

Recommendations for a National Mass Patient and Evacuee Movement, Regulating, and Tracking System

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Executive Summary

Since this report was finalized with the national steering committee charged with guiding and informing the project (see Appendix A), efforts have been ongoing to develop a national tracking system in DHS, HHS, and DoD. Some of those recent efforts may not be reported here.

In October 2005 the Agency for Healthcare Research and Quality (AHRQ) awarded a contract to Abt Associates and its subcontractor, Partners Healthcare, to support development of a national strategy for the design, development, and implementation of an interagency mass patient and evacuee movement, regulating and tracking system. The project had two overall goals:

- **Develop recommendations** for a National Mass Patient and Evacuee Movement, Regulating, and Tracking System – herein referred to as the “National System” – that could be used *during* a mass casualty or evacuation incident for the purposes of locating, tracking, and regulating¹ patients and evacuees, as well as provide decision support to persons and organizations with responsibility for patient and evacuee movement and care, health care and transportation resource allocation, and incident management.
- **Build a Web-based Mass Evacuation Transportation Planning Model for use before** a mass casualty / evacuation incident to estimate the transportation resources needed to evacuate patients and evacuees from health care facilities and other locations.

This report addresses the first of these two project goals, the development of recommendations for a National System. A separate report to AHRQ contains the Mass Evacuation Transportation Planning Model, available on the AHRQ Web site for use by Federal, State, and local emergency planners. The model may be accessed at <http://www.ahrq.gov/prep/massevac/>.

Methodology

To develop the recommendations for the National System, a key initial step was recruiting, in collaboration with AHRQ, a national steering committee that would guide and inform the project. Committee members who attended at least one of the three steering committee meetings are listed in appendix A; the panel consisted of Federal, State, and local government officials and non-governmental experts in emergency management, public health, health care, transportation, and information technology.

¹ Regulating is a process that attempts to ensure that a patient or evacuee is transported on an appropriate vehicle to a location that has the staff, equipment, and other supplies that are needed to care for this person.

Project staff also undertook the following steps:

- In-depth discussion during three day-long steering committee meetings (December 1, 2005, April 12, 2006, and October 27, 2006) at Abt Associates' Bethesda office;
- Search and exploration of existing locating, tracking, regulating, and resource availability systems via participation in conference calls, Internet searches, literature reviews, national conferences, discussions with the AHRQ Task Order Officer, Web-based demonstrations, and general scanning and informal networking activities;
- In-depth project team discussions with other Abt Associates staff with expertise in health care, shelters, correctional facilities, transportation, and information technology design;
- Discussions and meetings with representatives of urban, suburban, and rural health care, emergency management, and information technology organizations; and
- Steering committee review of prepared documents.

National System Goals and Objectives

The project team was instructed to consider a National System that is as inclusive and comprehensive as possible. In that sense, “national” refers to geographic scope, rather than to a level of government. In particular, the National System does not focus exclusively on patients and evacuees transported or cared for by Federal agencies, but rather on any person affected by a multi-jurisdictional incident who seeks medical attention, is unable to self-evacuate to a safe area, or needs assistance with transportation or shelter.

An ideal National System would update location and health status information of patients and evacuees at any location where they are treated, housed, sheltered, or transported, including overnight facilities, locations where patients and evacuees board or get off vehicles, or other temporary gathering points. This information would be made available to authorized persons with responsibility for housing, transporting, or treating patients and evacuees, both at the person-level (e.g., to determine where a specific person is or has been and to alert health care professionals and emergency responders at reception centers to the medical condition of patients and evacuees who will be arriving shortly) and at the aggregate-level (e.g., to determine the number of patients or evacuees, by health status, at various locations within a county, a multi-county region, a State, a multi-State area, or nationwide).

An ideal National System would also: contain timely location and health status information that is updated as soon as possible after the patient or evacuee arrives at or leaves one of these locations; include comprehensive medical information, so that health care professionals can provide appropriate medical care to patients and evacuees; ensure patient and evacuee

confidentiality; and adhere to all Federal privacy regulations such as the Health Insurance Portability and Accountability Act, and guard against stalkers or other predators; support patient/evacuee movement and regulating decisions by providing information on the availability of medical and transportation resources in both an affected area and unaffected areas where patients and evacuees could potentially be transported; and support decision making, monitoring, and reporting for emergency response and recovery.

Summary of Recommendations

Developing the ideal National System described above is an enormous undertaking and therefore must be implemented in phases. As soon as possible, ***the Federal government should fund development of a “Phase I” National System.*** The Phase I system will be a fully-functioning system that could be activated in the event of a national disaster. The Phase I system will also be a platform on which the system can be expanded in subsequent phases.

In the Phase I system, as patients and evacuees arrive and depart from different locations, ***a minimum set of data elements would be collected*** on each patient and evacuee. The following eight elements constitute that minimum data set: unique patient/evacuee identifier, name, gender, date of birth, health status, location identifier, arrival or departure indicator, and date and time of arrival or departure.

The central challenge for the National System is obtaining these data. In particular, any strategy that requires emergency responders and health care staff to enter additional data in the midst of a disaster will fail. Fortunately, much of the data needed to track the location and health status of patients and evacuees are already collected by existing systems at health care facilities, disaster shelters, and other locations. For example, hospitals collect this information on every patient who is admitted. We refer to these systems as “feeder” systems. ***The National System will obtain the minimum set of patient and evacuee data electronically from feeder systems.*** Feeder systems will only transmit data to the National System if the National System is activated. In discussions with health care providers and health IT vendors, we have confirmed that, from a technical perspective, the changes that need to be made are not difficult.

During Phase I, only a limited number of feeder systems should be linked to the National System to demonstrate successfully that the overall recommended approach of the National System is feasible, to develop guidelines to assist linking other feeder systems in subsequent phases, and to build political support for broader implementation of the National System. Selection of the “Phase I feeder systems” should also consider the likelihood that patients or evacuees would encounter a particular feeder system during an actual incident. ***We recommend that the Phase I feeder systems include (1) any available Federal (e.g., DoD and/or HHS) patient and evacuee tracking systems and (2) hospital admission and discharge systems at one (or possibly two) hospital systems that are affiliated with a major health information technology vendor.*** In particular, the Phase I plan assumes that either the DoD or HHS (or both) will implement systems that will be used to track patients and

evacuees that Federal agencies treat and/or transport. Independently of the timeline for the National System (or whether it is implemented at all), the Federal government should commit to implementing these Federal tracking systems.

Regulating depends not only on timely and accurate patient and evacuee tracking information, but also on resource availability information, especially the availability of health care and transportation assets. As a first step toward providing a regulating capability, *the Phase I system would include baseline inventory levels of a limited number of key resources*, including beds (at hospitals, nursing homes, and shelters from available secondary datasets) and transportation assets (ground ambulances, air ambulances, buses, airplanes, and trains controlled by major owners of these assets).

A recommended 21-month plan has been developed for implementing and testing the Phase I National System. The plan includes a pilot test of the system during month 19. The cost to implement the Phase I National System is estimated to be \$1 - \$1.5 million.

At the end of Phase I, an assessment should be made regarding the future direction and priorities for the National System in light of the implementation issues and obstacles that may arise during Phase I, whether future participation in the National System would be voluntary or required, and the likely future funding streams for the National System. The highest priority item for subsequent phases is linking as many feeder systems to the National System as possible, including institutional records systems and tracking systems used at the local or county level. Subsequent phases should also focus on improving the quality of health care and transportation resources availability data that are critical for regulating, incident management, and resource management.

Report Outline

The remainder of this report is divided into four sections and a series of appendixes. The four sections provide background information on the project (Section 1), discuss the goals and objectives of the National System (Section 2), discuss our recommendations for a Phase I National System (Section 3), and list priorities for subsequent phases (Section 4). The appendixes list project staff and steering committee members (Appendix A), review relevant legal issues (Appendix B), and discuss existing feeder systems that could be linked to the National System (Appendixes C, D, and E).

1. Project Origin and Background

The Catastrophic Incident Supplement (CIS) to the National Response Framework assumes that up to 100,000 casualties may require transport, regulating, and tracking from a catastrophic incident site to health care facilities providing definitive care that are located in the surrounding community, the surrounding region, or in other parts of the country.² The Department of Homeland Security's Interagency Security Planning Effort identified patient and evacuee mobilization planning for catastrophic events as a long-term and high-priority initiative.³

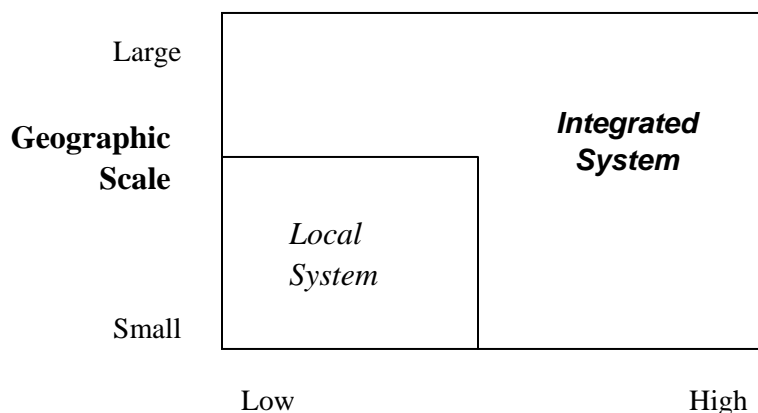
One outcome of this planning effort was that in October 2005, the Agency for Healthcare Research and Quality (AHRQ) awarded a contract to Abt Associates and its subcontractor, Partners Healthcare, with the goal of supporting development a national strategy for the design, development, and implementation of an interagency mass patient and evacuee movement, regulating, and tracking system. The project was undertaken with funding by the U.S. Department of Homeland Security Federal Emergency Management Agency, and the U.S. Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response. AHRQ and the Department of Defense jointly led the project and a steering committee guided the project. (See Appendix A.)

AHRQ Vision

The project is consistent with AHRQ's vision to create a set of umbrella systems that fill identified information gaps in disaster planning, response, and recovery. These systems are intended to link, but not replace, local and public-private systems and to serve as a solution in those localities where access to such systems is not currently enabled. As such, these systems need to be designed for flexibility and interoperability with pre-existing systems in the public and private domain over a predefined problem area. The targeted problem area addressed by these systems is depicted in the diagram below.

² U.S. Department of Homeland Security, National Response Plan (NRP), December 2004. (N.B. The NRP was superseded by the National Response Framework (NRF) in January 2008. The NRF is available at www.fema.gov/nrf. In February 2009, the CIS was undergoing review and revision to align it with the NRF.)

³ September 22, 2004 letter from the Secretary, Department of Homeland Security to Secretary, Department of Defense.



AHRQ has funded several systems that address this need. Two, in particular, are relevant to the project described here. The National Hospital Available Beds for Emergencies and Disasters (HAvBED) System, developed by Denver Health, provided a prototype national real-time hospital-bed tracking system to address a surge of patients during a mass casualty event. HAvBED focused on acquiring bed availability data from *existing systems*, rather than replacing existing systems. An important contribution of this project was the development of data standards for defining and communicating bed availability information.

AHRQ has also funded development of planning tools that can be used to estimate resource and staffing needs resulting from disasters. As noted earlier, one of the two goals for the Abt Associates’ AHRQ project was to develop a Mass Evacuation Transportation Model that estimates the required transportation resources needed to evacuate persons from health care and other facilities. In addition, AHRQ funded Abt Associates to create the Hospital Surge Model, which estimates the hospital resources needed to treat victims of various weapons of mass destruction scenarios. The model is available at <http://hospitalsurgemodel.ahrq.gov>.

Lessons Learned from Prior Disasters

This project is also an outcome of the lessons learned from prior disasters, including hurricanes Katrina and Rita. Four major lessons are particularly relevant to this project here.

Need for tracking. The Health and Social Services Committee of the New Orleans Commission recommended “generating databases with reliable and up-to-date demographic information that can contribute to enhancing hospital planning and decision-making during crisis situations.”⁴ The need for information with which to plan and respond is germane both to those communities directly impacted by an event and to those communities serving as a lifeboat in accepting evacuees. The need for tracking was also emphasized by Abt Associates Inc. researchers in a recent report in which issues of separation between patient-family and

⁴ Health and Social Services Committee of the New Orleans Commission, 2006: “Bringing New Orleans Back: Report and Recommendations to the Commission, January 18, 2006,” www.bringneworleansback.org.

family-family (in particular, children separated from parents) and the need for reunification were noted. These tracking needs are compounded by the fact that many complex evacuations across the U.S. involved an average of 3.5 moves, most of which were made across State lines.⁵

Need to include and integrate multiple evacuee source locations. Nursing homes are not typically incorporated into disaster-relief planning based on experience from Hurricane Andrew in 1992, the 1994 Northridge earthquake, and Hurricane Katrina in 2005.⁶ While hospitals are typically included in such planning activities, mandatory evacuations automatically exclude hospitals. Another report noted that hospitals become magnets for people needing help or seeking refuge during a crisis and recommended that automatic exclusion from evacuation orders be revisited and emphasized that a system for tracking evacuees is essential.⁷ At Tulane University during Hurricane Katrina, the numbers of individuals in need of evacuation included patients, staff, families of staff, families of patients, other nonpatients, and pets.⁸ Other types of evacuee source locations would include health care clinics, ambulatory surgery centers, formally designated shelters, temporary shelters such as public buildings (e.g., schools, churches, airports), hotels/motels (particularly in tourist areas), residences, and/or stranded mass transportation vehicles (i.e., trains, ships, planes).

Need for medical information. Health care workers in Houston receiving evacuees from Hurricane Katrina-affected areas found that many evacuees coming from the Superdome and other shelters arrived with pressing medical needs such as chronic illnesses, prescription fills for missing medications, replacement of eyeglasses, basic dental needs, and psychiatric services.⁹ Portable personal health records and/or electronic medical records that could be readily accessed from secure servers would facilitate critical health information exchange.

Need to prioritize evacuee status. Medical and social needs must be considered in triaging evacuees. The traditional medical model for triage in the U.S. is to treat the most critically injured first; in an overwhelming disaster situations, health care providers may shift to battlefield triage practices in which those with the highest probability of survival are treated first. Little is known about lay clinicians' abilities to shift paradigms during response.

⁵ Estimating Loss of Life from Hurricane-Related Flooding in the Greater New Orleans Area: Health Effects of Hurricane Katrina. Cambridge (MA): Abt Associates. May 2006.

⁶ Saliba, D, J Buchanan, RS Kington: "Function and Response of Nursing Facilities During Community Disaster," *AJPH*, 94(8):1436-1441, 2004.

⁷ Gray, BH and K Hebert (The Urban Institute): "Hospitals in Hurricane Katrina, Challenges Facing Custodial Institutions in a Disaster," July, 2006, <http://www.urban.org/url.cfm?ID=4113&renderforprint=1>.

⁸ Bovender, JO and B Carey: "A Week We Don't Want to Forget: Lessons Learned from Tulane," *Frontiers of Health Services Management*, 23(1):3-12, Fall, 2006.

⁹ Van Gorder, C: "Lessons from a Tragedy," *Hospitals & Health Networks*, hospitalconnect.com e-newsletter, <http://www.hhnmag.com/hhnmag/jsp/articledisplay.jsp?derpath=HHNMAG/PubsNewsArt>.

Further, guidelines on how to consider accompanying social issues, such as maintaining family units, need to be clearly structured. Consistent guidelines and associated protocols would support planning and decision-making during times of crisis.

In summary, during a disaster, data exist on patients, institutionalized individuals, and public citizens residing in or visiting a community. Effective response in times of disaster requires that such data be readily accessible and linked to support tracking needs. We lack the capability to exchange meaningful data across systems to facilitate evacuation holistically. The need to integrate siloed systems so that they can inform decisionmakers on sources/destinations, critical personal information, and evacuee status is emphasized by experience from prior disasters.

2. The National System: Goals and Objectives

Abt Associates and its subcontractor, Partners Healthcare, with the assistance of a steering committee, was contracted to develop recommendations for a National Mass Patient and Evacuee Locating, Tracking, and Regulating System – referred to here as “the National System” – that could be used during a multi-jurisdictional mass casualty or evacuation incident to locate, track, and regulate patients and evacuees.

For the purposes of this report, we will adopt the following terminology:

- A system that “*locates*” will provide authorized users with the ability to determine the current location and medical condition of a patient or evacuee.
- A system that “*tracks*” will provide authorized users with the ability to determine current and previous locations and medical conditions of a patient or evacuee or group of patients or evacuees.
- Regulating is a process that attempts to ensure that a patient or evacuee is transported on an appropriate vehicle (e.g., an airplane or an ambulance) to a location that has the staff, equipment, and other supplies that are needed to care for this person. Thus, a system that “*regulates*” will provide authorized users with a mechanism for assigning a patient or evacuee to a vehicle and then assigning a destination to that vehicle.

By accomplishing these objectives, the National System will also support family reunification efforts and provide decision support to persons and organizations with responsibility for patient and evacuee movement and care, health care and transportation resource allocation, and incident management.

The Abt Associates project team was instructed to consider a National System that is as inclusive and comprehensive as possible. In that sense, “national” implies a nationwide geographic scope, rather than a level of government. That is, the National System does not focus exclusively on patients and evacuees transported or cared for by Federal agencies.

In the remainder of this section on goals and objectives, we refer to an *ideal* National System. It should be clear reading these sections that implementing an ideal National System is an enormous undertaking that will take several years to effect. Our recommendations, discussed in Section 3, therefore focus on an initial, Phase I system that by no means represents the ideal system but is nevertheless a platform on which the National System can be expanded and improved.

2.1. Locating and Tracking

In terms of locating and tracking, an *ideal* National System would have a number of characteristics. It would provide authorized users with access to information on ***any person affected by a multi-jurisdictional incident who seeks medical attention or is unable to self-evacuate to a safe area***. Indeed, the Abt project team was instructed to consider *all* potential groups of patients and evacuees. This would include persons who:

- require medical attention as a result of a national disaster;
- are at shelters operated by the American Red Cross or other organizations;
- are in health care facilities that need to be evacuated;
- are in other overnight facilities, such as correctional facilities or hotels, that need to be evacuated;
- require transportation out of the affected area with the assistance of a Federal, State, or local government agency or community-based organization; or,
- are homebound and unable to receive assistance from family or friends.

As documented in Appendixes C and D, there are existing systems that can track a *subset* of these persons, at certain locations, in the event of a national disaster. For example, the National Disaster Medical System (NDMS) uses a DoD system called TRAC2ES to track and regulate patients transported on DoD aircraft or other Federal transportation assets to NDMS-participating medical facilities. The TRAC2ES system was activated during Katrina and was used to regulate several thousand evacuees during that disaster. A handful of municipalities have patient tracking systems that they use in mass casualties incidents to track patients from the incident scene to a hospital and possibly other locations. In addition, virtually any institution that houses patients or evacuees will have an automated system that “checks in” and “checks out” persons (see Appendix C – institutional records systems).

An ideal National System ***would update location and health status information of patients and evacuees at any location where they are treated, housed, sheltered, or transported***, in the same manner that package delivery companies “log in” a package when it is first picked up and then update the package’s status as it enters or leaves a facility, is loaded on or taken off a plane or truck, and when it is finally delivered to its final destination. For patients and evacuees, these locations include:

- overnight facilities for patients and evacuees, such as hospitals and shelters;

- locations providing medical treatment, including temporary medical facilities, as well as hospitals, nursing homes, and other overnight facilities;
- locations where patients and evacuees board or get off vehicles, such as airfields, train stations, bus stations, and piers; and,
- other temporary gathering points for patients and evacuees.

As an illustration, consider a person who presented at a disaster shelter, became ill, and had to be transported to a hospital, was discharged and returned to the shelter, was evacuated out of the affected area to a reception area in another part of the State, and then was transported to a local shelter. A database that tracked the location of this person might contain the following entries:

Date	Location	Event
10/15/07	Shelter XYZ	Arrive
10/17/07	Shelter XYZ	Depart
10/17/07	Hospital ABC	Arrive
10/19/07	Hospital ABC	Depart
10/19/07	Shelter XYZ	Arrive
10/23/07	Shelter XYZ	Depart
10/23/07	Bus 123	Board
10/23/07	Bus 123	Get off
10/24/07	Reception Area DEF	Arrive
10/24/07	Reception Area DEF	Depart
10/24/07	Bus XYZ	Board
10/24/07	Bus XYZ	Get off
10/24/07	Shelter ABC	Arrive

In addition to including all patients and evacuees and updating their status at any location where they are treated, housed, or transported, an ideal National System would also:

- contain *timely* location and health status information that is updated as soon as possible after the patient or evacuee arrives at or leaves one of the locations noted above;
- contain *comprehensive medical information*, so that health care professionals can provide appropriate medical care to patients and evacuees, who in all likelihood would arrive at a facility with little or no documented medical history; and,

- ***ensure patient and evacuee confidentiality***, adhere to all Federal privacy regulations such as HIPAA, and guard against domestic abusers or other predators (see Appendix B).

The above table also illustrates other potential uses for this information. Aside from the patient or evacuee locator function (i.e., “Where is John Doe right now?”), tracking information would:

- enable a hospital to determine the current location of all the patients that were evacuated from its facility;
- alert health care professionals and emergency responders at reception centers to the medical condition of patients and evacuees who shortly will be arriving at their reception center; and,
- enable public health officials to trace the movement of a patient or evacuee (and his or her contacts) who is later discovered to have a contagious disease.

Aggregate patient and evacuee location and health status data also can inform incident commanders and public health and emergency response officials at the county, State, and Federal levels. Thus, an *ideal* National System must be able to aggregate patient and evacuee data in a variety of ways, including:

- patient and evacuee status, including the number of patients or evacuees, by health status, at various locations within a county, a multi-county region, a State, a multi-State area, or nationwide;
- temporal trends, including daily or weekly trends in the number of patients or evacuees or the number of patients or evacuees by health status for the different geographic regions affected by the incident; and,
- spatial trends, including how the geographic scope of the incident and the transport of patients and evacuees has changed since the start of the incident.

2.2. Regulating

In a large scale or multi-jurisdictional disaster, regulating decisions are typically made on three levels:

- Group movement decisions to a region – e.g., a regulator decides to send 100 patients in an affected area to a reception center in a distant city.

- Group movement decisions to a facility – e.g., a regulator at the reception center, who is anticipating arrival of the 100 patients, decides how many patients will be sent to each of the 12 hospitals in the city.
- Individual movement decisions to a particular facility on a specific vehicle – e.g., a person at the reception center, having been notified how many patients will be sent to each hospital, assigns individual patients to specific ambulances and tells the driver the destination hospital.

At the Federal level, NDMS uses Federal Coordinating Centers (FCCs) to regulate patients from a disaster site to NDMS-participating medical facilities across the country. There are roughly 70 FCCs across the country, which have relationships with local NDMS-participating hospitals and, in the event that NDMS is activated, determine the number of patients that each hospital can accept over a period of time. DOD's TRAC2ES system notifies each FCC which patients are coming to their region. Regulating is also performed at the State level, by persons who determine where patients or evacuees should be moved within the State.

Clearly, regulating relies on complete, accurate, and timely information on the location and health status of patients and evacuees, including those in the affected area who need to be transported outside the affected area and those on their way to a particular location who will need to be cared for once they arrive. In other words, an *ideal* National System that provides for patient and evacuee locating and tracking will also assist with the regulating process.

In addition, effective regulating depends on ***resource availability information***. An *ideal* National System would provide regulators with information on the availability of medical and transportation resources in:

- an affected area – e.g., to help determine whether sufficient assets are in the area to treat and transport patients and evacuees; and,
- areas outside the affected area – e.g., to help determine potential locations to where patients and evacuees could be transported.

Information about resource availability is generally available in three forms.

- ***Real-time availability at the unit level.*** In this case, a regulator knows the real-time status of individual vehicles and has control over each vehicle's status (i.e., the regulator can assign a vehicle to a particular task). Dispatchers in police or emergency response communication centers know the availability of each police or EMS unit in their jurisdiction.

- ***Estimated number available at the “resource level.”*** In this case, a location reports that they have a certain number of a particular resource available. AHRQ’s HAvBED system provides a means for hospitals to report bed availability. Generally, the person receiving this information (e.g., the FCC receives bed availability information from NDMS hospitals) assumes that this number represents an estimate of the number available, rather than a guarantee that that number of beds are being reserved for them.
- ***The number of resources in a location’s inventory.*** In the absence of the above two types of availability information, a baseline inventory number – combined with an expected capacity percentage – provides a rough estimate of resource availability. For example, a 500-bed hospital assumed to be operating at 95 percent capability would ordinarily have 25 available beds at any given time (and could perhaps make more beds available during an emergency).

