Bioterrorism and Other Public Health Emergencies
Tools and Models for Planning and Preparedness

Health Emergency Assistance Line and Triage Hub (HEALTH) Model

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Note: Appendixes are accessible electronically at http://www.ahrq.gov/research/health/

Executive Summary

The Rocky Mountain Regional **H**ealth **E**mergency **A**ssistance **L**ine and **T**riage **H**ub (**HEALTH**) model is being developed by the Denver Health Medical Information Centers (DHMIC — the Rocky Mountain Poison & Drug Center and the Denver Health NurseLine) as a partial solution to the public health communication problems that have been recognized in the aftermath of September 11, 2001.

Our goal is to determine the requirements, specifications, and resources needed for developing a public health emergency contact center that is highly integrated with public health agencies and can minimize surges in the demand for health and event information during a public health emergency. We designed a model with medical contact centers (such as poison control centers and nurse advice lines) in mind as potential implementers, and as the appropriate repositories for the creation and maintenance of readiness for providing one-on-one health communication in a public health emergency.

The model is conceived of as an expansion of DHMIC or other medical contact centers' regular functions, which includes developing and maintaining readiness for providing incident-specific information and medical triage to the public and to healthcare providers, with capacity to conduct symptom surveillance for public health agencies, if required, during an emergency. The HEALTH model is a conceptualization of a communications system. The model is designed to meet the requirements of our public health emergency preparedness goals and objectives.

This document is organized following the steps of the Systems Development Lifecycle, or SDLC. The steps of SDLC are Problem Statement, Planning, Analysis, Design, Implementation, and Testing. In addition, we added sections on Methods, Model Requirements, Limitations and Risks, and Future Tasks. The Problem Statement and Planning sections give the background of the study. The Methods, Analysis, and Model Requirements sections are analogous to Methods, Results and Conclusions. The Design section describes the specific requirements for the HEALTH model and is presented in four sections: Process, People, Technology and Exportability. We have twice implemented a public health emergency call center in offering services to the Colorado Department of Public Health and Environment, and these experiences are described in the Implementation section and evaluated in the Testing section. The first experience came in early 2003, when we implemented the Smallpox Vaccination Program Support Service. The second opportunity came in the summer of 2003, when we implemented the West Nile virus hotline. Finally, we conclude with a brief discussion of Limitations and Risks, and Future Tasks.

As part of our analysis for the model, we conducted research into other agencies' responses to past emergency in the published literature and through interviews of agencies involved in health emergency events. We also researched best practices from the medical call center industry. From all of these components we have distilled a list of requirements for the people, processes and technology this model will need for full realization. Though these requirements are based on the foundation and infrastructure already in place at DHMIC, they can still be generalized to other medical contact centers with similar functions and capabilities.

In order to further assist other agencies in beginning to develop the capabilities and functions of our model, especially public health agencies, we created a HEALTH Contact Center Assessment Tool Set. The tool set is a Microsoft® Excel workbook that can be used by agencies to assess the potential demand they may face in a health emergency event and to determine the resources needed to address this demand. (Appendix N). The tool set consists of seven sections that are simple checklists or spreadsheets, including:

- Instructions
- Contact Surge Calculator
- Staffing-Resource Calculator
- Capital Expense Calculator
- Technology Expense Calculator
- Surge Options Matrix
- Glossary

Two ancillary reports are also included and are listed below. The reports are technical documents detailing the requirements and systems concept for the HEALTH model as it applies to the technology infrastructure at DHMIC. Although these documents are specific to the existing structure and capacity of DHMIC, they may be useful to others in developing HEALTH model capabilities after they use the tool set to determine their needs for emergency contact surge preparedness within their own organizations.

1) Requirements Document (Appendix O).

2) Multi-Channel Contact Center System Concept (Appendix P).

It should be emphasized that the systems described in the Multi-Channel Contact Center System Concept Plan and Report have not yet been implemented at DHMIC. The report describes future directions.

The need for realizing the HEALTH model concept has been continually reinforced by our own experiences, published reports on emergency event responses, and through conversations with other medical contact centers. In times of crisis, the public will need information resources to help guide their actions related to their health care. The HEALTH model incorporates the ability to provide one-on-one health information using the latest in technology to efficiently handle this demand through various communication modalities.

Chapter 1. Problem Statement

In the fall of 2001, following the discovery that anthrax spores had been intentionally released through the United States Postal System and had infected several citizens on the East Coast, the Denver Health Medical Information Centers (DHMIC), comprising the Rocky Mountain Poison & Drug Center (RMPDC) and the Denver Health NurseLine, experienced a 10 percent increase in call volume. The additional calls came from people concerned about anthrax, although there was no actual incident in our five-State service region (Colorado, Hawaii, Idaho, Montana and Nevada). If a Weapons of Mass Destruction (WMD) event had occurred in our service area of 9.3 million people, it is likely that demand would have overwhelmed our existing services as well as other medical and public health systems.

Recognizing the need to respond to the concerns of the public in such an event while simultaneously maintaining delivery of regular essential services, we began investing in technology to manage increases in call demand. Through partnerships with the Castlerock Foundation, Avaya, and Expanets, four dedicated T-1 trunk circuits (each T-1 trunk circuit is made up of 24 telephone lines) were installed and dedicated for emergency use. Two T-1 lines are available to offer public information through the Colorado Health Emergency Line for Public (CO-HELP), and two T-1 lines are available for disseminating information to health care professionals through the Colorado Provider & Hospital Information Line (CO-PHIL). These dedicated, toll-free emergency lines allow us to receive a surge of calls while protecting our contact center's other telephone lines for the appropriate users. In February of 2002, during a regional bioterrorism functional exercise, this system was tested, with incident-specific content being recorded on these lines within 60 minutes of the event's onset.

This was only the first step in providing information and assistance to callers with increased efficiency during periods of surges in call volumes. Providing medical information and triage advice regarding the release of chemical and biological agents, either accidental or as a result of terrorism, is a core competency of the DHMIC. By expanding our capabilities to provide incident-specific information and triage, we can potentially minimize surges in demand on public health and medical service providers. These surges in public demand did occur in the Washington, DC, area during October of 2001 when thousands of the "worried well" presented to hospitals with anthrax concerns.

In August of 2002, DHMIC received a grant from the Agency for Healthcare Research and Quality (AHRQ) to research the requirements, specifications, and resources needed to develop the Health Emergency Assistance Line and Triage Hub (HEALTH) model. Using the Integrated Delivery System Research Network (IDSRN), AHRQ solicited research proposals to model the impact of a bioterrorist event on hospitals and integrated delivery systems (IDS). Denver Health and the DHMIC are one of those integrated delivery systems uniquely qualified to examine hospital and delivery system capacity to respond to a bioterrorist event. The vital linkages between these systems and their health services researchers place the IDSRN in a strategic position: that of being able to address the issues of surge capacity and regional models of care urgently needed for bioterrorism preparedness at the State and local level.

Chapter 2. Planning

The DHMIC seeks to develop the Rocky Mountain Regional Health Emergency Assistance Line and Triage Hub (HEALTH) model, a 21st century contact center providing medical information and triage advice, through expanded communications pathways including voice, e-mail, fax, video, and Internet Web site. In planning the development of this model, our goals, strategies, and objectives were established. Roles and responsibilities were determined and a work plan was developed. Finally, methods for systems development were chosen. An overview of these tasks is included in this section of the report.

Goal, Strategies, and Objectives

Goal

To determine the requirements, specifications, and resources needed for developing Rocky Mountain Regional HEALTH. Rocky Mountain Regional HEALTH is a public health emergency contact center that is highly integrated with public health agencies. It is designed to minimize surges in patient demand on the health care delivery system during a bioterrorist event or other public health emergency.

Strategies

- Incorporate the lessons learned for bioterrorism preparedness from other regional models of care and DHMIC experiences in developing a model for emergency response.
- Determine what linkages with local public health and emergency preparedness infrastructure are required for the model.
- Create a model for surge capacity, including facilities, equipment, and personnel.

Objectives

Eleven objectives were identified in conjunction with the three strategies listed above:

1. Determine best practices for, challenges to, and shortfalls of public health agency communications during past public health emergencies.
2. Determine the types of information and the communication pathways used or requested by the public and healthcare providers; determine how recipients perceived the information provided; determine how delivery could be improved; and determine which communication pathways were most effective or convenient for recipients.

3. Determine which special populations were encountered in past events, and whether their needs were adequately addressed (i.e., elderly, children, and the disabled).

4. Determine the specifications and requirements of data storage and retrieval systems for information provided by and to public health agencies.

5. Determine the needs for infrastructure integration between HEALTH and existing State and local public health agencies.

6. Develop criteria for electronic data collection as required by data users (health departments) and for program evaluation that is integrated with current data collection systems and can relay information to public health agencies in real time.

7. Determine call metrics and reporting requirements for the public health agencies and the HEALTH model.

8. Determine the facility specifications for the HEALTH model.

9. Determine the technical and equipment requirements for communication modalities for HEALTH, incorporating lessons learned from other public health emergencies.

10. Determine the most effective, efficient, and feasible technical solutions; design a technology implementation strategy accordingly.

11. Develop methods for the rapid ramping-up of health care personnel for surge staffing**.**

Resources

Committees and Project Team

Core Project Team

The Core Project Team included DHMIC personnel charged with developing the HEALTH model. The team included a Project Manager, staff with disaster planning and emergency response experience, and staff with information systems and call center experience.

Gregory M Bogdan, Ph.D.	Principal Investigator, Research Director and Medical Toxicology Coordinator
Deb Scherger, R.N., M.S.	Information Systems and Telecommunications Manager
Deborah Keller	Project Manager
Kathleen M. Wruk, R.N.,M.H.S.	Administrative Director

David W. Daley	Information Systems Manager
Jim Peterson, R.N., B.S.N.	Program Manager, Rocky Mountain Poison Center
Diane Swanson	Business Manager, Denver Health NurseLine
Kurt Ammon	Business Manager, Rocky Mountain Drug Consultation Center
Shireen Brady	Researcher and Technical Writer

Export Committee

An export committee was created to guide the process toward development of a model that could easily be exported for use by other agencies in other parts of the Nation. Members of the export committee were drawn from public health agencies in Colorado, Hawaii, Utah, Nevada, Montana, Idaho, Wyoming, North Dakota, and South Dakota. The American Association of Poison Control Centers designates the Rocky Mountain Poison & Drug Center as the Regional Poison Control Center for Colorado, Hawaii, Montana, Idaho, and Clark County, Nevada. Utah, Wyoming, North Dakota, and South Dakota are within Federal Region VIII and were included to allow for feedback on use of the model in their service areas. A full list of the members and their contact information is included in Appendix A.

Steering Committee

A steering committee was created to periodically monitor the progress of the project, to consider the challenges facing public health and health care agencies, and to determine their requirements for using the HEALTH model to improve surge capacity to accommodate the public and healthcare providers. A full list of members and their contact information is provided in Appendix A. The committee includes representatives of the following agencies:

Colorado Department of Public Health and Environment

Colorado Health and Hospital Association

Colorado Rural Health Center

Denver Public Health Department

Tri-County Health Department

Jefferson County Department of Health and Environment

Denver Office of Emergency Management

Hawaii State Department of Health

Capabilities of the DHMIC and Denver Health

The DHMIC includes components of the Denver Health and Hospital Authority (Denver Health). The DHMIC comprises three specialized call centers--the Denver Health NurseLine, the Rocky Mountain Poison Center, and the Rocky Mountain Drug Consultation Center--and two support departments, Consulting & Research, and Medical Toxicology.

Poison Center

The Rocky Mountain Poison Center (RMPC) has been in operation since 1956. The center provides poison information and emergency treatment recommendations. The American Association of Poison Control Centers (AAPCC) certifies the RMPC as a regional poison center. Its service area encompasses Colorado, Montana, Idaho, Hawaii, and Clark County, Nevada. Physician telephone consultations can extend nationwide.

Drug Center

The Rocky Mountain Drug Consultation Center (RMDCC) is a drug information and safety center that provides medical information, adverse event reporting, and product complaint services. Pharmacists and nurses specializing in drug information staff the RMDCC. RMDCC currently provides its services to a number of pharmaceutical companies.

NurseLine

The Denver Health NurseLine provides telephone triage, medical advice, workplace injury reporting, after-hours healthcare services, call back service, provider notification, and eligibility verification to State agencies, hospitals, clinics, and worker's compensation programs. It was established in 1997 to provide 24-hour information to the public and contract clients regarding medical triage of health concerns, and recommendations for further medical evaluation as appropriate.

Consulting & Research and Medical Toxicology

Our Consulting & Research and Medical Toxicology Departments provide a wide range of consulting and research services to drug companies, biotechnology companies, legal firms, local/State/Federal governmental agencies, chemical manufacturers, pharmaceutical companies, and other organizations. In addition to conducting research for individual clients, we also conduct research for the benefit of the medical community. Consulting & Research currently manages over 30 research projects, including three clinical trials. There is a 10-person staff, headed by a Ph.D. in pharmacology and toxicology. In addition, our Director (M.D., Ph.D.) and Medical Director (M.D.), and physicians in our Accreditation Council for Graduate Medical Education (ACGME), an accredited Medical Toxicology Fellowship program, participate in research activities as well as provide physician support to our call centers.

Organizational Feasibility

Denver Health is committed to developing readiness for public health emergency events. Denver Health has committed human resources to determining the requirements for producing a model that efficiently manages call surges and is exportable for use by other States and agencies. The States of Colorado and Hawaii have already designated a portion of their Centers for Disease Control and Prevention bio-terrorism supplemental monies to fund technological improvements needed for developing of the HEALTH model. Our technology partners, Avaya and Expanets, want to continue their partnerships with us through in-kind equipment and programming assistance.

Chapter 3. Methods

The HEALTH model is a conceptualization of a communications system that includes the requirements for people, processes, and technology to meet our public health emergency preparedness goals and objectives. The model is designed to build upon and be consistent with the existing structure and capacities of the DHMIC. A standard system development technique known as the System Development Lifecycle (SDLC) was used to create our model. The steps of SDLC are problem definition, planning, analysis, design, implementation, and testing. Problem definition, planning, and analysis determine the requirements for the model, which ensure that it will meet our objectives. Based on those requirements, a blueprint for the people, processes, and technology necessary to achieve the objectives was designed. Finally, implementation and a test plan allow us to refine the model and verify that our emergency preparedness goal and objectives are met.

System Development Lifecycle

Analysis

The first step in the analysis included conducting research to determine the requirements for the people, processes, and technology of the HEALTH model. The next step in the analysis was to assess our existing resources, processes, and technology; then find commonalties between the needs of the HEALTH model and our current structure. The intention was to use as many of the existing processes within the call center as possible to meet the needs of the HEALTH model. The analysis was completed between November 16, 2002 and March 28, 2003.

Design

Design of the model took place between March 1, 2003 and May 31, 2003. The final report was submitted October 15, 2003.

The Steps in the Model Design

Process

- Define the processes that will suit the requirements of the HEALTH model.
- Identify the levels of service that drive the HEALTH contact process.
- Detail the input and output information flows for the HEALTH Model.
- Develop decision triage trees for routing calls through the process.

People

- Identify the personnel profile required for emergency and surge staffing.
- Determine scheduling requirements for surge capacity.
- Develop training plan for surges and emergency events.
- Develop a management structure for surges and emergency events.
- Identify the steps (change management) that will support the staff in adopting HEALTH, and include call center managers from the beginning.

Technology

- Determine HEALTH systems requirements.
- Determine commonalities between HEALTH and existing systems.
- Determine requirements to integrate HEALTH into the existing systems, staff, and processes.

Design Terms

Several specialized terms will be used throughout the design section. These terms are listed and defined here.

Medical Call Centers

Specialized medical or pharmaceutical call centers offer medical information, medical triage, drug information, or collect information on diverse topics.

Poison control centers offer telephone triage for acute toxic exposures and are, perhaps, the best established of medical call centers. A national body exists, the American Association of Poison Control Centers (AAPCC), which certifies poison control centers and sets forth voluntary industry standards. Other medical call centers, such as nurse advice lines, are more diverse in their objectives and industry standards, and best practices are less uniform.

Process Management

In the realm of contact center operations, the product being delivered is health communication; thus, the processes are the steps taken to deliver that health communication. Applying the principles of process management creates uniformity, consistency, and measurability. It clarifies the responsibilities between departments by identifying transition points within the process. Understanding, step-by-step, the process that each contact undergoes, as well as understanding the interactions between departments and with outside entities, is critical in creating a functional model within the contact center environment. Applying process

management to the HEALTH model involves defining the existing processes, creating HEALTH processes based on existing processes, and correcting any shortcomings of the process identified during testing.

Mapping Information Inputs and Outputs

The function of the contact center is to provide and collect information. Mapping of information flows is used to identify the resources needed to meet the contact center's communication and information collection objectives. By diagramming each step taken by a contact to reach all the possible communications sources, the process, systems, and staffing required can be visualized. From mapping these required flows we can determine the needs for software, content, management, staffing, and clinical decision trees. We can determine which databases, internal and external, must be integrated and what technology needs exist (i.e., telephones, interactive voice response [IVR], or automatic number identification [ANI]). Each "user" of the service has a different viewpoint on the desired outcome for the service. The endpoint of each route that the contact takes is one way to visualize the outcomes the process provides. This tool is especially helpful when multiple parties must be brought together in the communication process. By visualizing the process, different parties are able to see where they fit in, and the model can be adjusted to address limitations. A generalized HEALTH input/output flow diagram is available in Appendix B.

Call Metrics

Call metrics are the key performance indicators that must be collected and tabulated for quality control and evaluation purposes. Some of these fields will be determined internally for evaluation purposes, such as average length of calls or hang-up rates. Other fields will be determined by the public health agency that is contracting for the service; these may include information on the callers such as their county of origin or exposure status.

Decision Triage Trees

At each juncture in the routing, a decision tree is used to dictate the route to be taken. A decision tree is a series of questions, established ahead of time, which are used to determine the resources to which to route the contact.

Service Level Agreements

To efficiently meet the communication and data collection needs in the event of a vast assortment of potential bioterrorist events, standardized service level agreements (SLAs) with public health agencies are important. SLAs are service agreements established ahead of time with the Public Health agency that will contract for the service. Offering more than one level of service allows us to tailor service to the different types of agents and events that may be encountered. The SLA clarifies expectations between the contracting agencies, simplifies planning for the event, and reduces response time. SLAs frame the scope of the process. Questions such as, "Does the contact center need to be available 7 days a week and 24 hours per

day?" or, "Must the contact center have trained nurses on the phones at all times?" are answered by the level of service opted for.

Operational Management

Operational management describes the management structure and the ratio of management to workers within a business process., The appropriate number and structure of management continues to be the subject of debate among medical call centers Workforce management techniques and formulas have been created for the contact center industry to provide management structures that will improve performance and decrease costs. In creating the operational management structure for the HEALTH model, we looked at these practices and the three existing call centers within DHMIC to come up with possible solutions.

Organizational Change Management

Change management is a process used to help staff accept and adopt new systems. New systems often fail when staff is inadequately primed for adopting the change. To maximize employee satisfaction with the change, to promote efficiency, and to minimize the chance of failure, a change management plan should be drawn up before implementing the model. The plan would describe the change process and include a description of the resources dedicated to implementing the change. The plan should include the following steps:

- Revise management policies to be aligned with the model.
- Assess the costs and benefits to the organization and its employees for making the change.
- Motivate the change.
- Enable people to accept the change by providing the needed skills through training.

Capacity

Following the development of a process, the systems and staffing needs to achieve that process can be determined. Based on our existing technology, we chose a goal of being able to handle 1,000 public or health care provider contacts per hour, in addition to delivering regular services. Determining how to maintain readiness to deal with such surges within our existing staffing profile is an important component of the model. This involves forecasting the skills profile that will be needed, establishing training requirements and scheduling requirements, developing a management structure for surge capacity, and developing a plan to recruit and manage an emergency volunteer workforce.

Implementation

A plan to implement all components of the model is contingent upon funding of the systems upgrades. Parts of the HEALTH model were implemented for the Colorado Smallpox Vaccination Program Support Service (using CO-HELP and CO-PHIL) between January and April of 2003. CO-HELP was implemented again during the summer of 2003 to provide information on West Nile virus. These activities are described in the chapter on implementation.

Testing

Testing and refining components of the HEALTH model has been ongoing with the usage of both CO-HELP and CO-PHIL. In the section on testing, we evaluate our experiences with the CO-HELP and CO-PHIL in 2003. We hope that DHMIC and other agencies will have the chance to further implement, test, and refine the HEALTH model.

Chapter 4. Analysis

The result of the analysis is a list of requirements for the people, processes, and technology of the HEALTH model. To determine the users' requirements, we conducted research into past public health emergency communications. We also assessed our current capacities.

We conducted research to determine what human resources, processes, and technology would be required to meet our goals and objectives. The research included: review of literature on past responses to public health emergencies, best practices for medical call centers, legal requirements, and direct communication with other public health agencies and medical call centers.

