enrolled as a trauma, stroke, or STEMI hospital reports their status to the system through an intranet computer system. BREMSS-TCC always knows each hospital's capability and capacity of service lines needed to treat these acute-event patients real-time, minute to minute.

The TCC takes the information from the paramedic and performs a secondary triage. TCC makes the decision of hospital destination based on hospital availability, transport time (ground or air), and patient condition. "We match the patient to the right hospital," Acker said.

Information is then entered into a database, which automatically transmits via the intranet to the hospital's work station. The patient is routed appropriately to the hospital, which is waiting in readiness for the patient. The hospital gives BREMSS control over destination decisions and "we guarantee [every participating] hospital that we will not send them a patient they don't have the resource availability to treat."

The system also facilitates interfacility transfers. Emergency physicians who are not able to locate a specialist or subspecialist can call TCC and immediately identify a facility that is able to care for their patient. "We have taken care of our EMTALA issues on that," Acker said. "One call does it all."

The system is voluntary. Until 2 years ago, there was no enabling legislation from the state. The system was funded with local dollars. The software system that ties everything together was built with local dollars. The hospitals supported and paid for the system. "That's what happens when you give value to what the EMS system can do for acute-event patients and hospitals," Acker said. "We make or save the hospitals money, because we match the right patient to the right hospital, and we guarantee that we are going to be responsive to the patient, hospitals, and emergency medicine's needs."

AUDIENCE DISCUSSION

Dawson asked, as we move forward with a regionalized, accountable emergency medical services system, and we examine demonstration projects in this area, what do the panelists feel would be the most important item—with respect to either data or communication—to include in a demonstration program?

McGinnis replied, "Acquiring wireless and connections to fiber for broadband communications." Mann suggested, "Funding for the standardization of the different types of data that need to go into the national electronic health record, and then harmonizing those data sets." Hunt said integrating NEMSIS and NTDB data, both for real-time and retrospective use. Finally, Acker said, "if funds are going to be there to support data, communications, system development, [and] system operation . . . those funds need to go to teaching hospitals. . . . That's where the minds are. That's where the systems can be developed. That's where the accountability is."

David Boyd noted that in the EMS Act of 1973, about 40 percent of his budget went to support communication systems. He said, if we go the route of demonstration projects "you are going to see at least a 40 percent communication need, right off the bat."

Telemedicine's Potential

Bill Hanson, an intensivist who runs a telemedical intensive care unit (ICU) program from the University of Pennsylvania, said his organization has also addressed issues about whether to keep patients in place and when to move them. They have discussed colocating a stroke center and a home telehealth center in the same physical core, and he believes there is an opportunity there.

Hanson said that some of the infrastructure costs that may seem prohibitive aren't necessarily in play when it involves an existing core location with experts or nurses or doctors in position. You can put very inexpensive hardware in place in a variety of emergency rooms, move it around from bed to bed to bed, capture some of the data using video, and just receive information through the monitors or from streaming data through low-bandwidth connections. This might be a good demonstration project in an existing location.

McGinnis said, "I absolutely agree. I think the tele-trauma, tele-ICU capabilities of that sort are going to increase our ability to keep patients in their communities, which is the other side of regionalization, and are going to be critical." He added that there are likely to be EMS/telemedicine applications that can do the same kinds of things.

Acker also agreed, saying "we have pitched this to potential client hospitals as a win-win opportunity. It allows them to keep patients in their

hospital that can be appropriately cared for and we will assist in transferring those patients the hospital does not have the current resources to care for. It allows them to identify patients that should be moved and move them very quickly."

Hunt said that in the early 1990s, East Carolina University initiated a telemedicine program for trauma patients. He said, "I saw real changes. I saw us not transport a patient by helicopter because of telemedicine. I saw it change what happened to patients." But, he said, "That concept hasn't seemed to take off in the way I think may have been envisioned at the beginning."

Hunt observed that last year, there seemed to be "a very new sense that this was much readier for primetime than it may have been previously." Nevertheless, he said, "I don't know where the initiatives are," and "it [still] hasn't taken off the way I thought it would have." But he added that he has seen it make some difference, particularly in neurosurgery patients, where you can make some decisions about transfer very, very quickly, without spending a lot of resources.

Acker said that "one of the most basic needs that we have in any system is the ability to transmit digital studies." There are significant potential cost savings there, both in not having to repeat the studies and in not having to move patients from a non-metropolitan hospital to a metropolitan hospital. There are systems out there that make this possible and don't cost much money. He argued that "that makes more difference and will save more dollars and more times when a patient shouldn't be transported than probably almost anything we can do."

For example, Acker said, "We have a terrible, terrible problem with spontaneous head-bleed patients, which are not stroke patients, which are not trauma patients. It eats up our neurosurgical resources, [although] those patients really don't need to be transferred from that rural hospital. They just need somebody to look at the film, or at the study, and comfort that physician at the other end and say, 'This patient just needs to be watched. Call me back if certain things occur.'"

Boyd, who currently works for the Indian Health Service, said that the IHS is not quite sure whether to buy into the tele-trauma video business because there is no data to support it and they believe it could just be a fad. They are concerned that any equipment they buy will simply "lie around." But, he said, "Transmission of CT [images] we are locked into." He added, "we think that's the greatest thing and that it's going to improve the trauma care for our rural-placed hospitals." If the Indian Health Service puts a CT in each one of its 40 hospitals, he said, and those are linked into their regional trauma centers, they could get an immediate read, which would definitely help determine the proper management plan for minor head injuries and other issues.

Boyd said that by having the images read in its hospitals and making provisions for the patients to be kept at home, Indian Health Service (IHS) could save over $35 million in unnecessary transport. "This is big-time dough. So we are really looking at that hard."

Sanddal argued that there is also an increasing body of evidence that documents the efficacy of telemedicine/telehealth. He said that Dr. Jeffrey Saffle at Intermountain Burn Center in Utah has generated a comprehensive bibliography that supports its use in trauma and burns. He said that at a recent meeting, Saffle provided a case example of the need for telemedicine: a patient was shipped to Salt Lake City for burn care, but once the soot was removed from the patient's face, all he needed was a 79-cent tube of Bacitracin. But it had cost $15,000 to transport him, plus he was hospitalized for 2 days while his family drove from Montana to get him.

Reimbursement and Regulation of Telemedicine

Dave Thompson from Syracuse said that when he worked with Dr. Hunt at East Carolina in earlier days, telemedicine "obviously had bandwidth issues and equipment issues." The telemedicine unit used to take up a quarter of the attending office. Now, he said, "you can do it from a laptop, and clearly the bandwidth is there."

"One issue that hasn't changed very much has been reimbursement," Thompson pointed out. Reimbursement for telemedicine has been "very variable." Also, one of the things we need to address is who is going to pay for all this equipment? Telemedicine is getting cheaper and easier, "but you still have to pay for the equipment, maintain it, and [pay] all the people that are going to be on the other end sitting there waiting." He asked Acker how they pay for having physicians, or whoever is in the unit, taking those calls.

Acker said that they staff with paramedics. With respect to the telemedicine component, they have five hospitals that contribute so that they can be part of the system. But, he added, "I think you are exactly right on with the issue of telemedicine. We will never build statewide stroke systems—wall-to-wall stroke systems—if we don't do it with telemedicine. Somebody has to wake up in the federal government, in the reimbursement process, and recognize that there has to be better support for telemedicine, especially for stroke, which is the number-three killer and the number-one cause of adult disability." He added, "It won't happen without telemedicine, and telemedicine won't happen if we don't get reimbursement."

Thompson added that "the other piece that inhibits telemedicine is licensure issues." He said you can send images all over the world, "but I can't talk to somebody in Pennsylvania and look at their images without running afoul of the law." Acker said the American Stroke Association is really pushing on that issue now.

Hunt added that we need to take a stand in which we are really connecting with the regulators and the payers. We need to let them know that "telemedicine is integral to making the emergency care system more functional, more cost-effective, [with improved] quality." He said, "I don't think we have made a very deliberate approach [with regard] to telemedicine."

Telemedicine Through Poison Control Centers

Lewis Goldfrank said that 35 years ago he and Dr. Boyd set up a telemedicine system for poison control. It was based originally on the telephone but has since become a very sophisticated electronic system. Goldfrank said it allows people to call and receive advice for free. Moreover, it has allowed large numbers of people to stay at home rather than use the EMS system or go to the emergency department. Estimates suggest that 20,000-40,000 fewer people go to emergency department (ED) per year because of poison centers. Because of the phone interventions, most hospital intensive-care units don't ever see a child with a poisoning, or they see less than a handful a year, he said. This represents multiple millions of dollars in reduced health care costs, much of which would be borne by hospitals in the case of patients without insurance.

Goldfrank argued the call centers could become "a very consequential model." He said, "We have a model that works, [largely] because no one was interested in it, so no one got in the way of its development. It's quite remarkable. I think it could be used as something that is very helpful for the rest of us." He posed the question, "Why couldn't you use a call center for many other disorders?"

Medical Records and Hospital Diversion in an Air Traffic Control Model

Stephen Epstein of Beth Israel Deaconess Medical Center in Boston said to Acker, "It sounds like you operate with primarily one major tertiary center, a lot of feeders into that." He said he was curious whether it would be possible to expand that system into a much larger venue where there are multiple organizations competing within a single region or metropolitan area. Referring to Magid's presentation (see Chapter 3), he said "if you have sort of an air-traffic-control system, which you do, one of the things that must happen so that the patient doesn't go to Elsewhere General Hospital, [which won't have] their records, is to have some portability of patient records."

Epstein said that it's relatively easy to make sure that that information is going to flow if you are within one system in a metropolitan area. But how do we get that patient's records to flow when it turns out that the closest,

best hospital, not on diversion, that has the service line available, is not in the system network where my patient's records are? "As we all know, there are legal, technical, cultural challenges to getting those records to where they need to go."