In addition to providing complete and accurate resource availability information, an *ideal* National System could also assist regulating in the following ways:

- ***Automated notification of regulating decision.*** Once a decision is made to move a group of patients or evacuees (or an individual patient or evacuee) to a location, persons with responsibility for transporting or providing medical treatment at that location could be notified automatically of the movement decision. TRAC2ES provides this type of information to FCCs.
- ***Automated assignment of patients and evacuees to vehicles and locations.*** Just as police and EMS computer aided dispatch systems recommend units to dispatch to calls for service (based on an “average expected location” for each unit), an *ideal* regulating system could offer decision support in the process of matching vehicles to patients and evacuees. This of course requires that the regulating system know the real-time availability of each vehicle.

As discussed later in Section 3, our recommendations focus on initial steps for improving regulating by improving the quality of availability information for a select group of key transportation and health care resources.

3. Recommendations for a Phase I National System

Building the ideal National System, described in the previous section, is an enormous undertaking and must therefore be implemented in phases. As soon as possible, the Federal government should fund development of a “Phase I” system. As described below, a Phase I system:

- would be a fully-functioning system that could be activated in the event of a national disaster;
- would contain location and health status data on patients/evacuees treated or housed at a limited number of locations;
- would contain information on the availability of a limited set of key medical and transportation resources that are critical for regulating patients and evacuees; and,
- would provide authorized users with access to patient, evacuee, and resource availability data in appropriate formats and levels of aggregations.

Most importantly, the Phase I National System would be a platform on which the system can be expanded in subsequent phases (see Section 4).

The remainder of this section describes major recommendations and presents a 21-month implementation plan for the Phase I National System.

3.1. Patient/Evacuee Data Elements

While a comprehensive set of demographic and medical data would be extremely useful for tracking, regulating, and treating patients and evacuees, the project team and the steering committee recommend that, for the Phase I system, only a *minimum set of data* on patients and evacuees be included in the National System. The project’s steering committee agreed that the following eight data elements comprise this minimum data set: unique patient/evacuee identifier, name, gender, date of birth, health status, location identifier, arrival or departure indicator, and date and time of arrival or departure.¹⁰

¹⁰ By coincidence, a DoD-VA patient tracking working group independently developed the same list of minimum data elements just days before the project’s final steering committee meeting.

In Section 3.2 we discuss our recommendation for how to obtain these data. We recommend that these data be obtained electronically from existing “feeder” systems such as institutional records systems (“check in/check out” systems) and local- or agency-based tracking systems.

Minimum Data Elements

The following constitute the minimum data elements that should be collected at each location where a patient or evacuee is treated or housed:

- **Unique identifier.** It is essential that each individual being tracked have a unique identifying number, to avoid duplicates and confusion. Existing patient tracking systems and institutional records systems (see Appendixes C and D) use such numbers, but these systems use different algorithms for generating the IDs. A key task in the Phase I implementation of the National System will be agreement on a common algorithm for creating unique patient or evacuee identifiers. We recommend that the ID be created from the data elements in the minimum data set, namely:
 - name,
 - gender, and
 - date of birth (if not available, substitute age range: <1, 1-5, 5-10, 10-20, 20-30, etc.)

If the local feeder system providing these data to the National System assigns a unique identifier to the patient or evacuee (using a bar code, for example), this number could also be incorporated into the minimum data elements.

We do not recommend the use of social security numbers (SSNs) because people may not recall their number, may use a fake number (SSN cards have no current photo), or may not have a SSN (as in the case of some children and many immigrants). A driver’s license or passport number could be used, but these can be lost and it must be possible to reconstruct the unique identifier using nothing more than information a person will know about themselves, without reference to documentation.

- **Name, gender, date of birth.** The steering committee agreed that name, gender, and date of birth constitute the three most critical data elements for identifying a patient or evacuee. Additional physical descriptors (e.g., height, weight, hair color, eye color, primary language spoken, hearing or sight impairment) should be considered following implementation of the Phase I National System.
- **Health Status.** The only medical information recommended for the Phase I National System is a single health status indicator. The health status categories will vary depending on where the person is being assessed and whether medical personnel are making the assessment:

1. **Red/yellow/green triage color** – for individuals assessed by medical personnel (emergency medical technicians [EMTs], triage nurses) prior to being transported to a hospital. This is common practice for EMTs at accident scenes.

Red = emergent

Yellow = urgent

Green = no medical care needed

OR

2. **ICU/floor/discharge ready, not yet admitted** – for hospital patients being evacuated, who are assessed by medical personnel. This will guide transportation to an appropriate receiving facility.

ICU = being evacuated from an ICU, needs transport to an ICU

Floor = being evacuated from a hospital floor, needs to be admitted to a general hospital floor

Discharge ready, not yet admitted = person can be relocated to a shelter or other non-medical setting

OR

3. **Acutely ill/well but with medical history/healthy** – for evacuees being assessed by non-medical personnel, as at a shelter, bus station or other non-medical touch point.

Acutely ill = needs emergency transport to a hospital

Well with medical history = can be transported to a shelter but will need medical attention soon (e.g. medications, equipment for glucose monitoring)

Healthy = has no medical needs

- **Location identifier.** A location identification number is needed so that the patient or evacuee is unambiguously linked to a location at a particular date and time. The location identifier must be unique to that location and, like the unique person ID, should be composed using a to-be-developed universal algorithm – for example, one based on type of location (from a list: hospital, shelter, airport, staging area, etc.), zip code of location, county, and State.
- **Arrival or departure.** The minimum data set should include an indicator for whether the patient is arriving at or departing from the location.
- **Date and time of arrival or departure.**

Secondary Data Elements

Once the Phase I National System is operational, additional data elements should be included that describe in more detail the patient/evacuee's medical condition and needs.

The following other data elements would be extremely helpful for service providers (rescue workers, physicians, shelter staff) who are assisting people during the evacuation process. They will also be useful for managers trying to coordinate safe transportation to appropriate locations – especially for people with medical needs.

- ***Special transportation needs*** (e.g., advanced life support (ALS) or basic life support (BLS) ambulance, wheelchair), to assure safe transport (e.g. sending a wheelchair van to a location that needs to relocate wheelchair-bound evacuees).
- ***Special medical needs*** (e.g., ventilator, oxygen, dialysis, current medications), to assure that patients with these needs reach a location equipped to meet them, and to support resource allocation so that a location that has several patients needing medication will get necessary shipments.
- ***Contamination/radiation/contagion status***, should exposed people need to be segregated/quarantined/decontaminated, to avoid putting others at risk.
- ***Security/supervision needs/status***, for psychiatric patients, prisoners, domestic abuse victims who may require special security for their own protection and that of others.
- ***Family unification code***, to link family members to each other; shelters commonly include a family indicator as part of the unique ID, to help reunite families who become separated.
- ***Attached files (medical records and images)***, to allow transfer of other electronic information, especially health records, to be accessed by service providers at each touch point.
- ***Special communication needs***, to help arrange for translator services or services for hearing or vision impaired persons.
- ***Final "exit" status*** (e.g., left with relatives, went home, deceased, admitted to long-term nursing home). Individuals who have been tracked during an evacuation will eventually leave the tracking system, either because the emergency has ended and they can return home or because they have reached a semi-permanent location and are no longer in need for evacuation/services. Rather than letting people simply wander off, it would be helpful to know that they are no longer in need of assistance. In

addition, should other relatives still be searching for someone who has left the system, a final address/location would be helpful.

3.2. Obtain Patient/Evacuee Data From Existing Systems

The central challenge for the National System is obtaining complete and accurate location and health status data on patients and evacuees as they are treated at and transported to different locations during and after the disaster – specifically, the data elements described in the previous section. In particular, any strategy that requires emergency responders and health care staff to enter additional data – especially into an unfamiliar system – in the midst of a disaster will fail. Fortunately, much of the data needed to track the location and health status of patients and evacuees are already collected by existing systems at health care facilities, disaster shelters, and other locations. For example, hospitals enter information on every patient who is admitted or discharged. We refer to these systems as “feeder” systems. ***We recommend that the National System obtain necessary locating and tracking data electronically from these feeder systems.*** Feeder systems will only transmit data to the National System if the system is activated. Given the importance of feeder systems in our recommendations for the National System, the project team invested considerable resources researching these systems (see Appendixes C and D).

Feeder Systems

A complete discussion of feeder systems is in the appendix. Briefly, we group feeder systems into two broad categories. The first are ***institutional records systems***. These are “check in/check out” systems that contain the current location of persons but are not designed to track their movement from one location to another. Homeless shelters, hospitals, nursing homes, and virtually any other facility that houses persons use automated systems to keep track of who is in their facility.

The second type of feeder systems are ***tracking systems*** – systems designed to record the movement of persons from one location to another. (Note that we are distinguishing between the National Systems which, of course, serves a tracking purpose, and feeder tracking systems.) Feeder tracking systems include tracking systems that cities, counties, or other government agencies have purchased to track patients or evacuees. Most commonly, they are used to track patients being transported from a mass casualty site to hospitals. They include both commercially licensed systems and “home-grown” systems such as ReddiNet in Los Angeles. The DOD uses tracking systems to track military casualties – TRAC2ES is used for transport and regulating purposes and the Joint Patient Tracking Application (JPTA) to track military casualties as they are treated at different U.S. military hospitals. As noted in Section 3.3, both DOD and HHS are considering adapting existing or obtaining new tracking systems for use in civilian mass casualty or evacuation incidents.

Illustrative Data Flow Between Feeder Systems and the National System

The following sequence of events illustrates how we envision the relationship between feeder systems and the National System:

Event	Data Flow
Casualty triaged at the incident scene.	<ul style="list-style-type: none"> • Patient logged into the jurisdiction’s tracking system (i.e., the feeder tracking system), which transmits location and medical status data to the National System.
Patient arrives at hospital 1.	<ul style="list-style-type: none"> • Patient arrival recorded in the jurisdiction’s tracking system, which transmits patient location and medical status data to the National System. • Patient arrival also recorded in hospital information system, which transmits patient location and medical status data to the National System.
Patient leaves hospital 1, bound for airport 1.	<ul style="list-style-type: none"> • Patient departure recorded in the jurisdiction’s tracking system, which transmits updated patient location and medical status data to the National System. • Patient departure recorded in hospital information system, which transmits updated patient location and medical status data to the National System.
Patient arrives at airport 1; boards airplane; arrives at airport 2; boards ambulance bound for hospital 2.	<ul style="list-style-type: none"> • Patient airport arrival, plane boarding, plane deplaning, and departure from airport 2 recorded in the feeder tracking system in use at these locations, which transmits updated patient location and medical status data to the National System.
Patient arrives at hospital 2.	<ul style="list-style-type: none"> • Patient arrival recorded in the jurisdiction’s tracking system, which transmits updated patient location and medical status data to the National System. • Patient logged into hospital information system, which transmits patient location and medical status data to the National System.

This illustration assumes that a number of different feeder systems exist and are capable to transmitting data to the National System, including tracking systems in the jurisdiction where the incident occurs, tracking systems at the airport, and admission and discharge systems at both hospitals. As described in our implementation plan, we envision that, over time, more and more feeder systems will become linked to the National System, starting with the systems that are described in Section 3.3.

It should be noted that the above description assumes that one-way data exchange occurred between feeder systems and the National System. A more sophisticated two-way exchange could be considered for Phase II or III. With two-way data exchange, when a feeder system transmits location and medical information on a patient or evacuee to the National System, the National System could return to the feeder system either (1) an acknowledgment that this particular person has been added to the National System, or (2) a list of possible “John Does.” In this latter case, the feeder system would need to present the “possibles list” to the user and prompt the user to select which, if any, of the John Does is the person at their facility. This two-way communication would increase the accuracy of the National System (in particular, by increasing the instances in which a patient/evacuee record is correctly associated with an existing record for that same person). At the same time, from the perspective of the feeder systems’ owners, the cost to effect two-way communication in the feeder systems would be significantly higher than the costs required to effect one-way communication.

Implications of Relying on Feeder Systems

There are a number of important implications of relying on feeder systems to transmit patient and evacuee tracking data to the National System.

First, *the National System will not require line staff or emergency responders to enter additional data during the disaster*. As noted above, the alternative to linking the National System with feeder systems is to develop a new data collection system that staff at institutions treating or housing patients and evacuees would use to enter patient and evacuee data. While developing the IT components of such a system would take less time and resources than the approach we are recommending, project staff and the steering committee believe that the likelihood is very low that a new and unfamiliar system would actually be used during a catastrophic incident.

Second, *activating the National System will not involve deploying and transporting assets to an incident scene* in the manner that activating the Strategic National Stockpile does. Instead, owners of feeder systems (that have completed a certification process that ensures that the feeder system can correctly transmit patient/evacuee data to the National System) will need to “flip a switch” that activates the process for transmitting data from the feeder system to the National System.

Third, *a central repository is needed to receive patient and evacuee data from feeder systems*. The repository also must provide authorized users with access to person- and aggregate-level data, guard against unauthorized attempts to access data, and facilitate various administrative tasks, such as creating users, archiving data, etc. Development and testing of this central repository is an important part of the Phase I Implementation Plan (see Section 3.6).

Fourth, *for the feeder system concept to work standards are needed for communicating with the National System.* Early in Phase I detailed protocols and procedures need to be developed that specify how data are transmitted between feeder systems and the National System. Broad acceptance of these requirements is critical to the success of the project, as is adherence to existing standards and related initiatives. In particular, any standards and protocols in the National System should be compatible with the Emergency Data Exchange Language (EDXL) protocol overseen by the Organization for the Advancement of Structured Information Standards (OASIS), as well as the initiatives of the Office of the National Coordinator for Health Information Technology.

In addition to developing a procedure to “flip the switch,” owners of feeder systems also will need to develop and test the process (based upon to-be-developed data standards) that gathers and transmits the patient/evacuee data from their system to the National System.¹¹ In discussions with health care providers and health IT vendors, we have confirmed that from a technical perspective, the changes that need to be made are not difficult – the level of effort is similar to that required for repackaging extant data and periodically submitting it to a regulatory agency. In the case of hospitals with vendor-supplied IT systems, the IT vendor would develop the process, the hospital system would test the process on a test server, and then the hospital system would install the patch on their production server.

A final implication is that rollout of the National System will be similar to the rollout of other national data collection systems (e.g., those operated by the CDC and the FBI), in the sense that reporting entities will begin participating in the National System over a long period of time. As a consequence, *a patient or evacuee initially will be entered into the National System whenever s/he encounters a feeder system that is linked to the National System.* Similarly, the frequency with which a patient’s or evacuee’s location and health status data are updated also depends on whether feeder systems at the locations where s/he is treated or transported to are linked to the National System.

¹¹ We envision that a “batch process” will be run (say, hourly) against the feeder system’s database that extracts the necessary data elements and pushes these data to the National System, as opposed to a “real-time” transfer of data to the National System immediately after the transaction occurs in the feeder system. The latter option, while providing more timely data, would be significantly harder (i.e., time-consuming) to develop within the feeder systems.

3.3. Link a Limited Number of Feeder Systems to the National System

During Phase I, only a limited number of feeder systems should be linked to the National System in order to demonstrate that the overall approach for the Phase I system is feasible, to develop guidelines to assist in linking other feeder systems in subsequent phases, and to build support for broader implementation of the National System. Selection of the Phase I feeder systems should consider the likelihood that patients or evacuees would encounter a particular feeder system during an actual incident. Priority should therefore be given to feeder systems that operate in higher-risk areas of the country. Another consideration is the likelihood that the owners of the feeder system will be able to link their feeder system to the National System according to the Phase I schedule (see Section 3.6). During Phase I, the Phase I feeder systems would need to be modified so that the Phase I data elements would be transmitted to the National System. These systems would then need to undergo a to-be-defined certification process to verify that data are transmitted according to specification. The links between these feeder systems and the National System would also be tested during the pilot test scheduled near the end of Phase I (see Section 3.6).

We recommend that the Phase I feeder systems include (1) any available Federal (e.g., DoD and/or HHS) patient and evacuee tracking systems and (2) hospital admission and discharge systems at one (or possibly two) hospital systems that are affiliated with a major health information technology vendor. Federal tracking systems are included in Phase I because they are intended to be used nationwide, rather than at just a single location. As a result, in a multi-jurisdictional incident, patients and evacuees are very likely to encounter staff who use these systems. A hospital system is included because it is critical to start the process of getting hospital systems linked to the National System, and starting with a hospital system that is affiliated with a major health information technology (HIT) vendor – as opposed to a small vendor or a hospital with a “home grown” system – increases the likelihood that the number of hospitals linked to the National System can be increased rapidly in subsequent phases.

Federal Tracking Systems

The Phase I implementation plan assumes that either the DoD or HHS (or both) will develop, test, and implement a system (or systems) that agency employees and/or National Guard personnel will use to track patients and evacuees that they treat and/or transport. The implementation plan makes no assumptions about the particular system developed, only that the system(s) be able to serve as feeder systems to the National System and that they will undergo a certification process for the National System during Phase I. Options for DoD and HHS include “civilianizing” the Joint Patient Tracking Application (JPTA), which the DoD currently uses to track patients at military hospitals; further developing the Emergency Tracking Accountability System (ETAS), which currently exists as a prototype; expanding use and access to TRAC2ES; or obtaining a new system. (JPTA, TRAC2ES, ETAS, and other tracking systems are discussed in appendix C.) Independent of the timeline for the

National System (or whether it is implemented at all), the Federal government should commit to implementing at least one of these systems.

Information Systems at Hospital Systems

During Phase I, the admission and discharge system used by a network of hospitals that is affiliated with a major health care information technology (HIT) vendor will be linked to the National System. At the beginning of Phase I, a major health care system (or two such systems) should be recruited to participate in the project. This health system should have hospitals in at-risk areas for disasters and, as noted above, use systems purchased from a major HIT vendor. As noted in the previous section, the vendor would have to develop a computer program that would be run (if the National System is activated) at a pre-specified interval that would extract the required data elements on patients who were admitted or discharged from the hospital because of the disaster and then transmit that data file to the National System. IT staff at the network of hospitals would have to test this procedure on a test server and then install it on their production server.

The experiences linking this feeder system to the National System will benefit other health care providers who will link their systems to the National System in subsequent phases of the project. In particular, Phase II will link the Phase I health IT vendor's other major hospital and nursing home clients to the National System, as well as work with other major health IT vendors. The groundwork for this expansion – establishing contacts with other health care systems, developing a detailed implementation guide, etc. – will be laid in Phase I.

The hospital systems with whom the project staff have spoken have indicated that their willingness to participate in Phase I depends on:

- whether participation will interrupt day-to-day operations at their facility;¹²
- whether linking to the National System will be voluntary or a requirement; and,
- the anticipated costs (primarily IT staff time) of modifying their system and whether they will be reimbursed for their costs.

Disaster Shelter Registration Systems

It may be possible ultimately for the Phase I feeder systems to include registration systems currently being explored at American Red Cross (ARC) disaster shelters, because evacuees would obviously encounter such as system during any incident in which the National System is activated. The ARC's long term goals include implementation of a client registration

¹² In our proposed approach for Phase I, activating the National System will not affect day-to-day operations at locations with feeder systems linked to the National System because line staff will not be required to enter data into a separate system.

system for its disaster shelters, but such a system is unlikely to be available for Phase I. Even when these systems are implemented, privacy considerations will likely preclude transmitting identifying person-level data to the National System. Possible alternatives include providing only aggregate data (e.g., the number of evacuees at a shelter, by health status category) or allowing evacuees to voluntarily register themselves in the National System. Another option is to explore whether systems used by the Coordinated Assistance Network (CAN) to coordinate benefits and other services for evacuees could be linked to the National System. CAN is a multi-organizational partnership that includes the ARC and some of the Nation's other leading nonprofit disaster relief organizations.¹³

3.4. Focus on a Limited Number of Health Care and Transportation Resources

Timely and accurate information on the availability of key health care and transportation resources is essential for making sound regulating decisions – that is, to ensure that a patient is transported on a vehicle that is staffed and equipped appropriately and transported to a location that will have an available bed, staff, and equipment.

The project team and the steering committee recommend that the Phase I system focus on assembling for the National System information on a limited number of key resources:

- Hospital beds (baseline number at each hospital);
- Nursing home beds (baseline number at each nursing home);
- Disaster shelter beds (baseline number at each disaster shelter);
- Ground ambulances (baseline number for major owners);
- Air ambulances (baseline number for major owners);
- Buses (baseline number for major owners);
- Airplanes (baseline number for major owners); and,
- Trains (baseline number for major owners).

Data collection procedures for the three types of beds already exist (hospital bed capacity, via the American Hospital Association's annual survey; nursing home bed capacity, via the Centers for Medicare & Medicaid Services' (CMS) Online Survey, Certification, and

¹³ See www.can.org for more information.

Reporting (OSCAR) System; and disaster shelter bed capacity, via the Red Cross's National Shelter System.

By contrast, there are no existing procedures or systems for obtaining location-specific baseline data on other high priority resources identified by the steering committee – i.e., ground ambulances, helicopter ambulances, buses, and airplanes. For these resources, we recommend that during Phase I a process be established for on-going collection of baseline capacity data from the *major owners* of the resources. Once this process is established, expanding it to include other owners of these resources can be considered for Phase II.

Additional background information on resource availability systems appears in Appendix E.

3.5. System Operation

Below we provide a brief, high-level, and illustrative overview of how the Phase I National System would operate, in terms of (1) pre-population of data, (2) system activation, (3) data exchange, (4) data access, and (5) system deactivation. A key task during development and testing of the Phase I system is development of detailed operating procedures and data protocols.

Pre-Population of Data

The goal of this stage is to minimize the amount of work necessary in the next stage (system activation) by populating the National System with as much data as possible prior to an incident. As noted in the previous section, the Phase I system would be populated with baseline bed capacity data from all hospitals, nursing homes, and disaster shelters, and baseline capacity data from the major owners of ground ambulances, helicopter ambulances, buses, airplanes, and trains. Other system configuration data – to be defined early in Phase I – would also be populated in the National system, such as facility locations and key user organizations (e.g., Emergency Operations Centers, public health agencies, FEMA, HHS, DHS).

System Activation

The decision to activate the National System will follow a predefined and to-be-developed protocol. Once this occurs, the administrator of the National System ensures that a number of tasks are completed. Most importantly, the system administrator ensures that owners of the Phase I feeder systems activate the processes that transmit data from their feeder systems to the National System. Other tasks include creating an incident in the National System (so that all subsequent data can be linked to that incident), activating the National System's data access portal, alerting authorized users that the National System has been activated, and answering questions from the National System users.

Data Exchange

After system activation, feeder systems begin submitting patient and evacuee data to the National System. The following scenario illustrates when and how patient/evacuee data will be transmitted to the National System.

- John Doe is injured in a mass casualty incident. The local EMS agency, using its own tracking system, logs John into their system. For the purposes of this illustration, this local tracking system is assumed *not* to be linked to the National System, so information about John is *not* transmitted to the National System at this time.
- John is transported and admitted to a local hospital, which (for illustrative purposes) is assumed to have a feeder system that is linked to the National System. A hospital administrator records information about John in the hospital admissions system. According to a pre-determined interval (e.g., every 4 hours), a computer process that was developed and tested as part of the feeder system certification process runs and pushes the minimum data elements (see Section 3.1) through the Internet to the National System. An initial record of John is now established in the National System.
- The next day John needs to be evacuated to a hospital in another State. After John's departure is recorded in the first hospital's information system, a process (similar to the one described in the previous bullet) transmits the minimum data elements to the National System. The National System now has two records for John: one indicating that he arrived at the first hospital and one that he departed that hospital.
- John arrives at a airfield near the first hospital, where a Federal tracking system is operational and logs in arriving patients and evacuees.¹⁴ After John is logged into the Federal system, a process is run on that system which transmits the minimum data elements to the National System. The Federal feeder system uses the same algorithm to produce a unique identifier as the first hospital's feeder system, thus enabling the National System to associate John Doe's arrival at the airfield with his previous arrival and departure at the hospital. The National System now knows that John arrived at this airfield; if this same Federal tracking system were used at the airfield where the plane arrives, the National System would know that John arrived at this second airfield.
- At the arriving airfield, John boards an ambulance and is taken to another hospital which, for the purposes of this illustration, does not have a feeder system linked to the National System. Thus, to authorized users accessing the National System, the most current information on John Doe's location is that he arrived at the second airfield.

¹⁴ The Federal tracking system could be a DoD-developed tracking system (e.g., a civilianized JPTA system or ETAS) or an HHS-developed tracking system.