Lessons Learned from Past Public Health Emergencies

Published literature that reported on the lessons learned from emergency or bioterrorist events involving public health or health care agencies was reviewed. Reports were searched for that would provide insight into the resources, processes, and facilities that were used in response and that aided communication with the public during the event. A review of medical libraries was performed using the following databases: Ovid Healthstar (1987-2002), Medline (1996-2002), and Google.com, the Internet search engine. Articles with the following subject headings were searched for: bioterrorism, disease outbreak, or disaster planning. This group was limited by the terms public health, hotlines, or communication. From this group, articles were considered if they referred to disasters, outbreaks, or mass casualty events, including terrorism. Articles that discussed communications or operational responses or limitations were included. If an article discussed only the identification and, treatment of a causative agent or hospital triage protocols without offering insight into organizational response or aspects of communication, the article was not included. Articles were to be included if the title or abstract discussed one or more of the following questions:

1. How did agencies communicate with the public during response to the emergency?
2. How did recipients perceive the information provided?
3. What information did the public need from government entities during the crisis?
4. What special populations were encountered?
5. What were communication system limitations during the emergency?
6. What were successful communication solutions?
7. What staffing issues were identified during the emergency?
8. What were facility limitations during the emergency?

Several challenges in locating and evaluating information on past responses were encountered. The range of disasters and emergencies that require public health professionals to play a role also include response from several other sectors. In many ways, the field of public health is the newcomer to disaster response. This means that valuable information on past responses may be in the domain of other fields of expertise, including law enforcement, public administration, communications, technology, and so forth. Each of these fields has its own protocols, priorities, and preferred venues for sharing information.

Ultimately, it was useful to expand the search beyond the peer-reviewed journals to include diverse sources, ranging from trade journal reports and commentaries to text from health department or municipal Websites, conferences, and even congressional testimony. These sources were explored after reviewing articles and doing focused Internet searches through a common search engine (Google.com). The breadth of information and commentary available made it impossible for us to do a comprehensive review. The diversity of evaluation methods, institutional priorities, and even of definitions of success made it appropriate to take a qualitative approach.

Evaluations of the response to past emergency events are not always made available to the public. Sometimes this is due to the sensitivity of the information. For example, the Center for Strategic International Studies arranged a high-level review of the 2001 anthrax attacks. However, due to the sensitivity of the report's content, the Department of Defense has withheld it from the public.[L1]

Evaluation methods have been inconsistent. In part this is due to the many different agencies and fields of expertise that are represented in emergency response. In part it is due to the local variation in organizational and operational structures of responding agencies, and in part it is simply due to the diverse and complex nature of disasters.

Development of uniform, objective measures to evaluate emergency response or emergency readiness is an emerging issue.[L2] Maintaining public safety and preventing further injury may be the clear objective, but how is it to be measured? It is difficult to assess how much mortality or morbidity was prevented by actions taken, or how much more could have been prevented if other steps had been taken. Thus, it is difficult to judge the "success" of the response to an event or to make comparisons.

Our interest in the effectiveness of communication during these events is an even more subjective matter. The success of communication will mean different things to different people. For our purposes, we were interested in whether the public health agency was successful in convincing the public to take actions as prescribed by the public health agency, whether they were trusted, and whether their message managed to calm the public. We were also interested in simpler measurements such as, "were they able to answer all their calls in a timely fashion?" or, "was the information shared with the public consistent and accurate?" As it turned out, both qualitative and quantitative information was lacking in the literature.

For example, we were interested to find out the volume of telephone calls to agencies or emergency hotlines during emergency events; we found this information was rarely reported. Even when volume was reported, the authors either did not offer an assessment of this information, or reported that they simply did not know the volume of calls that went unanswered due to staffing or system limitations.[L3] It appeared that most agencies did not have systems in place to conduct even this simple level of evaluation of telephone communications, a level of evaluation that is standard in the medical call center industry.

This sort of problem may stem from the perception that health departments are not communications centers and, therefore, that tracking the volume of calls, type of calls, length of call, number of hang-ups, wait time, etc. is not their role—this despite the fact that during emergencies many local and national public health departments set up impromptu call centers because of overwhelming public demand for direct communication.[L3- L6]

Valuable information was available from sources that are unconventional as far as most public health topics are concerned. Hospital administrators, public policy makers, information technology specialists, law enforcement, and emergency response departments are less likely to publish their experiences in peer reviewed journals and are more likely to post information on their Web sites--or to share it at conferences or in editorials or articles submitted to trade journals. Contributions also came from business, telecommunications and technology journals, Web sites, and newsletters.

Fifty-seven articles relayed experiences from actual events (disease outbreaks, the World Trade Centers attack, the 2001 anthrax attacks, mass casualty incidents, and natural disasters) or training exercises. These articles included reports on epidemiological investigations, national surveys, personal accounts and editorial commentary, or recommendations. In addition, we included six bioterrorism preparedness guidelines that were produced by State or national agencies. Although they did not assess past events, we thought it appropriate to consider the recommendations of these documents. Except for the guidelines and manuals that were included, articles were left out of the final selection if they did not include some reference to lessons learned from past events or training exercises.

The table below attempts to describe these sources, however the categories are subjective, and therefore the table should be used only as a general orientation to the sources we used.

Table 1. The range of sources reporting on actual events or training included in our review

	World Trade Center	Natural Disaster	Other/ Terrorist	Anthrax	Other Outbreak	Training/ Exercise	General Preparedness
Survey	2			2			3
Epidemiological Investigation	1			4	1		
Computer/Technical Trade Journal Article/popular press	2			1			
Comment/Editorial	5			6	1	1	3
Public Health/ Medical Source Case Study Public Health/Medical/ Administration Source		3	4	4		1	
Evaluation Public Health/Medical/ Administration Source	2			1	1	3	6
Guidelines/Manuals							6
Column Totals	12	3	4	18	3	5	18
TOTAL							**63**

Editorials, case studies, and evaluations were used as ways of describing the continuum of reporting, with editorials being the most subjective and evaluations the most objective and comprehensive. The surveys were directed either at public attitudes surrounding communications and disasters or were directed at health departments or hospitals to assess current state of

readiness. Several evaluation articles used more qualitative survey methods as a tool for conducting the evaluation; these were not included with the surveys. It should be kept in mind that most of the sources focused on only one or a few aspects of the events being described. Articles about general preparedness included a range of recommendations with examples from multiple past experiences.

The 63 sources that we ultimately used to inform our model development cannot be considered as a definitive collection. However, they did offer valuable insights. The patchwork nature of the sources that we found lent itself to a qualitative approach. We looked for issues that have emerged from these sources to establish some consensus between the articles and the questions we had posed.

How did agencies communicate with the public during the emergency?

Events that generated high public concern, whether localized or national in scope, were usually responded to with information posted on Web sites and in press releases and brochures. However, the higher th-e concern about the event, the greater the demand for one-on-one communication. In many cases, public agencies responded to this demand by setting up ad hoc hotlines.

Seven such hotlines were mentioned in 11 of our sources, including:

- New York City LifeNet (mental health hotline responding to September 11, 2001)[L5]
- New York City West Nile virus (WNV) hotline (during the 1999 outbreak)[L6]
- Greater New York Hospital Association (GNYHA) phone bank (located hospitalized friends and family after September 11, 2001)[L7]
- New Jersey Emergency Operations Center (hotline for surveillance of anthrax cases in 2001)[L8]
- Center for Disease Control and Prevention (CDC) Emergency Operations Center (put into operation in response to the anthrax letters)[L3, L9]
- Idaho StateComm (coordinated response to anthrax investigations)[L10]
- Florida Health Department meningitis vaccination hotline (following a meningitis outbreak)[L4]

How did recipients perceive the information provided?

We found no reports of focus groups, opinion surveys, or other attempts to collect information on the public's perception of the information given. This may mean that this information wasn't collected in these events or simply that it wasn't deemed important to the objective of the publication. In evaluating the public education campaign waged by the New York City Department of Health during the West Nile virus outbreak of 1999, Vincent Covello,

of the Centers for Risk Communication, concluded that this was the one major shortcoming of the campaign.[L6]

Public perception of the trustworthiness and reliability of information sources was assessed in surveys conducted by the Harvard School of Public Health and the Robert Wood Johnson Foundation Survey Project on American's Response to Biological Terrorism. In these surveys (conducted nationally in the last months of 2001), about 60 percent of Americans reported confidence in the CDC; 38 percent reportedly had confidence in the secretary of Health and Human Services, Tommy Thompson; 33 percent reported that they would trust the secretary for Homeland Security, Tom Ridge. Forty eight percent reported they trusted their State governor; 52 percent said they trusted the director of their State health department; 61 percent reported they would trust the head of the local fire department, and 77 percent said they trusted their own doctor for reliable information.[L11, L12]

The articles describing the implementation of emergency hotlines focused on aspects of epidemiological investigation; as a result, they did not attempt to assess public satisfaction with the information shared. In fact, the only indication of the potential for satisfaction or dissatisfaction was reflected in the frequent reports of agencies and hospitals being overwhelmed by surges in call volume (14 articles reported such surges). None of the reports included quantification of calls lost, dropped, hang-ups, or wait times that would indicate whether or not the systems in place were adequate to meet the demand.

Many health agencies reported confusion over who was in charge and what messages should be released to the public. Information and communication vacuums caused surges of concerned citizens to present at public health and medical facilities looking for information or even to volunteer; this severely impacted the activities of those agencies.[L13, L14]

A few articles alluded to the inconsistency of information being disseminated by the media, public agencies, or community leaders as having exacerbated the public's anxiety and distrust of authorities, leading to an increase in demand for information and poorer compliance with health recommendations.[L1, L4, L7]

In the case of the response to an outbreak of meningococcal disease in Florida, local politicians publicly challenged the health department's decision to vaccinate only those younger than age 18; this resulted in anxiety and many calls to the hotline set up by the health department (5,000 calls in 1 week in an affected population of 33,000).[L4]

Following the anthrax attacks, the New Jersey Department of Health went against the recommendations of the CDC and offered prophylaxis to all postal workers at the two affected offices in New Jersey.[L1, L7, L9] The contrast in treatment given to occupants of Senator Daschle's office and workers at the Washington, DC area postal center that had processed a suspect piece of mail resulted in widespread allegations of racism and severely undermined the trust the public had in CDC and other officials.[L1]

What information did the public need from government entities during the crisis?

High-stress situations evoke strong emotions, such as fear, anxiety, distrust, anger, outrage, helplessness, and frustration that form barriers to effective communication.[**L6**] "By definition, terrorism is an assault on the mental health and well-being of the public. Its goals are to create panic, fear, and anxiety."[L15] Especially if an infectious agent is released, it is vital that the public's trust and cooperation is engaged immediately to ensure that announced disease containment measures are followed. During the tabletop exercise "Dark Winter," former Senator

Sam Nunn was quoted as saying, "The Federal government has to have the cooperation from the American people. There is no Federal force out there that can require 300,000,000 people to take steps they don't want to take."[L16]

Several of the articles found through our research reported that during emergencies, many people contacted hospitals to obtain assistance, information, to locate missing loved ones, or to volunteer.

Following a school shooting with mass casualties, a hospital in Eugene, Oregon, set up a special room for parents of victims who arrived at the hospital trying to locate their relatives.[L17] The Greater New York Hospital Association and the Office of the Mayor of New York City worked together to set up a phone bank and a Web site to aid the public in locating missing family and friends immediately following September 11, 2001.[L7]

The 2001 anthrax attacks and WNV outbreak in 1999 created high demand for medical diagnostic and treatment information for patients, "worried well," and health care providers.[L1, L6, L18] Several sources described how health care providers came to rely on television news programs for information on the development of the anthrax investigation and latest recommendations because of the failure in communication from the CDC and State public health officials.[L1, L19]

In order to deal with an overwhelming demand for current information following the anthrax mailings, the District of Columbia Hospital Association commenced daily conference calls for all their local hospitals; they report that the number of participants grew to over 500 on each call.[L19]

Unfortunately, there is a general dearth of information on what the public actually wanted to know during any of these emergencies. None reported having systematically or routinely processed information on the causes for public concern. This may mean that this information was not collected and two-way communication was lacking, or it may only indicate that the information did not seem relevant to include in public documents. Although there is a wealth of literature on risk communication, little empirical data have been collected on the public's communication needs during particular events. A few articles discussed this problem in retrospect. Suggested ways to collect this information in future events included focus groups, surveys, or community meetings with an opportunity for community members to exchange ideas and concerns with officials.[L6, L21]

What special populations were encountered?

The populations of greatest concern to the public, as judged from the nature of the hotlines that were set up by various agencies, were children, hospitalized or missing victims of mass casualties, "worried well" or people with perceived exposures, and people suffering emotional trauma following an event. However, none of the articles evaluating response to actual events identified any other at-risk groups such as the elderly, tourists, or homeless, disabled, mentally ill, or minority populations. Again, this seems to be a function of the failure of respondents to have identified special populations or their needs during the event, and a failure to attempt post-event evaluation of this aspect of public service.

In Chapter 5, we further address special populations when we review the findings of a recent study on special populations in Colorado and their needs for risk communication in a public health emergency.

What were communication system limitations?

Emergency events, whether localized outbreaks or national terrorist events, resulted in a large demand for one-on-one communication, implying that press releases and media events do not satisfy all of the public's needs.

At least 14 articles described surges in call volume that surpassed the agency's capacity even though there was no technical failure. The events discussed ranged from a blackout to a high school shooting with mass casualties to the WTC attack and the anthrax attacks; the affected agencies included hospitals and public health departments. During the West Nile virus outbreak of 1999, the New York City Department of Health received more than 150,000 telephone calls in the first month of operation of their hotline.[L6, L21] During the anthrax investigations, the CDC telephone lines were overwhelmed, resulting in doctors and hospitals complaining that they were getting their information from news media reports.[L1, L19]

The CDC Web site crashed twice during the anthrax crisis due to heavy demand and lack of redundancy.[L1] In a test of the Health Alert Network conducted in 1999, only 35 percent of e-mails sent from the CDC to local health departments reached their targets, in part because so many agencies are still not equipped with adequate technology.[L19]

Although many healthcare facilities reported that they were able to use their disaster recovery plans and benefited greatly from past experience and training,[L17, L22] most agencies resorted to ad hoc processes or fell back on established relationships more than formal incident command structure to manage the situation.[L23, L24]

Telephone communication, whether landlines or cell phones, were unreliable, especially during the first hours of the events because of lines going down or channels being flooded with calls; yet most communication systems relied on telephone. It did not require an event the size of the World Trade Center (WTC) attack to jam cell phone frequencies. During the Columbine tragedy in Colorado, the cell phone network was overloaded by hundreds of journalists, citizens and responders trying to make calls; during the first hour of the response, the County dispatch center couldn't get through to the local command center because radio frequencies were also jammed.[L25]

Other communication modes including the Internet, Web-chat, fax, or e-mail, were not as widely used during the emergencies, although when they were used they were effective. On 9-11, approximately 4-5 million citizens across the country resorted to e-mail in order to locate friends and relatives because of their inability to get through on the telephone.[L26] The director of Medical Informatics at St. Vincent's Medical Center in New York City reports that their Web site received double the usual traffic in the 2 weeks following the WTC attacks.[L27] Impromptu call centers struggled to assure appropriate response to high priority calls amidst high call volumes due to inadequate staff or systems capacity.[L3] In at least two cases, forms were completed manually because computers or software programs were lacking; this resulted in errors and missing information.[L3, L28]

While in some cases incident command functioned very well due to prior training,[L29] in other cases a lack of clear command structure resulted in slow decision making, garbled communications within and between responding agencies, and lack of control of information being provided to the public and media.[L30] During the Top Officials (TOPOFF) exercise in 2000, consensus-making conference calls included between 50 and 100 participants.[L30, L31] During the WNV outbreak in 1999, up to 18 agencies were participating in the investigation and response, and communicating through lengthy conference calls.[L32]

Julie Casani and her colleagues at the Maryland Department of Health and Mental Hygiene describe how their agency struggled with the role as "consultant" to health care providers. The challenge was both in providing the right information amidst the changing understanding of the etiology and treatment of inhalational anthrax, and also simply in handling the demand for direct communication 24 hours a day, 7 days a week.[L24]

During the 1995 heat wave in Chicago, poor communications and decision-making within government led to a failure to recognize the growing disaster and to implement disaster management activities. This may have contributed to some of the 500- 700 lives lost. [L33]

What were successful communications solutions?

- Interhospital communications systems.[L7, L17, L20, L22 L34-36]
- Fax machines hooked up to run on emergency power for backup communications and use of broadcast faxes.[L22, L34]
- Emergency management mobile command vehicles.[L34, L37]
- Physical runners to communicate needs between hospitals.[L34]
- Accessing office functions from off-site via secure Web technology.[L34]
- Setting up mass dial-up Internet Service Provider accounts for local health agencies having trouble accessing Internet.[L34]
- High-speed wireless Internet networks.[L34]
- Wireless Local Area Network (LAN).[L34, L35]
- Satellite reach-back communications.[L34, L35]
- "BlackBerry," handheld wireless devices providing mobile, continuous e-mail access.[L34, L35, L38]
- Web sites set up to communicate with employees [L34, L36]
- Health Information Network, a Web-based system for infectious disease reporting and for syndromic surveillance or other centralized information sources for health care providers, by fax, e-mail, Web site, or hotline.[L28, L34 L36]
- Amateur radio.[L34, L39]
- Integrated Services Digital Network (ISDN), a dial-up connection that can be used for video conferencing.[L34, L35]

- Community-wide, centralized patient locator systems (such as the Greater New York Hospital Association established following the WTC attacks). [L20, L27, L34]

- Nextel "dispatch" function that allows responders to contact pre-programmed groups instantly and simultaneously, saving the time required to contact individuals separately.[L34]

- 800 MHz radios so responders can monitor emergency operations.[L22, L34, L40, L41]

- Videoconferencing.[L35, L42]

- Developing forums for two-way communications with the public.[L6, L35, L41]

- Pre-event joint planning, training and practice, not only to establish roles, but to create relationships between stakeholders, responders, and media to facilitate communication during the emergency.[L23, L29, L34, L43-L45]

- Offering mental health services to the public, including responders, as soon as possible following a tragic event.[L5, L20, L46]

- Triaging telephone calls.[L3, L22, L47]

- Redundancy in everything from cable lines to having pagers from multiple companies.[L34, L41 L44]

- Involving the news media early and consistently in the communication process.[L17, L27, L34, L41]

- Developing "dual uses" for emergency response systems so that systems with rare emergency use are exercised through some alternative, routine use. This also protects capacity through boom and bust funding cycles.[L21, L26, L32, L34, L42]

- Pre-event development of an "information stockpile" in multiple formats.[L34]

- Developing a responsibility checklist for each role within your agency's incident command system.[L29]

- Developing a procedure for processing potential volunteers and staff from other agencies or departments.[L37]

- Having an emergency transportation plan for staff and supplies.[L37]

- Organizing *regional* (events in surrounding States that will have impact) planning, decision-making, mutual aid agreements, and response committees.[L20, L29, L30, L38, L39]

What were staffing issues during emergencies?

Many agencies reported that sustained response strained the agency and staff.[L1, L4, L9, L10, L24, L28, L48, L49] Staff in many agencies were exhausted following the anthrax attacks because of the need to collect samples, conduct investigations, trace contacts, dispatch surveillance teams, and follow up on cases.

The CDC ultimately followed up on 10,000 individuals who received antibiotic prophylaxis for possible anthrax exposure.[L18] The New Jersey and CDC Operations Centers took over 6,000 telephone calls while conducting passive surveillance for anthrax.[L8] Connecticut estimated that surveillance for anthrax took up 1,500 hours of Federal and State staff time.[L50] Calls to New York City's mental health hotline, LifeNet, increased by 98 percent from October 2001 to March 2002, following September 11.2001.[L45] Staffing New York City's WNV hotline took from 25 to75 people per shift for 1 month.[L51] Although only 22 cases of anthrax were confirmed following the anthrax mailings, the Laboratory Response Network (LRN) processed more than 125,000 clinical specimens and almost 1 million environmental samples.[L52]

With the possibility of telephones lines being down and cellular lines jammed, communicating with staff during the emergency was a common problem. Alternatives to telephone communications are necessary for activating extra resources, whether staffing or supplies. Alternative systems suggested were Internet, e-mail, television and radio broadcasts, staff emergency call-up lists, and disaster plans dictating where staff and volunteers should report and to whom they should report when an emergency strikes.[L34, L35, L39, L41] As mentioned above, some agencies set up Web sites to inform employees of changing situations and direct them as to where and when to report.[L34, L36] It was also important to communicate to staff any changes in decision-making or other procedures as events unfolded.[L53]

As was noted previously, several articles mentioned the difficulty that health services and public health staff had in switching gears from consensus decision-making to an incident-command structure.[L1, L24. L30, L31] In both real and training events, actors had difficulty contacting their counterparts at other agencies, either because those people had moved to an emergency operations center, were on conference calls, or because they did not know whom, specifically, to contact.[L31, L52]

The need to pre-identify and train volunteers was a frequent topic of concern, along with community level disaster preparedness training.[L35, L48, L54] The inability of hospitals or other agencies to verify the skills, qualifications, licenses, or security clearance for volunteers was often discussed.[L24, L34, L55] When volunteers or staff from other departments had been cleared, training was a problem. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has called for funding of the Public Health Security Act. This act would create a national credentialing system to give planners before an event and Incident Commanders during an event access to information on credentialed volunteers.[L7]

Mass casualty incidents and sustained events also tax staff emotionally as well as physically. Several articles discussed the need to set up means for staff to communicate with family during a disaster without jamming telephone lines, or to set up rooms with television or radio to allow staff to follow unfolding events when their time permits.[L17, L40, L41, L53]

How to protect health care workers or first responders from unnecessary exposure to risk, whether from infectious or toxic agents or from other physical dangers, came up in a few papers.[L56] In several cases employees, whether hospital workers or other first responders, arrived at work to help even when not called, potentially putting themselves at risk unnecessarily.[L36] The

same concern exists for volunteers who are likely to risk their own health and safety in trying to help others.[L57]

What were facility limitations during the emergency?