Mann replied that NEMSIS is attempting to do that by serving as a national standard for EMS data collection. Probably the long-term solution is that there will be a national electronic health care record, and all those who participate in the care of a patient, in whatever phase, will have to stick to the standardized data set that flows into one central repository. Acker said that they had tried to establish a regional system of patient medical records, but it had failed because it relied on patients and physicians to take steps to provide the information.

Epstein asked a second question regarding diversion in that type of system: "There are hospital systems which purposely, I believe, try to keep their emergency departments on diversion in order to allow inpatient bed availability for more lucrative patients, such as elective surgery [and] cardiac catheterization. They purposely keep their EDs dysfunctional." He said, "There is no shaming that has changed that. The fiscal notes are the fiscal notes." He asked whether Acker could address that particular type of gaming of the system.

Acker replied that, in their system, "Every hospital sees the performance of every other hospital. That does work, [through] peer pressure." He explained, "It goes in front of all of the hospital administrators in the region, who sit by themselves in a room after I leave, and they discuss things. The peer pressure from one hospital group to another hospital group solves dramatic problems, let me tell you."

Boyd said, "I believe that. Anytime you get the hospitals on a basis where they are all looking at each other, they are more honest."

Hunt said that he had a similar experience in his previous position, with administrators looking at diversion data. But, he said, the pivot point only comes when you have all the CEOs in the room. Until it got to that level, nothing happened. Acker said he agreed "1,000 percent."

Details on the Birmingham System

Workshop chair Arthur Kellermann asked Acker how much his system costs and how small rural hospitals have fared under it. He replied that the cost of operating the trauma communication system each year is about $450,000-$500,000. Two communicators are there 24 hours a day, 7 days a week, and they have added a third communicator, because they now dispatch five aircraft. He said the hospitals pay all the overhead costs and they pay for one full-time communicator and part of another communicator. The state also pays for one communicator.

"Our hospitals think enough of this that they are willing to put dollars on the line," Acker said. Furthermore, they have not lost a single hospital out of the system.

Randy Pilgrim, emergency physician and chief medical officer of a practice management firm, the Schumacher Group, said that he is involved in advocacy at the state and federal levels regarding health care reimbursement changes that support improved quality and outcomes. Pilgrim said, "Questions come up very frequently around how you drive accountability with the reimbursement structure."

With regard to the Birmingham system, he said, "I get that your system [is] regionalized, [and] that it's coordinated, [and] your slide said [it's] also accountable." Pilgrim said that if the hospitals fund this, then you are accountable to them directly. "You are also very transparent hospital to hospital, so there are a lot of eyes watching."

But Pilgrim asked to hear more about the fiscal accountability. He said he understands that, long term, if you do a bad job and the hospitals are funding you, they will pull the plug. "But," he asked, "is there an episode-by-episode accountability where they would know if you were doing the wrong thing episode-by-episode?" If for some reason, you stopped doing a good job, would you see an immediate financial penalty?

Acker said that his organization produces an invoice on a month-to-month basis, and if a hospital is unhappy, they don't pay for that month. Also, he noted that the Veterans Administration participates in the system in trauma, stroke, and ST-evaluation myocardial infarction (STEMI) and "they pay the same kind of money that the rest of the hospitals in the system pay."

The other thing that creates accountability, he said, especially in the routing of patients, is that "third-party payers call us out if we misroute a patient." But he said just the opposite is occurring. The third-party payers are calling us to find out if hospital X was on divert that day.

Acker said that to date they "have not had a single third-party payer refuse to pay the bill for a patient we routed, even if that was not the traditional hospital that that patient would have gone to. The third-party payers like us, because we make sure we get the patient to the right hospital in the right time frame, when that resource availability is there, and we don't stick a patient in a hospital that doesn't have the resources, where it prolongs their length of stay and [increases] the complications that occur."

Linda Cole, of Children's Healthcare of Atlanta, asked Acker whether diversion rates, mortality, and hospital length-of-stay outcomes have shown changes during their tenure and whether these results have been published.

Acker replied that "we are part of the UAB [University of Alabama at Birmingham] health system, so that gives us the resource capability for a lot

of study issues." He said that one study reported in the *American Surgeon* found a 12 percent decrease in overall trauma deaths within the BREMSS region after implementation of the system. Also, length of stay for those with Injury Severity Score (ISS) of 15 or greater dropped from 16 days to 11 days. Today, patients with an ISS of 15 or greater have dropped to 9 days.

He cited another study by a colleague at UAB who looked at trauma patients who were in the trauma system and who were transported directly to a Level I center. They looked at the same class of patients, those with ISS of 15 or greater, who went to a community hospital first and then were transferred to the Level 1 (UAB). They found that patients who went to the community hospital first had 50 percent greater mortality. Moreover, their cost of care within UAB was twice what the cost of care was for comparable patients taken directly to UAB.

Acker added that the area hospitals have actually reduced their divert processes. The number of hours of divert for emergency departments have decreased about 15 percent over the last four and a half years. He said they have not been able to solve their divert problem for psychiatric cases, which, he called, "a terrible problem."

But, in general, we have the divert status in front of all of the hospitals all the time, Acker said, and "they literally will do everything they can do stay off of divert." However, his own view is that patient care suffers when the hospitals exceed a certain capacity—whether it's for a trauma, stroke, STEMI, or general medical patient. He said "I think to turn your head and say there's no need for divert in a system is foolish, and the patient ultimately pays the price for that."

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8

Preparedness

Lewis Goldfrank, director of Emergency Medicine at Bellevue Hospital Center and New York University Hospitals, chaired the final major session, which examined disaster preparedness. He said that the panelists were a remarkable group of people who have focused their attention on preparing the country for the unknown.

With regard to the earlier workshop discussions, he said there has been an impressive diversity of thought and perspective that he found very helpful. The spirit of advocacy among the participants, he said, had been remarkable, although perhaps somewhat parochial. "I worry that we lack some of the communitarian spirit that Bill Haddon [the first administrator of the National Highway Safety Administration] and David Boyd [administrator of the 1973 Emergency Medical Services (EMS) Act] characterized as appropriate in the 1960s and 1970s."

"Bill Haddon believed that every patient who presents to an ED [emergency department] is a failure of the public health system, not necessarily a success," Goldfrank said. "The Haddon Matrix focused us on preventing these occurrences." Goldfrank added, "Preparedness is thinking about the lives of all people, throughout the cycles of life, every single day, at all times." He acknowledged that he is probably more interested in the rate of untreated hypertension in the population than the rate of successful revascularization of STEMIs [ST-Segment Elevation Myocardial Infarctions]. "The STEMI case is one person out of how many?" he asked. "And how many of those cases could have been prevented?" Arriving in a catheterization lab could itself be considered a failure, he said.

Goldfrank said that the entire system—public health and health care—

must work together. It's "all the people all the time—no boundaries. Doctors Without Borders won the Nobel Prize," he pointed out. "Can we win the Nobel Prize for our health system of preparedness? Probably not today," he said, "but we can get there with the kind of creativity that everybody has shown."

He introduced the panelists and said that they bring a range of perspectives to the issue of disaster preparedness, ranging from the White House to the Department of Homeland Security (DHS) to the states.

LINKING DAILY EMERGENCY CARE AND DISASTER PREPAREDNESS

David Marcozzi, emergency physician and director of public health policy for the White House National Security Staff, began by highlighting the fundamental question, "What is regionalization?" He pointed out that the H1N1 virus does not respect state or international borders. He argued that this provides us an opportunity to think about regionalization and system coordination in a way that cuts across geopolitical boundaries. This "makes the lift even heavier," he said "but I think it's the right thing to do."

He recalled being on shift in an emergency department during a relatively small mass-casualty event. A system had been put in place that was supposed to be able to handle the distribution of patients during a disaster. He reported that the personnel on scene did not use the phone number that was provided to them during disaster preparedness planning; instead, responders called the number they used to transport patients on an everyday basis. "That number was posted on everybody's wall, corkboard, and computer, and was how we do things on a daily basis," Marcozzi said. Under a dual-use approach, he said, processes would be linked and could be adapted as situations arise.

Second, in defining regionalization, we have to incorporate not only STEMI, stroke, trauma, and pediatric care—and potentially sepsis and other specialty care areas—but also disaster care. This could help shape how we think about disaster paradigms, Marcozzi said.

Third, whatever we put forth with regard to regionalization must be all-inclusive. We should try to get our arms around all the issues—economic, political, operational, legal, and other—that may emerge with regard to acute care and develop systems that address all issues. He noted that the Health Resources and Services Administration (HRSA) trauma program has done some fantastic work. The best practices they developed should be a starting point for the next iteration of regionalization.

The fourth point, Marcozzi said, is that we need to build on the work that has already been done. In addition to the HRSA trauma program,

Marcozzi stated that the Hospital Preparedness Program has had some great successes with health care coalitions, as was recently detailed in a Center for Biosecurity report to the Office of the Assistant Secretary of Planning and Response (ASPR). Also, the DHS Metropolitan Medical Response System (MMRS) program has been able to coordinate public health, medical, police, and fire. Lastly, he said we should incorporate local emergency medical services and EMS mutual aid perspectives and capabilities as we move forward. Influencing and creating synergy with these programs with respect to regionalization will only serve to strengthen this effort.

Finally, Marcozzi said, regionalization provides an opportunity to exercise disaster plans. He referred to this as either the needle in the haystack or the diamond in the coal mine. He noted that we have lots of disaster plans that have not been exercised and we do not have corrective action plans to address gaps. Regionalization provides an opportunity to exercise disaster plans on a regular basis through the daily delivery of acute health care.