Data Access

A key task in Phase I (see Section 3.6) is to determine policies regarding access to data in the National System. These policies must consider the needs of authorized users while at the same time adhering to privacy and confidentiality regulations that are in effect at the time of the incident. Data access rules and access privileges will vary for different user groups. Illustrative rules include:

- allowing the hospital from which John Doe was evacuated to view where their (former) patient is located following the evacuation;
- allowing emergency health care providers to view patient identifiers and health status information of persons arriving via airplane and then to download the patient-level information into a local regulating system; and,
- allowing emergency operations center personnel and public health officials to view aggregate data on the health status and location of patients and evacuees, as well as hospital, nursing home, and shelter bed capacities.

After logging on to the National System, authorized users will be presented with a list of available reports and query options that reflect the type of data that they are allowed to view. Security access will be assigned so that only those with a need to see individual data can do so (e.g., physicians providing care), while others might only need to view aggregate data at the location, county, or incident level.

System Deactivation

Policies regarding system deactivation would be developed during Phase I (see Section 3.6). Presumably, this would happen in stages. First, the feeder systems that have been transmitting data to the National System would stop doing so. At a later time, depending on National System policies, authorized users would no longer have access to data obtained during the incident. Deactivation policies would also cover the release of archived data for after-action reports or for future preparedness planning and research.

3.6. Implementation Plan and Estimated Costs

An implementation schedule and 21-month task plan for the Phase I National System is shown in exhibit 3.1. *The 21-month time period does not include the time required to secure funding for the Phase I system.*

The proposed schedule is aggressive; in particular, it assumes that formal agreements can be reached quickly with Phase I partners, that oversight committees and subcommittees can be formed and convened quickly, and that the Phase I feeder systems are operational (but not linked to the National System) by month 10.

The implementation plan is divided into five major tasks: project start up, system specification, system development and testing, pilot test, and documentation.

Task 1: Project Start-Up

Task 1 includes four subtasks. At the start of the project, the recommendations here should be revisited, and if necessary revised, in light of developments occurring since the end of Abt Associates' AHRQ Task Order.

Second, Phase I partners need to be identified and recruited as soon as possible, ideally even before the start of Phase I. This includes a private contractor that will oversee the entire project and an information technology contractor that will be responsible for developing the National System's central infrastructure. Working relationships with the organizations that control the Phase I feeder systems need to be formalized as well. As discussed earlier in Section 3.3, we recommend that these organizations include a major hospital system (or two) affiliated with a major health IT vendor and Federal agencies that will use tracking systems during a major disaster (e.g., DoD and HHS).

Third, oversight committees and subcommittees must be formed. An oversight committee will be established to advise and bring broader perspective to the project. Committee members will serve on subcommittees that will focus on specific critical issues, such as data protocols, data security, privacy concerns, user requirements, standard terms of reference, and IT development. Committee members should include representatives from the Phase I partners, major national health care associations, Federal agencies with ESF 8 responsibility, and other national associations whose member organizations will be asked to participate in the National System following completion of Phase I.

Exhibit 3.1: Phase I National System Task Plan

Task / Subtask Title	Month																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Project Start Up																					
1.1 Revise scope statement.	X																				
1.2 Identify Phase I partners and formalize agreements.	X																				
1.3 Form oversight committee and subcommittees.	X																				
1.4 Address legal, regulatory, and privacy issues.		X	X	X	X																
2. Policy, Procedure, System and Data Specifications																					
2.1 Develop data policies and protocols.		X	X	X	X																
2.2 Develop functional specifications.		X	X	X	X																
2.3 Develop security specifications.		X	X	X	X																
2.4 Determine technical requirements.						X	X	X													
2.5 Produce system design and technical specifications.								X	X	X											
3. System Development and Testing																					
3.1 Set up central infrastructure systems environment.										X	X										
3.2 Develop and test of central infrastructure.											X	X	X	X	X	X					
3.3 Feeder system development and testing.	completed by month 10																				
3.4 Modify Phase I feeder systems.											X	X	X	X	X	X					
3.5 Certify Phase I feeder systems.																	X	X			
3.6 Make refinements to central system.																		X			

Task / Subtask Title	Month																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
4. Pilot test																					
4.1 Plan and prepare for pilot test.													X	X	X	X	X	X			
4.2 Acquire and load resource availability and other administrative data.														X	X	X	X	X			
4.3 Conduct pilot test of Phase I system.																			X		
4.4 Make refinements and modifications.																					X
5. Documentation																					
5.1 Pilot test after-action report.																					X
5.2 National System policies and procedures.																					X X
5.3 Central infrastructure operations and maintenance manual.																					X X
5.4 National system participation guide for feeder systems.																					X X

Finally, legal, regulatory, and security issues related to the Privacy Act, HIPAA waiver, Health Information Exchange, and other related concerns need to be evaluated in terms of how they impact and constrain the Phase I work. As discussed at length in appendix B, the exchange of identifying information presents various legal and regulatory issues, including protection of identifiable health information (HIPAA) and other privacy standards, patient information systems and retention of records, complaint and incident reporting, hospital requirements for discharge planning, reportable diseases, isolation and quarantine, and contact tracing. The privacy subcommittee should also address the issue of whether and how the general public will be allowed to search the National System's list of patients and evacuees.

Task 2: System Specification

In this task, the subcommittees, under the direction of the project manager, will formulate system requirements, including those focusing on data protocols, functional requirements, and security requirements. For example, detailed protocols and procedures need to be developed for invoking and disabling the system, effecting data exchange during an event, generating the common algorithm for unique ID numbers, providing data access both during and following an event, and archiving and retrieving data following an event. Broad acceptance of these requirements is critical to the success of the project, as is adherence to existing standards and related initiatives, such as EDXL and the Office of the National Coordinator for Health Information Technology.

The end product of this task is a system design and technical specification document. This document will be provided to the IT firm that will develop the security, data receipt, storage, query, reporting, and archiving features of the central repository. In addition, the document will be provided to the organizations that own the Phase I feeder systems, and guide their task of modifying their feeder systems so that they can transmit patient and evacuee data to the National System.

Task 3: System Development and Testing

During Task 3, the central infrastructure of the National System, which will receive data from certified feeder systems, allow authorized users to query the system and generate reports according to predefined data access rules, and provide tools to administer the system, will be developed and tested. Options for completing this work, as noted earlier in Section 3, include developing an entirely new system or enhancing an existing system (e.g., a Federal tracking system). Both a development and a production environment (hardware, software, and connectivity) will need to be obtained and set up for this.

Also during Task 3, the Phase I feeder systems will need to be modified (according to the system design and technical specifications document developed in Task 2), so that they can

transmit patient and evacuee data to the National System. As noted earlier in Section 3, these changes are not, from a technical perspective, difficult.¹⁵ Once these modifications are completed, a formal certification process (also developed in Task 2) will be undertaken for each feeder system to ensure that the patient and evacuee data are correctly transmitted to the National System.

The Phase I schedule assumes that modifications to the feeder systems will occur during a 6-month period starting on month 11. The schedule therefore assumes that these systems will be operational (but not linked to the National System) by month 10. This is not an issue for hospital systems participating in Phase I (since they will already have working admission and discharge systems), but may be for other Phase I feeder systems, in particular, Federal tracking systems.

Task 4: Pilot Test

While system development is occurring, a pilot test using the Phase I system will be planned. The pilot test is scheduled for month 19.

Also during Task 4, the resource availability data that will be included in the Phase I system will be collected and made accessible to the National System (either by directly loading the data or by establishing automated links to existing databases). As noted in Section 3.4, these resources include baseline numbers of hospital beds (at each hospital), nursing home beds (at each nursing home), disaster shelter beds (at each disaster shelter), ground ambulances (for major owners), air ambulances (for major owners), buses (for major owners), airplanes (for major owners), and trains (for major owners).

Task 5: Documentation

Phase I documentation will include after-action reports on the pilot test, a National System policies and procedures manual, a guide for operating and maintaining the National System's central repository, and a "National System Participation Guide" for organizations that will participate in subsequent phases of the project.

Estimated Phase I Costs

The cost to implement the five tasks described above is estimated to be between \$1 and \$1.5 million. At the conclusion of task 2 (System Specification), a more precise estimate of the costs of tasks 3 thru 5 can be made.

Key assumptions in this estimate include:

¹⁵ From a technical perspective, the modifications are not difficult, because we propose that a "batch process" be developed and run against the feeder system's database. This batch process would not involve changes to the feeder system's core processing functions or user interface.

- A private contractor, working collaboratively with Federal agencies, will oversee all aspects of the project.
- The Phase I partners, which will be identified and recruited in Task 1, will be reimbursed for their time and expenses for serving on working groups, modifying their feeder systems, and participating in the pilot test.
- Five working groups, with representatives from the project management firm, Federal agencies, Phase I partners, and non-Federal officials hired as consultants, will be needed for Task 2.
- The central infrastructure will need to be built (or, alternatively, major modifications and enhancements will need to be made to an existing system).
- A test and production environment (system software and hardware) for the National System's central infrastructure will need to be purchased and maintained.

4. Priorities for Subsequent Phases

The Phase I National System, as noted above, will be a platform on to which additional feeder systems and improved resource availability data can be linked. At the end of Phase I, an assessment should be made regarding the future directions and priorities for the National System, in light of the implementation issues and obstacles that arose during Phase I, whether participation in the National System is voluntary or mandatory, and the likely future funding streams for the National System.

Projecting ahead, however, we envision that the priorities for subsequent phases will be to link as many feeder systems to the National System as possible and improve the quality of resource availability information. In addition, as was noted in Section 3.1, additional patient and evacuee data elements should be included that describe in more detail the patient/evacuee's medical condition and needs.

4.1. Linking Additional Feeder Systems to the National System

The highest priority item for subsequent phases is *linking as many feeder systems to the National System as possible*, including institutional records systems and tracking systems used at the local or county level. Exhibit 4.1 shows a recommended prioritization for linking feeder systems to the National System. The extent to which items can be pursued in parallel depends, of course, on the funding available to continue expansion of the National System.

The number of feeder systems that can be certified over a given period of time is difficult to estimate, as it depends on the experiences and lessons learned from Phase I (and, in particular, from the certification and roll-out process with the to-be-identified HIT vendor) and on the level of resources available to support subsequent phases. For this reason, exhibit 4.1 is organized by high, moderate, and low priority, rather than by Phase I, II, and so on.

As noted in exhibit 4.1, our general strategy for expanding the number of feeder systems is to work with the major HIT vendors, starting with institutions affiliated with the vendor participating in Phase I and then with the other major vendors. The rationale is that these vendors can make changes to their systems which, in turn, can be installed by their (large) customer base. Fortunately, the HIT market is dominated by a relatively small number of major vendors. According to the 2005 annual report of the hospital IT market by HIMSS Analytics, the top 10 vendors account for nearly 90 percent of the market.

Exhibit 4.1: Suggested Priority for Linking Feeder Systems to the National System

Highest priority	Other hospital systems affiliated with the health information technology (HIT) vendor involved in Phase I
	Registration systems at disaster shelters
	Hospital systems affiliated with other major HIT vendors
	Patient tracking systems used at the local and county level
	Other hospital systems in areas that are at high risk for natural or man-made disasters
Moderate priority	Hospital systems affiliated with smaller HIT vendors
	Hospital systems with “home grown” IT systems
	Nursing home systems affiliated with major HIT vendors
	Nursing home systems affiliated with smaller IT vendors
	Nursing home systems with “home grown” IT systems
Home health systems	
Lower priority	Institutional records systems in operation at other potential overnight facilities housing patients and evacuees, such as hotels, convention centers, homeless shelters, and correctional facilities
	Institutional records systems or tracking systems used at transportation hubs and other locations where patients and evacuees would board or get off vehicles

4.2. Improving Health Care and Transportation Resource Availability Data

Subsequent phases should also focus on improving the quality of data describing the availability of health care and transportation resources that are critical for regulating, incident management, and resource management. Exhibit 4.2 summarizes our recommendations, by phase, pertaining to resource availability data. Recommendations for Phase I, which were outlined earlier in Section 3, are included for comparison purposes.

The major recommended initiatives for Phase II include (1) improving the baseline inventory for the transportation resources by including mid-range, as well as major, owners of these assets and (2) assessing the feasibility (and, if appropriate, development of prototype systems) of resource availability reporting systems for nursing home beds and for the major owners of transportation resources.

Subsequent phases should focus on incorporating additional health care and transportation resources in the National System.

Exhibit 4.2: Summary of Resource Availability Data in the National System, By Phase

	Resource	Baseline Inventory	Availability Estimates
Phase I	Hospital beds	All hospitals reporting to the AHA	Hospital beds (assuming HAvBED is operational)
	Nursing home beds	All nursing homes reporting to CMS	None
	Disaster shelter beds	All Red Cross disaster shelters	All Red Cross disaster shelters (assuming National Shelter System is operational)
	Ground ambulances	Major owners only	None
	Helicopter ambulances	Major owners only	None
	Buses	Major owners only	None
	Trains	Major owners only	None
Phase II	Hospital beds	All hospitals reporting to the AHA	Hospital beds (assuming HAvBED is operational)
	Nursing home beds	All nursing homes reporting to CMS	Assess feasibility of obtaining availability estimates from all nursing homes
	Disaster shelter beds	All Red Cross disaster shelters	All Red Cross disaster shelters (assuming National Shelter System is operational)
	Ground ambulances	Major and mid-range owners	Assess feasibility of obtaining availability estimates from major owners
	Helicopter ambulances	Major and mid-range owners	Assess feasibility of obtaining availability estimates from major owners
	Buses	Major and mid-range owners	Assess feasibility of obtaining availability estimates from major owners
	Trains	Major and mid-range owners	Assess feasibility of obtaining availability estimates from major owners
Later Phases	Other TBD resources	TBD	TBD

Appendix A: Project Team and Steering Committee Members

Key Project Staff

Tom Rich (Project Director)	Abt Associates Inc.
Paul Biddinger (Co-Principal Investigator)	Director of Pre-Hospital Care and Disaster Medicine Massachusetts General Hospital
Richard Zane (Co-Principal Investigator)	Department of Emergency Medicine Brigham & Women's Hospital
Andrea Hassol	Abt Associates Inc.
Lucy Savitz	Abt Associates Inc.
Margarita Warren	Abt Associates Inc.

Steering Committee Members

The following persons attended at least one of the three steering committee meetings, which were held on December 1, 2005, April 12, 2006, and October 27, 2006 at Abt Associates' Bethesda office.

Sally Phillips (Project Officer)	Director of Public Health Emergency Preparedness Research Program Agency for Healthcare Research and Quality U.S. Department of Health and Human Services
F. Christy Music	Office of the Assistant Secretary of Defense for Homeland Defense Department of Defense
Knox Andress	Emergency Preparedness Coordinator CHRISTUS Schumpert Health System
Brad Austin	Office of Public Health Emergency Preparedness U.S. Department of Health and Human Services

Janet Benini	Senior Advisor, Intelligence Security and Emergency Response U.S. Department of Transportation
Kathryn Brinsfield	Associate Medical Director Boston Emergency Medical System
Stephen Cantrill	Department of Emergency Medicine Denver Health Medical Center
Michael Feeser	Office of Policy, Plans and Preparedness Department of Veterans Affairs
Edward Gabriel	Director of Crisis Management Walt Disney Corporation
Derek Goldstein	Agency for Healthcare Research and Quality U.S. Department of Health and Human Services
Dan Hanfling	Emergency Management and Disaster Medicine Inova Health System
Scott Henderson	Manager, Web and Applications Development Northrop Grumman Force Health Protection
Nathaniel Hupert	Department of Public Health Weill Medical College of Cornell University
Ann Knebel	Office of the Assistant Secretary for Preparedness and Response U.S. Department of Health and Human Services
Harry Koerner	Operations Support Center Manager Federal Emergency Management Agency
Bill Kormos	Office of the Assistant Secretary of Defense Force Health Protection & Readiness Department of Defense
James Lawler	Director for Biodefense Policy Homeland Security Council

Deborah Levy	Division of Healthcare Quality Promotion Centers for Disease Control and Prevention
Teresa Lustig	Science and Technology Directorate U.S. Department of Homeland Security
Leonard Marcus	National Preparedness Leadership Initiative Harvard School of Public Health
Michael Meit	Department of Health Policy & Evaluation NORC at the University of Chicago
Vincent Mercadante	Office of Intelligence, Security and Emergency Response U.S. Department of Transportation
David Persse	Department of Health and Human Services City of Houston
Mark Roupas	Office of the Assistant Secretary of Defense for Homeland Defense Department of Defense
Bill Savage	Research Computing Division RTI International
James Sims	Emergency Preparedness Department City of Los Angeles
Arlene Stephenson	Springfield Hospital Center Maryland Department of Health and Mental Hygiene
Jennifer Todd	Agency for Healthcare Research and Quality U.S. Department of Health and Human Services
Scott Wetterhall	Health Security & Systems Research RTI International

Appendix B: Legal Issues

When the National System is activated, feeder systems (i.e., local institutional records systems and tracking systems) will transmit identifying information on patients and evacuees to the National System, where this information will be accessible to authorized users. While the rules as to which users can view identifying information, as opposed to aggregate data, are to be determined later, the exchange of identifying information presents various legal and regulatory issues. In brief, these issues are:

- Protection of identifiable health information (HIPAA) and other privacy standards
- Patient information systems and retention of records
- Complaint and incident reporting
- Hospital requirements for discharge planning
- Reportable diseases, isolation and quarantine, and contact tracing

The sections below present Federal legal and regulatory issues, as well as State and local issues. The States vary somewhat and this variation is revealed through analysis of four States' relevant regulations.

Relevant Federal Legal and Regulatory Issues

Patient Information and Privacy Standards

Patient information and privacy of health information are addressed in the regulations pertaining to the Medicare conditions of participation (COP) for hospitals and the Health Insurance Portability and Accessibility Act of 1996 (HIPAA). This section describes the standards provided in these two sets of regulations.¹⁶

The COP requires that hospitals have a medical record service that maintains patient records for every patient in the hospital and that allows for easy and timely retrieval of patient records.¹⁷ The regulations relate to the organization and staffing of the medical record service, the form and retention of the medical record, and the content of the record.

Form and retention of record. “The hospital must maintain a medical record for each inpatient and outpatient. Medical records must be accurately written, promptly completed, properly filed and retained, and accessible. The hospital must use a system of author identification and record maintenance that ensures the integrity of the authentication and protects the security of all record entries.” The regulations also contain specific requirements

¹⁶ 42 CFR §482.24; 45 CFR Parts 160 and 164

¹⁷ 42 CFR § 482.24

concerning the content of the medical record for hospital inpatient stays. The hospital must have an indexing system for timely retrieval of records by diagnosis. The regulations further stipulate that medical records must be retained in their original or legally produced form for a period of at least 5 years. In addition, the hospital must have a procedure to ensure the confidentiality of records.

The patient and evacuee tracking system will contain health status information. It may also contain more detailed medical information (when available). In the event that anyone questions/challenges the way the system contributed to patient care, or should there be litigation on behalf of one or more patients, all medical information should be retained for a time following a mass evacuation event. It is not clear how long the data should be retained, but the system will need to be designed to save all the patient-level records and retrieve them (by patient name). Hospitals that treat patient-evacuees might also want to be able to merge the records from the national tracking system into the patients' electronic medical records.

Health Information Privacy. The HIPAA privacy regulations require protection of individually identifiable health data. The regulations protect every data element of a patient's individually identifiable health information when the patient is in custody of a covered facility. The data elements that must be removed from each record to meet minimum standards under the privacy rule include:

- names;
- geographic subdivisions smaller than a State;
- dates related to an individual except month;
- age except when grouped into categories;
- telephone and fax numbers;
- electronic mail addresses and URLs;
- Social Security numbers;
- medical record numbers;
- account numbers;
- health insurance beneficiary numbers;
- certificate and license numbers;
- vehicle serial numbers and license plate numbers;
- biometric identifiers;
- full-face photographs; and
- other unique identifying codes and characteristics.

The HIPAA Privacy Rule applies to ‘covered entities’ that are generally defined as health care providers, health plans including private entities and government programs such as Medicare and Medicaid, and health care clearing houses such as billing services.¹⁸ We assume that the rule would also apply to the patient and evacuee tracking system. While the Privacy Rule encompasses a large number of data elements and applies to numerous entities that transfer health information, the Privacy Rule attempts to balance the protection of individual health information with the need to protect the public’s health.¹⁹ The Rule contains special provisions for circumstances when private health information may be disclosed. First, the rule permits the use and disclosure of certain protected health information to public health authorities for public health purposes including but not limited to public health surveillance, investigations, and interventions.²⁰ Second, HIPAA permits disclosure of protected health information when required by other Federal, State, tribal, or local laws.²¹ Third, certain types of private health information may be disclosed for the purpose of research.

It is not clear whether these exceptions would apply during a mass-casualty evacuation event – but probably not. Each exception is very specific and legal analysis may be needed. Clarification from the Federal government would be helpful for communities actively involved in disaster preparedness planning.

Relevant State Legal and Regulatory Issues

Patient Information and Privacy Standards

We examined related regulations in four States to understand the variability and issues that might arise in a multi-State evacuation. We chose States likely to have different regulatory environments: Massachusetts, Illinois, Texas and Kansas.

Massachusetts: Every licensed hospital, including the surge facility, must maintain medical records for each of its patients in accordance with MGL Chapter 111, Section 70 (see above) for a period of at least 30 years. A copy of the medical record must be made available to the patient or the patient’s authorized representative for a reasonable fee.

Illinois: Illinois requires that every licensed hospital must maintain an “adequate, accurate, timely, and complete” medical record for each patient.²² The regulations specify that these

¹⁸ 45 CFR §160.102

¹⁹ Centers for Disease Control and Prevention. HIPAA Privacy Rule and public health: guidance from CDC and the U.S. Department of Health and Human Services. MMWR 2003;52(Early Release): page 1.

²⁰ 45 CFR §164.512(b)

²¹ 45 CFR §164.512(a)

²² 77 Ill. Admin. Code 250.1510.

records must be housed safely to prevent unauthorized use and to protect the records from damage by water or fire. The State requires that a registered medical record administrator or accredited medical record technician be responsible for overseeing the hospital's record department. Medical records or photographs of such records must be preserved in accordance with the American Hospital Association's recommendation and legal opinion on record retention and preservation. In addition, each licensed hospital would need to have a policy for preservation of records should the hospital close. As in Massachusetts, a surge facility would need to comply with these requirements.

Kansas: Kansas regulations require that patient records be kept on file for 10 years after the date of last discharge of the patient and a summary be kept on file for 25 years. The regulations further stipulate that the records are the property of the hospital and should not be removed from the premises except as authorized by the governing body of the hospital or for purposes of litigation.²³ These requirements may pose a challenge for a surge facility, particularly with respect to the on-site storage of the medical records. The hospital's governing body would need to permit the removal of the records at the conclusion of the disaster.

Texas: Texas requires that patient records be kept on file for at least ten years. Films and other image records must be retained for 5 years. The regulations specify that if the hospital should close, the hospital must notify the Department of Health about the location where the records are stored and contact information for the custodian of the records. As described above, a surge facility would need to comply with these requirements.

Complaints and Incident Reports

We examined the procedures for complaints and incident reports in the same four States, to understand how State laws vary in ways that could be important during a multi-jurisdictional mass evacuation event.

Massachusetts:

Complaints. Every hospital must develop a written procedure for investigating serious complaints against hospital employees or members of the medical staff.²⁴ A senior member of the hospital staff must serve as a complaint officer and oversee the investigations. There must be a clear, written procedure for reporting and investigation of complaints. A similar procedure may need to be established for the tracking system, in case there are complaints about care provided during a mass evacuation – either at a facility or in transit.

²³ Kansas Hospital Regulations, 28-34-9.

²⁴ 105 CMR 130.330.

Incident Reports. In Massachusetts, health care providers are required to report immediately by telephone to Massachusetts Department of Public Health (MDPH) any of the following serious incidents and accidents that take place on the hospital premises:²⁵

- fire,
- suicide,
- serious criminal acts,
- pending or actual strike action by its employees and contingency plans for operation of the hospital, and
- serious physical injury to a patient resulting from an accident or unknown cause.

In addition, a written report must be filed with the MDPH of any serious incidents occurring on the licensed premises of the hospital that seriously affect the health and safety of its patients. All of these requirements may apply to incidents like these that take place in shelters or other evacuation facilities, or during transit.

Illinois: Illinois requires that each hospital report to the Department of Public Health any incidents or occurrence that puts patients at immediate jeopardy that requires the transfer of patients to other parts of the facility or to other facilities. Each report must be filed within 2 working days of the incident. Occurrences requiring reporting include but are not limited to fire, flood, and power failure.²⁶ In addition, Illinois requires reporting the death of a pregnant woman or the death of a woman within 1 year of the termination of a pregnancy²⁷ and special circumstances related to mothers and infants and discharges of children released to someone other than their natural parent,²⁸ such as communicable diseases.²⁹ These requirements would probably apply during the evacuation of patients and others.