None of the sources that we found attempted to comprehensively assess facility limitations. However, some limitations were mentioned. Often, equipment stocks were inadequate to support volunteers or additional staff; for example, there often were not enough telephones, computers, or safety hood cabinets.[L10]

Emergency procurement was a problem for hospitals and health agencies, sometimes because telephones were not working or because knowledge of procedures were lacking (such as how to access the National Pharmaceutical Stockpile).[L1, L10, L25]

At the Pentagon, a makeshift pharmacy was set up on Pentagon grounds to aid the wounded and emergency responders on 9-11. The pharmacy chief reported that the most important lesson that she learned was to have a large emergency sign to indicate the mobile pharmacy's location to people needing assistance or bringing in supplies.[L25]

Space for mass vaccination, triage, sheltering stranded citizens, decontamination, mortuary facilities, parking, mental health counseling, blood donation centers, volunteer coordination centers, meeting rooms, and press conferences were all mentioned as issues.[L2, L17, L29, L38, L40]

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Best Practices From the Medical Call Center Industry

Although poison control centers are well established, the advent of medical call centers, nurse advice lines, and technologies for remote triage and consultations are recent. As the public has become accustomed to rapid evolution of communications technology, healthcare providers and health management organizations are looking to modern communications technologies to improve their services, the education of their patients, and to streamline their costs and operations. In many ways public health is lagging behind the private sector in adapting new technologies to its purposes. We wanted to conduct a brief survey of call center, medical informatics, and technology publications to identify some of the proven solutions for public health communications, trends, and best practices within the industry.

A keyword search was conducted on the Ovid Healthstar and Medline databases, and on the Google Internet search engine. We searched for articles under the following subject headings: hotlines, call center, and decision support systems. The search results were limited to articles written in English, published from 2000-2003, and, for Ovid searches, articles for which full text links were available. Twenty-nine articles were found that met the search criteria. Articles were included if any of the following topics were discussed:

- Types of systems used.
- Dealing with special populations.
- Facility limitations.
- Resource limitations.
- Best practices for processes.
- Best practices for systems.

Healthcare professionals and researchers submitted the majority of articles, 24 of 29; telecommunications researchers or specialists wrote the 5 remaining articles. As with the "Lessons Learned" portion of our research, this research was not intended to be a definitive look at the industry. We looked for common themes that emerged in several of the articles. The issues that emerged from the 29 articles that met the search criteria were as follows:

- There is an increasing demand for one-on-one telephone and Internet sources that provide detailed, customizable, and current information with ease of access.[M1. M2, M3, M4, M5, M6]
- There is an increasing demand on the part of the public and systems users for availability of advanced technology; including interactive voice response (IVR), interactive television, live Internet interaction, and e-mail to provide information access and to bring efficiency and cost-control to healthcare system administrators.[M1, M4, M5, M7]

- The average United States citizen reads at an 8th grade level. Web-based materials are frequently reproduced as print materials. Web and print materials should be produced for those who read at an 8th grade reading level or lower, and should include easily understood visuals in addition to text. [M2]

- The relationship between the caller and the person providing information is the pivotal relationship in producing positive outcomes. Attentive, caring, responsive information providers can overcome system or process failures to give the call a positive outcome. Processes and systems cannot overcome a poor experience with an information provider.[M8, M9, M10, M11, M12]

- Staffing of call centers is a challenge, as call centers suffer from high turnover rates. Improving the call center staff's working environment, reducing training time, and incorporating certain process methods, such as skill-based routing and decision triage trees, can improve staff retention and reduce constant re-investment in staff development.[M13, M14, M15, M16, M17, M18, M19, M20]

- Best practices for the call center industry include recognition of the different viewpoints of success for different "users." Healthcare systems want improved cost-effectiveness along with improved medical protocol compliance; patients want prompt, trustworthy, caring support and information, with the guarantee of privacy and ease of access; call center staff want to feel that they have the opportunity to use their skills and that they helped callers. [M21, M22, M23, M24, M25]

- There is a growing recognition that call centers can be used to create efficiencies in many applications, including syndromic surveillance, emergency medicine and triage, and home health care support.[M26, M27, M28, M29, M30]

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Discussions With Health Emergency Response Agencies

In addition to reviewing publications describing lessons learned from disaster events, we opted to contact representatives of select agencies throughout the country directly to verify the results of our literature reviews. Using a standard questionnaire, we conducted telephone interviews with representatives from five agencies and spoke with them about their experience with a recent event of high public health concern (Table 2). Three of our interviews were with staff of poison control centers, one was with a State health department epidemiologist, and one was with the director of a county emergency management office. The events of concern were the anthrax attacks of 2001 (Anthrax); the World Trade Center attacks of 2001 (WTC); and pesticide spraying associated with fruit fly control measures in Florida during 1997 (Pesticide Spraying). The results of our interviews with these agencies are summarized in Tables 2a-2n.

Table 2. Public health emergency by type of agency interviewed

	Anthrax	WTC	Pesticide Spraying
Public Health Department (PHD)	1		
Poison Control Center (PCC)	1	1	1
Emergency Management (EM)	1		

Table 2a. Did your agency communicate with the public during the emergency?

	YES	If Yes, What Method?	NO	If No, Why?
PHD – Anthrax	X	Web site, daily press briefings, hotline staffed 24/7 with public health nurses, no interactive voice response (IVR) or recorded messages; callers had to hold until next available live agent.		
PCC – WTC			X	Mayor's office took responsibility for all public messages. No special messages or responses added for WTC event on PCC recordings.
PCC – Anthrax	X	The media came to us. Medical directors did frequent telephone interviews. No Web site or press briefings. No special messages or responses added for WTC event on PCC recordings.		
PCC -- Pesticide Spraying	X	Television interviews and press releases. Conducted joint community meetings with PHD and local university public health staff. Announced PCC number on evening news. In addition to regular PCC staff, added 2 pharmacy students on rotation to answer questions.		
EM – Anthrax	X	Daily press briefings combined with other agencies (law enforcement, PHD, fire and rescue, CDC, FBI, etc.); hotline was set up with recorded message 24/7 and live agents 12-14 hrs/day. No IVR; callers on hold until live agent available or left message. Used reverse 911 to broadcast message to 518,000 homes, with 57% of messages accepted. Fact sheets faxed to hospitals.		

Table 2b. What other agencies did the public call for information? Which source was preferred by the public?	
PHD – Anthrax	PCC, FBI, local law enforcement, fire department. By the volume of calls, probably the health department.
PCC – WTC	Police, fire, health departments. Have no idea which was preferred.
PCC – Anthrax	NA
PCC -- Pesticide Spraying	Health department. Not sure which was preferred; suspect the PCC because of 24/7 availability.
EM – Anthrax	Law enforcement, fire and rescue, PCC. Don't know which was preferred.

Table 2c. Was the message/information consistent among all information providers?		
PHD – Anthrax	YES	Department heads met daily and decided on the message for that day – sometimes geared toward health aspects, sometimes geared toward law enforcement.
PCC – WTC	NA	
PCC – Anthrax	NA	
PCC -- Pesticide Spraying	YES	It happened so fast that initially information was given by PCC staff--addressing anticholinergic effects [without any particular mechanism for information control].
EM – Anthrax	YES	We developed a Joint Information Center (JIC) to keep the message consistent – some days more emphasis on law enforcement, and some days more emphasis on health issues. Health department nurses were briefed.

Table 2d. What volume of calls was received? Were call metrics collected?		
PHD -- Anthrax	NA	[Referred to different contact]
PCC -- WTC	Volume doubled, > 1000 calls/day	Don't have exact numbers, didn't have the ability to get abandon rate with old system, and also couldn't tell if calls were in queue.
PCC -- Anthrax	Normal volume 170-200 calls/day; during event >1000 calls/day	Didn't have a way to verify abandon rate.
PCC -- Pesticide Spraying	Peak was 662 calls/day. Normal call volume is 200 calls/day. Total calls 5,000 received in 2.5 months.	Data were collected but no longer available.
EM -- Anthrax	Exact number not available, estimates up to 10,000 calls in a month.	No idea what the abandoned rate could be but believes they received tens of thousands of calls.

Table 2e. Were quality control or evaluations done?		
PHD -- Anthrax	YES	Daily meetings to discuss issues. State epidemiologists sat in at call center to help with questions that went beyond the public health nurses' knowledge. The Bureau of Epidemiology looked at questions, categorized them, and came up with standard replies. They have contracted with a private firm for their "Epi Hotline" that offers additional agents during an emergency.
PCC -- WTC	NA	No formal evaluation, but certain frequently asked questions had specific answers developed.
PCC -- Anthrax	NA	No formal evaluation, but all specialists in poison information (SPIs) were given info about anthrax. Most of the SPIs were part of a decontamination team after September 11, 2001, and before the anthrax event happened.
PCC -- Pesticide Spraying	YES	Health department conducted a survey measuring demographics, dates of peaks in symptom reports, and categories of symptoms.
EM - Anthrax	NO	

Table 2f. What information was provided? What information was requested by the public?	
PHD -- Anthrax	NA
PCC -- WTC	Requested: Many questions about the soot and smoke, was the water okay to drink, air quality, concerns about their food. About half of the calls were calls trying to find missing persons. Things were too crazy to attempt to collect data on the public's concerns or needs.
PCC -- Anthrax	Provided: Symptoms of anthrax, what to do about suspicious packages. Requested: Should I tape up my windows? Should I get a gas mask? They were in a frenzy about what to do with the mail.
PCC -- Pesticide Spraying	Provided: Spraying times/dates/location, how to protect the yard, cars, decontamination of skin, possible symptoms, who is at risk, teratogenicity, as well as the usual health assessment done by PCC staff. Explained that the particle size would not be absorbed by lungs and that the percent of active ingredient was low; gave reassurance. Requested: the public was very angry, wanted to vent on someone and wanted to know who to complain to and how can they put a stop to the spraying. Learned that the public was concerned about symptoms, wildlife, swimming pools. (Malathion combined with water, creates a more toxic malaoxon.)
EM -- Anthrax	Provided: Symptoms to watch for, route of transmission, concern was for inhalation, not gastrointestinal or cutaneous infection, what to do with suspicious packages, gave reassurance. Requested: What are symptoms, what to do with suspicious packages/white powder (collected > 3,000 samples of "suspicious powder" all negative for anthrax).

Table 2g. How was the information received by the public?	
PHD -- Anthrax	NA
PCC -- WTC	NA
PCC -- Anthrax	NA – Wouldn't know that – it was chaos.
PCC -- Pesticide Spraying	They wanted their concerns to be validated, requested free medical treatment and compensation for costs involved, i.e., draining swimming pools.
EM -- Anthrax	Very well received; they seemed comfortable because they were speaking with nurses (RNs).

Table 2h. Were any methods used to measure the public's compliance with recommendations?	
PHD -- Anthrax	NA
PCC -- WTC	NO
PCC -- Anthrax	NO
PCC -- Pesticide Spraying	NO -- Most health related instructions were concerning property.
EM -- Anthrax	YES -- Those that were put on Ciprofloxacin were given just a 2-week supply at a time, so that they had to return for additional doses- about 70% returned.

Table 2i. Did you discover any "special populations"? What was different about their needs?	
PHD -- Anthrax	NA
PCC -- WTC	NA – may have been a surge in use of the translation line.
PCC -- Anthrax	Seniors Citizens -- Months later, in the senior citizen presentations, special general instructions were given in case a suspicious package would be identified in their vicinity, i.e., know where fire exits are, how you would leave an area if a suspicious package was identified. Long-term care and residential facilities called for that information; we wrote articles in newsletters, which were distributed to seniors. Haitians – Large population, bilingual doctors spoke with these groups, held town hall meetings, and spoke with State representatives. Schools and School Principals – They were calling to ask how to prepare a school in the event of a threat. Had meetings with school board members. Needs – All had different preparedness needs.
PCC -- Pesticide Spraying	Children – Concern about daycare centers, playgrounds. Chemically sensitive individuals and environmentalists – They formed two

EM -- Anthrax	different groups: CRAM -- Citizens for Responsible Applications of Malathion and SCRAM -- Sarasota Citizens for Responsible Application of Malathion. Needs – Allergies and high sensitivity to chemicals. Senior Citizens – Seniors were more vulnerable. Spanish speaking -- Spanish TV and the Guatemalan Center helped with messages.

Table 2j. What resource limitations did you encounter?

	Personnel?	Regular Services Maintained?	Facilities?	Systems/ Technology?	Internal Communication?
PHD – Anthrax	More true at county level	Yes. About 39 days; after that it was no longer an emergency	NA	NA	NA
PCC -- WTC	Staff worked overtime. Managers answered telephones.	Yes, don't know how long could have kept it up.	Building destroyed; set up temporary quarters.	Old telephone system unable to check calls in queue/measure abandon rate.	NA
PCC – Anthrax	We were short staffed. 4-5 on telephones. Lots of overtime paid. Administration staff got on telephones and triaged calls.	Yes	12 stations total.	Unable to change the telephone message.	Was easy because of small staff.
PCC -- Pesticide Spraying	Yes	Yes, as long as we could find the funds to pay overtime and pharmacy students. Cost was $15,000.	Had the space to set up 2 extra stations for pharmacy students.	Better if we'd had telephone triage and messages. Could only take 5 calls at a time. Poisindex was insufficient; needed info on allergies, long-term effects, and carcinogenicity.	Good team effort – "all scrambling together," SPIs were very angry at the tripling of the call volumes.
EM -- Anthrax	Police, fire and rescue, all were spread thin. Lab facilities were inadequate – samples were being collected daily for about 3 months. Everything was time consuming.	Yes, could have maintained the emergency staffing almost 2 years.	Lab, storage of collected items became a problem (i.e., had to test a couch covered with white powder, entire mailboxes, actually had to impound a bus). 1,300 visitors to AMI building interviewed and medicated with help of Red Cross; needed to provide shade and water. Cipro/Doxy flown in within 6-8 hrs required a police convoy.	Used the JIC (Joint Information Center).	Worked well, used Nextel cell phones and point-to-point 800 megahertz 2-way radios.

Table 2k. Were volunteers used?	
PHD -- Anthrax	NO
PCC -- WTC	YES, police department staffed a phone bank in their conference room specifically to help callers locate missing persons.
PCC -- Anthrax	NO
PCC -- Pesticide Spraying	NO volunteers but used rotating pharmacy students who were paid.
EM -- Anthrax	YES, Red Cross and retired mental health workers.

Table 2l. Were any management issues encountered?	
PHD -- Anthrax	Initially, this was an epidemiology problem. When it became apparent that this was a potential terrorist threat, the FBI came in and imposed a blackout on public information for a couple of days. This increased the public's fear.
PCC -- WTC	NA
PCC -- Anthrax	Not really, Medical Director took leadership role, worked on all clinical aspects and protocols. He communicated with EMS and fire departments.
PCC -- Pesticide Spraying	Management had to drop everything else to create the media message, do data collection, create the panel, do research regarding Malathion, write press releases, do literature review, start research study for long-term effects, attend meetings.
EM -- Anthrax	NO, had 100% support from the CDC, but they were not authoritative. Had good relationship with law enforcement. The State has a unified health department with divisions in every county, and the poison center is part of the health department.

Table 2m. What methods worked?	
PHD -- Anthrax	The development of the joint information center (JIC).
PCC – WTC	NA
PCC -- Anthrax	Were networked with other poison centers as a back-up but didn't need to use them.
PCC -- Pesticide Spraying	The announcement on the evening news to call the poison center with questions worked very well. Continued the announcement from June to September.
EM -- Anthrax	CDC personnel very helpful.

Table 2n. What has your agency taken away from this experience? Or, what will your agency do differently next time?	
PHD – Anthrax	We learned that we need the joint information center set up earlier rather than later. Set up the hotline at the State level.
PCC -- WTC	The event expedited getting our new telephone system, which had been held up for 2 years. Now we have a fail-safe system (2 contact numbers; each goes through a different hub – have the ability to forward calls to the other hub if one hub is not operational, as occurred on 9/11). The 800 number is easy to move around. Now have a satellite telephone and portable telephone. Can get calls from health department staff. The PCC is an integral part of the New York City Health Department. The PCC staff is now a part of the emergency list – can get police escort/transportation if needed. PCC was asked to come up with a plan to create a new PCC – cost, structure, technology, hardware, software, personnel. Plan is now on paper.
PCC -- Anthrax	The PCC had been waiting to move for 5 years. Within 45 days of the anthrax incident, they moved to a new location. They now have an "on call" room with 2 beds, lounge area, and showers. The old PCC was just a small hallway, and they now have their own area. They learned that they were on the "front lines" – recognized their responsibility and can be the triage in the event of other similar events. The health department is 9 to 5, whereas the PCC is 24/7. The PCC has become the coordinating body for bioterrorism and WMD. We are now conducting training in ER departments, training MDs and members of the House and Senate. We conduct disaster drills and teach "suit up" classes. These activities have added to our visibility and secured a funding stream from the State legislature, which wasn't there before.
PCC -- Pesticide Spraying	Three of the administration staff started taking public health classes and are working on master of public health degrees. The health department formed a Statewide pesticide group, and there is a special liaison from the PCC to that group. Multiple agencies are involved. The health department realized that they couldn't just give the PCC staff 1 day's notice and expect it to go smoothly. The following year, had meetings months ahead of the spraying season. It was difficult to decide if the call to the PCC was an information call or an actual exposure. Most callers were convinced that any symptom they had was related to the Malathion whether or not they were actually exposed.
EM -- Anthrax	Make certain to communicate with all parties. Use a phone bank. Our Epidemiology Department now has a central computer system – all hospitals will be tied to this system – this will enable us to do syndromic surveillance. Future plans are to include schools in this system so that school nurses can enter data about students with systems. Now have a county anti-terrorism committee with a response plan in place. The county now has the same Emergency Support Function system as the Feds and a countywide plan to shelter and inform the public.

CDC, Centers for Disease Control and Prevention; EMS, Emergency Medical Services; ER, Emergency Room; FBI, Federal Bureau of Investigation; NA, No Answer; WMD, Weapons of Mass Destruction.

These interviews confirmed our research findings and our own experiences. In all cases, the interviewees reported that the public's demand for direct, personal communication was undeniable. The two non-poison center agencies established ad hoc hotlines to meet this demand.

All reported the fundamental importance of joint operations; the poison centers, especially, seemed to have discovered that they were on the front lines. All reported that consistency in public information was maintained the old-fashioned way, through daily joint meetings and briefings. Joint meetings, joint press briefings, a history of joint operations, and unified department organization all aided the process. Strong leadership (Office of the Mayor in the case of WTC and Poison Center Medical Director) cemented this coordination.

Staffing, facilities, and technology were challenges in all cases, in part due to poor funding of technological improvements for public health and poison centers over many years. Even the poison centers were not equipped with the technological capacity to monitor call volumes, calls in queue, or call abandon rates, and some even reported an inability to change or place a recorded message on the telephone line. Luckily, these events helped at least two centers finally acquire upgrades.

Staffing was clearly a challenge, although the anthrax and WTC events inspired truly heroic efforts by staff who willingly worked overtime. Paying for that overtime was another matter of

concern for agencies with already constrained budgets. Administrators, management, and pharmacy students were all drawn in to help handle the surge. The Florida Bureau of Epidemiology had to contract with a private firm to staff their "Epi Hotline" in an emergency.

In New York, the poison center was affected by the WTC attacks; their facilities were impacted by the loss of buildings housing the health department, police department, and FBI, prompting those agencies to initially set up operations in the poison center. They maintained their services by routing calls to an alternate hub, although their telephone lines were still jammed by the sheer volume of telephone traffic. Activities that took up time for police, fire, and health departments included collecting samples and distributing antibiotics, both of which reduced their availability for answering telephones. The only special populations reported were senior citizens, Spanish speaking populations, children, and chemically sensitive individuals.

Determining the Public Health Agencies' Requirements

The State health department is the primary determinant of the information content that is shared with the public and collected from the public. However, depending on the scale of the emergency, contact centers may also be serving local or Federal public health agencies. Required information, information format, and methods for sharing information with the agency must be determined.