REGIONALIZATION AND PREPAREDNESS FOR CATASTROPHIC EVENTS

Jon Krohmer, the principal deputy assistant secretary and deputy chief medical officer in the DHS's Office of Health Affairs, observed that "it's interesting when we look at regionalization from a preparedness perspective." But he cautioned that it's more than just multiple-casualty events; we really need to look this topic from the perspective of preparedness for catastrophic events. That is the perspective the Department of Homeland Security takes, he said.

Krohmer said that we need to agree to a number of baseline assumptions as we look at regionalization in the context of preparing for catastrophic events. One is, as Marcozzi noted, that we need to build a system of preparedness that is complementary to, and in sync with, day-to-day emergency care. "We can't build a separate set of capabilities. They have to be based on, and expand upon, what we do for handling situations on a day-to-day basis."

Two, we should remember that health care response is just one component of a much larger overall response. And three, no single entity—whether it's an ambulance company, a single hospital, or an integrated health care system—can be the end-all, be-all. "No entity can have all of the resources that are necessary for responding to a catastrophic event," Krohmer pointed out. That reality, by its nature, supports the need for regionalization and an inclusive system.

Krohmer said that in catastrophic events, patient care changes. On a day-to-day basis, we focus on a single patient and provide them with all the resources that are needed. In catastrophic events, we have to adopt a triage process that means that "the good of the many outweighs the needs of the

few." In other words, we have to look at patient care in a much different context. Health care providers don't always understand how things can change in austere or overloaded medical environments.

Krohmer pointed out that "region" could refer to a number of different things. He said, for example, that there are health care regions, emergency management regions, and public health regions. Health care regions have been established essentially by default through natural patient flows. Emergency management regions have been established based on public service considerations, including law enforcement and fire service response. Public health regions have been established based on resources and, to a certain extent, jurisdictional politics. But, he said, "we have to look at a system that brings together all of those various regions."

All disasters or catastrophic events are local for a period of time and then localities receive mutual aid and other support from state and federal resources, Krohmer said. He pointed out that "the issue of who is in charge comes into play." He said that while, from a health care perspective, we always assume that the physicians are in charge, "I can tell you . . . the emergency management folks don't buy off on that concept at all." In fact, he said, health care is part of an overall emergency management system, and a minor one at that.

A number of other issues also come into play in a catastrophic event, Krohmer added, such as credentialing. "A wallet card that says, 'I'm a physician licensed in Michigan and Ohio and Virginia' doesn't mean anything if you show up in Louisiana and want to volunteer to help." Appropriate credentialing systems need to be in place so that we can appropriately incorporate these volunteers into the response, Krohmer said. Finally, liability coverage is an issue that is fraught with difficulty, and it is one "without any real significant solutions in sight."

Krohmer said that "when we look at . . . preparing for catastrophic events, the need for regionalization is just inherent; it's a natural. But we have to do it in the context of other systems that also exist. We can't approach it solely from a health care perspective."

CATASTROPHIC MEDICINE OPERATIONS IN TEXAS

Lori Upton, executive director of the Catastrophic Medicine Operations Center at the Regional Health Preparedness Council in Texas, detailed the history of the regional operation, which now extends from East Texas and the border of Louisiana through the city of Houston and south to Matagorda Bay. Upton said the Catastrophic Medicine Operations Center started in 1997 as part of the Metropolitan Medical Response System program.

Originally, the thought was that this system would build off of the

trauma system in the Houston region, which included two Level I and eight Level III hospitals. However, in 2001, Hurricane Allison wiped out four of those hospitals and the Texas Medical Center had to be evacuated. They lost over 1,200 inpatient beds and 500 intensive care unit (ICU) beds in one evening. "We learned very quickly that we cannot rely on the Mecca [Texas Medical Center] to carry the entire community," she said.

At that point the regional providers decided they needed to establish a coordinating body that was not affiliated with any one of them, and that everyone bought into. This would be a neutral party, supported by the jurisdictions. She said, "We had to be supported by the emergency management coordinators, as well as our county judges and our mayors. We had to promise the hospitals that if they agreed to join us in this fight, we would protect their infrastructure, [and] that we would only send them the patients that they could care for—when they could care for them—and [that] if they needed the resources to care for them, we would be sure to get those resources to them."

"Then, Katrina hit," Upton said. They were supposed to receive 25,000 people in Houston and ended up receiving about 250,000. She said at that point the concept of a regional medical operations center came into full operation. "I'll be the first to admit," she said, "there was no plan for how to operate this."

However, she said, they learned very quickly (both from Katrina and Rita) that "all disasters are not trauma" (see Figure 8-1). She said the trauma systems are in place and they work well on an everyday basis, but "Patients during a large catastrophic disaster are not trauma patients. They are dialysis patients, and patients with gastrointestinal problems and hypertensive crises. They are individuals who are in their homes and you don't even know about them until they lose electricity or water. Then they . . . beat down the doors of the hospitals . . . trying to find a place to get to."

She said they also realized early on that in a disaster of that magnitude, public health partners were needed to assist with patients that are community medical special needs cases. Their initial plan was to house special needs patients—for example individuals with high blood pressure and diabetes who require insulin and regular blood sugar testing and perhaps more extensive workups—at a hospital during an evacuation. "Well," she said, "there are not enough hospital beds anywhere to take in all the diabetics, hypertensives, and people who are bed-bound and need help with activities of daily living." So they have been working with their public health partners. They serve in the medical operations center and there is a public health branch just to deal with these epidemiology issues and the mass sheltering problem.

Also, she said "EMS providers are the experts in dispatching ambulances and air transports, so they have a seat inside the operations center to run the

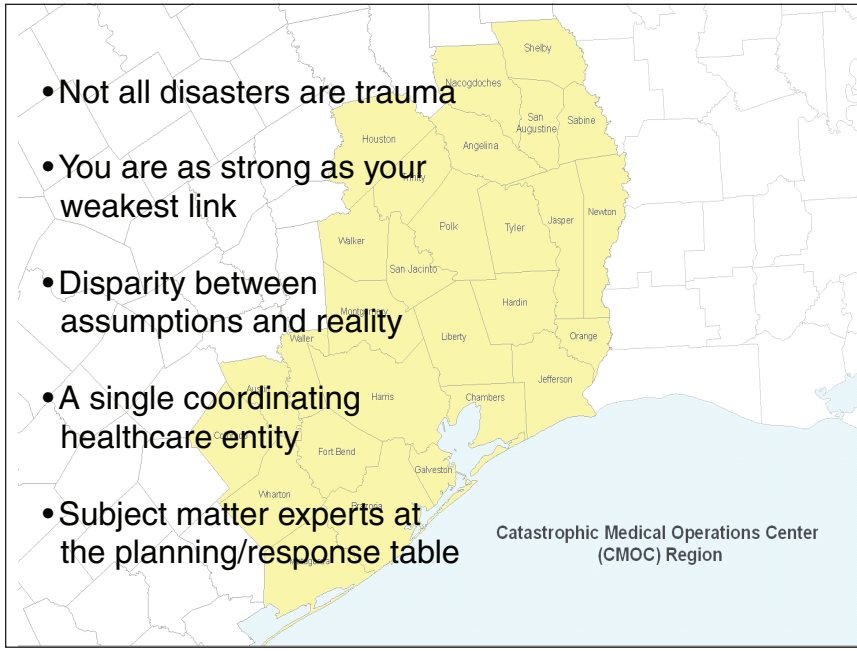

FIGURE 8-1 Regionalized response to catastrophic events in Texas: lessons learned.
SOURCE: Upton (2009).

transport sector. There are also medical personnel who are there and take the names of the people calling in. They do a brief triage over the phone and decide whether a particular patient matches the resources of a particular hospital. If the facility has the capability and capacity to take the patient at that point in time, an EMS transport is dispatched to take the patient there. The information from the case is entered into a data system, and the hospital is notified immediately."

Upton noted that every hospital is able to see how many patients all the other hospitals are receiving. "It's very transparent," she said. "They can drill down to see what they have. At any time, they can call and say, 'I'm getting full. Can you give me a break for two hours, so I can clear these people out? Then I'll be back in the rotation.' So," she said, "we have in place a single coordinating entity that directs a particular patient to a particular hospital based on its resources in real-time."

Upton said that the Regional Hospital Preparedness Council is a 501(c) (3) organization that can contract with jurisdictions and with the state. Its mission is to provide coordination, protection, and to maintain

the medical infrastructure of that regional community. All of the hospitals and other health care entities have free membership—there are no dues. She said that there is nothing that they have to do except support the concept of the operations center and "agree to play along on game day." Also, each hospital contributes a staff member for a 12-hour shift one day a month. She said that costs them about $600 per month. But, she noted, if a hospital can avoid receiving even one GI (gastrointestinal) patient who doesn't belong there, they can save over $2,900.

Upton said that the region encompasses 18 counties, 177 cities, and 6.5 million people, which is about 25 percent of the state population. Over 800,000 individuals have declared themselves as having medical special needs in that area. There are 121 hospitals and 220 nursing homes in the region and she said that the coordinating center provides a safety net for them. "They have just one phone number they have to call."

A CULTURE OF PREPAREDNESS

Joe Waeckerle, chief medical officer in the Missouri Office of Homeland Security, discussed the rationale for regionalized disaster preparedness systems that are integrated into the rest of the regionalized health care system. He said that "disaster medicine is a unique experience." He said it is often assumed that disaster response is an escalation of the everyday response of the EMS/hospital system in your community. "This is not true," he said. "It is an uncustomary or singular response." As Krohmer indicated in his presentation, Waeckerle said, disaster medicine is austere medicine, provided in the worst of all possible environments. He continued, "It's very difficult to change the mindset of the health care provider and the expectations of the patient as well as the expectations of the system" in the time frame that a disaster provides. "So there are tremendous constraints in the response plan that you have to take into account," Waeckerle said.