Kansas: Kansas also requires hospital risk management committees to review all clinical concerns raised by hospital employees, evaluate the level of risk, and report those meeting certain requirements to the licensing agency.³⁰

Texas: Texas regulations require reporting of fire and other safety-related incidents. In addition, Texas hospitals must develop emergency plans to be put into effect if an incident affecting patient safety were to occur.³¹ Incidents that occur during a mass evacuation may

²⁵ 105 CMR 130.331.

²⁶ 77 Ill., Admin. Code, Chapter 1, Subchapter b, Section 250.1520.

²⁷ 77 Ill. Adm. Code 657, 77 Ill., 77 Ill. Adm. Code. Subchapter b, Section 250.1830 (i)(2).

²⁸ 77 Ill. Admin. Code, Subchapter b, Section 250.1830 and Section 250.1840.

²⁹ 77 Ill. Adm. Code 690.

³⁰ KAR 28-52-1

³¹ 25 TAC 133

require reporting, but emergency plans to prevent future occurrences are unlikely during a mass evacuation.

Patient Rights

We similarly examined the four States' regulations concerning patient rights.

Massachusetts: MGL Chapter 111, Section 70E, confers certain legal rights upon patients at hospitals and other health care facilities, including the right of every patient to choose the facility at which the patient will be treated. Although this right is suspended in the event a patient requires emergency medical treatment, the patient ordinarily may refuse to be transferred from one health care facility to another (e.g., transfer from a hospital to a skilled nursing facility or another hospital). Exercise of this right may interrupt the flow of patients during an evacuation, but this is unlikely as patients will wish to be evacuated out of harm's way. However, this right to choose one's health care facility is embedded in a statute; there is no waiver available that would allow officials to override the patient's decision.

Illinois: Section 250.260 of Title 77 of the Illinois Administrative Code "recommends" that hospitals adopt a written policy on patients' rights and that should be available to all patients. That section requires that hospitals have a written plan for the provision of spiritual, emotional, and attitudinal health of the patient, patients' families, and hospital personnel. These required plans may need to be waived during a mass evacuation.

Kansas: Kansas' Hospital Regulations 28-34-3b confers legal rights to inpatients and outpatients at Kansas hospitals. The regulations do not include provisions for choosing the facility at which the patient is treated.

Texas: Texas Hospital Licensing Rules provide detailed requirements for hospitals regarding patient rights, however, these requirements do not include provisions for selecting the facility at which the patient is treated.³²

Discharge Planning; Advocacy Office

Massachusetts:

Discharge Planning. Massachusetts requires every licensed hospital to develop a comprehensive discharge planning service for its patients.³³ Medicare rules for discharge planning are incorporated directly into the Massachusetts regulations. The regulations are unusually specific about certain requirements for the discharge planning service (e.g., for

³² 25 TAC 133.42

³³ 105 CMR 342-349A.

Medicare patients, the regulations set forth the minimum size of the type to be used on the front page of every individual patient discharge plan). The discharge planning service must be multi-disciplinary and responsible for coordinating the transfer of patients to either an independent living situation or another institution. As with any hospital, patients may be discharged from a surge hospital facility for a variety of reasons, including a need for a more acute level of care than is available from the surge hospital, to return home if medical care is no longer needed, or to transfer to another type of health care facility, such as a skilled nursing facility. Traditional discharge planning will not occur during a mass evacuation. The patient and evacuee tracking system will be designed to assist transportation of patients so that those needing hospital services are transported to a hospital. In a sense it will be used to support appropriate discharges from imperiled hospitals; but it will not comply entirely with these Massachusetts regulations.

Advocacy Office. Acute care hospitals that serve Medicare patients in Massachusetts are required to take certain steps to protect the rights of Medicare beneficiaries.³⁴ Hospitals are prohibited from taking any discriminatory action against any patient based upon the patient's status as a Medicare beneficiary. A notice of rights must be distributed to every Medicare beneficiary. In the event a Medicare beneficiary believes a hospital engages in discriminatory behavior or provides inadequate discharge planning, the beneficiary has a right to file a complaint with the Advocacy Office within the MDPH. The Advocacy Office has the authority to investigate complaints from Medicare beneficiaries, encourage negotiated resolution of complaints and issue Notices of Final Disposition in the event negotiated resolutions cannot be achieved. Although this report does not discuss payment issues, Medicare beneficiaries are almost certainly going to be in the patient population being evacuated and any complaints about patients not being transported to appropriate health care facilities could be investigated. Again, the tracking system's records will need to be retained in case they are needed during any subsequent investigation.

Illinois: Illinois requires that hospitals have written policies for admission, discharge, and referral of all patients who present themselves for care. In addition, Illinois regulations include the Medicare requirement that hospitals provide 24-hour notice to Medicare beneficiaries prior to discharge along with information concerning their right to appeal.³⁵ Otherwise, Illinois regulations regarding patient rights do not include provisions for filing a complaint or complaint resolution.³⁶

Kansas: Kansas regulations include requirements for maternity and infant discharges but are silent with respect to other discharges. Kansas regulations require the hospital to develop a procedure for responding to patient grievances.³⁷

³⁴ 105 CMR 130.345.

³⁵ 77 Ill Adm. Code 250.240

³⁶ 77 Ill Adm. Code 250.260

³⁷ KAR 28-34-3b

Texas: Hospitals in Texas must comply with a detailed list of requirements concerning patient transfers from one hospital to another. The regulations provide definitions of patients who may be transferred, conditions under which a patient may be transferred, notification requirements regarding the transfer, and parties responsible for the patient during and after the transfer. The regulations describe transfer from one hospital to another but are silent with regard to discharges home or to another institution.³⁸ Texas regulations also include requirements that all hospitals develop and implement policies to ensure patients' rights, including informing the patient of the hospital's policy for resolving patient complaints.³⁹

Reportable Diseases, Isolation and Quarantine

The Federal Government (CDC) requires reporting of certain diseases. The list is updated periodically; the 2006 list can be found at <http://www.cdc.gov/EPO/DPHSI/phs/infdis2006.htm>.

The CDC also has guidance regarding patient isolation and quarantine. A fact sheet can be found at http://www.cdc.gov/ncidod/dq/sars_facts/isolationquarantine.pdf.

The most recent example of patient isolation employed in the U.S. was in 2003 during the SARS outbreak. The CDC has also created "model" legislation that States can employ to craft their own regulations regarding isolation and quarantine, which can be found at <http://www.aclu.org/FilesPDFs/msehpa2.pdf>

States have a variety of regulations which could, in some circumstances, come into play during a multi-jurisdictional mass evacuation event.

Massachusetts:

Reportable Diseases. Massachusetts health care providers are required to report certain diseases and medical conditions to their local boards of health.⁴⁰ The term "health care providers" is broadly defined to include hospitals, physicians, registered nurses and others. The list of diseases reportable to local health authorities is published at 105 CMR 300.100. A much shorter list of diseases that are directly reportable to the MDPH by any health care provider is set forth at 105 CMR 300.180(A)-(C). Finally, the MDPH requires that any unusual illness or any illness that is part of an outbreak or cluster be reported to the appropriate local board of health. See 105 CMR 300.133-134. It is possible that someone being evacuated could come down with a reportable infectious disease. The national tracking

³⁸ 25 TAC 133.44

³⁹ 25 TAC 133.41

⁴⁰ See, generally, 105 CMR 300.000.

system will need a policy regarding reporting, or whether instead the reporting function will remain with the eventual health care provider.

Isolation and Quarantine. 105 CMR 300.200 authorizes isolation and quarantine for diseases identified as dangerous to the public health. Local boards of health are usually the entities charged with enforcing these provisions. The isolation and quarantine requirements, in general, focus on issues of infection control in the overall population and are not limited to, or even intended for, the hospital setting. For example, the most common restrictions are on food handlers who have contagious infections. Standard medical reasons for isolating a patient, such as the patient having an open wound or a compromised immune system, are not addressed in the isolation and quarantine regulations. However, in the event an infectious agent causes a mass casualty event, the Governor and the Commissioner of Public Health, using the governor's emergency powers, have authority to impose isolation and quarantine restrictions beyond those expressed in the regulations. If isolation or quarantine is ordered mid-evacuation, the tracking system would need to be able to find the person(s) to be isolated, and all their contacts – other evacuees and staff – to complete case-finding and institute a quarantine.

Local Authority. A series of statutes that authorize local authorities to take police action in the event of an outbreak of infectious disease remain in effect even though they have not been enforced for many years⁴¹. These laws allow, in part, for local authorities to break into houses to seize infected persons, to seize hotels, rooming houses and other non-public buildings to house infected persons, and to quarantine individuals in isolation as may be required to protect the public health. In the event of a mass casualty, some of these laws may be resurrected and enforced. A possible “touchpoint” might therefore be some sort of quarantine shelter/facility.

Waivers. 105 CMR 300.000 does not have a waiver provision.

Illinois: Illinois has very detailed rules for reporting suspected or confirmed cases of infectious, contagious, and dangerous diseases.⁴² The regulations also place responsibility on an array of health care providers and school personnel for reporting the suspected or diagnosed cases.

Isolation and Quarantine. Unlike Massachusetts, Illinois regulations refer hospital personnel to the CDC's guidelines for isolation precautions in hospitals. The regulations follow the CDC's recommendations with respect to the duration of isolation, except for a few specific diseases for which Illinois has developed different requirements.

Local Authority. The regulations also give authority to the local health authority having jurisdiction over the area in which the suspected or known carrier of a communicable disease

⁴¹ See, generally, MGL chapter 111, Sections 92-109.

⁴² 77 Ill. Adm. Code. Section 690.100

resides. Only the local health authority may establish isolation and quarantine of contacts to a case, carrier, or suspected case of a communicable disease and terminate the isolation and quarantine period. Like Massachusetts, Illinois law gives the health authorities the right to close to the public any private property in the event of an emergency involving communicable diseases.⁴³

Kansas: Kansas regulations require notification of the State department of health and environment by laboratories that yield positive tests for certain diseases. The regulations define a positive test result and prescribe the information to be reported. It is unlikely that a State department of health would waive this reporting in the case of a mass casualty event, particularly one related to a biologic outbreak.

Isolation and Quarantine. Kansas regulations contain detailed provisions for isolation and quarantine of specific infections and contagious diseases, as well as general provisions for conditions of isolation and quarantine that are not specified in the regulations.⁴⁴ Like Massachusetts regulations, the regulations in Kansas do not make specific reference to isolation and quarantine in hospital settings.

Local Authority. The general provisions will be ordered and enforced by a local health officer or the secretary of health and environment.

Texas: Texas regulations also include detailed provisions for reporting of certain conditions and suspected conditions. The regulations provide detailed instructions about who must report a condition; timeliness of reporting; information to be reported; and communication between local, regional, and State health authorities.⁴⁵ These requirements are unlikely to be waived in the case of a mass casualty event.

Isolation and Quarantine. The regulations concerning isolation and quarantine are very general. A health authority may declare a house, building, or apartment to be a place of quarantine. The regulations do not provide specific requirements for particular diseases nor do they make reference to any specific rules for hospitals. The local health authority will determine the length of quarantine.

Local Authority. The local health authority has jurisdiction over any events relating to isolation and quarantine.

There are other laws and regulations on these or other related matters, in various States around the Nation.

⁴³ 20 UKCS 2105-400

⁴⁴ Kansas Disease Control Regulations, 28-1-5 through 28-1-12.

⁴⁵ 25 TAC 97.1—97.13

Appendix C: Existing Systems: Tracking Systems

The proposed National System would be used during multi-jurisdictional mass casualty/evacuation incidents to (1) locate, track, and regulate patients and evacuees and (2) improve decision making regarding patients and evacuee transportation, resource allocation, and incident management. A fundamental recommendation (see Section 3) for the National System is that, to the extent possible, it be compatible with existing systems and procedures and that development of new systems and procedures be minimized. In particular, the more information that can be drawn from existing information systems, the more likely the National System will be adopted and used. For this reason, project staff conducted a review of existing systems, including:

- Tracking systems – i.e., systems designed to record the movement of persons from one location to another.
- Institutional records systems – i.e., systems that contain the current location of persons but are not designed to track their movement from one location to another.
- Resource inventory or availability systems – i.e., databases that contain baseline inventory of a resource or systems designed to solicit the current level of resource availability, from resource owners.
- Resource requirements models – i.e., planning tools that could be used to estimate resource requirements, which could in turn be compared to resource availability to yield resource shortfalls or gaps.

The purpose of this review is to highlight the primary examples of existing systems, rather than provide a comprehensive directory of all existing systems.

The remainder of this appendix reviews tracking systems. Institutional records systems, resource inventory or availability systems, and resource requirements models are discussed in appendixes D, E, and F, respectively.

Overview

The primary purpose of a patient and evacuee tracking systems is to monitor the movements of people who require evacuation assistance, so that each is transported to a safe and appropriate location and none “slip through the cracks”. For example, nursing home patients must be transported to a nursing home or hospital rather than a shelter, and ICU patients must be transported to a hospital with ICU space available. For many patients, timely transportation to an appropriate facility is also important – delay in adverse conditions could be life-threatening and transportation prioritization must be based on urgency of health needs. The tracking system will also give facilities (shelters, hospitals) at the receiving end

some information about the needs of people who will be arriving. Finally, family members need to know where other family members are so they can try to make contact and reunify the family (e.g., parents locating missing children).

The patient or evacuee tracking function is not unlike that employed by package delivery companies such as Federal Express or UPS. Each “package” must be uniquely identified and tagged (e.g. bar-coded), and its whereabouts reported into the central database each time it is moved. The central database can then generate a tracking record showing each stop along a package’s journey from pickup to delivery. The same can theoretically be done with people being evacuated from a disaster zone; each time a person arrives at a new location their tracking record is amended in the central database. (See, for example, the table on p. 11.)

People are, of course, harder to keep track of than packages. They may leave a shelter on their own initiative without letting anyone know, they may insist on waiting in a location for their other family members to arrive, they may remove their identifying “tag,” or they may suddenly go from safe residence in a shelter to being in urgent need of medical care.

Discussed in this section are patient or evacuee tracking systems currently in use at the local or regional level, and at the Federal/national level. Almost all are for patient tracking; one DoD system has been used for evacuee tracking.

Systems Used at the Local or Regional Level

Some jurisdictions use patient tracking systems to track the location of victims of all mass casualty incidents (at the local level typically defined as an incident with six or more victims). While in theory such systems could be used to track movements of people between *any* pair of locations, patient tracking systems generally are used to track movements only from an incident/accident scene to the receiving hospital.

Emergency responders assign a unique ID to patients in the field (e.g., via a wristband that contains a barcode, radio frequency identification (RFID) device or handwritten information) and then transport the victim to a hospital. The unique ID, triage category, and possibly other information about the patient (e.g., location of receiving hospital) are typically uploaded via a wireless connection to a central database, where hospital Emergency Department (ED) staff can see how many and what type of patients are in transit to their hospital. When the patient arrives at the ED, his/her location can be updated in the tracking system.

Authorized users can access tracking data for a variety of purposes: emergency operations center personnel can monitor and track casualties and the number of patients taken to each hospital (to help with load balancing); hospital personnel can track incoming casualties and prepare for specific casualty types. A public Web site can also be set up so that the public can query the database to learn to which hospital particular evacuees were taken.

The number of jurisdictions using patient tracking systems is not known, but it is a very small percentage of jurisdictions across the country. One possible reason for the small number of sites is that there are few compelling reasons for using these systems on a *daily basis*. From the emergency responder's perspective, it is easier to contact the hospital via a two-way radio. In fact, the systems were designed primarily to be used in mass casualty incidents or to help prepare for such an incident via periodic refresher trainings (e.g., "Triage Tuesdays"). Patient tracking systems include both commercial and institutional systems. For example, the Hospital Association of Southern California has developed an open source alternative to commercial systems – Rapid Emergency Digital Data Information Network (ReddiNet).⁴⁶ Originally built in the 1980s for use in Los Angeles, ReddiNet has been modernized and is extensively used in nearly 250 emergency response organizations throughout 17 California counties, including Los Angeles and Orange counties. ReddiNet connects hospitals, agencies, and service providers within regional health care systems and displays real time, regional, and inter-regional diversion data and available resources. Special data screens allow for data input on patient capacity, victim identification, and dispatch information to evenly distribute patients to waiting hospitals. A polling feature allows rapid assessment of bed availability, bed census, epidemic surveillance, and other parameters.

Systems Used or in Development at the Federal Level

The U.S. Department of Defense uses two systems for tracking and regulating military casualties – JPTA and TRAC2ES. Another system (ETAS) was designed for evacuee tracking and exists as a prototype. Both the DoD and the U.S. Department of Health and Human Services (HHS) are currently considering different options for expanding their capacity to track and regulate civilian patients and evacuees. In particular, in response to an initiative from the DoD's Office of the Secretary of Defense and Office of the Secretary of Homeland Defense, and supported by the NORAD-NORTHCOM Surgeon's Directorate, DoD is considering options for establishing a system that will provide information on the movement, regulation, and tracking of all DoD and civilian patients and/or evacuees moved by the DoD during contingency operations resulting from a man-made or natural disaster in the U.S. Northern Command (USNORTHCOM) Area of Responsibility.

Any new system(s) would be coordinated with the Federal government's National Disaster Medical System (NDMS). This system augments the Nation's medical response capability by establishing a single integrated National medical response capability for assisting State and local authorities in dealing with the medical impacts of major peacetime disasters.⁴⁷

⁴⁶ <http://www.reddinet.com/index.html>

⁴⁷ <http://www.oep-ndms.dhhs.gov/>

JPTA. The DoD uses the Joint Patient Tracking Application (JPTA) to track the location of casualties treated in military hospitals around the world. JPTA was first deployed in January 2004 and, as of June 2006, was used in 25 military hospitals. DoD ultimately plans to use JPTA in all military hospitals. JPTA has never been used in a civilian setting; a “disaster relief” version of JPTA was developed for Katrina, but it was not used.

JPTA has a patient registration module; some of the fields in this module, including the arrival date, are automatically filled in via a link to TRAC2ES (see below). JPTA records the patient’s treatment status, hospital and room number, and disposition/referral destination. If patients are later transported to another military hospital, the patient’s existing JPTA record is updated. Electronic medical records and other files also can be attached to JPTA records and accessed by health care providers as the patient moves from one military or Veterans Health Administration facility to another. JPTA users have different access privileges, some being limited to a single hospital while others can view system-wide data and reports. According to JPTA personnel who have worked with hospitals using the system, JPTA benefits hospitals in three primary ways: (1) patients have “visibility” outside of the hospital, thus reducing the number of phone inquiries about whether a patient is at a hospital, (2) hospital staff have advanced warning about patient arrivals via TRAC2ES, and (3) JPTA is a convenient way to transfer electronic medical records between medical providers.

TRAC2ES. As noted above, the DoD has linked JPTA to the Transportation Command Regulating and Command and Control Evacuation System (TRAC2ES) system. TRAC2ES has a transportation focus: its goal is to effectively use military patient transport planes so that planes arrive to pick up patients in a timely manner and so that they have the necessary resources on board to care for the patient (e.g., a nurse, blood, a monitor). Patient movements are associated with an event; in 2005, two such events were Operation Iraqi Freedom and Katrina. Once an event is defined, a patient movement request (PMR) can be generated. The PMR includes identifying information on the patient, clinical information (in particular, medical resources needed on the airplane), the patient’s location (i.e., where the plane will pick up the patient), and the patient’s destination (typically a military hospital). The patient’s location is updated once s/he boards the plane, when the patient arrives at the destination airfield, and when the patient arrives at the hospital. If the patient is subsequently flown to another military hospital, that information is appended to the patient’s TRAC2ES record. TRAC2ES alerts hospitals about incoming patients by sending a message to JPTA.

TRAC2ES was been used to track the movement of U.S. citizens being rapidly evacuated from Lebanon in the summer of 2006. As such, it is the only Federal/national tracking system that has been deployed for evacuees (as opposed to patients). It is not, however, fully scaled up and it assumes the presence of “handlers” like the National Guard or other personnel to enter the data on evacuees at each checkpoint; it has not yet been integrated into civilian disaster response.

ETAS. In addition to TRAC2ES and JPTA, the DoD has developed a prototype evacuee tracking system called Emergency Tracking Accountability System (ETAS). This system

evolved from the DoD's Non-Combatant Evacuation and Repatriation Operations (NEO) Tracking System, or NTS. First deployed in 1996, in part to support a possible non-combatant evacuation in South Korea, NTS has been used for non-combatant evacuations in Turkey, Lebanon, and other locales. In 2005, DoD requested development of an evacuation tracking system for civilian evacuation operations in the U.S., which led to development of the ETAS prototype. ETAS's goals were to: improve the efficiency of evacuation operations; manifest and track evacuees using the FEDEX/UPS model of barcode scanning at departures and arrivals; use robust, redundant communications for transmission of encrypted evacuee data; and enhance coordination, control, and management of evacuees. ETAS currently does not have a sponsor and is unfunded within DoD.⁴⁸

NDMS. The Department of Health and Human Services operates the National Disaster Medical System (NDMS) and is considering options for implementing a system to track the movement of patients and transfer their medical records, wherever they are served by NDMS units. Federal Medical Shelters (FMSs) are temporary medical units deployed inside facilities that have been erected or commandeered to serve as temporary shelters (e.g. airports, army bases, stadiums). FMSs are staffed by Federal clinicians, or by activated Disaster Medical Assistance Teams (DMATs). Both the FMSs and the DMAT teams are part of NDMS. At this time, only hard copy records are created by NDMS clinicians and there is no system to track the movement of patients or transfer electronic medical information about these patients. If, for example, an evacuee arrived at the Superdome and needed medical assistance, s/he would most likely have been seen by the NDMS medical staff on site. When that patient was then transported to the Houston Astrodome where another FMS was deployed, there was no system to track their movement and assure that medical staff in Houston assumed medical responsibility for the patient and no system to relay medical information from the Superdome to the Astrodome.

⁴⁸ Presentation on November 16, 2006 by Mike Masica, Chief, Operations Support Division, Defense Manpower Data Center.

Appendix D: Institutional Records Systems

Institutional records systems are “check in / check out” systems that contain the current location of persons. Hospitals, nursing homes, home health agencies, homeless shelters, and virtually any other facility that houses (or cares for) persons use automated systems to keep track of who is in their facility. The purpose of such information in health care facilities is for correct billing. As noted earlier in this report, the proposed National System would obtain patient and evacuee location and health status data from local, State, and Federal feeder systems, including tracking systems (see Appendix C) and institutional records systems.

Because institutional record systems are so ubiquitous, having a truly comprehensive National System – which the project team was instructed to consider – depends on eventually linking a wide variety of types of institutional records systems to the National System. The project team therefore invested considerable resources researching these systems. Specifically, for each type of location, facility, or organization that houses or cares for a potential evacuee, we tried to obtain:

- ***Basic typology and definitions*** (e.g., public vs. private, local vs. county vs. State-operated, range in size and number).
- ***Perceived benefits of participating in the National System***, for example:
 - (e.g., Do these locations control the transportation resources that would be needed to evacuate their clients?)
 - Do these locations control similar facilities to which their clients will be moved in the event of an evacuation?
 - Have there been drills or actual evacuations that have demonstrated the need for a more systematic approach to client movement and tracking?)
- ***Privacy and confidentiality issues*** (e.g., are there privacy and confidentiality laws or regulations that must be overcome if the location is to share client-level data with the National System?)
- ***Existing “check in” and “check out” procedures on to which the National System can piggyback*** (e.g., what are they and do they vary across locations within separate organizations?)
- ***Existing information technology (IT) systems with data on all clients at the location, for example:***
 - How prevalent are “census” IT systems?

- Is the market for these systems dominated by one or two big vendors, lots of vendors, or by home-grown systems?
- Is there a standard set of data that all of these systems must be able to produce or extract?
- Is there already an existing Federal data aggregation program across multiple locations?
- Are the electronic data elements collected at these locations generally the same across locations or do they vary widely?

Below, we first summarize our findings across all the location types and provide details about each location type. It should be noted that the purpose of this review is to highlight the primary examples of existing systems, rather than provide a comprehensive directory of all existing systems.

Summary

The following table summarizes the types of locations or organizations that have person-level record systems that could serve as feeder systems to the National System.