An opportunity to explore data sharing requirements arose when the Colorado Department of Public Health and Environment (CDPHE) contracted with Denver Health Medical Information Centers (DHMIC) to use Colorado Health Emergency Line for Public (CO-HELP) and Colorado Provider & Hospital Information Line (CO-PHIL) telephone lines during Colorado's Smallpox Vaccination Program in the winter of 2003, and to use CO-HELP during the West Nile virus outbreak in the summer of 2003. This was an opportunity to test both the internal management structure of the Health Emergency Assistance Line and Triage Hub (HEALTH) and the external data input and output that was required. The infrastructure integration between the call center and the State health department was a virtual one. This virtual infrastructure can be seen in Appendix B, which diagrams input and output information flows.

During delivery of this service, a brief set of data fields was requested by CDPHE. A table of those fields is included in Appendix C. The amount of data to be collected for each caller was limited to maintain the comfort of the caller and the speed of the call and to minimize the amount of data storage needed and the time involved in sharing and converting files.

Data were downloaded into a Microsoft® Excel spreadsheet, encrypted, and sent weekly by e-mail to the State authorities. Using a simple software program with which most people are familiar and from which data can be exported for additional analysis ultimately was the best choice for data sharing.

Determining the Public's Requirements

The public, including special populations, is also a "user" of the service. The literature on risk communication and relevant findings from this field are summarized below. Few articles in

our research attempted to identify the specific information needs of the public that arose during past emergencies. However, journalists can serve as a proxy for the general public in emergency situations. Vincent Covello, of the Center for Risk Communication, has compiled a list of 77 questions that journalists are likely to ask, which is included in Appendix D. Although these questions were designed to prepare a public information officer for an interview, they include the information that a caller is likely to ask. The questions include requests for explanation of what happened and what actions are being advised as well as questions that help the askers gauge the trustworthiness of the source and prepare them for what will be coming next.

Special Populations

We were fortunate that the Colorado Department of Public Health and Environment had commissioned a study of special populations in Colorado and their communication requirements in a public health emergency (Cohen J. Colorado Demographics and Effective Risk Communication). According to the study, special populations are those groups that "are at risk for not receiving emergency communication, not understanding it, or not being able to follow instructions." Through key informant interviews with 23 specialists in various health, education, and social services agencies, the study identified 16 target groups. Demographic data were collected to identify where the groups were located in Colorado. The study author used focus groups and individual interviews with representatives of the target populations, literature review, and key informants to determine the risk communication requirements of the target groups. The 16 target groups were:

- Elderly
- Mentally ill
- Non-English speaking
- Low income/single parent/low literacy
- Developmentally disabled
- Undocumented immigrants
- Deaf/hearing impaired
- Homeless
- Physically disabled
- Isolated rural
- Blind
- Latchkey children
- Tourists
- Migrant farm workers
- Disenfranchised African-Americans
- Native Americans

The study assessed the groups' perceptions of who is trustworthy; how to make the message effective; how to be respectful of different values; what moral or ethical issues to avoid; what expectations the population had for risk communication; and where, how, and when the risk

information should be shared. Many of the groups overlap or share communications needs. The findings may be useful to other States with similar demographics. However, some of Colorado's special populations differed in their concerns or needs from their corollaries in national risk communication studies, pointing to the uniqueness of groups' experiences in different parts of the country. Here we reiterate the findings from this study that had relevance to our model:

Disenfranchised African-Americans and Native Americans

While most African-Americans cannot be differentiated from the majority population in their response to an emergency situation, there are those who, because of historical precedence, are inclined to distrust official warnings. This group is more inclined to trust messages coming from black community leaders or black-oriented radio stations. While they are inclined to distrust government officials, they do trust medical professionals. Black employees of Denver Health were specifically mentioned as trustworthy during focus group sessions. Technical jargon should be avoided, as this group mistrusts it. Native Americans have a similar distrust of government. About 23,000 Native Americans live in the Denver metro area, and about 3,000 live on the Southern Ute and Ute Mountain Reservations. On the reservations many of the elderly speak only Ute. On the Ute Mountain Reservation, there is a tribal public access television station and a locally produced Ute-language radio program; both would be good conduits for emergency communication.

Deaf/Hearing Impaired

The study authors report that about 7,000 Colorado residents speak only American Sign Language, which does not translate directly to English. Written messages, including those given by a teletype operator, may be confusing. Sentences must be kept simple to compensate for this.

Elderly

Because of dementia, hearing loss, failing eyesight, or speech problems, the elderly may be isolated. It would be ideal to have family members, neighbors, or other caregivers look in on them and assist them with emergency response. On their own, some frail elderly may not be physically able to take action, some may be unwilling to take action, and others may be unable to understand instructions. For the HEALTH model, this may suggest the need for developing information geared to helping caregivers aid the elderly as well as information that aids elderly callers in finding assistance. Of major concern to this group are transportation needs, getting medications, and pet care.

Physically Disabled

The report focused on the needs of individuals who live independently, assuming that caregivers would provide for those living in institutions. The physically disabled who live on their own were found to be very independent and well supported. They did not claim unique communication needs. However, they would have concerns about transportation; handicapped accessibility of shelters and vaccination clinics; and what to do in the absence of their supporters, such as spouses or family members.

Isolated Rural Residents

Many isolated rural residents do not have access to regional radio or television stations. Most have telephones. Rural schools, post offices, and convenience stores are good places to post emergency and contact information.

Homeless

Colorado has almost 20,000 homeless persons, and up to one-half may be mentally ill. Past studies cited in this report indicate that about one-third of the homeless will learn of an emergency event through media such as radio or television. Some use the Internet through public library access. Liquor stores, libraries, bus stations, shelters, food banks, and medical and mental health clinics are good places to post information. Most homeless people can read and, except for those who are psychotic or inebriated, most can follow instructions.

Latchkey Children

Although no statistics are collected in Colorado on the number of children who are younger than age 12 and stay home alone after school, the report provides one estimate that this number may be 21 percent, or 52,000 children. Most children at home have the TV on; however, some children may not be able to read. The report emphasizes the importance of schools and parents providing emergency plans and contacts, such as school staff, neighbors, parents' work telephone numbers, or emergency telephone numbers, in advance.

Low Income, Single Parent, and Low Literacy Families

People living in poverty may feel a lack of control over environmental risks and may not take action to improve their situation. These families usually have television and telephone. The message must be delivered in a way that enhances the feeling of personal control over the outcomes to elicit positive action from this group.

Non-English Speaking

Spanish, Asian languages, and Russian are the most commonly spoken languages among non-English speakers in Colorado. Many immigrants use the Internet, and posting of messages in multiple languages would be useful. All focus groups encouraged media to deliver the message in multiple languages. All groups watch TV and would like to see emergency messages broadcast on television in their language. Some immigrants may be illiterate in their own language, making the availability of informational telephone service with translation all the more important. It was reported that in past emergency events, local Spanish-language TV lagged behind the English-language networks in delivering important information. Interviewees reported that they turned to the English-language stations and tried to understand what was being said.

Ensuring Privacy of Medical Information

The HEALTH model incorporates technology channels (e-mail, Internet, fax) that potentially place personal health information at risk. Health-care organizations are required to follow privacy standards, and the model must comply with these standards. Law requires security of health and personal data; the model must meet these requirements. Confidentiality is a tool for protecting privacy. Health-care organizations are required by law to follow privacy and data security standards. The HEALTH model also must comply with these standards. Privacy of personal medical information is ensured under the following laws:

- Privacy Act of 1974
- Copyright Act of 1976
- Medical Records Confidentiality Act of 1995
- Health Insurance Portability and Accountability Act (HIPAA) of 1996
- Children's Online Privacy Protection Act of 1999

Ensuring Data Integrity

We assure the accuracy and completeness of data by archiving and retrieval processes, establishment of redundant systems, and development of a disaster recovery plan. Once entered, data are unalterable. Archiving and retrieval processes are constructed so as to not alter or delete data.

Security of Data Files

Computerized records allow health care information to be accessed, copied, or transferred to unauthorized parties; medical information is most vulnerable when transported via the Internet. Protection of data requires methods that allow only authorized personnel to have access. Security involves controlling access to information and protecting it from disclosure to unauthorized persons, alteration, destruction, or loss.[*] A security structure must be developed using:

- Encryption
- Authentication
- Firewalls
- Electronic signatures

[*] Maheu M, Whitten P, Allen A. E-Health, Telehealth, and Telemedicine: A Guide to Start-up and Success. San Francisco: Jossey Bass. 2001

Professional Licensure

By using various technology channels, the HEALTH model has the potential to provide services across State lines. For future implementation of Level 2 service outside Colorado, which can include medical triage, it will be necessary to define the licensure issues addressing specific State mandates or Federal models and to work with appropriate organizations to identify possible solutions.

Assessing Existing Resources, Processes, and Systems

Three call centers operate at DHMIC today: the Poison Center, the Drug Center, and the NurseLine. The documentation required in each organization for each contact varies and, depending on the case, can be quite extensive. DHMIC's current telephony technology is state-of- the-art with current releases. Routing of all current processes is shown in the HEALTH Model Requirements Document. A visual representation of the current systems is available in Appendix G.

The center has four T-1 lines dedicated for use by CO-HELP and CO-PHIL for emergency communications. Based on the experiences of other agencies during disaster events, we expect that during the initial week of an event, contact volumes could exceed 1,000 per hour. Although current telephony systems in place at DHMIC could handle the traffic, there would be staffing limitations; the number of staff required to handle this call volume would be 89 full-time employees.

The current systems offer accommodations for frequently encountered special populations, including Spanish-speaking agents; access to a language line with translation in 250 languages; and access to teletype for the hearing impaired.

NurseLine Systems

Processes in the NurseLine use LVM e-Centaurus. E-Centaurus Nurse Telephone Triage software offers three sets of standardized nursing guidelines: the Schmitt Pediatric guidelines, the Thompson Adult guidelines, and the American Institute for Preventive Medicine guidelines. Using these standardized guidelines, the software allows triage and tracking of each call. Licensed nurses staff the NurseLine 24 hours a day, 7 days a week.

Poison Center Systems

The Poison Center handles a large volume of calls and a large amount of case documentation, all while balancing up to three callers at a time. Each call is documented in CasePro, an on-line patient record used for data collection, case management, tracking, and reporting. The poison center also serves hospitals and health-care providers with pill identification. The different callers and potentially life-threatening cases require careful telephone triage, which is done primarily through initial assessment by staff. The system complies with Toxic Exposure to Substances Surveillance, used by the American Association of Poison Control Centers for data collection and reporting. The system also complies with the

Federal Insecticide, Fungicide, and Rodenticide Act to allow reporting to the Environmental Protection Agency (EPA) on poisonings related to pesticides. The poison center is staffed 24 hours, 7 days a week by an average of 6 information specialists with 15 on staff during peak times and as few as 2 during low periods. A portion of the calls are followed up in order to clarify outcomes and for quality control purposes.

Drug Center Systems

Within the Drug Center, the clients, mainly pharmaceutical companies, dictate the call flow, data forms, and quality control requirements. The drug center is staffed 24 hours a day, 7 days a week by registered pharmacists.

Chapter 5. Model Requirements

Using the research on lessons learned for emergency response and best practices for call center management, we derived a set of requirements for the model. These requirements achieve the goal of delivering a public health emergency contact center that is highly integrated with public health agencies and can minimize surges to the health-care delivery system during a bioterrorist event or other public health emergency.

We produced a Requirements Document, which is available as a companion to this report (Appendix O). It lays out the technical specifications or functionality required to support the business needs associated with developing the Health Emergency Assistance Line and Triage Hub (HEALTH). This document is a technical document used to guide purveyors of information and communications technology in submitting proposals for systems upgrades that would meet our objectives. It should be kept in mind that this document, as well as its follow-up document, HEALTH Multi-Channel Contact Center Specifications Concept Plan and Report, are specific to DHMIC and are included as examples of the steps in acquiring appropriate technology upgrades.

Process Requirements

- Data collection should attempt to identify the public's risk perceptions, particularly around issues of trust, control over the risk, equity, and dread.
- The process should effectively handle surges of up to 1,000 contacts per hour.
- The process should include maintenance of a library of Centers for Disease Control and Prevention (CDC)-approved Frequently Asked Questions (FAQs) on agents of concern for bioterrorism.

Privacy and Security

- The model must include a privacy policy statement and updates of privacy and confidentiality policies as they relate to various technology channels.
- Notice and consent verbiage that advises patients of confidentiality and security issues must be developed.
- A security structure must be developed.

Data

- Data collected must give feedback to public health agencies on the public's concerns.
- Data fields must meet public health agencies' needs.

- Database content must be consistent with State and CDC disease reporting programs.

- Call metrics must be collected for continuous quality improvement, including the costs per call, hang-up rates, wait times, call length, FAQs shared, etc.

Personnel Requirements

- The model should maintain readiness for surge capacity staffing without additional cost.

- The model should minimize training times.

Volunteers

- The model should include a volunteer management plan that addresses recruitment, management, training, activation, evaluation, and security.

- Staff and volunteers must be trained specifically to deal with callers in a disaster event by adjusting for the public's lessened ability to process information under stress. This can be accomplished by tailoring the message and the method of delivery accordingly and frequently repeating the message.

Technology Requirements

- The public's preferred communication modes should be offered (e-mail, fax, etc.).

- The technology must be cost-effective and able to keep up with future technology advances.

- The model should offer alternatives to traditional telephony if telephone systems are down, especially during the first hours of an event.

- The systems must accommodate a call volume of 1,000 calls per hour without detracting from other essential service provisions of DHMIC.

- The systems should include plans for remote access or alternative site staffing.

- The system should allow high priority calls to get through in time in spite of surges.

Incident Command System

Incident Command System (ICS) is an organizational tool that can be thought of both as a requirement of public health and disaster response agencies and as an internal requirement for good emergency response management. Disaster events may involve huge numbers of personnel whose activities must be carefully coordinated, and multiple agencies that must quickly establish effective ways of interfacing with each other and, in a unified fashion, with the public.

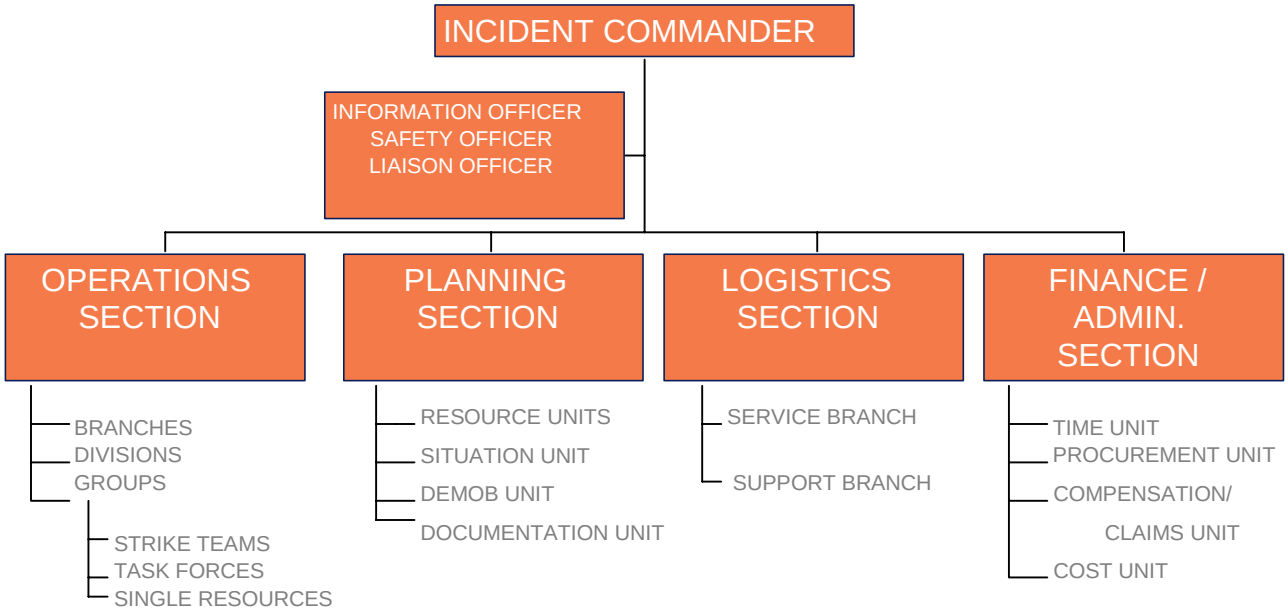
The ICS is an organizational tool, used by emergency response agencies to maximize the effectiveness of their response. Law enforcement, fire departments, and the military have long used this system. Public health agencies have come to realize the necessity of identifying how to fit into the larger ICS and how to apply it internally to make their emergency response more effective. The same challenge--identifying how to fit into the larger incident command structure and how to apply it internally--exists for the HEALTH model. To be prepared for emergency mobilization, the call center must establish its own internal incident command structure and activation procedures. This framework must be established prior to any event and frequently tested and evaluated.

ICS provides the following key management functions:

- Minimizes the span of control.
- Maintains unity of command.
- Keep decisions and resource allocations prioritized and objective-driven.
- Uses common terminology.
- Creates and follows an action plan.

ICS begins with establishing lines of authority and communication to be followed when an event occurs (see Figure 1, below). Roles and responsibilities are pre-assigned and are based on job title. The Command staff consists of the Incident Commander and the Liaison, Information, Safety, Operations, Planning, Logistics, and Finance and Administration Offices.

Figure 1. ICS organizational flow chart



The Incident Commander has the ultimate responsibility for determining event objectives and strategies. The Information Officer coordinates all information dissemination and clears all information releases. If an information point person is not made readily available to the media or is not prepared to provide accurate information that addresses the public's concerns, the media will conduct its own risk interpretation and will disseminate its own conclusions to the public. In the case of a possible bioterrorist event, information control can be a more sensitive issue if, for example, a criminal investigation is concurrent with the event management. In the case of an event involving human patients, there are additional concerns for privacy of victims and sensitivity to victims' families.

The Safety Officer anticipates, detects, and corrects unsafe situations. The Liaison Officer serves as a contact point for representatives of assisting and cooperating agencies. The Operations Section develops the strategy portion of the Incident Action Plan, participates in the planning process, and accomplishes the incident objectives. The Planning Section maintains resource status, gathers and analyzes data, provides displays of situations, estimates future probabilities, and prepares alternative strategies. The Logistics section manages the allocation of personnel, equipment, services, and support. This section is responsible for management of internal communications equipment and strategies. The section also is responsible for procurement and for servicing equipment. The Finance and Administration Section will provide financial management and accountability. They will authorize expenditures, maintain disaster records, maintain injury and damage documentation, negotiate vendor contracts, and establish any formal agreements with other agencies.

ICS is flexible, allowing for a systematic approach that can be expanded or collapsed as needed, depending on the level of response required for a specific incident. ICS allows for multiple emergency response agencies to effectively coordinate to maximize resource utilization and improve communication while minimizing confusion, proliferation of misinformation, and duplication of efforts.

Effective Risk Communication

Risk communication is the science of communicating critical information to the public in situations of high concern. The objectives in emergency communications are to identify and respond to the barriers of fear, panic, distrust, and anger; build or re-establish trust; resolve conflicts; and coordinate between stakeholders so that the necessary messages can be received, understood, accepted, and acted on.

Risk communication includes using both one-way (mass broadcast) and two-way (including one-on-one) communication strategies to identify and overcome barriers to effective communication. The goal is to assist people at risk in identifying their risk status and making choices that will protect their health and safety.

Principles of Risk Communication

- *Identify the public's risk perceptions*. Collect information about the public's perceptions about the risk, particularly around issues of trust, control of the risk, equity, and dread.

- *Establish two-way communication*. Listen to the public's concerns. The public must feel that their concerns are heard and are being addressed. Accept and involve the public as a legitimate partner. Sustain interaction with the public regarding their concerns.

- *Avoid unnecessary negative language*. Adjust for the public's tendency to focus on negative messages by countering negative messages with positive or solution-oriented messages.

- *Develop trust*. Be honest, frank, and open. Trust will be erased by public disagreement among experts, denial of risk, insensitivity, irresponsibility, or lack of coordination.

- *Coordinate and collaborate with other credible sources*. While trust is best established ahead of time, "trust transference" can occur when a highly trusted source concurs with the message delivered by a less-trusted source.

- *Cut through the mental noise*. Speak clearly and with compassion. Adjust for the public's ability to process information under stress. Tailor the message and the method of delivery accordingly. Make sure the message is repeated frequently.

- *Provide one-on-one communication*. Television and radio broadcasts will provide information that is adequate for most of the public; however, there will always be concerned citizens who, for whatever reason, need personal communication.