Waeckerle argued that there needs to be a "culture of preparedness," and that culture of preparedness is not something that can be assumed in any local community, region, or state. Local communities may want to conduct a vulnerability analysis and then a cost-benefit analysis. "But," he said, "what they are going to find out is that a once-in-a-lifetime incident for a local community is not cost-effective to plan for." Nevertheless, he said, "they need to decide if they are going to plan for it or if they are going to give up." If they do decide to plan for it, and they become regionally integrated, they are going to have to make a commitment to collaboration, coordination, and communication within the region, and use the same systems approach that other regionalized systems (e.g., trauma, STEMI, and stroke) have utilized.

Waeckerle emphasized that all disasters are local. "That mantra is finally getting through to everybody." Most mutual aid pacts don't allow for help

to arrive for a considerable period of time, perhaps days; until that time, the local community will be the first and only responders. Nevertheless, local communities need to make a commitment to mutual aid, understanding that they have to integrate the system and call for mutual aid, notwithstanding all the political ramifications and other issues that can accompany that.

Local communities must have a credible response plan, Waeckerle said, but most do not. "Any plan is founded on a capable system, so there has to be a capable EMS/hospital system at the local level and regional levels in order to support a good response," he said. "This will also need to involve other partners in the community, aside from medicine and health. These include law enforcement, the intelligence communities, military assets, and even local construction companies, as we learned with the Hyatt disaster. These all have to be brought to the table during the planning, because if you assume it's all medical, you are being arrogant in making assumptions and you are going to fail."

AUDIENCE DISCUSSION

The panel discussed the axiom that all disasters are local—or at least start out as local responsibilities. Goldfrank noted that Waeckerle had endorsed the concept that all disasters are local, but had also explained exactly why they are not just local. Upton had also said that disasters were not only local.

Upton responded that disasters clearly reach out to different localities. During Hurricane Ike, for example, 2.1 million people had to be evacuated, which affected other cities and regions. "The receiving areas also become a disaster point," she said. These areas have to open up shelters, shut down sports and concert venues, and make other arrangements. It's a huge economic burden on those receiving communities, she added. "The response starts local," she said, "but it quickly grows to a regional response."

Krohmer said it's important to recognize that disasters begin locally, but then quickly build up from there. Even in the case of September 11, he said, the initial response was in New York City and Arlington and Alexandria, Virginia, and then it quickly expanded. Also, Waeckerle had provided the example of agro terrorism, which has the potential to impact a large number of Americans. Krohmer argued that "an agro event will [play out in] multiple local situations [that are] occurring all at the same time, until we come to the realization that . . . these are all tied in together."

Krohmer also observed that many local communities establish emergency operations centers in response to disasters. He said he would encourage them to place this operation in the context of emergency management and have the medical operations center as an annex to the emergency operations center.

Upton said that their medical operations center is situated inside the emergency operations center for the city of Houston. Inside the emergency operations center, she has a number of resources that are immediately available. She noted that "with Hurricane Ike we lost power to 3.2 million people all at once, [and] we had CenterPoint Energy sitting next to me, with the power grids, telling me when they were coming up." Also, when water service was lost, and all of the dialysis centers went down, the public works department was sitting there. "They were able to tell me what areas they were going to be able to put back up, so I could get some dialysis folks in to an open dialysis center . . . even though that wasn't their dialysis center."

Significant Progress Over Time

David Boyd said that when he first became the EMS director for the state of Illinois in the 1960s, he also became the disaster medical officer. At that time, he said, "the bunker mentality was incredible." Plus, he said, "folks seemed to be more interested in getting to talk to the governor over the phone . . . than saving anybody's life or property." In 1972, *The Journal of Trauma* published an article reviewing major disasters and found that in most instances there were actually two disasters. The first, Boyd said, was "the original natural or manmade disaster. The second disaster was when we showed up. [Responses were] uncoordinated [and] discombobulated. . . . [They were] just incredible, disorganized things."

The nation, he said, is in a much better position now. "Our capability [has expanded] enormously throughout the whole system, far beyond where we were not very many years ago. You are to be congratulated."

Advice for Atlanta

Dr. Kellermann noted that the participants had seemed to reach a clear conclusion that in most circumstances a regional system is better than one that is fragmented and disconnected, and that there are opportunities but also barriers to bringing that about. He said he believed he also heard that a regionalized system is necessary but insufficient to have an adequate response to a local or regional disaster, because that type of event would involve much more.

Kellermann said that "If a terrorist placed a bomb in the emergency center of Grady Hospital in Atlanta—the only Level I trauma center for an area encompassing over 5 million people—he would bring down the entire trauma care system for half of the state. " And there is no Plan B in Atlanta today," he added. The city currently has an ad hoc regionalized system, but it is vulnerable at a couple of critical chokepoints, he said. It's "probably not a model for a resilient system."

He asked the panel: if our federal or state partners indicated that they wanted to systematically promote regionalization in metro Atlanta in a way that enhances its resilience and capacity to deal with disasters, what practical advice would you give for that effort? What are some of the core attributes or strategies Atlantans should be thinking about if they were to design such a program?

Marcozzi said that, in his view, this type of program should not be conducted through grants. He said that it would have to be built into the daily health care delivery system. Grant funding occurs once every year, and could be less one year, more the next, and it is not a suitable vehicle. The funding mechanism might have to include payers or involve some type of regionalization tax. Marcozzi said that if we make a small initial investment in coordinating care, there will be a sizable return on investment. For example, if we know what tests the previous physician has conducted and he has the capability to share that information with a transferring hospital, then those tests will not have to be repeated—which is not the current state of affairs in evaluating patients in most hospitals. "A coordinated system will pay dividends," he said.

Also, Marcozzi said that Atlanta needs a sister hospital that has some of the same capabilities as Grady. The city should not be relying on a single "mega-system." Finally, he said, training is required on a range of issues, from incident command to critical care and appropriate resource utilization for an overburdened system.

Krohmer said it's striking that Atlanta is still in this position after having lived through the Olympic bombing event. But, he said, there are a number of things that can be done. At the federal level, there are a number of grant programs that can come into play. He noted that the Metropolitan Medical Response System requires regional planning, which could provide some stimulus to the effort. Also, the Hospital Preparedness Program and the Centers for Disease Control and Prevention's (CDC's) public health emergency preparedness programs require regional planning activities.

The federal government has developed 15 planning scenarios, one of which involves an explosive event. Krohmer said he believes that it is incumbent upon the planners in any metropolitan area to ask, what would we do in response to this type of event? In this case, what would we do if a suicide bomber attacks the emergency department at Grady? How would we care for the community at that point? He said that it really becomes a community planning issue.

Waeckerle said that whether this involves a bomber at the hospital or whether 1,000 patients flood the hospital after a disaster event that occurs down the street, or whether that many patients are transferred and arrive from facilities that are farther out, there is not any practical difference. Astute planners will take all of these scenarios into account.

Waeckerle emphasized that there needs to be redundancy built in to the system. Communications need to be redundant and hospital systems need to be redundant. The whole system should examine this.

Another point to consider, he said, is that while a disaster in Atlanta could possibly be a suicide bomber at the emergency department, a disaster in Piedmont, Missouri, could be a car wreck with eight people, given the fact that they have no medical care and no EMS system.

Inability to Handle Day-to-Day Disasters

Lance Becker, director of the Center for Resuscitation Science at the University of Pennsylvania, said he worries we have given false reassurance to the public in indicating that we are ready for disasters that may strike. "I feel like my emergency department is a disaster on a regular basis, [even though] there is no disaster that has been called," he said. This is true at emergency departments all over the country, he said, with patients boarded in the hallway, backlogs of people in waiting rooms who haven't been seen, and ambulances placed on diversion.

Becker said this problem seems to be getting worse. If anybody believes that we have increased our capacity, over the past 10 years our capacity has actually diminished, with respect to emergency departments (EDs) and ED beds. He said it strains credibility for us to talk about our ability to handle a disaster.

Krohmer said that Becker was looking at the capacity issue in the context of day-to-day health care. But "when a large-scale disaster happens," he said, "that's going to change very, very quickly." He said he knew of an example from several years ago where there had been a commercial airline crash in the United States. The local hospital emergency department received notification from the airport before any EMS or first responders had arrived on the scene. At the time they had about 50-55 people in the ED waiting room. These people were informed, "Folks, we just suffered an airline crash at the airport. Anybody that doesn't need to be here, please contact your doctor tomorrow or come back tomorrow." He said that 50 of those 55 people left.

Krohmer added that when faced with those situations, hospitalists will be going through all the inpatient beds and finding out which patients can be either discharged (by themselves or with family), sent to nursing homes, or sent to tertiary care centers, which, in turn, will be transferring some of their patients to other facilities. "I hear what you are saying," he said, "but we need to look at capacity not in the context of day-to-day health care, but in the context of what really will be alternative standards."

Goldfrank added that in New York City from September 17 to October 17, roughly 50 percent of the hospital beds were available, and virtually

no one came to the emergency department. He said it even appeared that people weren't going into labor as rapidly. But Marcozzi agreed with Becker that there have been reductions in capacity. He said the system is set up to decrease resource utilization and reduce capacity—not so much to increase efficiency, but to increase profit margins. He said that if we continue to shrink our daily capacity, it should not be a shock to anyone that our surge capacity has decreased.

Altered Standards of Care

A participant observed that the panelists all spoke about the need to build on and leverage the capabilities of the day-to-day emergency care system, but that disasters are much different with respect to the austere environment and the altered community and political dynamics. One question that consistently arises from nurses in preparedness training activities is, "How do I find out when the call has been made and the altered rules of care apply?"