Patient/Evacuee Location	Attributes	Control
Hospitals	<i>All electronic</i> Registration – current Discharges – current	Maintained at each hospital, some maintained by IT vendors
Nursing Homes	<i>Most electronic</i> Registration – current Discharges – current	Maintained at each NH, some maintained by IT vendors; reported to States and then CMS in OSCAR database (lag)
Homebound Patients	<i>Most electronic</i> Discharges - current	Maintained at each HHS; reported to CMS via OASIS database (lag)
Homeless Shelters	<i>Paper and electronic</i> Registration – current Departures – incomplete	Maintained at each shelter, reported to States and HUD quarterly
Disaster Shelters	<i>Paper and electronic</i> Registration – delayed in very large evacuations Departures - incomplete	Red Cross/FEMA National Disaster Shelter System
Prisons & Jails	<i>Most electronic</i> Registration – current Departures – current	Maintained at each jail & prison with little reporting/sharing; Federal BoP uses a centralized database
Other lists of people needing evacuation assistance (hotels, pre-evacuation registries, MedicAlert clients, vocational rehabilitation clients, special assistance lists)	<i>Paper and electronic</i>	Maintained by each service organization/firm

Hospitals

There are 5,756 hospitals registered in the U.S. Data from the most recent Healthcare Information and Management Systems Society (HIMSS) survey indicate that almost all hospitals use automated patient registration systems.⁴⁹ Hospitals routinely collect identifying and billing information, including:

- Name
- Address
- Date of birth
- Social Security number
- Payor/insurance(s) (if any) and insurance policy number(s)
- Family contacts/next of kin/emergency contact/guarantor
- Employer
- Socio-demographics that vary by institution (e.g., race/ethnicity, family income, primary language spoken)
- Referring physician name
- Primary/presenting diagnosis (not universal)
- Unique patient ID

Patients presenting at a hospital emergency department (ED) are logged in but are not considered “admitted” to the hospital unless they will be staying 24 hours or longer. Some hospitals’ ED systems simply indicate that the patient is present, and contain no electronic information about presenting diagnosis, medications, etc. All patients, whether admitted or seen in the ED, usually receive an I.D. bracelet which they wear until they are discharged. When they are transferred to another facility, this bracelet is replaced by another issued at the new facility.

Similarly, hospitals collect electronic information about discharged patients, including their discharge destination (nursing home, home, etc.). The discharge process may be handled by a distinct discharge department that enters the data or may be centralized. Some (but not all) discharge information systems contain/report detailed data (medications, etc.) that are helpful to the next institution caring for the patient

Since the admission and discharge elements of patient tracking already are automated at almost all U.S. hospitals, those all could (in theory) become feeder systems for a national patient tracking system.

⁴⁹ Annual Report of the U.S. Hospital IT Market; 2004 complete and 2005 first quarter data. HIMSS Analytics.

Nursing Homes

There are approximately 1.6 million nursing home residents in 18,000 nursing homes in the US; 90% of nursing home residents are elderly (65 and over).⁵⁰

Admission (check-in) and discharge (check-out) procedures are similar across all Medicare and Medicaid nursing homes. A social worker or director of nursing reviews an admissions agreement with the patient or their proxy/guardian, including review of resident's rights and financial information. If the patient is transferring from a hospital, medical records and medications are faxed from the hospital and medical charts are created (often paper).

Information is entered into the nursing home billing system, including

- Name
- Date of birth
- Social Security number
- Payor/insurance (if any) and insurance policy number
- Family contacts/next of kin/emergency contact
- Demographics
- Physician name
- Diagnosis

Some facilities attach identification bracelets to their patients and others do not (unless the patients frequently wander).

Nursing home electronic billing systems in most facilities generate an internal daily census report at midnight each night, which includes (at a minimum): patient names and payor source, room number, medical record number, age, physician, and diagnoses. This census report could be modified to become data fed to a national patient tracking system. Nursing home clinical data systems contain more detailed data but are not as timely.

Home Health

There are about 7,530 home health agencies (HHAs) and 1.4 million home health care patients in the United States. HHAs provide part-time care to patients in their home. In a major disaster, many home health patients are not able to safely self-evacuate.

Home health patients are referred to an agency from a physician, hospital, or other provider and the HHA decides whether they can provide the services the patient needs. Upon admission to the HHA, a nurse consults with physicians to create a written plan of care. Data elements include

- Name
- Date of birth

⁵⁰ Centers for Disease Control and Prevention, National Nursing Home Survey, 1999.

- Social Security number
- Payor/insurance (if any) and insurance policy number
- Family contacts/next of kin/emergency contact
- Demographics
- Physician name
- Physical capabilities and assistance needed with activities of daily living
- Care regimen and duration

This intake information could be considered a census of patients for each HHA, and could be adapted to feed into a national patient tracking system.

More detailed and progressive clinical information is collected as the care episode proceeds, and reported (starting at 5 days from intake) to CMS via the OSCAR data system. The data contained in this system are not precisely current, but are close, and would include more information about evacuation needs (equipment, medications, transportation, etc.). This system could also be modified to feed data to a national patient tracking system.

Shelters

Shelters are classified as Disaster Shelters (American Red Cross, FEMA, Federal Medical Shelters, etc.), and Homeless Shelters (overnight or “emergency,” transitional and permanent housing for the homeless).

Disaster Shelter Systems. Persons in disaster shelters, and most of those in homeless overnight/emergency shelters, will be unable to self-evacuate. Many disaster shelters use the Coordinated Assistance Network (CAN) to manage client-level data and coordinate services and benefits during large-scale inter-jurisdictional disasters. The CAN data include identifying information that can help track individuals and reunite families. CAN also contains information about individuals’ other social service needs, since some may not have homes, jobs, or schools to return to after a disaster. CAN and the National Shelter System absorb data from tens of thousands of disaster shelters, and could potentially feed these data to a national patient and evacuee tracking system, although privacy issues would likely preclude doing this.

The American Red Cross (ARC) is currently developing a National Shelter System for use in all its disaster shelters. To date, development has focused primarily on obtaining shelter capacity data – See Appendix E, Resource Availability Systems. The ARC’s long term goals include adding a client registration component to this system; as noted in Section 3, such a system would make an ideal feeder system to the National System.

Homeless Shelter Data Systems. Homeless shelters each use a version of the homeless management information system (HMIS), as they must report data quarterly and annually to their States and then to the Department of Housing and Urban Development (HUD). The data collected include:

- Name
- Date of birth
- Social Security number
- Unique ID
- Ethnicity and race
- Gender
- Disabling conditions
- Program entry/exit dates

These data are collected on paper in most homeless shelters, and entered into electronic format at a later date – sometimes days or weeks later – and are then aggregated and reported to funding and oversight authorities. These data are probably not timely, accurate, and automated enough to be fed to a national patient and evacuee tracking system during an emergency.

Prisons and Jails

Jails and prisons differ in the type of inmates they hold, their daily and annual population, and the manner in which they are operated. People with all types of medical conditions and at all levels of ambulatory ability are arrested and incarcerated in jails and prisons. Prisons maintain very accurate (census) records of who is in each facility, and any movement of inmates from one facility to another. In many cases, however, these data are not automated; even when they are automated, they are often only accessible within a facility in legacy information systems and cannot be exported/shared. The Federal Bureau of Prisons (BoP) has a system-wide database, but within States and counties there is little consistency. In addition, many prisons have modest computing capabilities and internet access. Beyond the FBoP there are probably few systems that could feed data to a national tracking system, and indeed prisons and jails prefer to handle evacuations on their own, due to security considerations, rather than relying on assistance from civilian entities.

Other People Needing Evacuation Assistance

The need for evacuation assistance and tracking of non-institutionalized persons could be substantial; an official from the Department on Disability in Los Angeles estimates that 25 to 30 percent of the general population will need evacuation assistance.⁵¹

- Hotel and resort guests: Hotels have accurate lists of all registered guests; these lists are often maintained in a central database for hotel chains and could be fed into a national patient and evacuee tracking system.

⁵¹ 2006 personal communication with Angela Kaufman, Project Coordinator, Los Angeles Department on Disability.

- Evacuation pre-registration: Many areas in storm zones offer pre-evacuation registries for residents who know they will need assistance. During an evacuation, emergency managers will attempt to verify whether help is indeed needed, and send emergency responders to assist. Ventilator-dependent (and other electricity-dependent) patients, those who are bed-bound or wheelchair-bound and without any transportation assistance, and anyone else who knows that they will not be able to self-evacuate safely, can pre-register. According to a county emergency manager in Florida (which mandates operation of such voluntary registries in every county), most of these registries are small and are not thoroughly automated. It is not clear whether they could feed data to a national tracking system.
- Local special assistance lists: Many fire departments offer disabled persons who might need to be rescued (e.g., in a fire) the opportunity to be listed, so that responders are aware that a disabled person lives in a house. In addition to those who are mobility impaired, persons with communication impairment (deaf, mute) may voluntarily add their names to such a list. These lists are usually not automated.
- MedicAlert and other emergency pager systems have lists of clients who might require assistance, especially in a rapid evacuation. Client lists are likely available electronically, but based on these lists it would not be possible to determine which clients have self-evacuated and which need assistance.
- Vocational rehabilitation and independent living centers have lists of persons receiving personal home aide (not home health) services and will likely know which require mobility assistance to evacuate.

Hospitals

Typology and Definitions

U.S. hospitals vary considerably by function, ownership, location, bed size, special services offered, and affiliation. The following table shows the types and numbers of hospitals in the U.S. classified in various ways. Bed size ranges from under 20 beds in some small rural hospitals, to over 500 beds in urban tertiary medical centers. Thirty-five percent of U.S. hospitals are rural. (Many of these are also quite small).

Type of Hospital	Number Registered in U.S.
Total Number of All U.S. Registered Hospitals	5,756
Number of Nongovernment Not-for-Profit Community Hospitals	2,958
Number of Investor-Owned (For-Profit) Community Hospitals	868
Number of State and Local Government Community Hospitals	1,110
Number of Federal Government Hospitals	226
Number of Nonfederal Psychiatric Hospitals	456
Number of Nonfederal Long-Term Care Hospitals	118
Number of Hospital Units of Institutions (Prison Hospitals, College Inpatient Infirmaries, Etc.)	20
Number of Rural Community Hospitals	2,009
Number of Urban Community Hospitals	2,927

Some of these hospitals' patients will have special evacuation transportation needs. For example, many patients in rehabilitation hospitals are in wheelchairs or in traction devices, some in long-term care hospitals are comatose, many in both types of hospitals will be on ventilators. Psychiatric hospitals have special evacuation needs, mainly assuring sufficient staff to accompany patients and continue to provide care at the destination facility, and bringing a temporary supply of medications for these patients. And children's hospitals would try to evacuate parents with their children whenever possible, doubling the transportation needs. Ill inmates in prison hospitals will need security during transport, and so on.

Hospital Intake and Discharge Processes

Data from the most recent HIMSS survey indicate that almost all hospitals use automated patient registration systems.⁵² Some of these systems were purchased from vendors years

⁵² Annual Report of the U.S. Hospital IT Market; 2004 complete and 2005 first quarter data. HIMSS Analytics.

or decades ago and have not been upgraded, but many are modern systems. Some hospitals purchase just the system and retain/process the data in-house. That is, their data are not exported to the vendor for processing and storage. Some of these hospitals have off-site storage they own or control, but some keep all their data on-site where it is vulnerable to whatever disaster affects the hospital (floods, power failures, etc.) Other hospitals contract with vendors entirely. Data are processed and stored on the vendor's servers, not those of the hospital itself. In the latter case it will be easier to incorporate data directly from off-site, vendor controlled databases. Hospitals routinely collect identifying and billing information, including:

- Name
- Address
- Date of birth
- Sex
- Social Security number
- Payor/insurance(s), (if any,) and insurance policy number(s)
- Family contacts/next of kin/emergency contact/guarantor
- Employer
- Demographics-sociodemographics (e.g., race/ethnicity, family income, primary language spoken)
- Referring physician name
- Primary/presenting diagnosis (not universally included)
- Unique ID

Patients presenting at a hospital emergency department are logged in but are not considered “admitted” to the hospital unless they will be staying 24 hours or longer. Some hospitals’ ED systems simply indicate that the patient is present and contain no electronic information about presenting diagnosis, medications, etc.

Similarly, hospitals collect electronic information about discharged patients, including their discharge destination (nursing home, home, etc.). The discharge process may be handled by a distinct discharge department which enters the data or may be centralized. Some discharge information systems contain/report detailed data that are helpful to the next institution caring for the patient (medications, etc.).

When patients are transferred between hospitals or between a hospital and a nursing home, paper records often accompany the patient (or arrive at the destination just before or after the patient does). Even hospitals that have electronic records systems rarely share electronic data unless they are co-owned or closely affiliated in an integrated network. Thus a hospital may have complete electronic data on all physician orders, lab test results, medications, etc., but will print this out for transfer to the patient’s next destination. Similarly, incoming patients arrive with their paper charts. Patients are often transferred with standard film x-rays and images, or with a CD containing digital images.

Hospital Evacuation Transfers. We interviewed hospitals in four States and all but one have evacuation plans, although in some cases the plan is to simply “shelter in place”.⁵³ In an evacuation situation, most hospitals anticipate using paper records (nursing “reports” – see below) that would physically accompany patients who are being transferred, generally because they may be uncertain where the patients ultimately will end up. Patients would be discharged and transported with a 1-3 day supply of important medications, in case the receiving institution does not have an adequate supply.

An exception to this plan of using paper discharge summaries is when patients are evacuated from one “sister” hospital to another – hospitals that are co-owned or part of the same provider network or where a memorandum of agreement is in place. In such cases, if one hospital is in the mass casualty incident zone and a sister hospital is not, the imperiled hospital will discharge patients to the safer hospital. In a hurricane area, there is usually enough time to send electronic records to the receiving hospital. (Affiliated hospitals often share an IT platform and can easily share records.) Staff from the higher risk hospital may be trained/drilled to fit comfortably into the routines of the lower risk hospital⁵⁴, and drills include both transport and reestablishing patient care at the receiving hospital. Some hospitals in hurricane areas have perfected data tracking systems for use during such a circumstance. For example, a group of three sister hospitals in Florida have repeatedly used a patient tracking form (see exhibit D.1) during evacuations; it lists each patient with pertinent medical and transportation information. It is populated from their electronic patient registration/census system, so they know who is in the evacuating hospital and can track each patient’s progress. They update it as each patient is transported, indicating the destination and other pertinent medical information that the receiving hospital will need. The receiving hospital completes the update when the patient arrives, noting the room and the physician to which the patient has been assigned.

When a major storm is within 3 days, the hospital stops admitting patients and discharges every possible patient – they usually have about 30-40% remaining that must be evacuated to the sister hospital. Soon a decision is made to evacuate and the entire evacuation of the remaining patients (a few dozen at most) requires no more than 6 hours. The evacuation must be completed before winds become too severe for air evacuation, and before the risk of flooding (which would immobilize ambulances). This orderly evacuation with automated tracking would probably not work as well in a situation where there is no advance warning of the need to evacuate, no power, and rapid evacuation is essential (following a bomb, an earthquake, a fire, etc.).

⁵³ Generally speaking, smaller hospitals in remote rural areas, especially places without much risk for natural disasters, do not anticipate evacuating and may not have a full evacuation plan even for circumstances like fires. They are often the only hospital in their vicinity and there are few ambulances or other transportation, and few accessible hospital beds nearby.

⁵⁴ Nurses from the evacuating hospital generally accompany their patients and continue to provide care at the receiving hospital, augmenting that hospital’s staff.

For hospitals without shared electronic systems, a hard-copy form resembling a Nursing Report would accompany evacuated patients to the receiving hospital, and would contain data like the following:

- Triage class: emergency, urgent, non-urgent
- Discharge condition: critical, stable, expired
- Mode of transport: private care, ambulance, air evacuation
- Height, weight, age
- Physician name
- Chief complaint/method of injury
- Speech: coherent, incoherent, silent, baby, slurred, crying
- Skin color (normal, pale, mottled, cyanotic, jaundiced) and skin temperature (warm, hot, cool, cold)
- Mental status (conscious, lethargic, confused, unconscious, oriented, combative, hysterical, unresponsive, baby)
- Immunizations, tetanus, allergies
- Current medications IV information (time, solution, amount, rate)
- Nursing observations

Exhibit D.1: “Sister” Hospital Tracking Form

The first eight columns are populated from automated patient registration system/discharge at the evacuating hospital; the next eight are populated by nursing staff hard copy and then entered into the system; and the last columns are populated at the receiving hospital from its patient registration system.

DATE

PATIENT EVACUATION							TOTAL CENSUS		TOTAL ER PTS	TOTAL OR CASES IN PROG.		TOTAL TRANSFERRED TO OTHER FACILITIES	
This row updates continuously =>							0		0	0		0	
Last Name	First Name	Nursing Station	Room-Bed	Age	Sex	Diagnosis	Attending Physician	D/C Home	Destination Facility	Room # at Receiving Facility	Chart Ready on Floor	Time pt ready to go to staging area	Type of transport: ALS or BLS

DATE

PATIENT EVACUATION							TOTAL TO CCH	TOTAL TO HRMC		TOTAL TO PBCH		TOTAL TO WMH	TOTAL TO SNF		TOTAL TO OTHER	TOTAL DISCHARGES	
This row updates continuously =>							0	0		0		0	0		0	0	0
Last Name	First Name	Nursing Station	Room-Bed	Age	Sex	Diagnosis	Medical Record final check complete in staging area	Time Left Sending Facility	Time Arrived Receiving Facility	IV	O2	(S)tretcher or (W)heel chair	Vent	Monitor	Isolation type or precaution	Receiving Physician	Additional Comments

Existing Hospital Information Technology Systems with Population-Level or Client-Level Data

Hospital Admission / Discharge IT Systems. The top 10 registration/ADT system suppliers accounted for 89.37 percent of the market in 2005. Top vendors include MEDITECH (26.20 percent), McKesson Provider Technologies (18.97 percent) and Siemens (17.38 percent). Cerner Corp., CPSI, Healthcare Management Systems Inc., IDX, Epic Systems Corp., and Dairyland Healthcare Solutions each had small market shares. Another 4.08 percent of the market uses self-developed applications. In 2005, 3,941 hospitals had either installed registration/ADT software or had signed a contract to do so. This represents 98.28 percent of the hospitals tracked in the sample.⁵⁵ The data collected to uniquely identify an individual vary depending on the software vendor and hospital preferences.

Hospital Clinical Data Systems. Vendors selling enterprise electronic medical records distribute software in an application environment consisting of clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized practitioner order entry, pharmacy, and clinical documentation. Some hospitals purchase (or create) separate IT packages for some or all of these functions, while others purchase an integrated product for the entire enterprise. In addition, 4.23 percent of the market uses self-developed applications. In 2005, 2,260 hospitals had either installed enterprise EMR software or had signed a contract to do so. This represents 56.36 percent of the hospitals tracked in the sample.⁵⁶

Hospital Perceptions: Benefits of Evacuation Tracking

When a community experiences a mass casualty incident, family members are often unable to locate their loved ones and begin calling all hospitals in the vicinity, tying up hospital phone lines. Some hospitals have installed a special phone line for this purpose. In rural areas, some counties take this responsibility and centralized information from the hospitals (although this does not always prevent families from calling hospitals as well). A major benefit all hospital interviewees mentioned for a patient tracking system was to avoid having to answer all the incoming calls.

Another benefit hospitals foresee is being able to know or learn where their patients are sent, whether they arrive in good shape, and whether the receiving hospital needs more information to provide good care. As hospitals evacuate, they often send nurses with

⁵⁵ Ibid.

⁵⁶ Ibid.

patients, effectively emptying the imperiled hospitals of staff as well as patients. They would like to be able to track where the patients end up, in part to know where their staff end up.⁵⁷

Finally, hospitals in a “destination” city (receiving incoming patients from an MCI area) want to know how patients are being distributed – to assure that each hospital accepts responsibility for a “fair share” of the incoming patient-evacuees. Hospitals in a competitive environment may all agree to forego “diversion” to accommodate the incoming patients, but they want to be sure that they are not being overtaxed while their competitors are idle.

Hospital Privacy and Confidentiality Issues

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) sets standards to protect patients’ medical records and health information provided to health plans, physicians, and health care providers. The rule sets limits on how health plans and providers may use individually identifiable health information. Patients must sign a specific authorization before the provider may release their medical information to an outside business for purposes not related to their health care. (See Appendix B for more detail about patient privacy and confidentiality issues.)

⁵⁷ When hospitals are evacuated (as happens with some regularity in Florida and other Gulf Coast States) they rarely get “their patients” back. Patients become the responsibility of the receiving hospital until they are well enough to be discharged elsewhere.

Nursing Homes

Nursing homes house and care for elderly persons and others with physical disabilities who cannot care for themselves. In a major disaster, nursing home residents are not able to self-evacuate and many require handicap vans, access to care, and specialty aids or medical equipment in order to evacuate. Benefits of a national system, privacy and confidentiality issues, existing admission and discharge procedures, and existing information technology systems for nursing homes were examined through discussions with nursing home administrators and directors of nursing in urban and rural areas of Florida and California.

Nursing Home Typology and Definitions

A typical nursing home resident can not be cared for at home or in the community due to physical, emotional, or mental problems and require access to care 24 hours a day. Chronic care residents remain in the nursing home from months to years, while post-acute care residents who are admitted to a nursing home following an acute care hospitalization and require intensive rehabilitation are typically discharged after a month. There are approximately 1.6 million nursing home residents in the US; 90% of nursing home residents are elderly (65 and over).⁵⁸

Nursing home residents receive a range of care including nursing services, prescription and non-prescription medications, personal care, nutritional services, social services, and help with equipment or devices.⁵⁹ Many require assistance with several activities of daily living (bathing, dressing, eating, etc.) daily and the majority requires aids and/or assistive devices (62% of residents use wheelchairs and 25% use walkers).⁶⁰

There are approximately 18,000 nursing homes in the United States containing 1.88 million beds. The majority of nursing homes are for-profit (67%), others are nonprofit (27%) or government and other (6%).⁶¹ Forty percent of nursing homes are independently owned and 60% are part of a chain. Almost all (97%) nursing homes are Medicare and/or Medicaid certified, but 3% of nursing homes are not certified.⁶² The discussion presented in this section relates only to certified nursing homes because non-certified facilities do not transmit any data to State or national data systems.

Nursing home residents represent a fairly large number of evacuees in urban areas. In Miami-Dade County, there are 51 Medicare and/or Medicaid certified freestanding nursing homes that have between 46 and 462 certified beds. An additional nursing home is located

⁵⁸ Centers for Disease Control and Prevention, National Nursing Home Survey, 1999.

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Ibid.

⁶² Ibid.

within a hospital. Only two nursing homes (with 120 certified beds each) are in Monroe, a rural county in southern Florida.⁶³ In Los Angeles County, there are 358 Medicare and/or Medicaid certified non-hospital based nursing homes that have between 7 and 391 certified beds and an additional 40 Medicare and/or Medicaid certified nursing homes located within a hospital. In the southern California rural county of San Luis Obispo, there are 8 certified freestanding nursing homes, with between 23 and 162 certified beds and one additional hospital-based nursing home.

Nursing Home Intake and Discharge Processes

Admission and discharge procedures are similar across all Medicare and/or Medicaid nursing homes. Once a person has been accepted as a patient, a social worker or director of nursing reviews an admissions agreement with the patient, including review of resident's rights and financial information. If the patient is transferring from a hospital, medical records and medications are faxed from the hospital and medical charts are created (often paper).

Information is entered into the nursing home billing system, including

- Name
- Date of birth
- Social Security number
- Payer/insurance (if any) and insurance policy number
- Family contacts/next of kin/emergency contact
- Demographics
- Physician name
- Diagnosis

Some facilities attach identification bracelets to their patients and others do not (unless the patients frequently wander).

Many nursing home patients remain in the nursing home until they die. In these cases, the day of expiration is entered into the records, the medical charts are put away, and all records are closed. For those patients who are discharged to home or an acute care setting, a discharge assessment (head-to-toe assessment of health status) is completed. The business system reflects the discharge, but the destination location is not necessarily entered in any electronic system. Some nursing homes enter the discharge address in a clinical system but not in the billing system.

In an emergency evacuation, administrators said they would not use normal check-out procedures; it would be a "grab and run" situation. One nursing home's system is backed up weekly, and in an emergency the patient data would be taken with the staff on a CD.

⁶³ Nursing Home Compare, www.medicare.gov.

Existing Nursing-Home Information Technology Systems with Population-Level or Client-Level Data

Several systems have population-level or client-level data on nursing home residents. Most nursing homes have electronic systems for their business data and some clinical data, but these systems may or may not be linked. A few major vendors for these systems dominate the market and no interviewed facilities had home-grown systems. Many nursing homes still use paper medical charts for their clinical medical records. These systems use unique identifiers for each patient, but these identifiers are not developed the same way across systems. One facility uses the medical records number, another uses a medical record number and an account record number that is created by their system, and another uses the patient's Social Security number.

Nursing Home Business / Billing IT Systems. Nursing homes have electronic business/billing system to provide data to payer sources so the facility can be paid. Business systems have timely, client-level information – they are updated when a patient is admitted and when a patient is discharged. Data entered into the business system include name, date of birth, diagnosis, secondary diagnosis, physician, and demographics, but not health status.