Strengths of DHMIC in Providing Effective Risk Communication

Our medical information centers (Poison Center, Drug Center, and NurseLine) are already trusted sources of information used by more than 250,000 people each year; the public currently

confers a high level of trust on medical information centers. Our staff is trained to listen and to provide critical information to callers who may be in distress. They are experienced in conferring respect and confidentiality to their callers. Poison centers and nurse advice lines hold the position of trusted information service providers, making them appropriate vehicles for risk communication in a bioterrorism event. When the communication is delivered in a compassionate, informed, and consistent manner, it will foster trust and reduce anxiety. The DHMIC is exploring remote triage capabilities to provide services in high-demand situations. Remote triage may take on great importance in the event of an outbreak of infectious disease that creates a need for mass quarantine, causes hospital closures, and necessitates home-based care.

The Importance of Two-way Communications

The importance of establishing one-on-one communication or two-way mechanisms as early as possible has been identified as a need in the evaluation of response to several disasters, including the WTC bombings. This necessity is dual: it is essential to have the capacity to collect information on both symptoms and the community's concerns. This allows the public health agencies to respond to the public's concerns and symptoms, building critical trust and credibility.

Exportability Requirements

We determined that there are three key requirements for a truly exportable model of an emergency contact center. These requirements deal with the ability to provide medical triage, offer preferred communication formats, and assess capacity for providing services.

- The HEALTH model should address medical licensing requirements for serving States other than Colorado with medically licensed call center staff.

- The HEALTH model should offer different communication modalities to reflect the differing needs of agencies that serve populations with different preferences.

- The model should offer a "tool set" that can aid other organizations in assessing their capacity and needs for developing this sort of service.

The first issue is outside the scope of this project and depends on legislative bodies and their decisions. The second issue depends on the specific characteristics of the population to be served, which are addressed in Chapter 5, and the potential technological solutions, which are addressed in section Chapter 7. To address the last issue, we have developed a "tool set," which is included in this report and discussed in section Chapter 6.

HEALTH Contact Center Assessment Tool Set

In the fall of 2001, the intentional release of anthrax in the eastern United States caused much fear and panic. The Denver Health Medical Information Centers (Rocky Mountain Poison & Drug Center and the Denver Health NurseLine) experienced a 10 percent increase in call

volume without an actual incident in our five-State service region (Colorado, Hawaii, Idaho, Montana, and Nevada).

- What would your agency do to accommodate a surge in contacts from a public trying to get information?

- Could you adequately predict the potential volume?

- How would you begin to identify staff and other resource needs?

Understanding the potential information demands related to a health emergency and developing strategies to handle these surges is important for all public health and health care agencies.

A tool set was developed in conjunction with the HEALTH model to assist public health agencies in understanding the potential magnitude of public information needs related to bioterrorism or other emergency events. The tool set allows for minimal and fine-tuning input to help public health agencies assess their current operational and technological infrastructure and their capability to field public inquiries. The user will enter data into the tools or view sample calculations to determine resources needed to meet potential risk communication demands related to public health emergencies. The user will review different options and strategies for handling these risk communication demands and better understand the requirements and resources for each option. The tool set contains six tools or components:

1. **Instructions**--Provides basic directions for using the tool set and allows you to enter a target population. Each of the subsequent components contains further instructions on how to use them. In case there is any question about the tool or its use, contact information has been provided.

2. **Contact Surge Calculator**--Provides a simple way for a public health agency to estimate the number of contacts (telephone, Web site, e-mail, fax) that may be generated from a bioterrorism or emergency event.

3. **Staffing-Resource Calculator**--Provides a simple way for a public health agency to determine personnel and basic resources (telephone lines) needed to handle an expected number of contacts (based on call center industry standards) with an internal contact center or hotline. This component uses Erlang-B and Erlang-C modeling calculations (long used as a standard for call center planning and forecasting). By entering basic parameters, such as service level required, call volume numbers, and duration of calls, the user can calculate staffing requirements.

4. **Capital Expense Calculator**--Provides a means for a public health agency to assess the facilities and equipment needed to handle an expected number of contacts. This component calculates the potential investment needed for resources not currently available so agencies understand potential costs associated with an internal contact center or hotline.

5. **Technology Expense Calculator**--Provides a means for a public health agency to assess the technology infrastructure needed to handle an expected number of contacts. This component calculates the potential investment needed for resources not currently available so agencies understand potential costs associated with an internal contact center or hotline.

6. **Surge Options Matrix--**Provides a simple way for a public health agency to assess its capabilities for implementing an emergency contact center or hotline and suggests other potential options.

A functional copy of the HEALTH Contact Center Assessment Tool Set can be found in Appendix N.

Chapter 6. Design

Why a Contact Center?

Experience has demonstrated (see Chapter 5) that there would be a very high demand for direct communication in a bioterrorist event. Health emergency events, including disease outbreaks and disasters with implications for public health, universally result in large numbers of people calling local and State health and safety agencies. While to date the primary communication means has been telephone, a wider variety of means is now possible. Thus, we will use the term "contact centers" instead of "call centers." Contact centers would offer expanded choices for users to access information and could include telephone, e-mail, Web sites, Web-chat, fax, and video (see Appendix H for examples).

Public health authorities risk losing control of the public's perception of the event if they do not provide good risk communication. While television and radio broadcasts will provide information that is adequate for most of the public, there will always be concerned citizens or "worried well" who, for whatever reasons, require additional personalized communication. In the past, authorities have set up impromptu call centers to deal with the demand for individual communications. These call centers have been set up in response to disease outbreaks to give the public treatment advice or prophylaxis recommendations. Usually these centers use existing personnel who are drawn away from their usual duties. The drawbacks to the impromptu creation of a contact center include high cost, poor planning, loose organization, lack of security, ad hoc training of staff, and low capacity for consistency of data sharing and data collection. Additionally, the reactive creation of a contact center prevents systematic performance evaluation because basic metrics and measurements of effectiveness are generally not available.

An existing contact center, utilizing the best practices for risk communication in an emergency, is clearly a superior application of resources. Poison centers and nurse advice lines are already a primary point of contact for acute exposures and medical triage. Poison centers, in particular, are well known to the public and are trusted sources for information. Thus, the DHMIC proposes that existing medical contact centers may be appropriate repositories for creating and maintaining readiness to provide one-on-one health and medical information in a health emergency.

Processes

Designing the model started with a definition of what processes suit the model's needs, identifying how the call center and State health department's infrastructures needed to be integrated, understanding the existing call centers' processes, and identifying commonalties between processes within the various DHMIC call centers. This can be best visualized through a tool that we used called input/output information mapping. Once the steps in the process were identified, levels of service that drive the Health Emergency Assistance Line and Triage Hub (HEALTH) contact processes were determined. Through the implementation of the Smallpox

Vaccination Support Services program, an operational management structure to support the HEALTH contact process was developed and tested. Finally, we addressed the legal requirements for security and privacy that would be required in the HEALTH model.

Ensuring Consistency of the Message With Decision Triage Trees

The service user (usually the State health department) approves the content of each decision tree, which will depend on the weapons-of-mass-destruction (WMD) agent or other type of event being responded to. A sample decision triage tree is available in Appendix I and on the CDC Web site at www.bt.cdc.gov/agent/smallpox/vaccination/clineval. At each juncture in the routing, a decision tree is used to dictate the route to be taken. Some decision trees will be at the discretion of the caller through interactive voice response (IVR); other decision trees will be decided through an information specialist using a series of pre-determined questions.

This system offers the best guarantee that a consistent message and consistent response to each call is delivered. Use of decision trees also minimizes training times and can allow for the use of information specialists without specialized medical training or licensing.

Using decision triage trees that are embedded in the software being used by the answering information specialist provides another important function. Offering information on public health topics can come close to crossing a line into offering medical advice or diagnosing symptoms. These practices could be a liability risk for the call center. The decision triage tree should prevent such errors by providing an appropriate answer or referral when a caller asks for medical advice. In spite of their knowledge and expertise, even nurses on health advice lines usually use medical triage software for just these reasons.

Testing Different Operational Management Models

Stand-Alone Management Model

In implementing the Smallpox Vaccination Program Support Services telephone lines, a stand-alone management model was used; that is, a call center manager and dedicated smallpox support services staff were hired for the duration of that service. Because of the high cost of maintaining readiness under this model, we attempted to convert to an integrated management model after the initial few weeks of operations.

Integrated Response Management Model

For HEALTH to function well, an integrated approach was necessary. However, this meant that the same staff who managed the NurseLine, Drug Center, and Poison Center had to take on additional roles to implement Colorado Provider & Hospital Information Line (CO-PHIL) and Colorado Health Emergency Line for Public (CO-HELP). Currently, the NurseLine, Drug Center, and Poison Center have 3 different managers and different protocols, skills, and software. For our agency, an integrated management plan would require the unification of management, processes, employee training, and systems at the three call centers. For these reasons the integrated management plan did not work and a modified integrated response management model was proposed.

Modified Integrated Response Management Model

Following discussions with DHMIC call center managers, a modified integrated response model was decided on. The modified model integrated the management of HEALTH into the NurseLine, with access to personnel and systems resources in the other two call centers when surge capacity was required. The model functioned on a day-to-day basis, and this competency was tested when the West Nile virus hotline was provided through CO-HELP.

This approach provided:

- A management structure than can be scaled up or down to deal with a small planned event or a large surge by accessing personnel from the other call centers.
- Defined roles and responsibilities for CO-HELP, CO-PHIL, and other call center personnel.
- Minimized cost (does not require standardization of the different management processes of the three call centers) by focusing the integration into one program, the NurseLine.

Ensuring Privacy and Security

Within the three call centers at DHMIC, legal requirements, confidentiality, and privacy are well established for traditional telephone communications. This is another advantage that a medical call center has over an impromptu set-up. Current confidentiality policies must be updated to incorporate references to each new media channel (Web-chat, fax, e-mail), before it is brought on line. The policy statements regarding each media channel must specifically address users, authentication, confidentiality, security provisions, and usage rules.

When discussing personal or medical information in the delivery of service, a "notice and consent" form must be developed for patients who wish to use various media channels to communicate with the center. The notice advises contacts of the confidentiality and security issues, and identifies who will see their health information.

Directions must be provided on how to use the channels for communication or medical triage purposes. This includes information on how callers identify themselves, the specific kind of messages appropriate for e-mail, how to escalate issues when necessary, and cautions against using certain channels, e-mail for example, for emergencies or sensitive health issues.

Usage boundaries need to be defined. This includes how information is shared and forwarded and rules for handling.

Where the communication will be stored and whether it will be referenced to any personal identifiers must be determined.

Finally, technical security measures need to be developed to address HIPAA requirements, for example, the possible use of encryption technology and auditing mechanisms.

An example of a privacy policy statement that can be used follows:

> The Center respects an individual's rights to privacy and strives to protect such rights when using e-mail to disseminate health-care information. It is important to note that e-mail communication is not entirely secure. All information collected by the Center, including your e-mail address, is confidential and is not shared with other

organizations. Should information need to be disclosed to another organization, an informed consent will be obtained. Data collected augments your confidential medical record information and includes your e-mail address. At the present, e-mail is used solely for the purpose of disseminating health information to persons requesting such information. Should questions arise following receipt of the e-mail, the requestor needs to call the Center. Only authorized health providers, systems, and administrative staff of the Center have access to your information. The Center maintains a secure network, and measures are taken to ensure security.

The Center currently has a secure local area network (LAN) using network-based authentication of users and external access through a firewall. Users access the network through a log-in requiring an individual user name and password that expires every 60 days. Screen savers with password protection protect information on a computer workstation. As part of the new employee process, all personnel sign a security agreement. Network and desktop anti-virus software also protects data and systems. Training, policies, and procedures describe the security measures enforced, and job descriptions identify access rights to secured information.

To ensure data integrity, the Center will maintain and enforce a policy on record retention and retrieval and purging old documents. Data are currently backed up and stored on-site and off-site. In addition, disaster recovery processes include redundant telecommunications, computer systems, and T-1 connections and an emergency power supply to critical departments in the Center.

Measuring Performance

Measuring the performance of resources is key to providing quality management. Continuous quality improvement is an effective management tool to provide these measurements. This is actually part of the day-to-day operational management structure. It uses call metrics and other measures to assess the quality of the service provided and to identify and address inefficiencies in the processes. A continuous quality monitoring process that was used for the Smallpox Vaccination Program Support Service is available in Appendix J.

Continuous quality improvement steps:

1. Call audits
    a. Listening to calls or
    b. Reviewing call data for:
        i. Service requirements/processes
        ii. Confidentiality
        iii. Risk communication
        iv. Documentation
        v. Communication
        vi. Information gathering

2. Recording corrections or additions
    a. Written request is sent for record correction or additions.

b. Corrections are added to database.
c. Date and time of new entry are recorded.

Disaster Recovery Plan

DHMIC has plans in place for recovery from disasters. The types of events that must be planned for will vary for different agencies. We have planned for five types of events:

1. Mass toxic exposure resulting in a sudden and substantial increase in calls to the Poison Center.

2. Media crisis – any event involving a potentially toxic exposure requiring information dissemination to the media and public.

3. Paralytic disaster – any event that hinders or prevents DHMIC from providing services, such as natural or man-made events or extreme weather conditions resulting in mechanical breakdown of systems or preventing staff from reporting to work.

4. Fire at the DHMIC facility.

5. Tornado or severe weather warning for the DHMIC facility.

A generalized version of the DHMIC's Disaster Recovery Plan is included in Appendix K. Our plans address several components, outlined below, in preparing for a disaster. Activation of CO-HELP or CO-PHIL follows the same procedures, with the addition of the necessary request for service by the State health department.

Preparing for Systems and Facilities Failures

- Preparing for a disaster requires installing redundant or back-up systems in case of power failure, communications system failure, or computer failure.

- Planning for such systems failure may include planning for an alternative site; DHMIC has such plans in place through reciprocal agreements with two other western poison centers for calls to be routed to the alternative poison center in a paralytic disaster.

- Alternatively, an agency may develop a facilities checklist to ensure that an alternative site chosen during an emergency will meet their needs.

- For some agencies or types of events, new sets of equipment or facilities necessitate the preparation of emergency response kits, including 2-way radios, vital informational resources, and emergency call-down lists.

Assigning Roles and Responsibilities

Regardless of the severity of the emergency, roles and responsibilities must be defined in advance and incorporated into employees' training and performance objectives.

- Decision-making should be consolidated. Experience has shown that decision-making by committee is dangerously inefficient during a disaster.

- Chain of command must be pre-determined. For our agency, the type of event may indicate a different chain of command or response sequence; leadership during a loss of computers or telephone lines will primarily fall to the Director of Information Systems, whereas the response to a mass toxic exposure will be headed by the Director of the Poison Center.

- Lines of communication must be pre-established. Call-down lists and contact information must be kept current, including contact information for partner agencies and media.

- Responsibilities for all levels of staff must be pre-assigned and must be addressed in employee orientation, training, and evaluations.

People

We identified strategies to provide staffing capacity for emergencies and to define roles and responsibilities of volunteer and paid personnel during an event.

The strategies are:

- Personnel profile

- Emergency/surge staffing

- Volunteer management plan

- Training plan

Personnel Profile

The skill profile of the personnel needed is dependent on the level of service required; this would be determined by the nature of the event. With the administration of CO-HELP and CO-PHIL for the Smallpox Vaccination Program Support Service, two service level agreements (SLAs) were developed to meet the need of the Colorado Department of Public Health and Environment (CDPHE). Level One service requires information specialists who do not need to have a medical background. Level Two service requires access to licensed staff (nurses, pharmacists, and physicians). Job descriptions for both levels of service are included in Appendix L. Establishing these SLAs allowed us to quickly and easily clarify expectations with CDPHE. This will aid in quick start-up in the event of an emergency.

Level One Service

This basic service offers information by telephone and Internet, with recorded messages and information specialists available to answer questions via approved Frequently Asked Questions (FAQs), along with collection of the caller's county of origin and which FAQ was accessed.

Level Two Service

This expanded level of service would offer recorded information supplemented by available information specialists answering questions from approved FAQs and protocols, but would also offer decision support for the public from licensed professionals using pre-designed protocols or Centers for Disease Control and Prevention (CDC) clinical decision trees. This service would also offer decision support for symptoms reported by health care providers and symptom or exposure surveillance for the public health agency. The delivery method would include telephone, Web-based technology, information specialists, registered nurses, and pharmacists, with the possibility of consultations with other professionals (e.g., infectious disease specialists, epidemiologists, and toxicologists) as necessary.

Emergency/Surge Capacity Staffing

Based on research and the proposed multi-channel systems (described in Appendix P), it was determined that 59 people would be required to handle 1,000 contacts per hour if the various media channels (Internet, Web chat, e-mail and fax) were fully used. The staffing resource and contact surge calculators available in the tool set (see Appendix N) will calculate the number of people needed to handle emergencies of varying magnitude given whatever technology is available.

Internally, the DHMIC can draw on staff from the NurseLine, Drug Center, Poison Center, Research and Consulting Department, and Medical Toxicology. Use of in-house human resources for addressing surge capacity in a public health emergency requires development of an internal management plan for scheduling, payroll coding, and management as well as development of software and database linkages, cross-training, and maintaining existing services. It also requires maintaining a roster of staff who may have priority obligations elsewhere (such as National Guard or physicians who may be called to the Emergency Department). Declaration of an emergency would signal a move to the Incident Command System of management, allowing the call center Incident Commander to make decisions on surge capacity and emergency personnel resources.

Volunteer Management Plan

Externally, a pool of potential volunteers may need to be recruited and developed. From research on public health emergencies, volunteers, planned-for and unplanned-for, are a surprisingly consistent factor in disaster events. Volunteers are potentially a crucial resource that, if not planned for, can become an actual threat to security and site management. Volunteer management is required both to address unplanned-for volunteers showing up and to provide additional personnel to address surges in call volume. Nationally, health departments are

developing lists of potential volunteers that can be called in large-scale emergencies. Medically licensed volunteers will be in demand. Planning for such an event requires the volunteer pool to be defined in advance. For DHMIC, recruitment and training of volunteers is a future task, and finalization of a volunteer management plan likewise will take time.

A volunteer management plan should include:

1. Pre-event recruitment
2. Call-up procedures
3. Training plan
    a. Advance training (pre-event training)
    b. Emergency ("just in time") training
4. Management plan
    a. Roles and responsibilities
    b. Incident command structure
5. Security plan
6. Evaluation
    a. Volunteer satisfaction
    b. Volunteer performance

Training Plan

A training process was developed for and tested during the implementation of the Colorado Smallpox Vaccination Program Support Service and the West Nile virus hotline. Both projects had very rapid ramp-up times; implementation took less than one month. New personnel received 3 hours of didactic and 3 hours of practical training. Existing administrative personnel received training in the program in case of surges in call volume. A generalized training plan is available in Appendix F.

Technology

This component describes a conceptualization of the systems required to create the 21st-century contact center, which was visualized as the answer to the problem of emergency public health communications. A representation of the existing systems at DHMIC and the proposed augmentations is available in Appendix G. A technology expense calculator and a surge (technology) options matrix are included in the tool set (Appendix N).

The system allows the same call center staff person to manage multiple channels of contact, including voice, e-mail, Web chat, and fax, while accessing multiple databases for providing information, medical decision trees, or data collection. The concept provides information options to the public, is exportable, ensures the consistency of information, and is designed to handle surges of up to 1,000 callers per hour while getting priority calls through to skilled professionals. The complete description of the systems model on which this section is based is available in the component report entitled, HEALTH Multi-Channel Contact Center Specifications Concept Plan and Report (Appendix P), prepared for DHMIC by William Wood of Wood Associates Corporation, Highlands Ranch, CO.

In summary, the proposed systems provide:

1. IVR (interactive voice response)
    a. Capable of automatic number identification (ANI) capture and computer telephony integration (CTI) (capture, store, write to other applications such as LVM e-Centaurus and CasePro)
    b. Capable of interfacing with Web applications
    c. Capable of natural speech recognition
2. Touchtone or "speak" input/prompt capture
3. Multi-channel routing solution
    a. Capable of routing voice, e-mail, Web/chat, and fax work items
4. Health care professional (contact center agent) desktop
    a. Ability to have a "screen-pop" of captured information from IVR or other routed channels in local databases/applications (LVM e-Centaurus and CasePro)
5. Health care professional (contact center agent) desktop REMOTE workstation
6. Ability to work remotely with full function workstations
7. Robust real-time and historical reporting system

The Multi-Channel Contact Center

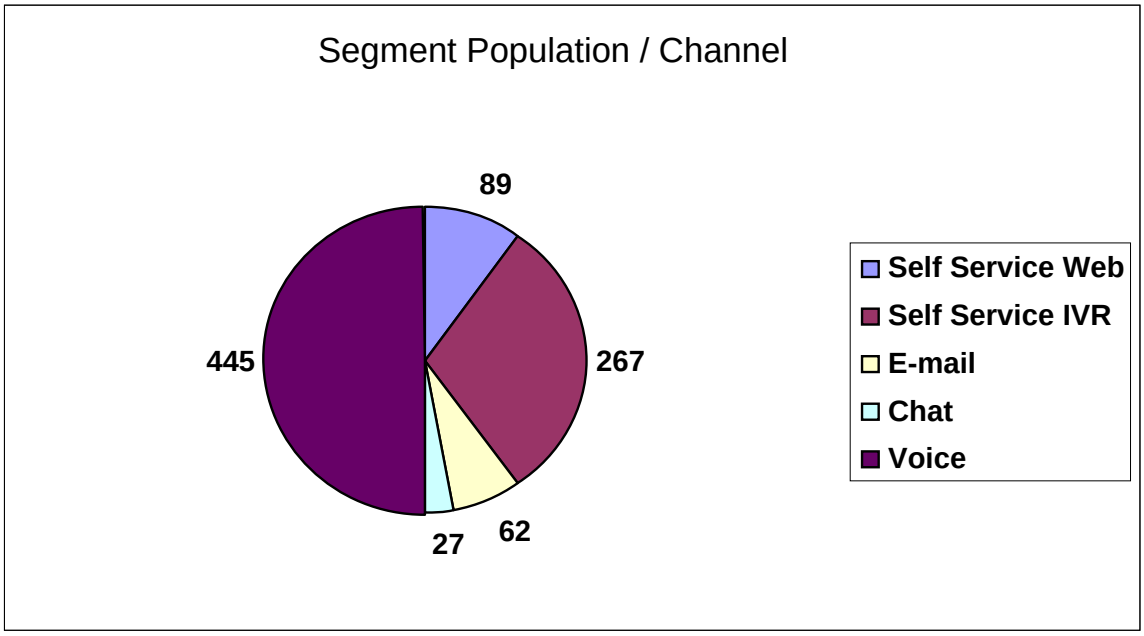
The general population will be able to access information from the World Wide Web or through a self-service application on an IVR or voice response unit (VRU) that will provide the latest information regarding the event. FAQs can be posted for use by the public either on the Web or through the IVR and updated as additional statistics and information are gathered from those reporting on the event.