Upton replied that her region in Texas has a communications network that notifies all of their facilities when the order has been activated. It can only be activated by a jurisdictional authority (e.g., a city or a fire chief). She said everyone is given a very brief overview of what is known and what actions are recommended. Updates are continually provided through the Internet and other notification systems. They also have one phone number that they can call to reach the center as well as email addresses.

However, Waeckerle argued that we need to distinguish between the disaster at the local level and the disaster at the regional level. During a disaster in a local community, he said, you don't have situational awareness, you don't have communication, you don't have resources, and, since in the past there has been no system of incident command, many things are decided intuitively.

In a disaster, he said, "it's great to have an operations center. There is nothing I would like more than that. But it isn't going to communicate with me, because there are no communications, because it's a disaster. I'm busy, and so is everybody else in the local community. We are so busy [that] we don't even know if they've communicated [to us anything about] the status of our own hospitals." He said, "Communication remains the biggest problem in the history of disasters and always will."

Waeckerle said flatly, "I knew to change my standards of care [because] I had no capability of offering that care anymore. I didn't have any more IVs. I didn't have any morphine. I didn't have a stretcher. I didn't have anybody else to get the patient out of there, [so] I couldn't get them out of there." He said he did not want to overdramatize this, and he agreed with Dr. Boyd

that we are better than we used to be, but local disasters, especially in the first 24 to 48 hours, are truly disasters.

Marcozzi said that with regard to changing standards of care, in cases where some level of resources still exist, the shift is from a clinical, one-to-one doctor-patient interaction to one that is based on a broader public health perspective. For a clinician, this is a very difficult shift, and it is one that has many ramifications, liability just being one of them.

He offered an illustration: "When a 92-year-old hypertensive patient who is septic presents in the emergency department, she would typically receive all resources, including vasopressors and ventilatory support, and be sent to the ICU. But if there were a concurrent public health emergency, with hundreds more patients to see and not enough resources to support her care, the reality is she would likely be black-tagged, provided comfort measures, and resources would be directed at more salvageable patients, reevaluating her status as conditions change and more resources become available."

He pressed the participants to "show me the liability protection afforded [for] that scenario, and the definitive way for clinicians to proceed when [the paradigm] shifts from one-to-one to one-to-1,000. That's a difficult discussion—medical, legal, and ethical—but one that needs attention."

Krohmer said that he agreed completely with all the comments, but wanted to reinforce Waeckerle's point that the first three problems in any disaster response are always communications, communications, and communications. While disaster response has improved significantly over the past 10-15 years, "we are still very much in our infancy," he said. For example, whereas public safety agencies, such as the fire service, have been using the incident-management system for more than 35 years, health care has just begun to adopt that model in the past 5-10 years.

REFERENCE

Upton, L. 2009. PowerPoint slide presented at the Regionalizing Emergency Care Workshop, Washington, DC.

9

Wrap-Up Discussion with Federal Partners

Workshop chair Arthur Kellermann introduced the final session, describing it as the final opportunity for the workshop's three federal partners—the Departments of Transportation, Homeland Security, and Health and Human Services (HHS)—to offer summary comments about what they heard over the course of the two-day workshop.

Drew Dawson, director of the Office of Emergency Medical Services at the National Highway Traffic Safety Administration (NHTSA) within the Department of Transportation, led off the response. He highlighted several key points. First, he said, by and large the workshop participants view regionalization (however, that will later be defined), as a good idea. But he emphasized that the "devil is in the details" with respect to how regionalization gets accomplished, by whom, when, how it's structured, and how it's financed.

Second, he emphasized that we need population-based data in order to determine the effectiveness of regionalized systems and to evaluate how well they are operating. Data should drive what we are doing, he said, whether that is hospital-based data, population-based data, or data from the National Emergency Medical Services Information System (NEMSIS).

Third, he underscored the importance of systems research. He said we have talked a lot about various types of systems. However, we have also acknowledged that we do have the ability to evaluate different systems or to assess whether one is more effective than another. Then, if we find one more effective than the other, how can we determine which components of the system contributed to the increased efficiency or the improved patient outcomes? He noted there had been quite a bit of discussion about aligning

reimbursement with system performance and system design. He also noted that comparison against system benchmarks is important, whether those are generated at the federal, state, local, or regional level.

Dawson concluded, "It seems to me that perhaps one of the most important things is relationship building . . . continuing to build relationships among emergency services providers [and] among the components of the system, so that you have day-to-day honest dialogue and the people just get along with each other. That may be one of the most critical things we do."

Jon Krohmer, principal deputy assistant secretary and deputy chief medical officer in the Office of Health Affairs at the Department of Homeland Security, said he would support all of Dawson's comments. He pointed out that "something that came up in the preparedness discussion [Chapter 8] is the fact that the system is stressed on a daily basis right now. . . . We have to figure out ways to address that."

Another key point of the discussion, Krohmer said, was the issue of leadership and how that comes about. At the federal level there has been a lot of controversy about who the federal lead agency is and how the federal partners should work together. Krohmer said that, through a combination of the Federal Interagency Committee on Emergency Medical Services (FICEMS) and the Emergency Care Coordination Center (ECCC), the federal agencies have over the last couple of years been able to increasingly work together on these issues.

But, he said, he is not sure about the leadership or authority responsibilities held at the state and sub-state levels. Obviously, it varies state to state, but he said to his knowledge, within most states there is nothing that authorizes or empowers an entity to become the regional leader. He challenged the group to focus on who will provide leadership at the state and sub-state levels and what authorities and responsibilities these groups must have.

Andrew Roszak, senior health policy fellow at the Emergency Care Coordination Center (ECCC), within the Office of the Assistant Secretary for Preparedness and Response (ASPR), in the Department of Health and Human Services, endorsed Dawson and Krohmer's comments, especially those regarding federal leadership. He said that with the advent of FICEMS and the Council on Emergency Medical Care and the establishment of the ECCC, "we are at a unique place in time where emergency care is finally getting a voice within the federal government—and very importantly, a centralized voice."

Roszak said that the ECCC is very interested in regionalization. He said, "We are tasked with looking at the delivery of daily in-hospital emergency care. Regionalization, obviously, plays right into that." He said the ECCC's goal is also to coordinate emergency care issues throughout the federal government. Currently, these issues are scattered among many different agencies

and it seems that "everyone kind of has a hand in it." He said if there is a way to align some of the incentives, and some of the research, and some of the grant work that is going on so that it makes more sense, "I think we'd be doing a great service."

"That being said, it seems clear that regionalization is ultimately a state issue—just with the way the licensure works and the way EMS systems have traditionally been set up." Roszak noted, "We do have to work on that relationship building with the state and local partners."

Roszak recalled that reading the materials written by Dr. Boyd in the 1970s "is a reminder that these issues have been around for a long time, even something as simple as defining the term 'regionalization.' The more we get together and work on these issues and begin to develop a common lexicon, the better off we will all be."

WIN-WIN REGIONALIZATION

Kellermann stated that "Regionalization is a paradigm that applies to the critically injured or highly technically complex patient who needs a level of technical expertise that is not available at an isolated local facility, but is available in a tertiary care setting. But a point of emphasis this morning was that regionalization needs to be a web, not a funnel. Ultimately that may provide us with additional efficiencies and opportunities—but first we will need to get beyond the competitive turf battles and the regulatory, financial, and cultural barriers we have identified." He concluded that the workshop had established an important concept that "the idea of bidirectionality is very, very important—regionalization must be a win-win proposition."

Waeckerle agreed that in order for regionalization to be supported, "it has to be win-win." He said regionalization should not be viewed as "centralization with a one-way funnel. [It is] collegial communication and coordination, so that everybody wins—the patient, the local medical community, the local health care professionals, EMS, [and] the secondary and tertiary-care center. It has to work for the public institutions and the private institutions. They have to come together. . . . We can't sell it unless everybody wins."

Waeckerle concluded by noting that "A few things will result if we approach regionalization from that mindset. First, there will be improved care at the community level. Second, we will likely get more primary care docs out into places they haven't been before (which has been a goal in this country for a long time). And third, we might incentivize more people to enter the health care field, whereas now young people, including my own children, are shying away from the field, saying, "I don't know if I want to do this, Dad. I don't know if I want the hassles, and I don't want to work for somebody who is telling me what to do all the time." Waeckerle said

that "our greatest advocates are our citizens and our population." As the health reform debates move on, "we need to get them on our side. They need to win."

ENVISIONING A CONGRESSIONAL ACTION PLAN

Andrew Bern, of the American College of Emergency Physicians, posed a hypothetical question to the panel: Congress is working on a health reform bill and a Congressional leader calls asking how much money would be needed to enact the reforms we have been discussing. Also, what would need to be in the legislation? How would you answer?

Kellermann responded that the short answer would be that we need a renewal of the EMS Systems Act of 1973. It would be the EMS Act of 2009 and it would provide a clear, comprehensive vision. "It would be a big win for everybody," he added.

Dawson said he didn't think we had done enough work on this to be able to estimate exactly what a program would cost. It would depend on how the legislation was structured and what was included in it. Krohmer thought the price tag to do it right could be substantial. Roszak agreed that the cost could be high, but noted that demonstration projects would make a lot of sense, with an eye toward examining what works in urban versus suburban versus rural areas.

Dawson added that it's important to emphasize that improving the nation's emergency care system is not just about dollars. "It's about leadership," he said. "It's about coordination. It's about ensuring that emergency medical services and trauma systems and emergency care are included in the national health security strategy. It's important that those items be included in all of the grant funding. It's [also] important that the evidence-based practice guideline process drive the improvements in the emergency care system." He said, "I think sometimes we look at legislation and dollars, and although they are very important, that isn't always the solution to improving emergency care in the nation."