The business system is also used by the facility to compile an internal daily census report at midnight. The daily census report includes at least all patients names and payer source and may also include room number, medical record number, age, physician, and diagnosis. In addition to the generated census report, the system can be accessed by staff throughout the day.

Nursing Home Clinical Data Systems. Many facilities continue to use paper medical charts, but Medicare and/or Medicaid certified nursing homes are required to transmit Minimum Data Set (MDS) patient-level data to the States. The Nursing Home Minimum Data Set (MDS) is a standardized, primary screening and assessment tool of health status; it measures physical, medical, psychological, and social functioning of nursing home residents. The general categories of data and health status items in the MDS include demographics and patient history, cognitive, communication/hearing, vision, and mood/behavior patterns, psychosocial well-being, physical functioning, continence, disease diagnosis, health conditions, medications, nutritional and dental status, skin condition, activity patterns, special treatments and procedures and discharge potential. Demographics collected include gender, age, marital status, race or ethnicity, current payment sources and health status. Other data collected include social security number, Medicare beneficiary number, facility provider number, date of entry into the facility, and mode of locomotion.

MDS data is collected for all residents in a Medicare and/or Medicaid certified nursing and long-term care facilities. Data is collected on admission (by day 5), quarterly, annually, and when the resident experiences a significant change in status. The data is collected and entered more frequently for residents that are receiving Medicare nursing home Prospective Payment System payment (5, 14, 30, 60, 90 days). Nursing homes electronically transmit

this person-level health data to the State licensing agency where the data reside. Each State is responsible for preparing MDS data for retrieval by a national repository established by the Centers for Medicare & Medicaid Services (CMS).

Comparison of Nursing Home Data Systems. A nursing home's business/billing system holds the most up-to-date patient-level data; admissions and discharges are reflected in the system on the same day as the event. This system does not necessarily have health status information but does have patient-identifying data and each patient's primary and secondary diagnosis. MDS systems also have patient-level data and have detailed health status data, but it is less up-to-date than a business system because the MDS does not need to be completed until the fifth day after admission to the facility. This data is transmitted to State databases and then to a national repository. OSCAR and Nursing Home Compare facility-level data are accurate as of the facility's last survey inspection but provides a quick way to identify how many facilities are in a given area and the number of certified beds at each facility.

Nursing Home Evacuation Plans

Current nursing home evacuation plans are probably sufficient in a limited scenario, such as a hurricane affecting a small geographic area. In these situations, nursing homes can use the transport agreements they have established with the local ambulance/ambulette companies or other local services. None of the interviewed nursing homes have had to evacuate their facilities before, but an administrator spoke of a neighboring facility's evacuation (due to localized flooding) and the need for a more systematic approach to client movement. It took the nursing home 3 full days to adequately evacuate the facility (including using staff private cars). The facility was part of a large corporation, so residents were moved to other facilities that had beds available. We spoke with a rural California nursing home that plans to use a nearby Indian reservation's handicap vans and the local school system handicap vans. Another facility has its own transportation van that can hold nine passengers, but has no transportation for patients on ventilators.

Nursing home evacuation plans include mutual transfer agreements with other local facilities, but many nursing homes do not have transfer agreements with facilities outside of their local area (away from the disaster zone). One rural California nursing home has plans to evacuate their residents to a previously used acute campus that is one-half mile away from the facility. The administrator does not know where his residents would go in a larger-scale evacuation. Another rural California nursing home has transfer agreements with local facilities and the local hospital, but knows that in a larger evacuation neither would have sufficient space to accept all their residents. One urban nursing home routinely transfers patients to three nearby facilities when demand exceeds their capacity, but has no plan for relocating their entire patient population in a situation where the entire county must evacuate.

Many nursing homes (60%) are part of a larger organization that operates other facilities, but often these "sister" nursing homes are not close enough for the evacuating facility to transfer residents. One southern Florida nursing home we interviewed is part of a corporation that

also operates hotels, but the hotels cannot be used in an evacuation because residents can only be transferred to a facility with the same or higher level of care (nursing home or hospital).

Larger nursing homes will need to disperse their residents to several different facilities in an evacuation, because individual nursing homes do not have enough open beds to accommodate all residents. One administrator noted he would not want to send residents to hospitals because the hospitals would be overwhelmed with other evacuees and anyone injured in the disaster.

Nursing Home Perceptions: Benefits of Evacuation Tracking

Although every certified nursing home must have an evacuation plan, most plans are developed for facility-level evacuations or small-scale evacuations. Benefits for nursing homes participating in a national system include assistance with coordination of transportation for residents and identifying destination locations.

In the event of a large-scale evacuation, nursing homes do not know who will transport their residents. The local ambulance/ambulette companies will only be able to assist one or two facilities because all the local facilities have transport agreements with the same companies. Many residents have intensive care and technology needs and cannot be transported on buses. In urban areas, a large-scale evacuation causes concern about transportation because of the volume of nursing home patients that would need to be moved. One nursing home administrator felt national involvement would be necessary to help move the 15,000 nursing home patients in Miami-Dade County.

Other perceived benefits of a national system include providing a more systematic way to track where residents are moved to and providing support to facilities with limited staff resources. One rural California nursing home has detailed paper forms that the staff will use to keep track of where the residents go and what to send with them (medical charts, medications, etc.). Although the paper forms are helpful for the facility to keep track of the patients, an electronic system would provide staff and family members with an easier way to track them.

Another benefit of a national system is the assistance it would provide to busy nursing home staff. During an emergency, staff will be concerned about their own family and evacuation so any assistance from a national system will be appreciated. Many areas in the country have nursing shortages and a fear of administrators is that they will not be able to get enough staff to come to the facility to coordinate the resources to evacuate patients.

Nursing Home Privacy and Confidentiality Issues

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) sets standards to protect patients' medical records and health information provided to health plans, physicians,

and health care providers. The rule sets limits on how health plans and providers may use individually identifiable health information. Patients must sign a specific authorization before the provider may release their medical information to an outside business for purposes not related to their health care.

One administrator noted that HIPAA is intended to safeguard patients and their information, so it might be acceptable for client-level information to be transmitted to a national system in a major disaster. It is important that receiving facilities have access to as much information as possible about the resident medical records to provide the most appropriate care for them. In a large-scale evacuation scenario, it may also be important for the transportation services to have information on the residents' medical status because travel from the evacuating facility to the receiving facility may take a long time.

Home Health

Home health agencies (HHAs) provide part-time care to patients in their homes. In a major disaster, many home health patients are not able to self-evacuate and require help moving, access to care, and specialty aids or medical equipment in order to evacuate and travel to a new location. Benefits of a national system, privacy and confidentiality issues, existing admission and discharge procedures, and existing information technology systems for home health agencies were examined through discussions with HHA directors or administrators in urban and rural areas of Florida and California.

Home Health Typology, Population and Definitions

HHAs provide skilled nursing care, physical therapy, occupational therapy, speech-language therapy, home health aide services, medical social services, and other services to patients in their home. Some patients require services multiple times per week and others require assistance multiple times per day. Medicare home health patients are homebound and require skilled nursing or therapy services.

There are about 7,530 HHAs and 1.4 million home health care patients in the United States. About 7% of home health patients are served by a noncertified HHA; the remainder is served by a Medicare and/or Medicaid certified HHA. Proprietary HHAs serve about 34% of home health patients; nonprofit agencies serve 57% of patients; and government or other serve 9% of home health patients in the U.S. Sixty-five percent of patients are served by an agency that is part of a chain, operated by a hospital, or operated by a health maintenance organization.⁶⁴ This discussion of HHA procedures, systems, and evacuation plans only applies to certified HHAs.

There are 270 Medicare certified HHAs in Miami-Dade County and 37 in Monroe County, a southern Florida rural county. There are 396 Medicare certified HHAs in Los Angeles County and 12 in San Luis Obispo, a southern California rural county.⁶⁵

Home Health Intake and Discharge Processes

Home health patients are referred to an agency from a physician, hospital, or other provider and the HHA decides whether they can provide the services the patient needs. Preliminary information is entered into their IT system and a nurse is dispatched to the patients' home to do the initial assessment. A written plan of care is created between the physician and the HHA staff. This plan of care describes which services will be provided to the patient. Data elements include:

- Name
- Date of birth

⁶⁴ Center for Disease Control and Prevention, National Home and Hospice Care data, 2000.

⁶⁵ Home Health Compare, www.medicare.gov/HHCompare.

- Social Security number
- Payer/insurance (if any) and insurance policy number
- Family contacts/next of kin/emergency contact
- Demographics
- Physician name
- Physical capabilities and assistance needed with activities of daily living
- Care regimen and duration

Internet access is generally not available where the patient is assessed (in the patient's home), but is available where the data are later entered (at the HHA office).

Medicare home health patients typically receive a 60-day episode of care. At the end of each episode, the HHA reports back to the physician and Medicare about the condition of the patient. If the patient is not better or needs additional care, the patient is discharged (because the episode is complete) and readmitted. The patient needs to be recertified and the nurse goes back to the patient's home to reassess the patient and develop a new plan of care. Most home health patients require care for more than one 60-day episode. If a patient is recertified, they receive the same medical record number and same identification number, but a different episode number. When services are no longer needed, the patient is discharged.

In an emergency evacuation, the HHA would not discharge the patients in the system if patients are being evacuated for a day or two. If the evacuation is for a longer period of time, the HHA could place the patients 'on hold' and alert their families.

Existing Home Health Information Technology Systems with Population-Level or Client-Level Data

Several systems have population-level or client-level data on home health patients. Home health agencies have electronic systems for their billing and some clinical data. These systems use unique identifiers for each patient, but the identifiers are not the same across systems. There are several major vendors of these IT systems.

Home Health Client-Level Data. The Outcome and Assessment Information Set (OASIS) is the core group of data elements that are collected during a comprehensive assessment for all Medicare or Medicaid home health patients receiving skilled care. This comprehensive assessment is completed within 5 days of the start of care. These data elements and assessments are the basis for the development of the plan of care and ongoing management of the patient. OASIS data are used to measure changes in a patient's health status between two or more time points. All home health agencies must be able to produce or extract a standard set of data for Medicare/Medicaid patients.

Data elements collected include demographics (gender, age, race/ethnicity, marital status, informal caregiver assistance) and patient history, living arrangements, supportive assistance, health status (sensory, skin, respiratory, neuro/behavioral status), activities of daily living,

medications, and required medical equipment. Patient addresses are not transmitted with OASIS data; in order for a national system to find the locations from which home health patients need to be evacuated, the OASIS data would need to be matched against the Medicare Enrollment Database using patient identifying information.

HHAs are required to transmit electronically OASIS data for home health patients receiving Medicare and Medicaid services to State survey agencies within 30 days of the completion of an assessment. The State survey agencies are responsible for collecting OASIS data according to CMS specifications and preparing the data for a CMS established national repository.

Home health agencies are able to run internal daily reports on the number of current home health patients they are serving. The system allows the agency to run reports by several categories, but these daily reports are usually sorted by diagnosis or physician name.

Home Health Comparison of Data Systems. In an emergency, it would not be possible to know exactly how many home health patients are living in a specified area and what type of help each patient needs to be evacuated (ambulance, van equipped for wheelchairs, etc.). Facility-level databases have information on location of home health agencies and the services they provide, but do not have information on the number of patients served by each agency. Patient-level data is available through OASIS, but this data is not current (does not need to be transmitted to the State agency until 30 days from completion of the comprehensive assessment) and does not include patient addresses. Since data on the patient's informal caregiver assistance is collected during the comprehensive assistance, OASIS can identify those patients who are completely dependent on others for evacuation and do not have family or another caregiver to help.

Home Health Evacuation Plans

Some HHAs believe it is their responsibility to help transport patients in an emergency, but others do not. One HHA administrator said the HHA does not have its own transportation since nurses and aides travel in their personal cars to the patient homes. It would not be possible for the HHA to transport the patients.

Patients with family members in the local area likely will have help from their family to leave their home, but other patients will need transportation help. Those agencies that do feel responsible for helping their patients evacuate may have agreements with local transportation companies and will work with them to set up transportation for each patient. Evacuation of patients will be time consuming since each patient starts in a different location (in their home) and will evacuate to different locations.

In an emergency, HHAs would review each patient's needs and try to identify a location that can provide care for their individual needs. The HHA refers patients to shelters and will call to see if there is space available for the patient. If a patient needs help with wound care or

medications, they will be evacuated to a specialty shelter that can provide that care. Some shelters allow home health agencies to send their staff with the patient and then the patient remains in the nurse's care and is not discharged from the HHA. However, since each nurse tends several patients, and they would probably not all be evacuated to at the same shelter, many patients would be sheltered without their nurses.⁶⁶ One HHA administrator believes that the HHA staff are part of each patient's family and will do whatever is needed to help each patient; this administrator said that "It doesn't matter where the nurse has to go to give a patient their care – she will go."

In Florida, where emergency plans are mostly focused on hurricanes, HHAs do have detailed plans to care for their patients in a hurricane. An HHA does not want to endanger the nurses and aides by asking them to go to the patient's homes, so they ask the staff to go to the patients homes before the hurricane arrives to make sure they have everything they need. One HHA gives each patient a disaster recovery plan that details everything a patient should do in an emergency (what food to have, what to bring with them if evacuating, where to go, etc.). After the storm, nurses visit their patients to determine their status and assess any new needs resulting from the storm. Home health agencies are not as prepared for a larger or longer mass evacuation.

Home Health Perceptions: Benefits of Evacuation Tracking

During an evacuation, HHAs want to know what has happened to their patients. In the weeks immediately following Katrina, New Orleans HHAs heard from most of their staff, but did not know what had become of the great majority of their patients – whether they had evacuated, were receiving appropriate care, etc. Since HHA patients are located in their homes and not at one physical location, evacuating each patient in an emergency is difficult and time may be inadequate to evacuate them all following an evacuation order. Some HHAs believe they are fully responsible for helping their patients evacuate, while others do not believe they can accept this responsibility.

HHAs need to alert emergency coordinators about where their patients who cannot self-evacuate reside. A national tracking system could provide assistance with coordinating transportation, identifying destination locations, making certain that patients end up in appropriate care settings, and eventually resettling patients back to their homes. One administrator is a proponent of a national system because it will help assure patients that in an emergency, someone is concerned with locating them and helping with their evacuation and relocation.

⁶⁶ In addition, nurses and their families may also be facing evacuation, so planners should not assume that home health patients will be accompanied by their familiar nurses.

Home Health Privacy and Confidentiality Issues

Under HIPPA, patients must sign a specific authorization before the provider may release their medical information to an outside business for purposes not related to their health care. The HHA must ensure that all patient identifiable information remains confidential as a condition of participation as a Medicare provider.

It is important that receiving locations have access to as much information as possible about the patient medical records to provide the most appropriate care for them. Home health agencies do not have further company policies about sharing information and believe that it is possible to share aggregate-level information.

Shelters

Shelter Typologies and Definitions

Homeless shelters (assistance providers) are organized at the State and county level into Continuums of Care (CoCs). CoCs are essentially local networks that provide services appropriate to the range of homeless needs in individual communities, and coordinate the delivery of care across various provider types. These can include: Prevention and Outreach/Assessment Services, Emergency Shelters, Transitional Housing Programs, Permanent Supported Housing and other, population-specific homeless assistance programs. CoCs typically rely on Federal HUD Supportive Housing Program (SHP) grant funding for a significant portion of their budgets, and report data to HUD. Individual shelters depend on a mix of public and private (foundation and faith-based) funds to maintain operations. CoC lead agencies can be either nonprofit or governmental organizations.

Emergency Shelters are typically the points of entry into the homeless service system. Emergency shelters provide up to sixty days of temporary housing. Many are congregate facilities, but emergency housing can also include hotel or motel vouchers and short-stay apartments. CoCs typically dedicate separate facilities to single men, single women, and families.⁶⁷ In addition, more specialized shelters cater to specific subpopulations such as homeless veterans, victims of domestic abuse, mental health and HIV/AIDS patients, homeless or runaway youth, and teen parents. Nationally, the size of emergency shelters and the number and types of clients served vary by geographic location.⁶⁸

- *Transitional Housing Programs* provide homeless persons or families with housing and case management for up to 9 months (6 months in some jurisdictions). Transitional housing programs typically offer on-site case-management services, which range from alcohol and drug abuse treatment to financial counseling and job training.
- *Permanent Supported Housing* is affordable rental housing with support services for limited-income people or homeless persons (and their families) with disabilities, severe mental illness, chronic substance abuse problems, or HIV/AIDS and related diseases.
- *Disaster Shelters* are activated in schools, town halls, stadiums and other open-spaces and often are run by nonprofit organizations such as the Red Cross, the Salvation Army and United Way working with State and local officials after an emergency. Some disaster shelters are designated as “special needs” shelters, for persons who

⁶⁷ U.S Department of Housing and Urban Development, Office of Policy Development and Research; “Evaluation of Continuums of Care for Homeless People Final Report”. May 2002.

⁶⁸ HUD’s 2002 CoC Evaluation discusses the variation in both style and intensity of emergency services provided by communities across the country.

have medical needs but who do not require hospitalization. Recent efforts to improve communication among the various local and national aid organizations have resulted in the formation of the Coordinated Assistance Network (CAN)⁶⁹ and the affiliated National Shelter System. CAN contains person-level records for each person sheltered by any of the participating voluntary organizations (American Red Cross, National Voluntary Organizations Active in Disasters, Safe Horizon, Salvation Army, 9-11 United Services Group, and United Way of America). The National Shelter System contains information about tens of thousands of disaster shelters, including their capacity (number of evacuees who can be sheltered) and facilities such as food preparation, back-up generators, etc.

Homeless Shelter Intake and Discharge Processes

Homeless Shelter Intake. Shelter intake processes, although varied, generally consist of assigning clients to a bed and performing some sort of needs assessment, tasks which are usually assigned to trained shelter staff or social workers. Intake staff will collect basic identifying and demographic information on persons making use of shelter services and are responsible for assigning client IDs to all new users.⁷⁰ In some cases, the attempt to determine a person's prior use of the shelter's services is verbal and self-reported. In others, staff may query an electronic database to search for existing client files as a means of preventing duplication. According to shelter administrators, the attempt to re-use unique identifiers and verify prior admission is a key component of the log-in procedure given clients' frequent reluctance to provide personal identifying data such as name, social security number or date-of birth. Unlike at the larger urban shelters, where admission or login most often occurs via a Web-based information management system, staff at many of the smaller, less well-funded shelters continue to rely on paper-based systems to collect data on the people they house. Under these circumstances, persons seeking shelter are assigned to a bed and given a questionnaire or data sheet to fill out, which, once completed, is entered into the shelter's database for tracking and reporting purposes by either full-time staff or shelter volunteers. Desk staff and caseworkers typically spend time with program participants to either help them complete the login procedure or answer any questions they may have. Data-entry at these smaller organizations typically occurs within 72 hours but may vary depending on staff size and resource availability. Use of census IT systems and reporting requirements for the various shelter types are discussed in greater detail below.

⁶⁹ CAN is a formal partnership among seven leading disaster relief nonprofit organizations: Alliance for Information and Referral Systems (AIRS), American Red Cross, National Voluntary Organizations Active in Disaster (NVOAD), Safe Horizon, Salvation Army, 9-11 United Services Group, and United Way of America. The CAN IT vendor is responsible for maintaining the National Shelter System and its related applications during an evacuation.

⁷⁰ Family programs will collect information by household and maintain one file per family as opposed to collecting data on individual family members.

Although most smaller shelters do not distribute physical devices to program entrants that allow them facility access, large shelters servicing a sizeable portion of a local homeless population or those providing both emergency and transitional housing services will sometimes generate badges or tags to facilitate admission. For clients staying at a shelter longer than one night, a photo ID or badge with a bar code is used to re-enter the program and allows easy access to meals and other social services.⁷¹ While there is a recognized need among administrators and intake personnel for a simpler intake process, a majority of shelters do not have the resources or funding to purchase ID generating technology. Loss of IDs and badges-- which can link to an individual's personal data-- is also of great concern to shelter staff and managers alike and, as one participant stated, "Issuing badges in the midst of a crisis would most probably not be ideal".

Discussions with shelter administrators indicated that while medical personnel are typically not part of the intake process, shelter staff do receive training to help them determine whether clients require emergency medical attention or specific assistive devices. In some cases, CoCs have adopted information-sharing policies that allow intake staff to view a client's file and history of service use within the local continuum; under these circumstances, shelter staff are capable of assessing a person's health and referral needs upon program entry. Interviewees indicated however that a majority of shelters have not adopted this approach, noting that comprehensive needs assessment is typically separate from intake and that caseworkers-- as opposed to intake staff-- are most often involved in this process. The extent to which shelters collect health status information varies according to the type of services a shelter provides: homeless assistance programs serving persons with HIV/AIDS will, for instance, collect more detailed and complete information on a clients' health status than on an emergency housing program. As one participant noted, intake workers at most shelters will simply ask clients if they have special needs. When trained medical professional are available, intake will ask program entrants if they would like to make an appointment to speak with whoever is on premises. Although most shelter programs do not collect information on whether a person is ambulatory, intake staff are more likely than not to make that determination due to the nature of the beds available (ie: bunk beds vs. cots or mats).

Although emergency shelters and temporary housing programs are not required to maintain open-door policies, many of these organizations will provide individuals with housing regardless of bed availability, either in the form of hotel vouchers or floor-space when demand is high or when receiving clients from sister shelters in need of extra beds. When helping other facilities with overflow, shelters may not necessarily log all arrivals into their own system because no actual services are being provided beyond helping to fill another program's gap for a night or two. People in transition from one shelter to another can therefore easily slip through the cracks should there be high demand for housing or other homeless assistance services.

⁷¹ The Salvation Army Emergency Shelter in Sarasota, FL and the Shreveport-Bossier Rescue Mission in Louisiana both generated badges for their clients during recent mass evacuations. Both indicated that badges only work at their individual shelters and cannot be used to log in at other locations.

Homeless Shelter Discharge. While shelters are generally good at collecting data upon a person’s entry into a program, exit data can be more difficult to collect. Formalized departure processes are implemented only in transitional or permanent housing programs. Emergency shelters in particular, which clear out on a nightly basis, have trouble gathering information from clients before they leave as many simply abandon their beds without checking out. If a bed is unoccupied, it is assumed to be no longer in use. As one participant stated, “Nothing about the shelter environment encourages people to check out or inform intake personnel of their plans”. Transitional and permanent housing programs do however make a more concerted effort to document a person’s health and housing status at the end of that person’s stay. Clients are typically asked to provide information on their next destination, and workers will check to see if a person’s economic, employment, or health status has changed. The frequency with which entry and exit data is documented depends on the type of services provided: Whereas emergency shelters make use of bed-lists and document the number of people on location daily, transitional and permanent housing programs collect data at the beginning and end of a person or household’s stay. Files are updated periodically during caseworker follow-up sessions, but there are no Federal requirements or protocols for the frequency of these visits. Clients in permanent or supported housing programs are not required to login or out intermittently and program staff have no way of tracking or monitoring their whereabouts.

Shelter Information Technology Systems

Homeless Shelters. CoCs receiving State and Federal Supported Housing Program (SHP) funds are required to collect client-level data on assistance use and the characteristics of homeless persons within their community via Homeless Management Information Systems (HMIS). An HMIS is a Web-based software application that can encompass information from disparate providers in geographic areas ranging from a single county to an entire State. Although intake and discharge processes vary by shelter type, all participating homeless assistance providers must collect a standard set of data elements. These include: name, date of birth, Social Security number, unique ID, and program entry/exit date. Programs with annual progress reporting requirements and providers funded through Housing Opportunities for Persons with AIDS must also supply detailed information on the health and socio-economic status of clients and the types of services received during their stay. The table below provides more detailed information on the client-level information captured by HMIS.

Although response categories for both universal and program-specific data elements are HUD mandated, providers have flexibility in terms of how the data is collected and when it is entered into an HMIS. For shelters with Internet connectivity and available workstations, data may be entered real-time at intake; however, a majority of participating shelters at present are simply documenting user data through existing paper-based or legacy systems and entering it into the HMIS later. More specifically, providers are allowed to collect universal and program-specific elements via client interviews or questionnaires and can submit data to their local HMIS soon thereafter (Although CoCs can establish their own data

entry protocols; discussants noted that most providers transfer data with 2-to-3 business days of intake). HMIS administrators at the CoC level receive information from all participating providers for de-duplication on a quarterly basis; aggregate (de-identified) data is then reported to HUD annually.