We estimate conservatively that at least 40 percent of the general public could be satisfied through these two self-service sources of information. Although there was no tracking of self-service information sourcing in past public health events in our research, there is significant documentation regarding self-service channels in call centers. Depending on the industry (banking reporting the highest use of self-service channels), anywhere from 40 percent to 85 percent of traditional "voice channel" calls can be handled through self-service.[*] This estimate held up in our experience with the smallpox vaccination program, and with West Nile virus (WNV), when 54 percent and 45 percent of calls respectively were served by the recorded message alone. Health care providers could also use these self-service options, although we anticipate 50 percent reduction in usage from that of the general population. A small percentage of the symptomatic public (most likely self-determined as falling into that category) may be satisfied through these self-service options.

In Figure 2 we have plotted how 1,000 contacts per hour might be segmented by channel of choice for those clients requiring information regarding an event. There will still be a significant request volume via the traditional voice channel; however, with IVR augmenting that channel, it will help deflect part of the voice channel volume. The self-service options for both Web and IVR could reduce the need for agents by 53 percent, or 47 full-time equivalents (FTE), from 89 to 42 FTE.

[*] National Performance Review, Federal Consortium. Putting Customers First; Serving the American Public: Best Practices in Telephone Service 1997.

Figure 2. Anticipated use of communication modalities during an emergency (N = 1000 contacts per hour)



Chapter 7. Implementation

Smallpox Vaccination Program Support Service

Following the Presidential Order of December 13, 2002 to vaccinate emergency medical hospital staff against the smallpox virus, the Colorado Department of Public Health and Environment (CDPHE) implemented Phase I of the Colorado Smallpox Vaccination Plan. The CDPHE contracted with Denver Health Medical Information Centers (DHMIC) to provide support telephone lines to the public via the Colorado Health Emergency Line for Public (CO-HELP) and to vaccine recipients and their health care providers via the Colorado Provider & Hospital Information Line (CO-PHIL) during implementation of the smallpox vaccination program. This was recognized as an opportunity to test some components of the Health Emergency Assistance Line and Triage Hub (HEALTH) model.

The service provided general smallpox information to the public and specific vaccine information to vaccine recipients and their health care providers. The service collected Vaccine Adverse Events Report Surveillance (VAERS) data on behalf of CDPHE and the Centers for Disease Control (CDC). The service also provided trained nurses to offer decision support and referrals to vaccine recipients who were experiencing vaccine-related adverse events using CDC approved clinical decision trees. A diagram of the information flow delivered in this service is available in Appendix E, and a sample report made to the State health department is in Appendix C.

With approximately 1 month to plan for the event, the DHMIC hired a call center manager and five information specialists. The rapid ramp-up of the service allowed DHMIC to approximate the response to a public health emergency event. Calls were routed to our center using the CO-HELP and CO-PHIL toll-free numbers via a total of four dedicated emergency T-1 lines (each T-1 is made up of 24 telephone lines). These telephone numbers and T-1 lines had been installed in early 2002. Callers received information provided by the CDPHE and CDC through a recorded message with the option to speak to an information specialist afterwards. Information specialists documented types of questions asked by callers, information given, and required data for vaccine adverse events. They also offered referral to on-call physicians, State and national epidemiologists, and infectious disease specialists. Registered nurses provided medical decision-making assistance using the CDC clinical decision trees. The need for new required information arose on two occasions. The first occurred when an ophthalmic inoculation occurred. This prompted the CDC to develop a new clinical decision tree. The second need arose when military vaccine recipients emerged as a special population that requested service through this program.

CO-HELP and CO-PHIL received 193 calls between January 28 and April 26, 2003. Of these, 116 called via CO-HELP and 77 called via CO-PHIL. Of all 193 calls, 76 callers (39 percent) spoke with a live agent. The most common questions asked by callers are summarized in Table 3. Adverse events were reported in 12 cases. Ten of those cases were civilian, and two were military vaccine recipients. A summary of the adverse events reported is presented in Table 4.

Table 3. Most common questions from vaccination recipients and providers (N = 76; callers had multiple questions.)

Type of Question	No. (%)
Military referral?	19 (25%)
Concern about contact with vaccine recipient or inoculation site?	11 (14%)
Smallpox Resource Referral list?	7 (9%)
Does the old vaccine still protect?	6 (8%)
Can I work if I'm vaccinated?	5 (7%)
After I am vaccinated, how long do I need to wait to donate sperm/blood, take steroids, etc.?	5 (7%)
Should my children be vaccinated?	3 (4%)
Other	24 (31%)

Table 4. Adverse events reported to CO-PHIL (N = 12)

Adverse Events	No. (%)
Contact inoculation	3 (25%)
Ophthalmic inoculation	3 (25%)
High blood pressure w/ visual symptom	2 (16%)
Encephalitis	1 (8%)
Generalized vaccinia	1 (8%)
Neurologic symptoms	1 (8%)
Localized reaction	1 (8%)

West Nile Virus

During the summer of 2003, Colorado was hit with the worst outbreak of WNV yet experienced in the United States. By the end of September, 42 people had died and 2,013 people had serologically confirmed infections. Anticipating the spread of WNV in the State, CDPHE contracted with us to provide a WNV hotline. CO-HELP went into operation on July 22, 2003 and was available through October 13, 2003.

Our basic level of service, staffed by information specialists and delivered via CO-HELP, was implemented for public support during the WNV outbreak. Callers listened to a recorded message and afterwards were instructed to stay on the line to speak with an information provider. The information specialists answered questions using Frequently Asked Questions (FAQs) that had been developed by State epidemiologists. We designed a Public Health Information Program within the LVM e-Centaurus Software used in our NurseLine to assure accurate and consistent delivery of this information. The design was built on a database containing State approved FAQ information and used embedded decision trees to assure that information specialists responded to call types appropriately. Ongoing updates were communicated as required. A dead bird survey was developed to support counties that were overwhelmed doing dead bird surveillance. During the smallpox vaccination support program, we collected county data only from callers. During WNV per county requests, we collected zip code and city as well. Calls were received from 54 Colorado counties (84 percent), 33 other States, and Canada.

Reports were produced in Excel and sent to CDPHE in encrypted e-mails. Early on in the program some counties saw the value of the data collection and requested county-, zip code-, and city-specific dead bird reports to support their surveillance efforts.

By September 30, 2003, we had received 12,227 calls. Forty-five percent of callers listened to the recorded message only; 3 percent hung up while on hold for a live agent; and a live agent handled the majority, 52 percent, of calls. We began the program with 223 FAQs and had to add 21 additional ones to meet caller requests, ending with 244 FAQs. The frequency of top FAQ categories is listed in Table 5, and the frequency of the top 10 questions asked by callers is summarized in Table 6.

Table 5. Frequency of top FAQ categories (N = 6687, callers who spoke with a live agent)

Top Categories	%
Dead bird report	41.6%
General information call	25.5%
Possible human WNV case	20.6%
Other	9.6%
Possible animal WNV case	1.3%
Callback	0.7%
Health professional, nurse, doctor	0.6%
Media request	0.1%
E-mail information back to caller	0.1%

Table 6. Frequency of top 10 questions asked by callers (N = 131)

Top 10 Questions	No. (%)
What are the symptoms of WNV?	1318 (38.8%)
How can I protect myself from WNV?	740 (21.8%)
I found a dead bird; is it likely to have died from WNV?	422 (12.4%)
How can I safely handle a dead bird?	209 (6.2%)
Can birds pass WNV directly to humans?	152 (4.5%)
Why have some areas stopped testing dead birds?	149 (4.4%)
Will a WNV infection protect me from future infections?	128 (3.8%)
How should I deal with dead birds on my property?	120 (3.5%)
Can my dog/cat get WNV?	88 (2.6%)
Is there a mosquito control program in my area?	73 (2.2%)

We summarized our call metrics for CO-HELP during the WNV hotline period. We used the same categories of metrics that are used by the broader call center industry. It is important to note that while we could report these metrics, no direct comparisons should be made due to the significantly specialized nature and circumstances of the WNV hotline. For example, there are training differences between a "hotline" and a full-blown call center operation, with the former being more specialized and emergent. In addition, without known call volumes as is the case with an emergency hotline, we were pleased to meet some, and come close to other, metrics set for a contact center that does standard work with predictable call volumes. We had the advantage of being within a well-equipped call center environment, which allowed us to gather metric information not normally gathered by hotlines. We are using the call data to begin the normal call forecasting.

Table 7. CO-HELP metrics during West Nile virus

Category/Element	Best-in-class Metric	WNV metric
Average speed of answer (ASA)	15 seconds	75 seconds
Queue time	15-20 seconds	72 seconds
Blockage	< 1%	< 1%
Abandon calls	3.0-4.5%	3%
Outbound calls	variable	44
Transferred calls	≤15%	<1%
After call	≤65 seconds	Not Applicable
IVR call handling	≥40%	48%
Call forecasting accuracy	≥99%	Not Available
Future call forecasting	12 month minimum	Not Available
Schedule adherence	≥90%	95%
Occupancy	85%	85%
Available time	75%	80%
Attrition rate	3-7%	0%
First call resolution	85-95%	91%
Repeat calls	≤16%	Not Applicable
Customer satisfaction	≥95%	Not Available
IS availability	99.99%	100%
Performance feedback	monthly	monthly, as needeeds
Outcome-based pay for performance	yes	Not Applicable
Strategic plan	communicated	communicated
Vision/mission	displayed	displayed
Cost per call (by minute)	≤$1.00	evaluating
Training time	≥3 weeks	8 hours
Recognition plans	yes	Not Applicable
Customer knowledge data	yes	yes
Customer contact automation	yes	yes
Attendant prompting	4 options	3 options
IVR/menu prompts	4 layers	3 layers
"0" to live attendant	yes	no

IVR= interactive voice response

Chapter 8. Testing

Valuable information was garnered from the implementation of the Smallpox Vaccination Program Support Service and from implementation of the Colorado Health Emergency Line for the Public (CO-HELP) for West Nile virus (WNV). Not all aspects of the Health Emergency Assistance Line and Triage Hub (HEALTH) can be tested in these two applications; for example, use of the Incident Command System (ICS) cannot be tested, as these were planned events not necessitating an Incident Command System, and exportability cannot be tested as the applications were limited to Colorado. Funding of the proposed systems upgrades (e.g., IVR, "screenpop" function, Web-chat) must occur before those elements in the multi-channel system concept can be tested. It is clear that different types of events and testing opportunities will be required to test all components of the HEALTH model.

In attempting to evaluate our service delivery, we went back to the original objectives of this project (presented in Chapter 3) to assess our progress.

Objective 1: Determine best practices, challenges, and shortfalls of communications.

Best Practices

Quality Control in Real Time

With only a 0.5 full-time equivalent (FTE) project manager, we were still able to review 100 percent of call records (n = 6,687) for incomplete documentation. The project manager monitored approximately 30 percent of calls for quality by listening to the call in real time.

A CentreVu® Call Management System allowed the manager to track call metrics in real time. This means that the manager was aware when calls went into queue and how many were in the queue (that is, callers had heard the complete message and were on hold for the information specialist). The manager was also able to know whether information specialists were logged out of the system, and keep track of abandon rates all in real time (rather than 1 month after the fact).

Complaints and praise for the hotline were immediately input and e-mailed by the information specialist to the project manager, allowing the project manager to immediately take whatever actions were possible to remedy the situation.

Providing a Communication Conduit Between the Public and Public Health

All information shared with callers had to be approved prior by the State Health Department. We provided frequently asked questions (FAQs) on 55 topics during the smallpox program and 244 topics during WNV. New information was required throughout the delivery of both programs, and processes were in place to accommodate these occurrences.

During WNV, our system advanced to the point at which an information specialist handling a call for which there was no approved FAQ completed an e-mail request for information while the caller was on the line. The e-mail was sent immediately to the State epidemiologist and the

project manager. The information specialist would take the caller's contact information and the caller would be called back (usually within 1day) with the answer. There was a total of 21 WNV FAQs added to the 223 original FAQs the program started with (a 9 percent increase). A summary of the types of FAQs added are presented in Table 8.

Table 8. Summary of original and added FAQs for West Nile virus by category

	Original	Added	Total	Examples of Information Added
General information	13	2	15	Testing results and end of season information
Transmission and ecology	10	0	10	
Action plan	9	0	9	
Birds	30	2	32	Complaints and end of season information
Horses	28	0	28	
Protection (personal)	4	0	4	
Protection (home)	17	0	17	
Protection (community)	8	0	8	
Repellents	29	0	29	
Humans	49	2	51	Time frame for test results/paying for testing
Provider information	0	1	1	Where to get more information
Other animal	10	0	10	
Blood donations	16	0	16	
Spraying	0	14	14	Pesticide spraying information
TOTAL	**223**	**21**	**244**	

Over time, we were able to identify areas of concern for citizens (e.g., concern about who to call about standing water, information on mosquito spraying) and share that with local and State public and environmental health agencies. This feedback allowed those entities to adjust their public information messages accordingly. We also identified a demand for information from health care providers and veterinarians. An information sheet was developed and available to be faxed or e-mailed to those providers.

Assuring Delivery of a Consistent Message

Our use of software embedded with decision triage assured consistency in the information that was shared. Our quality reviews confirmed this. Something of particular concern in the WNV hotline was the frequent demand on the part of the public for evaluation of symptoms. Because only a Level One service level agreement (SLA) was established with the State Health Department, this was not a competency that was available to the public. For information specialists to offer medical advice would have produced issues of liability both for Denver Health Medical Information Centers (DHMIC) and possibly for the State Health Department. The decision triage software, along with approved FAQs and quality review of staff, offered the highest level of protection from this possibility.

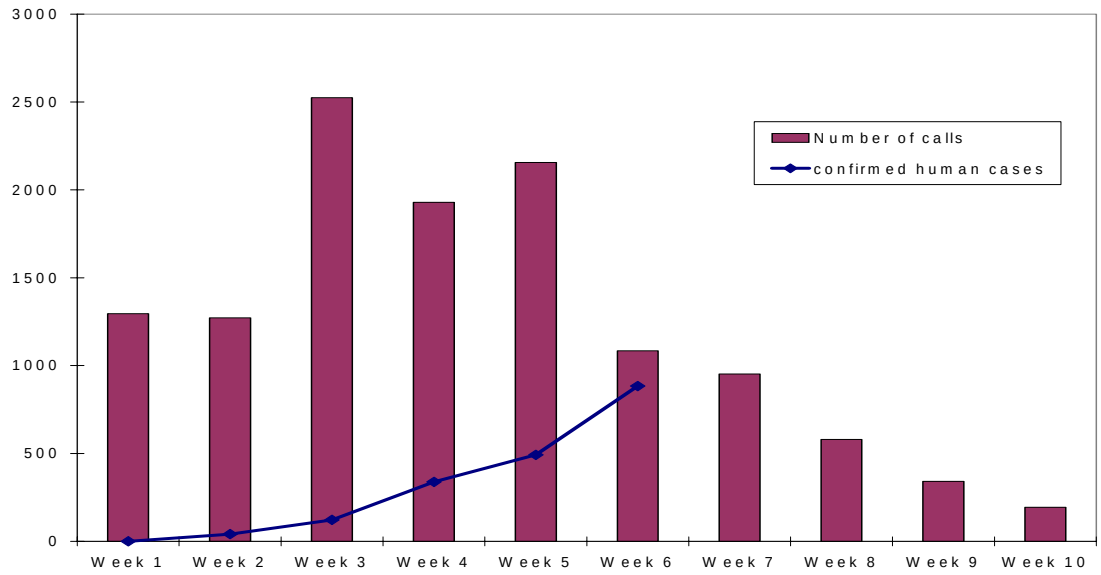
Challenges

Unknown Call Volumes

Because there is a lack of information on this kind of service, we had no idea what to expect in terms of demand for the hotlines. The smallpox vaccination program initially had plans of vaccinating more than 2,000 people but the majority refused vaccination. Thus, the volume of calls for that project (193 calls) was lower than anticipated. The lack of information made it

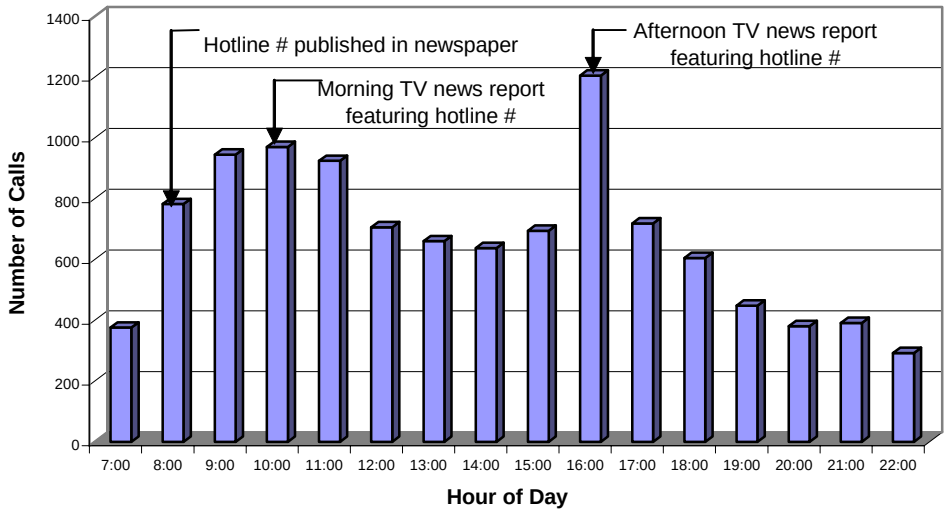
difficult to anticipate scheduling needs and budget needs. This also made it a challenge to convince the client (State Health) that the service was necessary for WNV. However, calls to the Colorado Department of Public Health and Environment (CDPHE), during the 2002 WNV outbreak, caused a lot of disruption to CDPHE's normal operations. The success of the smallpox vaccination program hotlines suggested that CO-HELP should be activated during the 2003 WNV season. Though we staffed CO-HELP for 1,000 calls per week, the actual demand far surpassed these predictions as the outbreak got progressively worse in August 2003 (Figure 3).

Figure 3. CO-HELP weekly call volume along with number of confirmed infections (July 22, 2003--September 30, 2003)



We tasked 3 full-time employees as information specialists for WNV and 0.5 full-time employees to manage the project. We discovered that surges in call volumes could be expected immediately following media coverage that included publication of the hotline number. This meant that surges could be predicted to start at 7:00 a.m. following a newspaper article, and at 11:00 a.m., 4:00 p.m., and 5:00 p.m. following local news coverage. Call volumes were primarily related to media coverage and less related to occurrence of deaths or reports of illness due to WNV. A sample of how media reports impacted call volume is shown in Figure 4.

Figure 4. CO-HELP hourly call volume along with media releases of hotline number



Intermittent Employees

Because the smallpox program was only to be offered in the short-term, staff was initially hired as intermittent. Knowing that their employment would end shortly, intermittent staff generally had greater allegiance to their primary job. This caused some scheduling challenges. For WNV, the staff was hired as permanent employees, which improved job performance and attendance.

Shortcomings

No Fax Server

Physicians preferred to get information sent to them by fax; none wanted to receive our information sheets by e-mail. Unfortunately, our system was not set up with a fax server. This meant that information specialists had to wait until they had coverage, or slow time, to go to the fax machine (in another room) and send the fax manually.