Boyd noted that his original plan in 1975 was a $500 million plan. He said that total today would be a reasonable request. As to the specifics, he responded, "it's not complicated. Read what we did last time. See how we put it together. That's what needs to be done again. There needs to be a grants program. There needs to be a technical assistance program. There needs to be a research program. There needs to be an interagency committee. There needs to be a lead agency in the federal government that speaks to the clinical systems that we are talking about here, the old ones and the new ones."

He emphasized the importance of the federal lead agency concept. He said people should "look at the success of the lead agency in the nine years

that it was [within the U.S. government]. We went from the dark ages to modern systems just about every place, and many of them were successful." If you give HHS $500 million as the lead agency, they will provide the technical assistance, build up the systems, and the health departments. HHS will also be in a leadership position to redirect and make some sense out of some other programs.

What needs to be purchased and what needs to be allocated is very straightforward, Boyd said. "There is a lot of money that needs to go to communication systems, maybe 40 percent. Some has to go into training of all kinds of people in all kinds of ways. There is also an administrative component. . . . It's not a very difficult model." In addition, he argued that the research program has to be focused on systems, "not redos from other agencies."

Boyd said that if we go the route of demonstration projects, say the amount is $10 million, we need to remember to demonstrate, not build, programs. "We don't need to put money out there to subsidize somebody's developmental lead agency, but to demonstrate issues." But he argued, we don't just have rural and urban. "We have urban communities that group themselves into megalopolis kinds of arrangements. We have other communities, about 60 percent of this country, that are actually the rural-metropolitan model—the Lexington, Kentucky, and the other places that have trees" (see Chapter 1). "Then we have frontier settings—places in the middle of our country that don't have any trees and they don't have any trauma centers or regional centers. They are sparsely populated and sparsely resourced." Boyd said all three models are important in framing how the issues in the demonstrations should be tested.

THE ROLE OF A FEDERAL LEAD AGENCY

Dia Gainor, chief of the Idaho Emergency Medical Services Bureau, argued that "for any of us to say this problem has been around for a long time is really no excuse. I don't think it should [lessen] any of our enthusiasm to seek positive change or solutions."

With respect to the federal lead agency issue, Gainor said that many past arguments about this topic have been centered on which agency should be the lead federal agency for EMS. But, she observed, there has not been a substantive conversation or any consensus about what such a lead federal agency would do. She asked the panelists if they agreed that more should be done at a federal level and, if so, what specific tasks, deliverables, programs, and grants would they see coming out of it?

Dawson agreed that the functions of a potential lead agency have never been clearly delineated, including in the 2006 Institute of Medicine (IOM) report. It is not up to him to define what those functions should be—that is

something we should do collectively, he said. The focus should be on defining what the responsibility of the federal government as a whole should be with respect to emergency medical services. Once that is defined, "there may be a whole variety of ways to get there."

Dawson elaborated, "We have heard during the course of this workshop that the federal government should have an active role. We have also heard that perhaps the federal government should not have as active a role, for example with respect to providing benchmarks. I think we haven't arrived at what we want the role to be. If we can collectively define—not just as a federal government, but in conjunction with all of the participating organizations and agencies throughout the nation—what those functions should be, then we can also collectively determine how to meet those functions. Otherwise," Dawson concluded, "We are proposing a solution before the exact problem has been defined."

Krohmer said that he agreed with Gainor and Dawson that we have not yet defined what the appropriate roles and responsibilities of a federal lead agency would be. However, having said that, based on his own experience, he believes that a single lead federal agency—if it was given the authority—could be very helpful when it comes to issues such as disaster preparedness and mutual aid. He continued, "A lead agency could also be helpful in identifying five levels of EMS providers and defining their scopes of practice, so that a paramedic in Idaho is the same as a paramedic in Michigan, is the same as a paramedic in Florida. That would allow cross-jurisdictional credentialing and patient-care issues to be addressed much more easily. That would be just one example of what a lead agency could do."

Krohmer said he would be hesitant to say that within a national system we would need 303 regions and these regions need to do A, B, and C. "I think there is enough uniqueness in each state that my preference would be to leave it up to a state entity to help facilitate that." He added, "I think there does need to be a state entity to do that. Not all states have that authority currently vested in some entity."

Roszak echoed Krohmer's comments. "The federal government currently does a lot with respect to research and data. It's just scattered throughout all the different agencies." He said the federal government should make it a goal to incentivize data collection and analysis and should help in dissemination. "This would be a tremendous service," he said. However, he added, it's a matter of getting the states on board to figure out ways to do that.

Also, the federal government has a sizable role with respect to disseminating best practices. Roszak said, "If we ever did move to a national system, where a paramedic is a paramedic is a paramedic, it would be a great resource to have the federal government help determine appropriate treatment protocols and then disseminate best practices."

The federal government is currently doing many things in a lot of different areas, Roszak added. "Bringing all that together is certainly the goal of the Emergency Care Coordination Center, and I hope that we can achieve that goal." He said that the government has made considerable progress, but that at some point it may make sense to have a discussion of what else they could do to help.

Dawson responded that "the concept of what the responsibility of the federal government should be is a legitimate item for discussion at FICEMS, at the Council for Emergency Care, and, from a non-federal perspective, through the National EMS Advisory Council."

BUILDING A UNIFIED SYSTEM

Jon Mark Hirshon of the University of Maryland observed that "we have discussed many systems—trauma systems, EMS systems, STEMI systems. There are multiple different systems." During an earlier part of the workshop, Ken Kizer pointed out that there is no health care system in the United States, no systematic approach to the issues we face. This morning, Ricardo Martinez put forth the vision of an interconnected web. Hirshon argued that this needs to be "multidirectional, not just bidirectional." However, right now there is no coordinated response from an overall systems perspective.

Hirshon asked, "How do we take this wonderful discussion of the last two days and . . . integrate that into a functional system? More specifically," he asked, "what is the role of the federal government within that integration process (recognizing that form follows finance)? How is it that we are going to go from all these different systems into one integrated systems, with multidirectional communication—a kind of web of emergency care?"

Dawson replied, "I'm not sure it's a realistic expectation to say that the entire nation will be one interconnected web. That may be a bit [too] ambitious. We probably need to concentrate on working with states and state EMS agencies, to help provide them some tools, to help provide some consistency on a nationwide basis. I think it's a lot easier to try to focus on 50 elements than to focus on every individual agency in the nation. [W]orking with states, so that states assume a leadership role in developing regional or interconnected webs, or whatever we talk about—I think we can provide tools and assistance to help them do that." He added, "I'm not an advocate of the federal government necessarily doing that. I'm much more of an advocate of building up the capability within the states and local areas."

Krohmer said we need to continue to refine the model. But while it may not be the total responsibility of the federal government, there is a role at the federal level to get all of the health care disciplines on board so that they accept the concept, buy off on it, and promote it. Then, he said, it becomes

an issue of drawing in the third-party payers and making it a part of the reimbursement system.

Roszak agreed. "The federal government can help significantly on the front end by establishing the relationships necessary to make this a reality and helping to identify some of the potential pitfalls that may run the project afoul, and then on the back end, providing support, data collection, analysis, and performance assessment, and ways to improve." He added, "They could then package all that up and generate best practices that could be disseminated to other parts of the country. . . . That would be a commonsense approach for the federal government to take."

LIABILITY REFORM

Alex Valadka, a neurosurgeon from Texas, raised the issue of liability reform, which he said he been mentioned a few times during the workshop, but had not been discussed extensively. He noted that the 2006 IOM report cited liability as a factor that dissuades many people from participating in the emergency care system. The perception is that this is a significant risk for providers.

He acknowledged that the issue of medical liability reform, or tort reform, is "a huge, gargantuan thing." But he suggested focusing first on protection for the people who provide Emergency Medical Treatment and Active Labor Act (EMTALA)-mandated care. "EMTALA requires us to do things and doesn't give us any protections," he said. He asked whether it might be reasonable to include some reasonable statutory protections for people who are providing legitimate emergency services as part of any demonstration projects that move forward.

Kellermann replied that there are three major paradigms for tort reform. One is the microcap limits on pain and suffering, which have been a battleground for the better part of a decade. Another, which was enacted in Georgia several years ago under the auspices of an EMTALA give-back, was an increase in the legal standard to gross negligence, as opposed to some lesser standard. The third is a concept of a safe harbor. If you practice within well-established guidelines, you would have a safe harbor for your decisions (e.g., for not getting that computed tomography (CT) scan or not ordering that PET [positron emission tomography] scan).

Valadka responded that if there are guidelines that professional groups can come up with as a specialty and as a group, he would think that could be a starting point. He noted that microcap has been in existence for over three and a half decades in California and there are still problems. So while that is not going to answer all the problems, it would eliminate a potential barrier, making it easier for more people to participate in the emergency care system.

Appendix A

Workshop Agenda

September 10-11, 2009

Institute of Medicine
Keck Center of the National Academies
500 Fifth Street, NW
Room 100
Washington, DC 20001

Background:

In 2006, the Institute of Medicine (IOM) released a series of three reports on the Future of Emergency Care in the United States Health System. One of the central conclusions of those reports was that the nation should move toward a more regionalized system of emergency care. This workshop brings stakeholders and policymakers together to discuss how the federal government can promote "regionalized, coordinated, and accountable" emergency and trauma care systems, as envisioned in the 2006 reports. It also provides an opportunity to examine the progress that has been made in various parts of the country over the past several years.

Audience:

Participants will include policymakers from the various federal agencies involved in emergency care, state and local officials, and stakeholders from the health care provider community. Thought leaders from a wide range of

relevant disciplines will be in attendance, including nursing, EMS, specialist physicians and surgeons, public health officers, and hospital and health system administrators.

Objectives:

1. Foster information exchange between federal officials involved in advancing emergency care regionalization and key stakeholder groups from around the country.
2. Learn from past experience and current efforts.
3. Hold discussions with federal partners regarding policy options that could be the focus of future federal action.