HMIS prevalence and market concentration: Of the 469 CoCs that applied for Federal SHP funding in 2005, nearly three-quarters (72%) reported that they were collecting client-level information. According to HUD, there are currently 351 HMIS implementations in the country.⁷² Of these, 32% reported having achieved at least seventy-five percent bed coverage for each of the three main shelter types (emergency, transitional and permanent housing). An additional 34 % of communities anticipated achieving this goal by the end of 2005.⁷³ While HUD expects HMIS participation to become a normative practice for homeless-service providers across the country, information gathered in discussions with HMIS vendors and administrators indicates that users currently represent approximately sixty percent of shelters nationwide and are more likely to be found in urban than rural locales. Nonusers typically are private or faith-based organizations that rely on either homegrown or paper-based systems to meet homeless assistance needs of the populations they serve. While providers within a single continuum all use the same HMIS product or application to capture client-level information, a CoC can choose from many HMIS solution providers. HUD maintains a Web page of vendors with registered HMIS products to help communities identify potential partners; presently, 48 vendors advertise on HUD's site. Despite the proliferation of software vendors, the market for HMIS systems seems to be relatively concentrated in that the largest vendor covers nearly 70% of all participating providers.

HMIS data quality and reporting issues: Because HMIS implementation is a relatively new Federal requirement; homeless assistance providers are facing a variety of issues relating to data quality and de-duplication. Some of the issues raised by participants during discussions include: how to deal with missing or incomplete client records, the provision of false information (ie: when a client is unwilling to provide shelter staff with accurate data), delayed data entry or record transfer, transcription errors, and lack of specified and timely data-entry protocols for specific data elements that are subject to change. When asked whether it would be possible for providers to generate daily status reports using HMIS in the event of a natural disaster or mass casualty incident, most discussants responded that although technically possible, participating HMIS shelters are not yet able to produce timely or accurate person-level data on a moment's notice for the reasons noted above. Lack of resources, training, and the time involved to produce accurate, de-duplicated counts are barriers to conducting a daily census. In addition, should daily reporting by providers become

⁷² CoCs can choose to implement HMIS on their own or in conjunction with other CoCs. Of the 351 HMIS currently implemented, 314 represent a single CoC, 31 implementations include between 2 and 4 CoCs, and 6 include 5 or more CoCs.

⁷³ U.S Department of Housing and Urban Development, Office of Community Planning and Development: "Report to Congress: Fifth Progress Report on HUD's Strategy for Improving Homeless Data Collection, Reporting and Analysis". March 2006.

a requirement during such an event, there would be no way to track clients or evacuees in transition from one CoC to another or from one region to the next since identifiers are unique to individual communities.

Universal Data Elements		
Data Element	Use & Disclosure	Frequency
Name	Current and previous names	Intake
Social Security Number	Required for unduplication and to access previous records	Intake
Date of Birth	Age at program entry and for unduplication	Intake
Ethnicity and Race	Ethnicity and race recorded separately (two ethnicity categories and five race categories)	Intake
Gender	To determine number of homeless men and women	Intake
Veteran Status	Service in the U.S. Armed Forces	Intake/as needed
Disabling Condition	Disabling conditions determined from client interview, self-administered form, observation or formal assessment (conducted separately from intake unless information required to determine program eligibility)	Intake/as needed
Residence Prior to Program Entry	Where the person slept the night before program entry. There are separate fields for type of residence and length of stay in that residence	Intake/as needed
Zip Code of Last Permanent Address	Five-digit zip code of the apartment, room, or house where the client last lived for 90+ days	Intake/ as needed
Program Entry Date and Exit Date	Month, day, and year of first day of service. Used to calculate length of stay and homeless episodes	At each entry/exit
Personal Identification Number	Permanent and unique number generated by the HMIS software for every client in the system	Computer generated upon client's first contact with local HMIS
Program Identification Number	Assigned by HMIS for every program event for every client. Includes FIPS code for geographic location of provider; locally determined facility code; HUD-assigned CoC code; and program type code.	Computer generated at each entry
Household Identification Number	Defined as a group of persons who apply together for homeless assistance services. Used to differentiate between persons receiving services as individuals and persons in households.	Computer generated at each entry

Disaster Shelters. CAN and the National Shelter System, jointly developed by the American Red Cross Association and FEMA, is a nationwide, Web-based, registry of disaster-related shelters, services, and agency resources, as well as a records system for persons sheltered during an evacuation. It also supports referrals from shelters to numerous social service agencies. The National Shelter System currently contains information about some 40,000 disaster shelters, as well as the roads and transportation networks leading to them. The National Shelter System is supported by software that allows participating communities and agencies with pre-existing, formalized agreements with the Red Cross to upload facility and resource specifications both prior to and during a natural disaster or incident. A 3-year pilot program is currently being implemented in six cities to test usability and develop an emergency preparedness model applicable for the rest of the nation. Shelter location, capacity, utilities, accessibility, food prep, and ADA compliance are all documented; additional data and files can also be loaded manually into the system or over the phone during a disaster as facilities open their doors to the public. Hospitals and nursing homes are not currently included in the system even though these may occasionally become shelters in the event of a natural or man-made disaster. A mapping tool allows those operating the system to identify best possible routes to and from designated facilities.

The CAN client service management software application allows shelters to match evacuee needs with available resources. It tracks disaster shelter residents' individual and household information while identifying evacuee health, housing and social service needs. Plans for this component of the system include collecting person-level data such as name, date of birth, age, gender, room or cot number, arrival and departure date and relocation address or phone. Additional information on health needs, housing needs and legal assistance will also be collected. This application can be used on a daily basis as new evacuees enter the system and will remain activated during a community's recovery phase.

Shelter Privacy and Confidentiality Issues

Data sharing among participating providers at the CoC is limited to HMIS baseline privacy standards as stated in HUD's Final Notice on HMIS Privacy and Technical Standards. Organizations wishing to adopt open systems or share client-level information for referral purposes within their CoC must also comply with more stringent State and local confidentiality laws. Baseline standards require providers to 1) inform clients of the reasons for collecting information in the form of a privacy posting at intake and 2) develop a privacy notice that is available to all those who wish to see it. Privacy notices describe the uses and disclosures of personal identifying information, protocol for client access to and correction of personal identifying information, provider efforts to ensure client accountability and data quality, certification of staff confidentiality training and a statement noting the possibility of amendment. According to HUD's Final Privacy notice, providers may not use or disclose personal identifying information for purposes not listed in their own notices without first obtaining individual client consent. Should a shelter choose to adopt more stringent privacy protections regarding use and disclosure of protected information such as seeking written or oral consent or limiting disclosure to the minimum necessary, these protections become

mandatory as opposed to merely suggestive. Although most homeless assistance providers are not subject to HIPAA regulations, this may be a concern for particular programs providing targeted health services to homeless persons in the community. The recently re-authorized Violence Against Women Act may also limit domestic violence providers' ability to disclose person-level information, let alone participate in an HMIS. As stated in HUD's Final Notice, access to person-level data is restricted to local CoCs and is not intended for distribution at the national level.

Despite these restrictions, discussants noted the need for more open information-sharing and referral policies, especially in the face of a natural disaster or Katrina-like incident. Although providers "walk a fine line between trying to both honor the people [they] serve and maintaining a good working relationship with different agencies and providers", many seemed to think that if HIPAA-like provisions were relaxed and measures were taken to safeguard the identity of specific homeless sub-populations that information sharing would be possible in the event of national emergency. Because HMIS applications can be customized to meet the needs of a specific program or shelter, safeguards to limit access to personal identifying information to specific providers and ensure confidentiality already exist.

Shelter Perceptions: Benefits of Evacuation Tracking

Perceived benefits of implementing a national system among shelter administrators are mainly related to improved evacuation procedures and coordination of disaster relief resources transportation in the event of a mass casualty incident. Shelters located on the Gulf coast, and those having previously been on the receiving end of evacuations, were particularly interested in the possibility of better-coordinated transportation and referral services. Nearly every participant we spoke to indicated that they would consider this as an incentive to participate in a national system. According to the information gathered during these conversations, most shelters do not have enough resources to provide clients with safe and easily accessible transportation to another location — large shelters may have vans at their disposal but most would rely on their local 211 or cab companies for aid. Despite their limited resources, homeless assistance providers consider themselves responsible (or are considered responsible by the county) for arranging for clients' transportation needs. Moreover, while individual agencies may have pre-established agreements with other facilities in a nearby locales should evacuation be required, continuum-wide disaster planning appears to be in its infancy as there is limited information sharing regarding bed or other resource availability among providers today. There is however a recognized need for this type of communication-- local 211 agencies, emergency-responders and county representatives in many States are in the process of holding discussions regarding this particular issue. HUD itself is currently providing technical assistance to regions directly affected by Hurricane Katrina to establish a case management and tracking system for shelter residents and is working with HMIS vendors to provide region-wide resource directories for use by local providers.

Prisons and Jails

Corrections Typology and Definitions

Jails and prisons differ in the type of inmates they hold, their daily and annual population, and the manner in which they are operated. People with all types of medical conditions and at all levels of ambulatory ability are arrested and incarcerated in jails and prisons.

Typology of Jails and Prisons		
	JAILS	STATE PRISONS*
Criminal Justice Status of Inmates	Pretrial (not sentenced) Sentenced (up to 2 years)	Sentenced (2 or more years)
Organization	Operated by the Sheriff or County Autonomous units, not part of larger structure (there are regional and national Sheriffs' Associations, but they do not have authority over Sheriffs.)	Each State Department of Corrections (DOC) operates the prisons, sets policies and has authority over the prisons. However, each facility has a degree of autonomy and many policies and practices are at the discretion of the Warden.
Average Daily Population (ADP) and Annual Population	Jails have high inmate turnover and many short stay (a few hours to 14 days) inmates. As a result ADP is much lower than the number of inmates that pass through annually.	Stable inmate population with much less turnover than jails.
Inmates with Serious Medical Conditions	Typically not held, transferred to medical facility or other supervision option. Most facilities have medical units where inmates go for acute conditions.	Some States have one or more facility for inmates with serious medical conditions, but they are often held at regular facilities, sometimes in special units. All facilities have medical units where inmates go for acute conditions.
Medical and Other Programs	Less common due to the short length of stay.	Medical services and other programs are more common, but vary by system and facility.

*The Federal Bureau of Prisons (FBOP) operates Federal prisons and several private companies operate private prison facilities around the country. This report does not address the needs or readiness of private prisons.

Correctional Health Care. Correctional health care is increasingly provided by private companies who contract with corrections systems, often in a managed care arrangement. There are a few major private health care contractors and numerous smaller ones. This trend may have consequences for a national patient tracking system as the contracts for health care are regularly renewed and change hands; agreements with one contractor may not be agreeable to or even known about by the next contractor. Even if agreements are made with the correctional facility/system, the medical department (or contractor) would be responsible

for ensuring that medical information can and will be provided to the proposed system. (Abt recently conducted a survey of correctional medical departments for the U.S. Department of Justice and found that when there had been recent turnover in private contractors, the new health care vendor often did not have access to inmate medical data from their predecessor.)

Inmate Health Care Needs. Correctional facilities house a large number of inmates with infectious diseases, including conditions such as HIV and hepatitis C that require regular medication, as well as an increasing number of inmates with chronic diseases. They also often house a large number of inmates with mental health conditions. Inmates with mental health conditions cannot be evacuated without continuous medication and supervision, to assure that evacuation is safe for them and those around them.

Existing Corrections Information Systems

The different segments of the criminal justice system (police, court, DA, jails, prisons) almost never use the same IT systems. In some cases the police operate or maintain the electronic administrative systems for their local jail, but this does not guarantee that it is an integrated system. Data, whether administrative or medical, are maintained and accessed at the “department” level (e.g., individual jail, county department of corrections). In addition, medical and administrative data are usually in two separate systems, and administrative records are more likely to be in electronic form than are medical records.

Corrections Administrative Records. IT systems to manage corrections administration are almost universal (very small facilities may still have paper systems) and track the exact location of each inmate inside the facility, at all times. These tracking data are checked several times a day through inmate “head counts”. Most administrative record systems are homegrown or modified off-the-shelf systems, and do not connect to any other system in the criminal justice system or at the State or Federal level (except of course for the Federal Bureau of Prisons institutions). One jail respondent explained that their emergency plan included printing out this database hourly when they are on alert for an evacuation, in case the computers go down.

Corrections Electronic Medical Records (EMRs). There is no comprehensive information on how widespread EMRs are in jails or prisons. But there are some data from a variety of sources, including a 2005 Abt Survey of Infectious Diseases in Correctional Facilities that included questions on the use of EMRs and, more broadly access to computers and the Internet. The survey included the Federal BoP, the 50 State departments of corrections, and the 50 largest jails in the country. Survey results show that correctional systems that have an EMR may not be able to connect to the Internet (to upload data to a national evacuation tracking system) and that many correctional institutions lack computers and/or Internet access.

Access To Computers and The Internet and Use Or Planned Implementation Of EMRs				
	Access to Computers in Medical Unit	Access to Internet in Medical Unit	Currently Uses EMR	Plans EMR in next 12 months
33 of 50 Largest Jails	79%	55%	39%	22%
46 of 50 State Prisons and the Federal Bureau of Prisons	57%	43%	32%	15%

Data from Abt Associates Inc. 2005 Survey of Infectious Diseases in Correctional Facilities

Corrections officials interviewed about evacuation tracking also reported that:

- Only about 10% of the jails that apply for certification from NCCHC (an accreditaing body for correctional health care) use EMRs
- Most large jails have EMRs
- In many departments of corrections, a minority of facilities have EMRs; moreover they are not always connected to each other or the central office for data sharing

Home grown systems that have evolved over time are very common for both administrative and medical data. However there are many vendors for each type of system and few facilities have “enterprise” solutions that contain both administrative and medical data.

Unique IDs: Each facility/system may assign multiple ID numbers to each inmate for different purposes, and State prison systems will have at least one shared ID across facilities. There is no shared ID number across criminal justice entities (e.g., courts, jails, prisons). EMR IDs are probably be even less standardized.

Demographic Information: No standard administrative or medical data elements are required to be reported to an outside body. Presumably many systems collect a relatively similar core data set in terms of client demographics and criminal justice involvement, but the manner in which it is captured, the field names and the data formats vary widely.

Overall Health Status: There is generally no medical information in the administrative record. No correctional system that we spoke to had an EMR that can identify inmates with certain needs (e.g. wheelchairs, special medications), and none have a mechanism for easily identifying inmates who would need assistance evacuating. Detailed health information is available in the EMR in individual records, but as with hospital EMRs these systems probably cannot generate lists of persons in wheelchairs, persons requiring specific medications, etc.

The administrative and the facility census data are very accurate. The completeness and accessibility of medical data will vary by system, when there is any EMR at all. A major concern is that many correctional systems do not have remote backup for their systems so if

the facility's computers are down they cannot access records and may never be able to retrieve them.

Some prisons have explored alternative methods for tracking inmate movements. One we spoke with priced an RFID (radio frequency identification) system with handheld devices to scan each inmate's ID#, demographics, security level and medical data. The estimated cost for one large jail was \$1.8M for RFID, software and hand-held devices.

Special Evacuation Issues in Jails and Prisons

Three themes came up in the discussion of advanced planning for emergencies that highlighted some of the difficulties in planning for an inmate evacuation. First, it is difficult to set up agreements for transportation, housing, and other resources for inmates prior to an emergency because other correctional facilities are concerned about the liability and payment issues that might arise if they agree to accept inmates from another facility during an emergency. Private companies that could provide transportation, housing, etc., generally have reservations about aligning themselves with correctional systems. Second, during an emergency mutual aid agreements and emergency orders will be put in place that will either make other systems/companies more willing to cooperate or will require them to do so. Third, inmates and correctional facilities will be the lowest priority for public resources and the correctional facilities assume that they will have little access to community resources or transportation.

Corrections Evacuation Plans and Strategies. Some correctional facilities told us that they would not evacuate, even under an evacuation order. A concern with this strategy is that inmates will be at risk if there is loss of power or damage to the building. Inmates in segregation may be more at risk.

Others plan to evacuate vertically (or within the facility/complex) by moving only inmates in affected areas of the facility to other parts of the facility/complex. Since the Katrina experience, many facilities have revisited this concept and now realize that much depends on the nature and extent of the disaster. For example, in the event of flooding some degree of vertical evacuation may be possible; in an earthquake where the entire facility is damaged or destroyed, the building would have to be evacuated. One jail's plan includes cordoning off a city block outside the facility and holding inmates there until they can be moved elsewhere.

Evacuating to other (safe) correctional facilities is now being considered by more officials. In some cases, tents could be set up in the yard of another facility that has insufficient cell space to house the evacuees. If a correctional facility in another State is the closest alternative, more complex arrangements would be needed, as well as payment between the two States.

Some officials are considering use of large unused buildings, armories, National Guard facilities or fairgrounds that are reasonably close but out of harm's way. Concerns include

security, who will pay, and liability – all of which are partially resolved when an Emergency Operations Center is established and issues an executive order requiring sharing of resources (mutual aide).

Some low risk inmates could safely be released to self-evacuate. One jail reported that they have used this strategy on three previous occasions and each time all but one of the released inmates returned to the jail after the emergency. (Prisons do not have this option.)

Experts from the National Institute of Corrections advised us that emergency preparedness is not currently a major concern for jails and prisons. Few correctional systems have any type of emergency plan, and existing plans are generally out of date and have not been recently reviewed. Correctional staff receive very little training on emergency preparedness, and few use drills to practice for evacuation. Given the expense and security needs of moving inmates for a drill (within or out of the facility), they are rarely done. The task is so daunting that many facilities have not developed any evacuation plan at all.

The emergency preparedness plans that do exist in corrections can address a variety of emergencies and take a variety of forms:

- Plans for mass escape or hostage taking incidents
- Plans for fire (required for some accreditations)
- Some plans for specific disasters (e.g. hurricane, earthquake, bioterrorism)
- Some generic plans that are adapted for each type of emergency (corrections is moving towards generic as this simplifies staff training)
- Plans for on-site evacuations (if part of the facility becomes uninhabitable)
- Plans for off-site evacuations, for situations that affect just the facility and also for those that affect the entire community

National Incident Management System (NIMS), coordinated by FEMA. It was developed for fire departments and adopted by police departments, and is used in corrections but considered a “poor fit.”

Transportation Resources in Correctional Facilities. Under normal circumstances, inmates are transported “outside the walls” in specially secured vehicles with specific officer-to-inmate ratios depending on the security status of the inmate (minimum, medium or maximum security). Facilities generally have only a few transports to handle each week and even the largest do not have sufficient vehicles, fuel and staff to evacuate an entire jail or prison. In addition, inmates will need to be supervised by correctional officers in the required ratios at the evacuation destination; the officers will not be able to return to the facility to move more inmates out. Virtually all available officers would be used in the “first wave” of the transport, leaving none for subsequent roundtrips to and from the facility.

Jail systems vary in the extent to which they own buses to transport inmates. Jails that are attached or located in close proximity to the courts may not have buses because inmates are walked back and forth to court. More remote jails have many vehicles to transport inmates.

When inmates are moved from jail to prison (to serve longer sentences) the prison system is responsible for transportation. Some jails have formal or informal agreements with municipal agencies to use city or school buses in an evacuation, however most officials we spoke with were not optimistic that inmates would have priority in the event of a community-wide disaster. Most divisions of corrections do have a fleet of buses and vans for moving inmates between facilities, which they could deploy in an emergency, but not enough to evacuate all threatened facilities in an area the size of that affected by Katrina. (Note that in the New Orleans evacuation, many staff members transported inmates in their private cars.)

Inmate Identification During and After Evacuation. The most common plan for identifying inmates during an evacuation is to issue plastic bracelets marked with an ID number. This ID number would not be associated with any of the administrative or EMR IDs; it would be recorded and linked with the inmate's name (and could become the unique ID number that is uploaded to a national tracking system). In some jails, inmates already wear a bracelet throughout their incarceration printed, with the following data elements (not a barcode): picture from booking, jail and criminal ID numbers and name. No medical information or emergency alerts are included (e.g. diabetes).

Bracelets may be a poor identification strategy for inmates. When the New Orleans Parish Prison was evacuated, inmates were issued bracelets that were color-coded based on security level. Almost all the inmates, except the lowest level of security, cut or chewed the bracelets off before the buses deposited them at the prison that was used as their evacuation site. This meant that there was no way to identify any of the inmates for either security purposes or to treat them for medical conditions.

Medications. In facilities with "keep on person" (KOP) medication policies where inmates control their own supply of medication, each inmate could bring their current supply of medication with them during an evacuation. Some inmates, and some medications, must be controlled and administered by trained medical personnel. Medication might need to be dispensed in-transit during an evacuation as well as afterwards. Correctional staff will need to be responsible for assuring that inmates continue to receive necessary medication throughout an evacuation.

Privacy and Confidentiality in Corrections

Prison records contain information about inmates' crimes, sentences, medical records, and other potentially sensitive information. Many States post information on all sentenced inmates on their Web sites, so this information is not considered private or protected, but for people being held prior to trial, there would be confidentiality concerns. Correctional officials have concerns about information security and who will have access to each type of data. HIPAA is relevant for prisons, but the special security considerations raise additional issues. There are also concerns about legal issues and a general sense that the legal department would have to approve their participation in the proposed system.

Correctional Staff Perceptions: Benefits of Evacuation Tracking

Corrections officials were interested in an evacuation tracking system. For those that have electronic data but no backups (or whose systems are too damaged to access), the national system could be a temporary back-up – assuming data are uploaded quickly enough before the facility's own system fails.

Data for Other People Needing Evacuation Assistance

In addition to the institutional records described above, there are other databases that could be used to “pre-populate” a database of persons who need to be assisted – and tracked – during an evacuation. Some of these other databases may be electronic, but some may be print or written lists that cannot be as readily accessed. The need for evacuation assistance and tracking of non-institutionalized persons could be substantial; an official from the Department on Disability in Los Angeles estimates that 25 to 30 percent of the general population will need evacuation assistance.⁷⁴

- ***Hotel and resort guests.*** During hurricanes in tourist areas, hotels become temporary shelters for any of their guests who cannot secure evacuation transportation, and for others whose homes are unsafe. Hotels have accurate lists of all registered guests; these lists are often maintained in a central database for hotel chains. Most hotel guests need little more than transportation to a safe airport, but it might take several days before that is possible.
- ***Evacuation Pre-registration.*** Florida counties offer residents the opportunity to pre-register for evacuation assistance. People who know that they will require this assistance can pre-register for help. During an evacuation, emergency managers will attempt to verify whether help is indeed needed, and send emergency responders to assist. Ventilator-dependent (and other electricity-dependent) patients, those who are bed-bound or wheelchair-bound and without any transportation assistance, and anyone else who knows that they will not be able to self-evacuate safely, can pre-register. Miami-Dade County has such a system; its registration form is at <http://www.co.miami-dade.fl.us/oem/pdfs/EEAP.pdf>. In addition to identifying and location information, the form asks for the applicant’s health status (there are check boxes for 15 different conditions), whether they use medical equipment requiring electricity, whether a companion will accompany them to a shelter, and whether they use a wheelchair, walker, guide dog, or crutches. According to a county emergency manager in Florida, most of these registries are small – many people prefer not to be on such a list for reasons of privacy. Recent hurricanes have heightened awareness of the need to pre-register and the voluntary registries are expanding gradually.⁷⁵
- ***Local Special Assistance Lists.*** Many fire departments offer disabled persons who might need to be rescued (e.g. in a fire) the opportunity to be listed, so that responders are aware that a disabled person lives in a house. In addition to those who are mobility impaired, persons with communication impairment (deaf, mute) may voluntarily add their names to such a list.

⁷⁴ 2006 personal communication with Angela Kaufman, Project Coordinator, Los Angeles Department on Disability.

⁷⁵ 2006 personal Communication with David Freeman, Orange County, FL.

- ***MedicAlert and other emergency pager systems*** have lists of clients who might require assistance, especially in a rapid evacuation.
- ***Vocational rehabilitation and independent living centers*** have lists of persons receiving personal home aide (not home health) services and will likely know which require mobility assistance.

Appendix E: Resource Availability Systems

The proposed National System would improve the regulating function by improving access to resource availability information, in particular the availability of medical and transportation resources in an affected area (in order to help determine whether sufficient assets are in the area to treat and transport patients and evacuees) and outside the affected area (in order to help determine potential locations to where patients and evacuees could be transported).

The table below describes systems currently in use – and with future development potential – that capture resource availability information. They vary in any ways, including the frequency with which they are used (every day or only for declared emergencies) and the number of resources they track (ranging from one to dozens). There is also an important distinction between inventories that list “baseline” resources (e.g. total hospital beds) vs. real-time available resources (e.g. hospital beds available today). The sections following the table describe each current system in detail. The purpose of this review is to highlight the primary examples of existing systems, rather than provide a comprehensive directory of all existing systems.