Demand for Medical Triage and Symptom Support

About 1,300 callers reported WNV symptoms and were referred to their physicians. Many callers reported getting confusing or dismissive treatment from their health care providers; other callers reported that they had no insurance and did not know where to get treatment. If the client (State Health) had opted to include Level Two in the service level agreement (SLA) for WNV, registered nurses could have offered symptom management and triage support, similar to support services offered for smallpox vaccinations. As it was, many of the callers were disappointed with

referrals to a local clinical or primary health care provider for symptom management advice, and that no public services for testing, evaluation, or treatment were available. We suspect that many of these callers could have benefited from education as to what symptoms they should watch for in the progression of their illness, assistance in evaluating the danger of their symptoms, and education/information that would have supported them in making informed decisions about their health care needs.

Demand for Information on County/City Services

For WNV, there was a great demand for environmental information regarding clean-up of standing water, applications of larvicide, and spraying for adult mosquitoes. This information varied by municipality. We tried to develop FAQs regarding these requests; usually they took the form of a city or county contact. Many of these callers felt that they had received the runaround when calling city and county agencies and were frustrated with the referrals we provided.

A small number of callers were reporting symptoms from adverse reactions to mosquito repellant. Because of our location within a poison center, those calls were immediately linked to a poison information specialist.

Objective 2: Determine types of information and the communication pathways requested by the public. How was the information perceived?

Communication Pathways

The State Health Department provided a WNV Web site, "FightTheBiteColorado.com" that complemented our telephone service and showed the potential value of a multi-channel contact center. We referred many parties (especially schools and researchers) to the Web site, and also received many calls from people who accessed the hotline number from the Web site. The public seemed open to accessing Web-based information and receiving information from us by e-mail. The physician community preferred fax to e-mail.

Public's Perception of the Information Provided

A satisfaction survey for the smallpox program was sent to a sample of 39 callers. Overall, response was positive; of 12 surveys returned, 3 negative responses were received. (One caller was a nurse/paramedic who was preparing for a paramedic lecture and complained that, "I did not get all of my questions answered for my paramedic lecture; [I] was referred to other resources." The remaining two calls were responding to the question, "Did you receive satisfactory information and/or support when you called the military resources that we gave you?" Two of three respondents answered, "Strongly disagree.")

Ten out of 12 respondents reported that they were satisfied with the information and support they had received, and that it had aided them in more effectively dealing with their situation. Health care providers reported that the service reduced their call loads: "It's a great service, and I

think it should be available for Phase 2. We gave the number out. It reduced our on call work-[it] made our lives easier."

No such survey was done for the WNV hotline, because we did not collect contact information unless we specifically needed to return information to the caller. The State will be surveying county health departments for their feedback on this service.

For both implementations, callers generally reflected their pleasure that the State was offering the service. Dissatisfaction was uniform with matters beyond the scope of DHMIC. Callers either wanted services (e.g., dead birds to be picked up, free WNV serological testing, WNV symptom support, standing water to be cleaned up for them) that were not offered in this service, or were frustrated that they had not been able to get through to their local city or county officials.

During the WNV outbreak there was a surge of community spirit; callers reporting dead birds felt that they were doing a community service. Dead bird reports accounted for the greatest proportion of calls taken. This may be a powerful force to consider in future disasters. As was discussed in the section above on risk communication, the public wants to be engaged in the solution during an emergency and a hotline or contact center can provide a conduit for both communicating information on how they can get involved and collecting information from them.

Media Interest

We received a lot of positive media interest both because we were considered a resource for WNV information (among other things, we were able to give out the number of confirmed cases and deaths), and because of interest in the type of service being offered. Five on-site media visits were done, and we received coverage from local and national radio and television news programs including National Public Radio and Fox News. We also received inquiries from a Canadian radio station that did a story on our program.

Objective 3: Determine what special populations were encountered.

Military Referrals

Concurrent with the Colorado Smallpox Vaccination Program, approximately 10,000 regional military personnel were also being vaccinated for smallpox. As a result, several calls to the Colorado Provider and Hospital Information Line (CO-PHIL) and CO-HELP were received from military vaccine recipients, their civilian health care providers, or family members and contacts. The number one category of referral for the CO-PHIL line was military referral, or 25 percent of calls fielded on that line. This use of the telephone lines was unforeseen, and the military referral link had not been developed prior to initiation of the program. Within the first week of the call center's initiation, nine military related calls had been received, with two of those calls reporting an adverse event. Three additional reported adverse events occurred in civilian contacts that had a possible inoculation from a military vaccine recipient. The military was contacted and a referral to the military's emergent medical toll-free line, toll-free medical

information number, and vaccine-specific Web sites were provided. Military caller information and adverse event reporting data collection continued, although all calls that were identified as military-related were also given the military referral.

Health Care Providers

During WNV, health care providers emerged as an unanticipated population with very particular information needs. We developed a fact sheet with information on current recommendations and locations of testing facilities that was faxed or e-mailed to them, per request.

Spanish Speaking Callers

During WNV, a total of 87 callers required Spanish translations. The CO-HELP recorded message was provided in Spanish, and then information specialists accessed a translator to assist with the call. All brochures, and the Web site for the "Fight the Bite Colorado" campaign included the advertisement that the hotline had Spanish translation capabilities. However, the State had not advertised the hotline on Spanish radio or television. Around the second week of August 2003, Spanish calls began to pick up. After that, we asked Spanish-speaking staff to let us know if any Spanish media had published the hotline number. We observed that peaks in calls accessing the translation line followed such announcements on Spanish radio. The radio stations, following the intensive English media coverage, had also initiated these reports.

We also received one TTY (teletype for the hearing impaired) call that reportedly went well. The information provider reported that she repeated the caller's question back to the caller and asked if the caller had understood the answer provided, which the caller did.

Veterinarians and Concerned Animal Owners

Coloradoans own a lot of horses and other animals. So it should have come as no surprise that questions about pets arose during the WNV outbreak. We had to add several FAQs on WNV and animals. The Centers for Disease Control and Prevention (CDC) was receiving reports of infected horses, but received no reports for cats or dogs. Several frustrated veterinarians called about the lack of reported information regarding positive cases of WNV in cats and dogs.

Senior Citizens

Senior citizens were the largest group at risk in our population during the WNV outbreak; because we were only offering an information line, we did not actively collect information on the age of callers. However, many callers voluntarily identified themselves as seniors. We also received calls from managers of senior centers with questions on how to protect their grounds from mosquitoes.

Recreation and Travel

We did not have a particular FAQ category for tourism-related questions, but we did receive a lot of queries regarding recreational activities, such as whether it was safe to go camping, how to protect yourself from receiving mosquito bites on camping trips, should outdoor events be cancelled, and the like. We also received calls from 33 States because people who had traveled, or were planning travel, to Colorado had concerns about WNV.

Uninsured Callers

Many callers during the WNV outbreak intimated that they had no regular doctor and had no health insurance. This was a difficulty when they were calling about symptoms that were compatible with WNV. These callers were referred to a local hospital to find out about what clinics might be available with free or sliding-scale fee services.

Children, Infants, Pregnant Women, and Breast-Feeding Women

These were groups with a high level of concern. Often, the caller's health care provider did not know the answer to questions regarding WNV and while breast-feeding or during pregnancy. We shared FAQs developed by the State having the most current information on the effects of WNV. Common concerns surrounded the guidelines for use of DEET insect repellant on children, and we provided information consistent with the American Academy of Pediatrics.

Objective 4: Determine requirements for data storage and retrieval.

For both the smallpox and WNV implementations, the client (State Health) required reports in simple Microsoft® Excel spreadsheets sent by e-mail with encryption. The CDC required Vaccine Adverse Event Reporting System (VAERS) forms during the smallpox program, and we included the same data fields in our reports to CDPHE. In the future, the CDC will have new requirements for disease reporting formats, but they have not been determined to date. Call records required a security clearance permitting only the project manager to make corrections to protect data integrity.

Objective 5: Determine needs for infrastructure integration between CO-HELP/CO-PHIL and State and local health departments.

Information Input/Output Mapping Aids Coordination Between Agencies

We developed a virtual integration with the State Health Department. While the communication process during WNV was fairly simple, the process for smallpox was quite complex and involved not only the State Health Department, but on-call physicians and access to epidemiologists at the State and the CDC. The process used in the smallpox service is available in Appendix E. The processes and call flows that were developed were successful in handling all types of calls to the smallpox support services lines. The process and call flow diagram allowed those delivering the service to quickly identify bottlenecks, agree on solutions, and address any unique problems that emerged.

Objective 6: Develop criteria for electronic data collection and conveyance.

For the WNV application, we modified current software, LVM E-Centaurus, which is used by our NurseLine. The software is normally used to support telephone nurse triage. Modifying the software for our purposes required building a database of FAQs and a decision tree structure to aid the information specialist in appropriately responding to caller requests. Additional features were added later as demand developed. A dead bird reporting survey was developed at the request of counties that were being overwhelmed with reports of dead birds. We added additional data fields (zip code and city) at the request of counties.

For the smallpox program, all information shared with callers was based on CDPHE vaccination protocols and CDC developed information, and finally approved by the epidemiologist in charge of bioterrorism preparedness for Colorado. The smallpox support project installed an internal requirement of a 24-48 hour turnaround in responding to information requests, when the requested information was beyond the scope of the current content as approved by CDPHE. Recording of the caller's county and zip code, and specifics of information requested, allowed for a feedback loop from the vaccine recipients and health care providers to public health agencies on informational concerns.

Information on adverse events was recorded in the same fields used on the VAERS form required by the CDC, and those data were forwarded to CDPHE within 24 hours. Vaccine recipients experiencing vaccine-related adverse events, who were not already under the care of a physician for the adverse event, were immediately connected with trained call center nurses for assistance with symptom management. CDC-developed clinical decision trees were used in supporting vaccine recipients and their health care providers.

Objective 7: Determine call metrics required for public health agency.

We found that the client (State Health) was not aware of call metrics (abandon rates, queue times, etc.) or their importance to call center operations. Throughout the administration of WNV, because of the high volume of calls, the State health representative developed an awareness of some of the terms, particularly call queuing and abandon rates. A major concern for the client was minimizing costs. They began to see that knowing when call volumes were peaking (thus queuing was occurring and calls were being abandoned) would allow more appropriate and cost-effective scheduling.

Objective 8: Determine the facility specifications.

During the smallpox project, workstations were borrowed from the NurseLine. Because this would take away from the NurseLine in the long term, we acquired five new workstations for CO-HELP and CO-PHIL. (WNV coincided with a move for DHMIC to a new building; we provided adequate space for the expansion). We also acquired system upgrades for some administrative personnel to allow them to enter the system in response to surges and to assist with answering calls.

Objective 9: Determine the technical and equipment requirements.

Each workstation required a headset, a computer equipped with LVM E-Centaurus and linked to our call center network, and a digital telephone connected to a telephone switch with automatic call distribution capability. This allowed the user to log in to the telephone system and receive calls. Internet access was required to allow us to send e-mail responses to callers. As was mentioned above, we determined that a fax server is an essential future addition to the system, and we have invested in equipment to provide this capability.

Objective 10: Determine the most effective, feasible technical solutions.

The smallpox and WNV programs use the “voice channel” or telephone as the method for providing information to clients. In both programs, half of the callers were satisfied with the recorded message alone and did not opt to route to the information provider. During WNV, many clients connected to the Fight the Bite Colorado Web site for their informational needs, and

therefore did not need to contact the hotline. E-mail and fax were well received by callers needing printed materials that we could provide. With these capacities alone, and 1 to 2 information specialists on staff at a time, with backup from administrative staff in other departments, we were able to manage a peak of 537 calls in 1 day (on August 11, 2003) without any detrimental impact to our existing services. Had call volumes increased to higher levels, the need for other technological solutions to assist staff in handling the demand would have become more apparent.

Objective 11: Develop methods for rapid ramp-up for surge staffing.

Six additional administrative personnel in the DHMIC were cross-trained on the system to be called up in case of surges. We also acquired system upgrades for some administrative personnel to allow them to enter the system in response to surges. We had to use these additional staff resources several times during WNV operations.

Installation of the CentreVu® Call Management System allowed the project manager to monitor the volume of calls, and whether or not calls were going into the queue. This was vitally important because the call volumes were unknown and initially unpredictable. When the manager recognized that callers were on hold, she could access backup information providers to help clear the backlog.

Because call surges were so clearly linked to media reporting of the hotline number, the ideal disaster hotline facility would be equipped with televisions to allow the staff to monitor news coverage.

Chapter 9. Limitations and Risks

In spite of research, it is difficult to build infrastructure to respond to something that has never happened. Despite the magnitude of the World Trade Center attacks and the anthrax releases that followed, bioterrorism response professionals warn us that the release of an infectious or toxic agent could produce a disaster of unanticipated impact.

One limitation of our project was limited funding to contact all of the medical call centers within the model's nine-State region for input. Instead, we focused on making sure we had input from public health departments within the region as the ultimate "users" of the model.

The great challenge to the HEALTH model is that of maintaining readiness for an event of unknown size and scope in the lack of any events. DHMIC, with help from CDPHE, is attempting to build this readiness through a repertoire of experience with smaller, planned public health events such as the Smallpox Vaccination Program Support Service and providing West Nile virus information. Funding for the technology improvements required for the model is also a challenge.

A risk for the program is that emergency response partners throughout DHMIC's service area could fail to capitalize on the model. Another risk is that other agencies will develop these capacities separately, perhaps producing redundancy, inefficiency, and confusion. DHMIC is actively trying to counteract the potential for this by including State and local agency members from all States in the region to assist in oversight of the model's development. DHMIC personnel continue to be active members of the emergency preparedness and public health community in Colorado, and other service-area States, to make sure that channels of communication are kept open to prevent this from happening.

Further development of the model would greatly benefit by implementation of all or part of the HEALTH model by other call centers and public health agencies. This would allow testing of its components and concepts in other situations, and could grow the experiential knowledge of the emergency response community. There is a risk that for reasons of resource limitations or for lack of foresight that this would not happen. Therefore, members of the Core Team are committed to publicizing the results of this research, and to future implementation of Rocky Mountain Regional HEALTH through further grant funding and partnerships.

Chapter 10. Future Tasks

Our primary task is to persuade public health agencies that an established call center is the appropriate repository for this kind of capacity, and that making one-on-one communication available to the public during an emergency is to their advantage.

The CDC's *Cooperative Agreement on Public Health Preparedness and Response for Bioterrorism* requires State health departments to provide risk communication and health information to the public in case of an event. We believe that giving this service a dual use function (consistently using the service for routine communications on topical health issues, such as influenza or SARS, while maintaining capacity for service delivery during a large-scale emergency) is cost effective. We also believe that dual use strengthens the partnership between public health, health agencies, and the citizenry.

To maximize our surge capacity we must locate the funding to develop the multi-channel systems concept. After this has taken place, a Total Quality Improvement Plan could be developed.

Development and maintenance of a library of frequently asked questions and decision trees would be an essential future task. The content of this library could be shared with other call centers and agencies. Installing interactive voice response (IVR) would allow us to route callers to an audio library of the most popular FAQs, thereby saving staff time.

Mental health services and crisis counseling have been identified as needs of the public following events such as those of September 11, 2001. It may be appropriate to assess what role the public health emergency communications contact center might play in responding to this need; for example, conducting mental health assessments or referrals.

In the future, the development of the model for use in surveillance would be appropriate. During the smallpox application, vaccine adverse events were tracked for CDPHE and the CDC. During WNV, dead bird reports were collected to help State and local health agencies track the spread of disease through communities. The software that we have developed for knowledge management and data collection could be used as part of an early warning system to capture and report specific emergent events, such as clusters of toxic exposures, in real time to the State Health Department.

Acronyms

AAPCC	American Association of Poison Control Centers
ACGME	Accreditation Council for Graduate Medical Education
AHRQ	Agency for Healthcare Research and Quality
ANI	Automatic Number Identification
ASA	Average Speed of Answer
CDC	Centers for Disease Control and Prevention
CDPHE	Colorado Department of Public Health and Environment
CO-HELP	Colorado Health Emergency Line for Public
CO-PHIL	Colorado Provider and Hospital Information Line
CRAM	Citizens for Responsible Applications of Malathion
CTI	Computer Telephony Integration
DHMIC	Denver Health Medical Information Centers
EM	Emergency Management
EMS	Emergency Management Services
EPA	Environmental Protection Agency
ER	Emergency Room
FAQs	Frequently Asked Questions
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FTE	Full-time Equivalent
GNYHS	Greater New York Hospital Association
HCP	Health Care Professional
HEALTH	Health Emergency Assistance Line and Triage Hub
HIPAA	Health Insurance Portability and Accountability Act of 1996
ICS	Incident Command System
IDS	Integrated Delivery Systems
IDSRN	Integrated Delivery System Research Network
ISDN	Integrated Services Digital Network
IVR	Interactive Voice Response
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
JIC	Joint Information Center
LAN	Local Area Network
LRN	Laboratory Response Network
NYC	New York City
PCC	Poison Control Center
PHD	Public Health Department
RMDCC	Rocky Mountain Drug Consultation Center
RMPC	Rocky Mountain Poison Center
RMPDC	Rocky Mountain Poison & Drug Center
SARS	Severe Acute Respiratory Syndrome
SCRAM	Sarasota Citizens for Responsible Application of Malathion
SDLC	Systems Development Lifecycle
SLA	Service Level Agreement
SPI	Specialist in Poison Information
TESS	Toxic Exposure to Substances Surveillance

VAERS	Vaccine Adverse Events Report Surveillance
VRU	Voice Response Unit
WMD	Weapons of Mass Destruction
WNV	West Nile Virus
WTC	World Trade Center

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Michael O. Leavitt, *Secretary*

Office of Public Health and Science
Richard H. Carmona, M.D., M.P.H., F.A.C.S., *Surgeon General of the United States*

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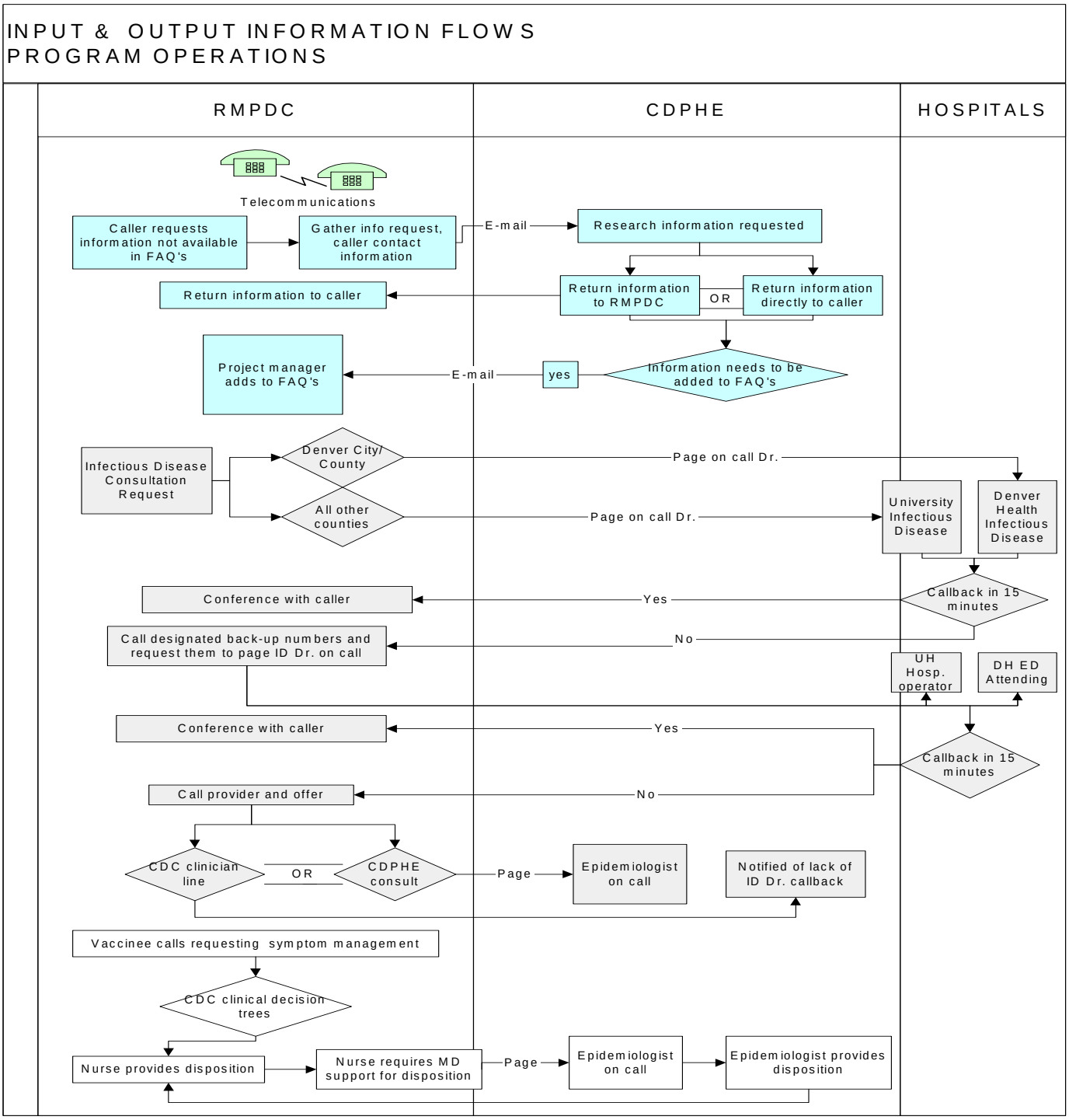
Input/Output Flows Program



CDC, Centers for Disease Control and Prevention; CDPHE, Colorado Department of Public Health and Environment; DH, Denver Health; ED, Emergency Department; FAQs, frequently asked questions; ID, infectious disease; MD, medical doctor; RMPDC, Rocky Mountain Poison and Drug Center; UH, University Hospital.