DAY 1: THURSDAY, SEPTEMBER 10, 2009

7:30 a.m.–8:30 a.m. **Workshop Registration and Continental Breakfast**

8:30 a.m.–8:45 a.m. **Welcome and Workshop Overview**

Arthur Kellermann
Professor and Associate Dean, Health Policy
Emory University School of Medicine

8:45 a.m.–10:30 a.m. **Regionalized Trauma Care: Past, Present, and Future**

Session Chair:

A. Brent Eastman
Chief Medical Officer
Chair of Trauma Services
Scripps Health

Panelists:

David Boyd
National Trauma Systems Coordinator
Office of Emergency Services
Indian Health Services
Federal Interagency Committee on Emergency Medical Services

Bob Bailey
Contractor, McKing Consulting
Senior Advisor to the Director
National Center for Injury Prevention and Control
Division of Injury Response
Centers for Disease Control and Prevention

John Fildes
Chief, Division of Trauma and Critical Care
University of Nevada School of Medicine

Ellen MacKenzie
Chair, Health Policy and Management
Fred and Julie Soper Professor in Health Policy and Management
Johns Hopkins Bloomberg School of Public Health

10:30 a.m.–10:45 a.m. **Break**

10:45 a.m.–12:15 p.m. **Emerging Models of Regionalization**

Session Chair:

Robert Bass
Executive Director
Maryland Institute for Emergency Medical Services Systems

Panelists:

Joseph Ornato
Chairman, Department of Emergency Medicine
Medical Director, Richmond Ambulance Authority
Virginia Commonwealth University/Medical College of Virginia

Lance Becker
Professor of Emergency Medicine
Director, Center for Resuscitation Science
University of Pennsylvania

Arthur Pancioli
Vice Chair, Emergency Medicine
Professor, Emergency Medicine
University of Cincinnati

Joseph Wright
Vice Chair, Professor of Pediatrics
Emergency Medicine and Health Policy
Senior Vice President
Children's National Medical Center

12:15 p.m.–1:15 p.m. **Lunch**

1:15 p.m.–2:45 p.m. **Lessons from Other Systems**

Session Chair:

Rear Admiral Gregory Timberlake
Director, Department of Defense/
Department of Veterans Affairs
Interagency Program Office

Panelists:

Kenneth W. Kizer
President and CEO
Kizer & Associates

John Holcomb
Professor of Surgery
Chief, Division of Acute Care Surgery
Director, Center for Translational Injury
Research
University of Texas Health Sciences Center

David Magid
Senior Scientist, Institute for Health Research
Director of Research, Colorado Kaiser
Permanente Medical Group

2:45 p.m.–3:00 p.m. **Break**

3:00 p.m.–4:45 p.m. **Regionalization: Potential and Pitfalls**

Session Chair:

Jon Krohmer
Principal Deputy Assistant Secretary
Deputy Chief Medical Officer
Office of Health Affairs
Department of Homeland Security

Panelists:

Ron Anderson
President and CEO
Parkland Health & Hospital System

Nels Sanddal
President
Critical Illness and Trauma Foundation

Michael Sayre
Associate Professor, Emergency Medicine
College of Medicine
Ohio State University

Dennis Andrulis
Associate Dean for Research
Director, Center for Health Equality
Drexel University

Stephen Epstein
Instructor in Medicine, Harvard Medical School
Department of Emergency Medicine
Beth Israel Deaconess Medical Center

Alex Valadka
Chief of Adult Neurosciences
Seton Brain and Spine Institute

4:45 p.m.–5:00 p.m. **Concluding Comments**

Arthur Kellermann
Professor and Associate Dean, Health Policy
Emory University School of Medicine

DAY 2: FRIDAY, SEPTEMBER 11, 2009

Objectives:

Day 2 will focus on a number of critical issues that arise in developing and implementing regionalization strategies.

7:30 a.m.–8:30 a.m. **Continental Breakfast**

8:30 a.m.–8:45 a.m. **Framing Discussion for Day 2**

Ricardo Martinez
Executive President of Medical Affairs
President, Division East
The Schumacher Group

8:45 a.m.–10:15 a.m. **Governance and Accountability**

Session Chair:

Bob Bailey
Contractor, McKing Consulting
Senior Advisor to the Director
National Center for Injury Prevention and Control
Division of Injury Response
Centers for Disease Control and Prevention

Panelists:

Robert Bass
Executive Director
Maryland Institute for Emergency Medical Services Systems

Dia Gainor
Chief, Bureau of EMS
Idaho Department of Health

Ed Racht
Chief Medical Officer
Piedmont-Newnan Hospital

Greg Mears
Associate Professor, Emergency Medicine
North Carolina EMS Medical Director
EMS Performance Improvement Center
University of North Carolina-Chapel Hill

10:15 a.m.–10:30 a.m. **Break**

10:30 a.m.–12:00 p.m. **Financing**

Session Chair:

Ricardo Martinez
Executive President of Medical Affairs
President, Division East
The Schumacher Group

Panelists:

Lynne Fagnani
Senior Vice President
National Association of Public Hospitals and Health Systems

Jane Englebright
Chief Nursing Officer and Vice President
Clinical Services Group
Hospital Corporation of America

Kurt Krumperman
Clinical Assistant Professor
Emergency Health Services Department
University of Maryland, Baltimore County

Harry Teter
Executive Director
American Trauma Society

Rodney Armstead
Senior Vice President, West Region Plan Operations
AmeriChoice, a UnitedHealth Group Company

12:00 p.m.–12:45 p.m. Lunch

12:45 p.m.–2:15 p.m. Data and Communications

Session Chair:

Drew Dawson
Director, Office of Emergency Medical Services
National Highway Traffic Safety Administration
Department of Transportation
Chairman, Technical Working Group
Federal Interagency Committee on Emergency Medical Services

Panelists:

Kevin McGinnis
Program Advisor
National Association of State EMS Officials

N. Clay Mann
Professor, Associate Director for Research
University of Utah School of Medicine
Intermountain Injury Control Research Center

Richard Hunt
Director, Division of Injury Response
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention

Joseph Acker
Director
Birmingham Regional Emergency Medical Services System

2:15 p.m.–2:30 p.m. **Break**

2:30 p.m.–4:00 p.m. **Preparedness**

Session Chair:

Lewis Goldfrank
Professor and Chair, Department of Emergency Medicine
Director of Emergency Medicine
Bellevue Hospital Center and New York University Hospitals
New York University School of Medicine

Panelists:

David Marcozzi
Director, Public Health Policy
White House Homeland Security Council

Jon Krohmer
Principal Deputy Assistant Secretary
Deputy Chief Medical Officer
Office of Health Affairs
Department of Homeland Security

Lori Upton
Assistant Director, Emergency Management
Texas Children's Hospital
Executive Director, Catastrophic Medical Operations Center
Regional Hospital Preparedness Council

Joseph Waeckerle
Chief Medical Officer
Office of Homeland Security,
State of Missouri

4:00 p.m.–5:00 p.m. **Wrap-Up Discussion with Federal Partners**

Session Chair:

Arthur Kellermann
Professor and Associate Dean, Health Policy
Emory University School of Medicine

Panelists:

Michael Handrigan
Acting Director, Emergency Care Coordination Center
Chair, Council on Emergency Medical Care
Office of the Assistant Secretary for Preparedness and Response
Department of Health and Human Services

Drew Dawson
Director, Office of Emergency Medical Services
National Highway Traffic Safety Administration
Department of Transportation
Chair, Technical Working Group
Federal Interagency Committee on Emergency Medical Services

Jon Krohmer
Principal Deputy Assistant Secretary
Deputy Chief Medical Officer
Office of Health Affairs
Department of Homeland Security

Appendix B

Workshop Presenters* and Participants

Joseph Acker*
Birmingham Regional Emergency Medical Services Systems

Ron Anderson*
Parkland Health & Hospital System

Dennis Andrulis*
Drexel University

Rodney Armstead*
AmeriChoice, a UnitedHealth Group Company

Elizabeth Armstrong
National Association of State EMS Officials

Bob Bailey*
McKing Consulting

Tali Bar-Shalom
Office of Management and Budget

Robert Bass*
Maryland Institute for Emergency Medical Services Systems

Lance Becker*
University of Pennsylvania

Andrew Bern
American College of Emergency Physicians

Steve Blessing
National Association of State EMS Officials

Douglass Boenning
Department of Health and Human Services

David Boyd*
Indian Health Services

Joyce Boyd
Retired

Sabina Braithwaite
University of Virginia Health System

David Bryson
National Highway Traffic Safety Administration

Tabina Burney
Department of Health and Human Services

Anthony Carlini
Johns Hopkins Bloomberg School of Public Health

Brendan Carr
University of Pennsylvania

Linda Cole
Children's Healthcare of Atlanta

Kathleen Cowling
American College of Emergency Physicians

Drew Dawson*
National Highway Traffic Safety Administration

Martha Deutscher
Department of Defense

Donald Donahue
Potomac Institute for Policy Studies

A. Brent Eastman*
Scripps Health

Brian Eigel
American Heart Association

Jane Englebright*
Hospital Corporation of America

Stephen Epstein*
Beth Israel Deaconess Medical Center

Lynne Fagnani*
National Association of Public Hospitals and Health Systems

Major Greg Feltenberger
Department of Defense

John Fildes*
University of Nevada School of Medicine

Dia Gainor*
Idaho Department of Health

Rebecca Gilson
University of Pennsylvania

Evelyn Godwin
Godwin Consulting Group

Lewis Goldfrank*
New York University School of Medicine

Tress Goodwin
Washington Hospital Center

Cathy Gotschall
National Highway Traffic Safety Administration

Gary Green
New York University/Langone Medical Center

Michael Handrigan*
Emergency Care Coordination Center

William Hanson
University of Pennsylvania

Barbara Hemberger
Weber Shandwick

Jon Mark Hirshon
University of Maryland School of Medicine

John Holcomb*
University of Texas Health Sciences Center

Michael Hopmeir
Unconventional Concepts, Inc.