Resource System	Attributes	Control	Feasibility of Use/Development
Existing Baseline/inventory Systems			
Hospital Bed Size	Annual Survey	American Hospital Association	In widespread use, straightforward to access
Nursing Home Bed Size	State Assessments, reported to CMS via OSCAR database	States and CMS	In use by CMS and researchers, accessible but less straightforward
Home Health Agency Size	State Assessments, reported to CMS via QIES. HHA capacity is more elastic and can expand more quickly than facility-based care.	States and CMS.	In use by CMS and researchers, accessible but less straightforward.
Homeless Shelter Capacity	State Assessments, reported to HUD	States and HUD	Accessible but not straightforward
Disaster Shelter Capacity	Information comes from every potential Red Cross disaster shelter	National Disaster Shelter System	Under construction; will be straightforward to use
Prisons & Jails	Cell/bunk space	Jurisdiction level (county, State, Federal Bureau of Prisons) but little sharing among jurisdictions	
Transportation	Varies widely	Municipalities, private firms, airlines, etc.	Unexplored

Resource System	Attributes	Control	Feasibility of Use/Development
Mixed-Asset Resource Inventories	Several designed, few in use	Rarely deployed	Might be deployed by more communities in the future
Existing Real-Time Resource Availability Systems			
Numerous Hospital Bed Availability Systems	Some require new/frequent data entry, others pull data from other systems.	Local, county, region (each system has different potentials)	HAvBED explored pulling data from numerous/diverse local systems; it has not yet been implemented beyond a small test
Jail and Prison Availability Systems	Each jurisdiction knows how many cells/bunks are empty.	Jurisdiction level; not aggregated into an automated real-time database nationwide.	
Mixed Asset Availability Systems	Various tools exist; some more widely deployed than others	Local, county, region (each system has different potentials)	

Hospital Assets

Hospital Baseline Resource Inventories

The American Hospital Association (AHA) conducts an annual survey to identify the number, size, and attributes of all U.S. hospitals, including psychiatric, children's, long term care, rehabilitation and general acute care hospitals. This survey is the standard widely-used data source for information about U.S. hospital capacity. With the cooperation of State and Metropolitan Hospital Associations, the AHA achieves a very high response rate and the database contains information on 6,000+ hospitals and health care systems, including more than 700 data fields covering Organizational Structure, Personnel, Hospital Facilities and Services, and Financial Performance. As hospital addresses are included, hospital capacity can be identified at the national, State, county and city levels. AHA data could be used to pre-populate a database with a baseline inventory of capacity for every hospital in the country. Bed counts change little from one year to the next, although hospitals do change their bed arrangements, open or close wings, etc. Data on each hospital include:

- Total staffed and licensed beds
- Medical/surgery beds
- Pediatric beds
- ICU and PICU beds
- Burn beds
- Psychiatric beds
- Rehabilitation beds
- Skilled nursing beds

Hospital Real-time Availability Systems

A common resource availability system is one that displays the diversion status (i.e., is the hospital emergency department accepting new patients) of all hospitals in a region. Many major urban areas have such a system. Participating hospitals enter key data (e.g., whether they are accepting new patients or the number of beds available) on a Web page. This helps emergency responders know where they can take patients, and it helps hospitals avoid having patients brought to them that they cannot accommodate. These systems only inform responders that a hospital is unable to take additional patients; other systems have been developed that report on the availability of beds available in a hospital that still has space.

These systems include *local “every day” bed availability systems*. A widely used non-commercial application is ReddiNet (Rapid Emergency Digital Data Information Network).⁷⁶ Originally built in the 1980s for use in Los Angeles, ReddiNet has been modernized by the Hospital Association of Southern California, and is used 17 California counties. ReddiNet tracks hospital diversion status and resource availability, as well as alert and incident management functions.

There are also *local “activated” bed availability systems*. With activated systems, an alert is issued to hospitals and other participating organizations, that are asked to enter resource availability information into a Web site. The resources asked for depend on the nature of the emergency. As with the “every day” systems described above, the activated systems are intended to improve communication among hospitals, dispatch centers, emergency responders, and public health officials. Web-based systems have replaced earlier “fax alert” and voice communication systems. The extent to which these systems have been implemented across the country is not known, although there are state-wide implementations of systems in New York (the HERDS system); Maryland, Pennsylvania, and Delaware (the FRED system); and Washington, Oregon, and South Carolina (Harborview Medical’s system). Another large activated resource availability system is the National Disaster Medical System (NDMS). When NDMS is activated, the 1,656 participating hospitals report to Federal Coordinating Centers (FCCs) the current number of available beds and the maximum number that could be made available in 24 and 48 hours.⁷⁷

Facilities Resource Emergency Database (FRED). In response to 9/11, the State of Maryland wanted to implement a system that would improve communication among all hospitals, emergency responders, and public health agencies in the State. Officials considered purchasing a commercial resource availability system but decided to develop their own. Subsequently, the Maryland Institute for Emergency Medical Services Systems (MIEMSS) developed the Facilities Resource Emergency Database

⁷⁶ <http://www.reddinet.com/index.html>

⁷⁷ As reported in the HAvBED final report, National Hospital Available Beds for Emergencies and Disasters (HAvBED) System: Final Report. AHRQ Publication No. 05-0103, December 2005. Agency for Healthcare Research and Quality, Rockville, MD.

(FRED) system. MIEMSS has also provided FRED to Pennsylvania and Delaware, where FRED is used statewide. FRED has about 400 participating organizations across Maryland, including hospitals, dispatch centers, and, most recently, nursing homes, which were added to the system in the aftermath of Katrina. Staff at these organizations have Web browsers directed to the FRED alert page. Depending on the nature of the alert, organizations may be asked to provide resource availability information. For example, an alert could be issued for all dispatch centers to enter the number of available ALS units. MIEMSS staff used national standards in developing resource lists, including those used in the National Incident Management System (NIMS)⁷⁸ and the Strategic National Stockpile.⁷⁹

HERDS. New York State's Health Emergency Response Data System (HERDS) is another example of an "activated" resource tracking system. The New York State Department of Health developed this system to report resource needs and, as noted in the previous section, for entering patient names so that the public can determine where mass casualty incident victims have been transported. HERDS staff participated in the HAvBED project, and developed an interface to report HERDS bed availability data to HAvBED. With HERDS, hospitals can report availability (or urgent needs) for a number of different resources, including beds, medical equipment, personnel, antibiotics, antidotes, blood, medical supplies, and pharmaceuticals.

National Hospital Availability Systems (HAvBED)

AHRQ funded Denver Health to develop the National Hospital Available Beds for Emergencies and Disasters (HAvBED) System. The goal of this project was to "develop, implement and evaluate a real-time electronic hospital bed tracking/monitoring system that will serve as a demonstration management tool to assist in a system/region's ability to care for a surge of patients in the event of a mass casualty incident."⁸⁰ HAvBED could in theory be activated within a county, State, region or even nationally, during an Incident of National Significance.

The HAvBED team focused on acquiring bed availability data from existing systems, rather than replacing existing systems. HAvBED assumes that local communities will continue to purchase and use systems that meet their own needs and that HAvBED should acquire information from these systems rather than requiring hospital staff to "double enter" bed availability information.

⁷⁸ http://www.nimsonline.com/resource_typing_system/index.htm

⁷⁹ <http://www.bt.cdc.gov/stockpile/>

⁸⁰ National Hospital Available Beds for Emergencies and Disasters (HAvBED) System: Final Report. AHRQ Publication No. 05-0103, December 2005. Agency for Healthcare Research and Quality, Rockville, MD. Available at <http://www.ahrq.gov/research/havbed/>.

HAvBED included development of data standards for defining and communicating bed availability. Through a collaborative process involving many stakeholders, the project used the bed definitions in the National Disaster Medical System (NDMS) and added a 24-hour and 72-hour availability to each of the six bed types. HAvBED also includes Emergency Department status (open, closed, or N/A), mass contamination facility availability (available or not available), and number of available ventilators. These data elements and the protocol for exchanging these data are now part of the Emergency Data Exchange Language (EDXL), which is part of the U.S. Department of Homeland Security's Disaster Management eGov Initiative.⁸¹

HAvBED underwent a 1-month test. Three project partners provided data electronically, using XML: the Washington Hospital Capacity System, EMSsystem, and HERDS. During the test period, when hospital staff and the partner systems were feeding data to HAvBED, bed availability data were provided once a day. The HAvBED report acknowledges "In day-to-day patient transports, bed availability is a second-by-second issue. Having data entered once a day is not timely enough for this application." Improving data timeliness without increasing the burden on data providers will be a challenge for HAvBED. Denver Health is currently enhancing HAvBED with funding from AHRQ.

Nursing Home Assets

Baseline Resource Inventories

Nursing homes are inspected by State agencies, and data about size, composition and other facility-level characteristics are collected. The information collected regularly and reported to the Centers for Medicare and Medicaid Services' (CMS). CMS's Online Survey, Certification, and Reporting (OSCAR) database contains information on facility-level characteristics. OSCAR data results from onsite survey inspections of facilities by the State survey agencies. These onsite facility evaluations occur at least once during a 15-month period. State survey agencies are responsible for entering survey information into the OSCAR database at the State level and then transmit, in a standardized format, to CMS. Information on the nursing homes' characteristics are prepared by each nursing home at the beginning of the regular State inspection and reviewed by the nursing home inspectors. The OSCAR database holds the nursing home characteristics and health deficiencies issued during the three most recent State inspections and recent complaint investigations.

Information collected, entered into the OSCAR database and transmitted to CMS includes facility characteristics (such as bed size, ownership type), staff information (employee and agency), and aggregate health status resident information and deficiency information.

⁸¹ <http://www.whitehouse.gov/omb/egov/c-2-2-disaster.html>

CMS also has a public Web site, Nursing Home Compare (www.medicare.gov/NHCompare), which has information on all Medicare/Medicaid certified nursing homes. Searches can show the nursing homes in a State, county, or distance from a zipcode. Information on each nursing home includes name, address, total number of certified beds, type of ownership, whether the facility is located in a hospital, and if it is owned by a multi-home organization. Data from OSCAR provides the facility characteristic information and data from MDS provides facility-level quality measures. There may be a fairly long lag time before the information from these two databases is updated on the Nursing Home Compare Web Site.

Real-time Availability Systems

Nursing homes are required to assess their patients within 5 days of intake and report data to State agencies, who in turn report it to the Center for Medicare and Medicaid (CMS) of DHHS. These data are updated every 15-30 days. This system could be used to estimate the number of available beds on an “average” day, but the lags and multiple steps in acquiring data would probably make this an unacceptably inaccurate source for real-time availability data.

The “activated” hospital bed availability called FRED (discussed above) has been adapted to include nursing homes. We are unaware of other real-time availability systems for nursing home beds, and to our knowledge none of the systems described above for hospitals have incorporated such data for nursing homes (although they could potentially do so).

Home Health

Baseline Resource Inventories

As with nursing homes, State agencies certify home health agencies regularly, and report information about each HHA to CMS. At the national level, the Quality Improvement Evaluation System (QIES) includes all aspects of data collection and reporting on home health agencies. The QIES includes HHA-level characteristics collected by the State survey agencies such as agency name, address, telephone number, services offered and type of ownership. Each State survey agency is responsible for entering and updating the information into the QIES database. The QIES also includes all OASIS assessment information that is submitted by the HHAs to their State survey agency.

CMS also has a public Web site, Home Health Compare (www.medicare.gov/HHCompare), which has information on all Medicare certified nursing homes. A search of agencies provides the name, address, services available, and home health quality measures of agencies in a specified State, county or zip code. The system does not have information on the number of patients served by each HHA.

Real-time Availability Systems

There are no real-time availability systems for home health, and no mechanism to determine how many additional home health patients could be accommodated in a particular geographic region. Home health care is somewhat elastic as it involves hiring more nurses, not building more “brick and mortar” infrastructure, so there is no licensed size limitation for an HHA and no finite capacity.

Shelter Assets

Baseline Shelter Resource Inventories

Local Homeless Shelter Inventories. Continuums of Care use electronic systems to coordinate/integrate services for their clients. They also report data about the services provided (number of clients, number of nights, etc.) to State agencies and then to HUD. The capacity (in beds, rooms, apartments) of each shelter changes little from year to year, and these data are maintained by States and by HUD in a readily accessible database. The beds are grouped by Emergency Shelter, Transitional Housing, or Permanent Supportive Housing. The bed information is broken out by family units/family beds/individual bed, seasonal beds and overflow. They also have codes for various subpopulation and special needs served by the program, such as "domestic violence" or HIV or simply "male" or "female" if its a single-sex facility.

National Disaster Shelter Inventories. The National (disaster) Shelter System is contains records from over 40,000 shelters include their capacity (how many people can take shelter in the facility) and several important functions like food preparation, back-up-generators, and heat. In an emergency, the system can also show remaining available capacity, so managers can know when the shelter is “full”. (Note that CAN is the companion shelter tracking system that records information about each person entering a disaster shelter.)

Real-time Shelter Availability Systems

Local Homeless Shelter Availability Systems. Most Continuums of Care that receive Federal funding use electronic systems that report not only on services provided, but also on service availability. Many of these systems also function as “reservation” systems so that social service agencies can locate a bed (or other services) for a homeless person. Each of these systems operations locally and data are not reported on a real time basis. There are a number of IT vendors in this market, Systems like this generate reports on available services, including homeless shelter beds. Each of these systems is operated locally and data are not reported on a real time basis.

An alternative approach would be to activate an emergency availability system – rather than using one that was created for everyday management of shelter client needs. The Boston implementation of Web EOC has a bulletin board where individual shelters can enter the following information:

- Status – open or closed
- Location
- Date / time of last update
- “Feeding space”, including the number used and the number open each day
- “Sleeping space”, including the number used and the number open each day

National Disaster Shelter Availability Systems. Ultimately, the American Red Cross's National Shelter System will provide the ability to report bed availability at each activated shelter, so managers and disaster coordinators will know when a shelter is "full". This capability, however, does not currently exist, as the ARC has focused first on obtaining bed capacity data.

Transportation Assets

Baseline Transportation Resource Inventories

Local Transportation Inventories. Most jurisdictions have information about the number of ambulances, medivac helicopters, buses, etc. in local private fleets, as well as in fire departments and other public/municipal fleets. Emergency Managers may have up-to-date – but probably not universal – lists from such sources at the local level, or can quickly assemble lists with a series of phone calls. This information is not, however, in an accessible database that can be linked to a national system.

Port authorities and public transportation systems similarly have information about the number of trains, subways, buses and other vehicles in the public domain, and can quickly share this with emergency managers. Again, this information may not be in an accessible database that could link to a national system.

Regional trauma coordination includes deployment of medical evacuation “air ambulances”; the number of appropriately equipped planes and helicopters (and pilots) is known within each trauma region. Depending on the State, this information may also be aggregated at the State level.

National Transportation Inventories. For transportation assets, any transit agency that receives Federal funds must submit annual reports to the U.S. Department of Transportation’s Bureau of Transportation Statistics (BTS). Thus, the BTS has baseline or inventory data from transit agencies.

The Department of Defense has a full baseline inventory of its transportation assets (and knows real-time availability as well). The Department of Transportation knows its owned assets, and contracts with many vendors whose transportation assets are also known. Amtrak has a full and reasonably up-to-date inventory of its rail assets. Airlines (and perhaps the FDA) know the number of functional planes in their fleets.

Real-time Transportation Availability Systems

Any public or private organization that manages a sizable fleet of vehicles will have computer systems that maintain status information (e.g., in service / out of service) on their vehicles. Such organizations include those that operate buses (public transit agencies, school districts, and private contractors), taxis and ambulances (public agencies and private contractors), airplanes (commercial, private, and military), boats (public and private contractors), helicopters (local rescue and law enforcement agencies, military, privately owned), and trains (subway, local commuter rail, and AMTRAK).

These computer systems are especially important for ambulances, because their availability status changes frequently and because a fast response is critical. Computer-aided dispatch

(CAD) systems for fire and EMS units have existed for over 25 years and dozens of vendors sell these systems. Dispatchers at 911 centers answer emergency calls for service, enter details about the call (e.g., date, time, type of emergency) into the CAD system, and then assign one or more response units (e.g., an ALS or BLS ambulance) to the call. When units have delivered their patient to the hospital, they radio the 911 center and the unit's status is changed to "available." To carry out these functions, CAD systems keep track of which response units are assigned to calls and which are available for dispatch. Some CAD systems are city-based; they track, for example, the availability status of all ALS and BLS ambulances in the city. Others are county-based. Some are operated by private ambulance companies whose response units provide services to several communities. As with the patient tracking software applications, CAD systems are independently developed in the absence of any data standards.

CAD systems have built-in rules (which dispatchers can overwrite) for how many and what type of response units should be dispatched to a particular type of call. CAD systems also typically recommend specific units for dispatch, based on the unit's last known location and the incident location. These rules and recommendations are for common types of incidents – fires, car accidents – and do not cover circumstances like evacuating an entire hospital, which would quickly exhaust all the response units. In the event of a major incident, commanders would seek additional transportation assets from such organizations as public transit companies, the National Guard, the military, or private organizations with large numbers of vehicles, such as private bus, package delivery, or interstate freight companies. Crisis management information systems would also be activated to help manage these incidents.

Corrections: Prisons & Jails

Baseline Corrections Resource Inventories

Each correctional jurisdiction (county, State, Federal Bureau of Prisons) knows how many cells/bunks are in its facilities. Privatized prison systems have this information as well. New jails and prisons come “on line” throughout the year and occasionally a facility may be decommissioned. All of this information is maintained at the jurisdictional level. That is, there is no centralized database, within a State or at the Federal level, indicating the location of every jail and prison, and its maximum capacity.

Real-time Corrections Availability Systems

Every prison and jail knows exactly how many inmates are incarcerated in their facility and how many empty cells/bunks are available. This information may be available electronically but this cannot be assumed; small jails probably count and report open spaces manually. The information about available cells/bunks are aggregated up to the responsible correctional jurisdiction. For example, county jails report open spaces to the county, but in most cases not to State or Federal entities.

The Federal Bureau of Prisons has an administrative database that records the location of each inmate, how many are in each facility, and how many open cells/bunks are in each facility and within the entire system. These data are available electronically and very close to real-time.

Other Mixed Asset Systems

Hospital diversion systems can also be embedded in more complex resource tracking and communications systems.

Citywide Asset and Logistics Management System (CALMS). Another example of a local resource inventory system is New York City’s CALMS, which was “designed to capture information on resources commonly used in disaster response and recovery. It includes modules for identifying facilities, fleet, heavy equipment, and emergency supplies from City agencies to fulfill critical needs during emergency and routine operations. CALMS also captures information about City personnel that enables emergency managers to quickly identify workers with special skill sets when additional assistance is requested.”⁸²

Area Resource File. HRSA’s Area Resource File, which contains over 6,000 health-related variables for each county in the U.S., is updated annually.⁸³

⁸² <http://www.nyc.gov/html/oem/html/response/calms.html>

⁸³ <http://www.arfsys.com/>

Local Crisis Management Resource Availability Systems

A final type of system includes crisis management information systems (CIMS). Like the activated resource availability systems discussed above, CIMS are also activated systems. CIMS are designed for both medical and non-medical emergencies.

According to a 2002 U.S. Department of Justice (DOJ) evaluation of these systems, “CIMS, the software found in emergency management operation centers, supports the management of crisis information and the corresponding response by public safety agencies.”⁸⁴ CIMS combine resource availability tracking and assignment of resources into a single package, and add features for real-time communications and management. The principles of the incident command system are typically embedded in these systems. Incidents may or may not involve emergency medical systems and personnel. As such, the types of resources CIMS are desired to handle are much broader than the systems described earlier in this section.

There are a number of commercial CIMS packages available, some of which can be tailored to meet specific needs.

⁸⁴ <http://www.ncjrs.gov/pdffiles1/nij/197065.pdf>

Appendix F: Resource Requirements Models

Models that estimate resource requirements can complement resource availability systems (see appendix E) by estimating the “gaps” (i.e., the difference between what’s required and what’s available) and therefore the resource levels that neighboring jurisdictions or the Federal government could potentially be asked to fill. These models can be used as part of a planning process to determine shortfalls and thus help drive investment decisions. In addition, the models could be used during an incident to estimate resource shortfalls at that moment.

This section briefly describes two AHRQ-funded resource requirements models related to mass casualty or evacuation incidents – the Surge Model and the Mass Evacuation Transportation Model. The latter model was developed under the same contract as the recommendations for the National System; separate reports to AHRQ include the model description and user manual for the Transportation Model.

AHRQ Hospital Surge Model

The AHRQ Hospital Surge Model, developed by Abt Associates, Weill Cornell Medical College, and Gryphon Scientific, estimates the hospital resources needed, by day, to treat casualties arising from various weapons of mass destruction attacks. The Hospital Surge Model includes ten different scenarios:

- Biological (anthrax, smallpox, and pandemic flu).
- Chemical (chlorine, sulfur mustard, or sarin).
- Nuclear (1 KT or 10 KT explosion).
- Radiological (dispersion device or point source).

When the Hospital Surge Model is run, the user selects one of the above scenarios and specifies the number of casualties that their hospital(s) will need to treat. Casualties are treated, as necessary, in the emergency department (ED), in the intensive care unit (ICU), or on a general medical/surgical bed ward. Hospitals are assumed to have unlimited capacity and provide a standard level of care to all casualties—that is, the Hospital Surge Model assumes that care is not degraded by the surge in patients or by resource constraints. Eventually, casualties in the model are either discharged or die in the hospital(s). While patients are in the hospital(s), the Hospital Surge Model estimates the amount of resources (e.g., personnel, equipment, supplies) they require.

For the selected scenario, the Hospital Surge Model estimates:

- The number of casualties in the hospital(s) by hospital unit (ED, ICU, or floor) and day.

- The cumulative number of dead or discharged casualties by day.
- The required hospital resources (personnel, equipment, and supplies) to treat casualties by hospital unit and day.

Information about the Hospital Surge Model is available at <http://www.ahrq.gov/prep/hospurgemodel/description/descriptionsum.htm>.

The Surge Model incorporates the AHRQ BERM Model, which estimates the number of staff needed to operate a mass prophylaxis center.⁸⁵ Researchers from Weill Medical College of Cornell University developed the BERM. Based on the number of people to be prophylaxed, the length of the campaign, characteristics of the prophylaxis clinic patient flow, speed of patient processing, and the bioterrorism release scenario, BERM calculates the number of staff required to prophylax the population in a given timeframe and the type of staff required to complete the campaign in the given timeframe. The BERM model is available at <http://www.ahrq.gov/research/biomodel.htm>

Mass Evacuation Transportation Model

As noted at the beginning of this report, one of the two objectives of Abt Associates' contract with AHRQ was to build a Web-based Mass Evacuation Transportation Planning Model for use before a mass casualty / evacuation incident to estimate the transportation resources needed to evacuate patients and evacuees from health care facilities and other locations.

The transportation model calculates the time necessary for evacuation of patients from designated evacuating locations to receiving facilities. It allows a user to designate patient types, prioritize patients, and consider evacuation of any number of facilities with the available vehicles. Furthermore, the model will show bottlenecks and overtaxed resources so that planners can prioritize resources. The model inputs include:

1. **Evacuation Resources:** The fleet of vehicles available in an emergency is a key input of the model. The user must identify how many ALS and BLS ambulances, wheelchair vans, and buses are available for use in an emergency, and how many patients each vehicle may carry. It is assumed that patients are ready for pickup by the emergency vehicles and only require a minimum loading time before transport.
2. **Facilities:** Users can input any number of facilities into the model. Facilities can be divided into types such as nursing homes and hospitals, if patients from one type of facility should not be transported to another type of facility. With information on the location of the facility, its capacity, its surge capacity percentage (percent over 100% capacity that a hospital could accept patients in an emergency), and its patient mix, the model will calculate the best distribution of patients to facilities in order to minimize travel time.

⁸⁵ <http://www.ahrq.gov/research/biomodel.htm>

3. **Patient mix:** Each facility (or facility type) may have a different patient mix. Specifically, the model needs to know what proportion of patients will need to be evacuated with ALS, BLS, wheelchair vans, or buses. Patients are thus grouped by acuity rather than the specific diagnosis, and can be prioritized to ensure that the most severely ill patients travel the least amount of distance.
4. **Additional inputs:** Several additional features include: accounting for traffic by adding time to the expected travel times, changing the loading or unloading time for each vehicle, designating overflow capacity outside the city for patients which cannot be accommodated.

The primary output of the model is the number of hours necessary to transport patients from evacuating facilities to receiving facilities. In addition to the total hours for evacuation, the model shows the number of hours and the number of trips made by vehicle type, showing which are most in demand. This will help planners anticipate resource needs.