Richard Hunt*
Centers for Disease Control and Prevention

Kelly Johnson
Agency for Healthcare Research and Quality

Tiffani Johnson
Emergency Medical Services for Children
National Resource Center

Captain Dan Kavanaugh
Health Resources and Services Administration

Arthur Kellermann*
Emory University School of Medicine

Kenneth W. Kizer*
Kizer & Associates

Walter Koroshetz*
National Institute of Neurological Disorders and Stroke

Jon Krohmer*
Department of Homeland Security

Kurt Krumperman*
University of Maryland, Baltimore County

Alicia Livinski
National Institutes of Health

Greg Lynskey
Association of Air Medical Services

Ellen MacKenzie*
Johns Hopkins Bloomberg School of Public Health

David Magid*
Colorado Kaiser Permanente Medical Group

Dawn Mancuso
Association of Air Medical Services

N. Clay Mann*
University of Utah School of Medicine

David Marcozzi*
White House Homeland Security Council

Ricardo Martinez*
The Schumacher Group

Jim McCartney
Weber Shandwick

Kristin McDonald
American College of Surgeons

Kevin McGinnis*
National Association of State EMS Officials

Susan McHenry
National Highway Traffic Safety Administration

Bryan McNally
Emory University School of Medicine

Greg Mears*
University of North Carolina-Chapel Hill

Abhi Mehrotra
University of North Carolina

Michael Miserocchi
Community Health Systems

Patrick Moore
National Association of Emergency Medical Technicians

Christine Murphy
Emergency Nurses Association

Ryan Mutter
Agency for Healthcare Quality and Research

Robert Neches
University of Southern California Information Sciences Institute

Rick Niska
Centers for Disease Control and Prevention

Anthony Oliver
National Highway Traffic Safety Administration

Joseph Ornato*
Virginia Commonwealth University/Medical College of Virginia

Arthur Pancioli*
University of Cincinnati

Ann Marie Papa
Emergency Nurses Association

Randy Pilgrim
The Schumacher Group

Ed Racht*
Piedmont-Newnan Hospital

Adrienne Roberts
American Association of Neurological Surgeons

Andrew Roszak*
Emergency Care Coordination Center

Nels Sanddal*
Critical Illness and Trauma Foundation

Michael Sayre*
Ohio State University

Roslyne Schulman
American Hospital Association

David Seaberg
American College of Emergency Physicians

Melicia Seay
Emergency Care Coordination Center

Cynthia Singh
American College of Emergency Physicians

David Sklar
University of New Mexico Health Sciences Center

Noah Smith
Battelle Memorial Institute

Frank Sokolik
The Joint Commission

David Stuhlmiller
Emergency Medical Associates

Italo Subbarao
American Medical Association

Harry Teter*
American Trauma Society

Iva Thibodeaux
The Schumacher Group

David Thomson
PHI Air Medical

Rear Admiral Gregory Timberlake*
Department of Defense/Veterans Affairs Interagency Program Office

Jeffrey S. Upperman
Children's Hospital Los Angeles

Lori Upton*
Texas Children's Hospital

Alex Valadka*
Seton Brain and Spine Institute

Joseph Waeckerle*
Office of Homeland Security, State of Missouri

Dondra Ward
Emergency Care Coordination Center

Tasmeen Weik
Emergency Medical Services for Children National Resource Center

Richard Wild
Centers for Medicare and Medicaid Services

Dean Wilkerson
American College of Emergency Physicians

Joseph Wright*
Children's National Medical Center

Kevin Yeskey
Department of Homeland Security

Appendix C

The Future of Emergency Care: Key Findings and Recommendations from 2006 Study

INSTITUTE OF MEDICINE
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FACT SHEET • JUNE 2006

The Future of Emergency Care: Key Findings and Recommendations

KEY FINDINGS

Many EDs and trauma centers are overcrowded. [Drawn from *Hospital-Based Emergency Care: At the Breaking Point*]

- Demand for emergency care has been growing fast—emergency department (ED) visits grew by 26 percent between 1993 and 2003.
- But over the same period, the number of EDs declined by 425, and the number of hospital beds declined by 198,000.
- ED crowding is a hospital-wide problem—patients back up in the ED because they can not get admitted to inpatient beds.
- As a result, patients are often "boarded"—held in the ED until an inpatient bed becomes available—for 48 hours or more.
- Also, ambulances are frequently diverted from overcrowded EDs to other hospitals that may be farther away and may not have the optimal services. In 2003, ambulances were diverted 501,000 times—an average of once every minute.

Emergency care is highly fragmented. [Drawn from *Emergency Medical Services At the Crossroads*]

- Cities and regions are often served by multiple 9-1-1 call centers.
- Emergency Medical Services (EMS) agencies do not effectively coordinate EMS services with EDs and trauma centers. As a result, the regional flow of patients is poorly managed, leaving some EDs empty and others overcrowded.
- EMS does not communicate effectively with public safety agencies and public health departments—they often operate on different radio frequencies and lack common procedures for emergencies.
- There are no nationwide standards for the training and certification of EMS personnel.
- Federal responsibility for oversight of the emergency and trauma care system is scattered across multiple agencies.

Critical specialists are often unavailable to provide emergency and trauma care. [Drawn from *Hospital-Based Emergency Care: At the Breaking Point*]

- Three quarters of hospitals report difficulty finding specialists to take emergency and trauma calls.
- Key specialties are in short supply. For example, the number of neurosurgeons declined between 1990 and 2002, while the number of trauma visits increased.
- On-call specialists often treat emergency patients without compensation due to high levels of uninsurance.
- These specialists also face higher medical liability exposure than those who do not provide on-call coverage.

The emergency care system is ill-prepared to handle a major disaster. [Drawn from all three reports]

- With many EDs at or over capacity, there is little surge capacity for a major event, whether it takes the form of a natural disaster, disease outbreak, or terrorist attack.
- EMS received only 4 percent of Department of Homeland Security first responder funding in 2002 and 2003.
- Emergency Medical Technicians in non-fire based services have received an average of less than one hour of training in disaster response.
- Both hospital and EMS personnel lack personal protective equipment needed to effectively respond to chemical, biological, or nuclear threats.

EMS and EDs are not well equipped to handle pediatric care. [Drawn from *Emergency Care for Children: Growing Pains.*]

- Most children receive emergency care in general (not children's) hospitals, which are less likely to have pediatric expertise, equipment, and policies in place for the care of children.
- Children make up 27 percent of all ED visits, but only 6 percent of EDs in the U.S. have all of the necessary supplies for pediatric emergencies.
- Many drugs and medical devices have not been adequately tested on, or dosed properly for, children.
- While children have increased vulnerability to disasters—for example, children have less fluid reserve, which leads to rapid dehydration—disaster planning has largely overlooked their needs.

Drawn from the Future of Emergency Care report series, 2006 • Institute of Medicine • www.iom.edu

RECOMMENDATIONS

Create a coordinated, regionalized, accountable system. [Drawn from all three reports]

- The emergency care system of the future should be one in which all participants (from 9-1-1 to ambulances to EDs) fully coordinate their activities and integrate communications to ensure seamless emergency and trauma services for the patient.
- Congress should enact a demonstration program ($88 million over 5 years) to encourage states to identify and test alternative strategies for achieving the vision.
- The federal government should support the development of national standards for: emergency care performance measurement; categorization of all emergency care facilities; and protocols for the treatment, triage, and transport of prehospital patients.

Create a lead agency. [Drawn from all three reports]

- The federal government should consolidate functions related to emergency care that are currently scattered among multiple agencies into a single agency in the Department of Health and Human Services (DHHS).

End ED boarding and diversion. [Drawn from *Hospital-Based Emergency Care: At the Breaking Point*]

- Hospitals should reduce crowding by improving hospital efficiency and patient flow, and using operational management methods and information technologies.
- The Joint Commission on the Accreditation of Healthcare Organizations should reinstate strong standards for ED boarding and diversion.
- The Centers for Medicare and Medicaid Services should develop payment and other incentives to discourage boarding and diversion.

Increase funding for emergency care. [Drawn from *Hospital-Based Emergency Care: At the Breaking Point* and *Emergency Medical Services At the Crossroads*]

- Congress should appropriate $50 million for hospitals that provide large amounts of uncompensated emergency and trauma care.
- Funding should be increased for the emergency medical component of preparedness—both EMS and hospital-based—especially for personal protective equipment, training, and planning.

Enhance emergency care research. [Drawn from all three reports]

- Federal agencies should target additional research funding to prehospital emergency care services and pediatric emergency care.
- DHHS should conduct a study of the research needs and gaps in emergency care, and determine the best strategy for closing the gaps, which may include a center or institute for emergency care research.

Promote EMS workforce standards. [Drawn from *Emergency Medical Services At the Crossroads*]

- States should strengthen the EMS workforce by: requiring national accreditation of paramedic education programs, accepting national certification for state licensure, and adopting common EMS certification levels.

Enhance pediatric presence throughout emergency care. [Drawn from *Emergency Care for Children: Growing Pains*.]

- EDs and EMS agencies should have pediatric coordinators to ensure appropriate equipment, training, and services for children.
- Pediatric concerns should be explicit in disaster planning.
- More research is needed to determine the appropriateness of many medical treatments, medications, and medical technologies for the care of children.
- Congress should increase funding for the federal Emergency Medical Services for Children Program to $37.5 million per year for 5 years.