Data Collected by CO-HELP and CO-PHIL

LINE	CALL VOLUME	CALL DISTRIBUTION					CALL TYPES			COUNTIES of CALLS HANDLED	TOTAL	YTD CALLS/AE
		Listen to Message	Live Agent	Abandoned	Average Abandon Time	Callbacks	AE	AE Type	Information			
REPORT DATE: January 28, 2003-February 13, 2003												
CO-HELP	49	37	11	1	.28	1	2	1. Military-possible contact inoculation 2. Military-encephalitis	-Should I get re-vaccinated? -Should my child get vaccinated? -Risks of vaccine recipient visiting newborns -Smallpox information resources for a lecture -How is smallpox spread? -Military contact numbers, 4 requests	Mesa El Paso Denver Sherman (Kansas)	49	49
CO-PHIL	7	0	7	0	0	0	0	NR	-Military contact number, M -Neonatologist called for medical military resource, M -Smallpox precautions from an EMT -Dr. with tennis elbow wanted to know when to get steroid injection -Military with eczema requested precautions to take with military vaccines, M -Firefighter requested smallpox information for presentation -EMT wanted to get vaccinated and requested process	Mesa El Paso Denver	7	7

Appendix C: Data Collected by CO-HELP and CO-PHIL

LINE	CALL VOLUME	CALL DISTRIBUTION					CALL TYPES			COUNTIES of CALLS HANDLED	TOTAL	YTD CALLS/AE
		Listen to Message	Live Agent	Abandoned	Average Abandon Time	Callbacks	AE	AE Type	Information			
LINE SUMMARY	37		18	1	----	1	2		Military Calls- 9 (includes .2 AEs)		56	56/2

AE, adverse event; CO-HELP, Colorado Health Emergency Line for Public; CO-PHIL, Colorado Provider & Hospital Information Line; EMT, emergency medical technician; M, military-related call]; req., requests; YTD, year-to-date.

Sample Report for CO-Help During West Nile Virus Service

General Call information

The caller information captured should include:

A call reference number

Date

Start time

Call source (CO-HELP, CO-PHIL, etc.)

Caller zip code/**county**

Call type (information, dead bird report, AE report, mental health assessment)

Topic (West Nile, smallpox, other [to be added later])

Other box – to record a topic not listed

Caller and patient contact information

Name

Address1

Address2

City, State, and County should be filled in for caller based on the previously entered zip code.

Multiple options should be given for return contact type. Examples:

Cell	303-555-9876
Home	303-555-7388
Pager	303-555-9399
E-mail	willo@tree.com

Notes – A general call-information notes box for the consultant to enter any important information

End time

Bold items are required.

Documentation sharing/recording

One of the main functions of the system is to allow Information Providers to share information from a document base of frequently asked questions (FAQs). These are documents containing text and pictures about the different topics a caller would have questions about. As documents are found to answer the caller's questions, an entry is made to record that that document was used for reporting.

In addition, the document system must allow for searching using two levels of keywords. The first level keyword will provide a list of related subjects. The subject will limit the results to a set of documents.

Example:

Topic: Smallpox
Subject: Vaccine
FAQ1 – What is the smallpox vaccine?
FAQ2 – Who should not get the vaccine?
FAQ3 – Should my children get vaccinated?
Etc.

If an answer cannot be found in the existing set of documents, the information provider must be able to take notes about what the request was for and indicate that the information was not found. If this is indicated, an e-mail message should be formatted and sent to the system's defined e-mail address as soon as the call is ended.

Sample e-mail:

Subject: Requested Information Not Available
A caller asked for the following information:
Can my cat get smallpox?

Contact information:
Abby Normal
123 Main St.
Colorado Springs, CO 801034
Work: 303-555-2314
Home: 920-555-9879
Cell: 720-555-9089
Fax: 303-555-6752
E-mail: abby.normal@mail.com
Contact Method: Home

Consultation Management

In a public health emergency, the need for the call center to involve other health care providers in a timely manner has been defined as a requirement. The system must be able to track pages sent to other health care providers, and provide a viewable list of open callbacks, so the consultant can quickly correlate a callback with a call. The system should also provide notification of when a defined time limit for the return of a page has been exceeded so the page

can be sent again or escalated. If a page is not returned in the allotted timeframe, the system will also send an e-mail to a specified address logging that a page was not returned. There are a number of different paging contacts that should be listed before the page sent is recorded. The software does not have to send the page (although this would be optimal), but must be able to record when an Information Provider manually sends a page.

Decision Trees

The system must be able to accept existing and new decision trees specific to the call type. If a call is received on smallpox, the decision trees available should be limited to those approved for managing smallpox cases. If a West Nile virus bird report is needed, the decision tree should walk the consultant through the appropriate questions to determine the outcome of the bird identification. The results must be stored with the call record.

Other Forms

Depending on the type of call, additional information may need to be gathered to send to an outside agency. This data must be collected and exported into a common file format (Microsoft® Excel, etc.), so it can be sent to an outside agency. An example of this is the Centers for Disease Control and Prevention's (CDC's) Vaccine Adverse Event Report System (VAERS) form used for reporting adverse vaccine reactions. The Information Provider should be able to bring up a form to collect this data, and a function should be available to export any VAERS data by an administrator.

Reporting

Most of our reporting requirements are standard and include things such as call volume, call types, information given, demographics collected. However, in certain report gathering situations, such as dead bird reports or VAERS reports, we are required to e-mail the report to designated State/county e-mail addresses within 24 hours.

Questions Asked by Journalists During a Crisis[1]

Journalists are likely to ask who, what, where, when, why, and how; (1) what happened; (2) what caused it to happen; (3) what does it mean. Questions include:

1) What is your name and title?
2) What are your job responsibilities?
3) What are your qualifications?
4) Can you tell us what happened?
5) When did it happen?
6) Where did it happen?
7) Who was harmed?
8) How many people were harmed?
9) Are those that were harmed getting help?
10) How certain are you about this information?
11) How are those who were harmed getting help?
12) Is the situation under control?
13) How certain are you that the situation is under control?
14) Is there any immediate danger?
15) What is being done in response to what happened?
16) Who is in charge?
17) What can we expect next?
18) What are you advising people to do?
19) How long will it be before the situation returns to normal?
20) What help has been requested or offered from others?
21) What responses have you received?
22) Can you be specific about the types of harm that occurred?
23) What are the names of those that were harmed?
24) Can we talk to them?
25) How much damage occurred?
26) What other damage may have occurred?
27) How certain are you?
28) How much damage do you expect?
29) What are you doing now?
30) Who else is involved in the response?

[1] **From:** Covello, V.T. *Keeping Your Head in a Crisis: Responding to Communication Challenges Posted by Bioterrorism and Emerging Infectious Diseases.* Association of State and Territorial Health Officers (ASTHO), 2002.

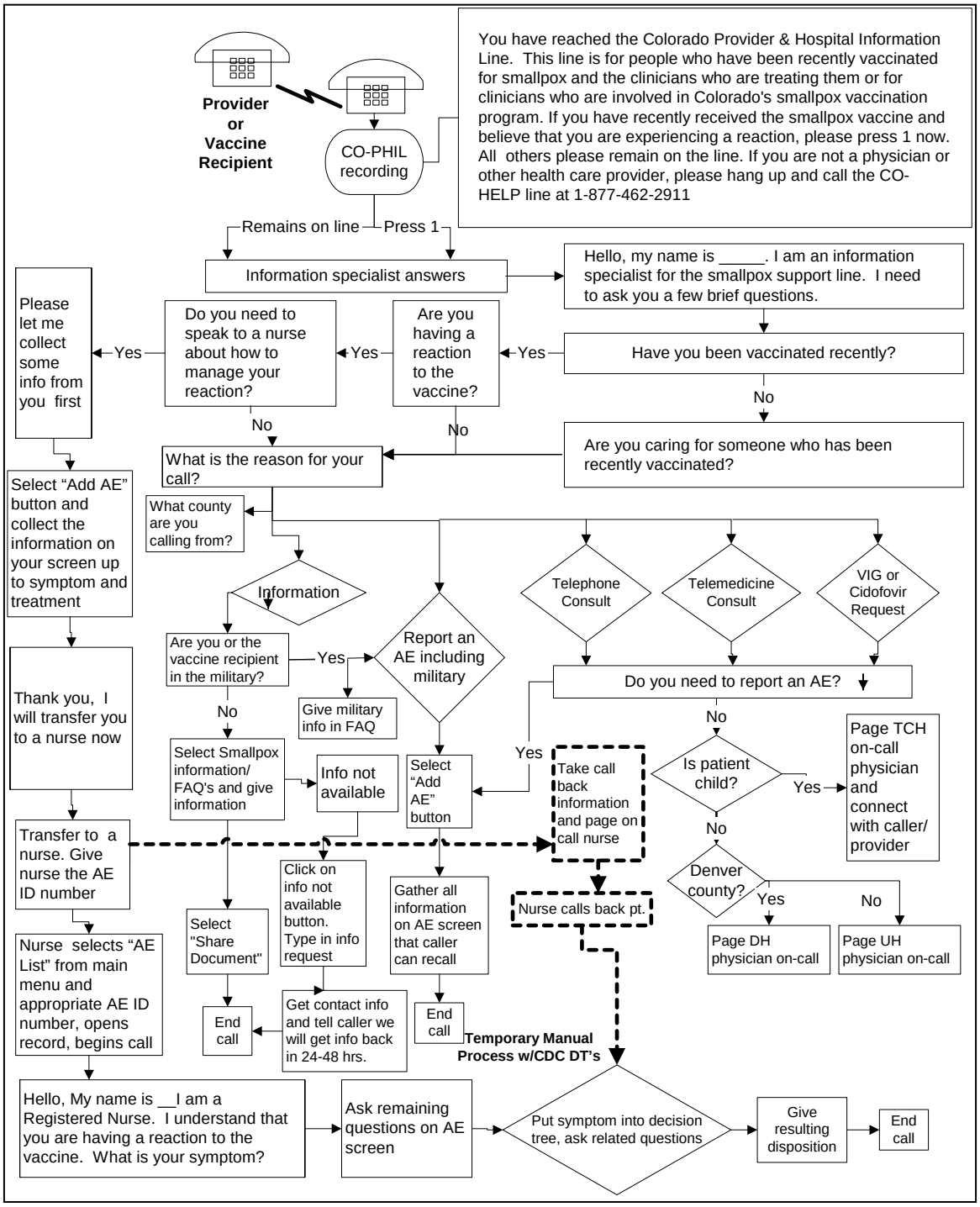
Appendix D: Questions Asked by Journalists during a Crisis (continued)

31) Why did this happen?
32) What was the cause?
33) Did you have any forewarning that this might happen?
34) Why wasn't this prevented from happening?
35) What else can go wrong?
36) If you are not sure of the cause, what is your best guess?
37) Who caused this to happen?
38) Who is to blame?
39) Could this have been avoided?
40) Do you think those involved handled the situation well enough?
41) When did your response to this begin?
42) When were you notified that something had happened?
43) Who is conducting the investigation?
44) What are you going to do after the investigation?
45) What have you found out so far?
46) Why was more not done to prevent this from happening?
47) What is your personal opinion?
48) What are you telling your own family?
49) Are all those involved in agreement?
50) Are people overreacting?
51) Which laws are applicable?
52) Has anyone broken the law?
53) How certain are you?
54) Has anyone made mistakes?
55) How certain are you?
56) Have you told us everything that you know?
57) What are you not telling us?
58) What effects will this have on the people involved?
59) What precautionary measures were taken?
60) Do you accept responsibility for what happened?
61) Has this ever happened before?
62) Can this happen elsewhere?
63) What is the worst case scenario?
64) What lessons were learned?
65) Were those lessons implemented?
66) What can be done to prevent this from happening again?
67) What would you like to say to those that have been harmed or to their families?
68) Is there any continuing danger?

69) Are people out of danger? Are people safe?
70) Will there be inconvenience to employees or to the public?
71) How much will all this cost?
72) Are you able and willing to pay the costs?
73) Who else will pay the costs?
74) When will we find out more?
75) What steps are being taken to avoid a similar event?
76) What lessons have you learned?
77) What does this all mean?

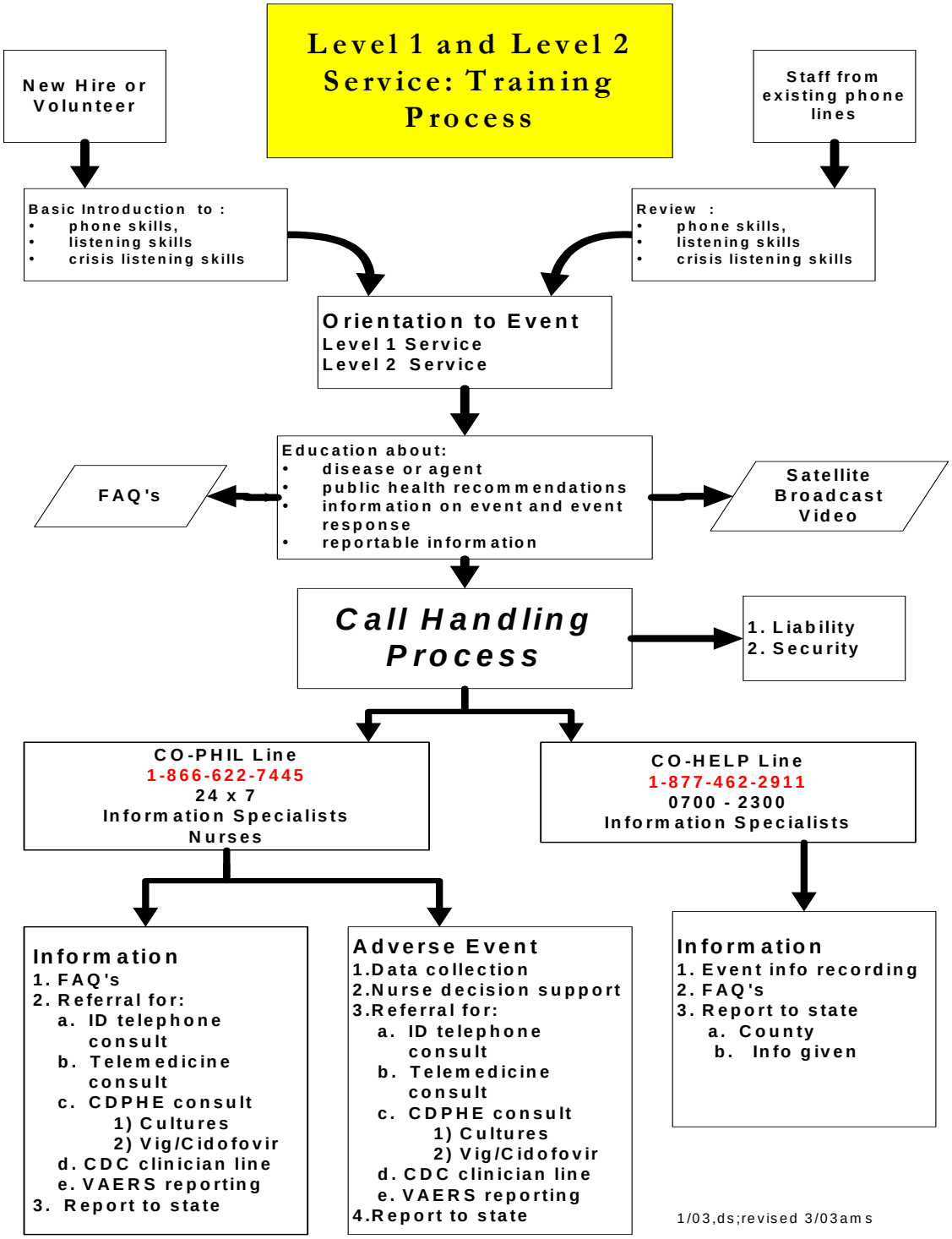
Appendix E: CO-PHIL Smallpox Call Flow Diagram

CO-PHIL Smallpox Call Flow Diagram



AE, adverse event; CO-PHIL, Colorado Provider & Hospital Information Line; DH, Denver Health; ID, infectious disease; pt., patient; TCH, The Children's Hospital, Denver; UH, University Hospital; VIG, vaccinia immune globulin.

CO-HELP & CO-PHIL Training Plan

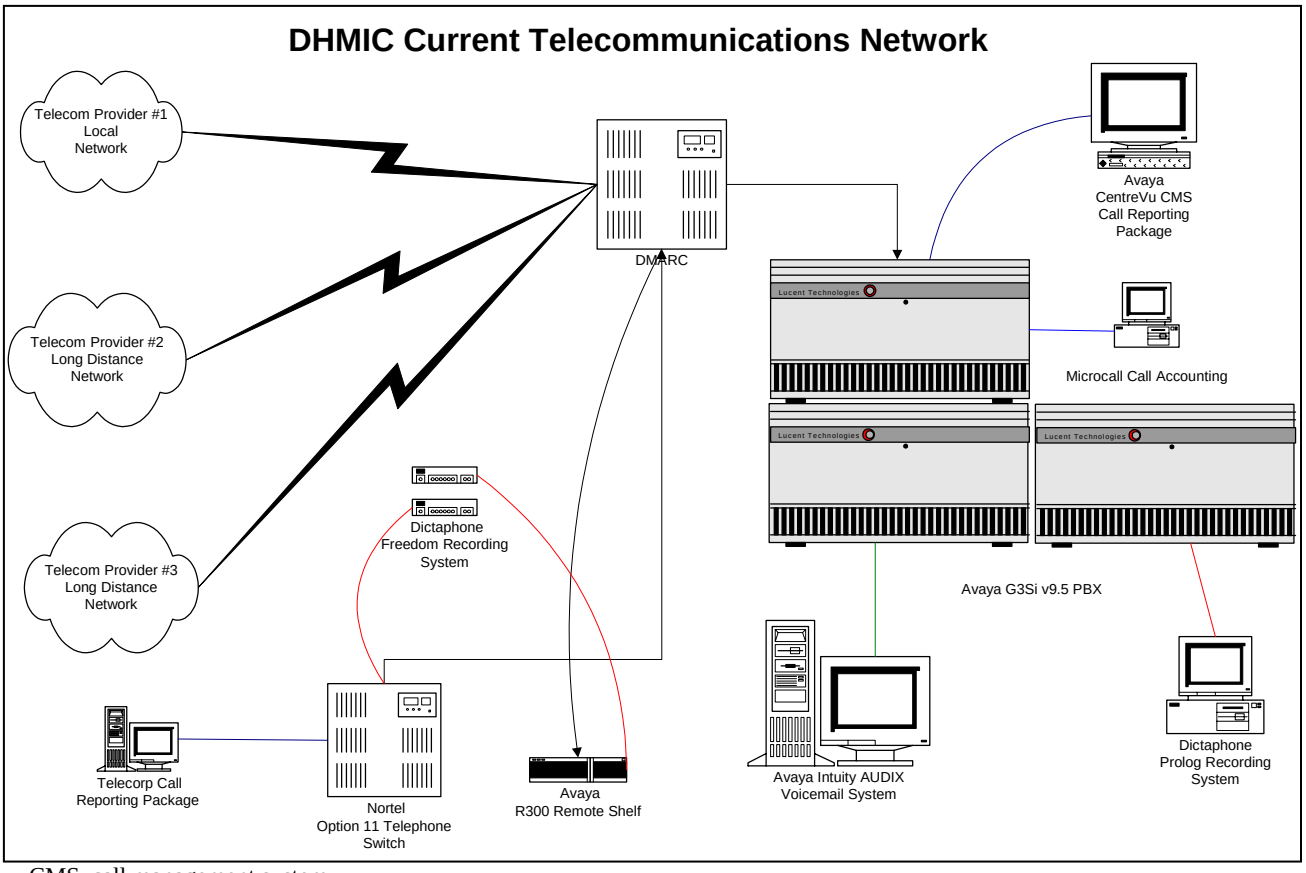


CDC, Centers for Disease Control and Prevention; CO-HELP, Colorado Health Emergency Line for Public; CO-PHIL, Colorado Provider & Hospital Information Line; CDPHE, Colorado Department of Public Health and Environment; FAQs, frequently asked questions; VAERS, Vaccine Adverse Events Report Surveillance.

Current and Proposed Systems

Denver Health Medical Information Centers (DHMIC) Current Systems Network

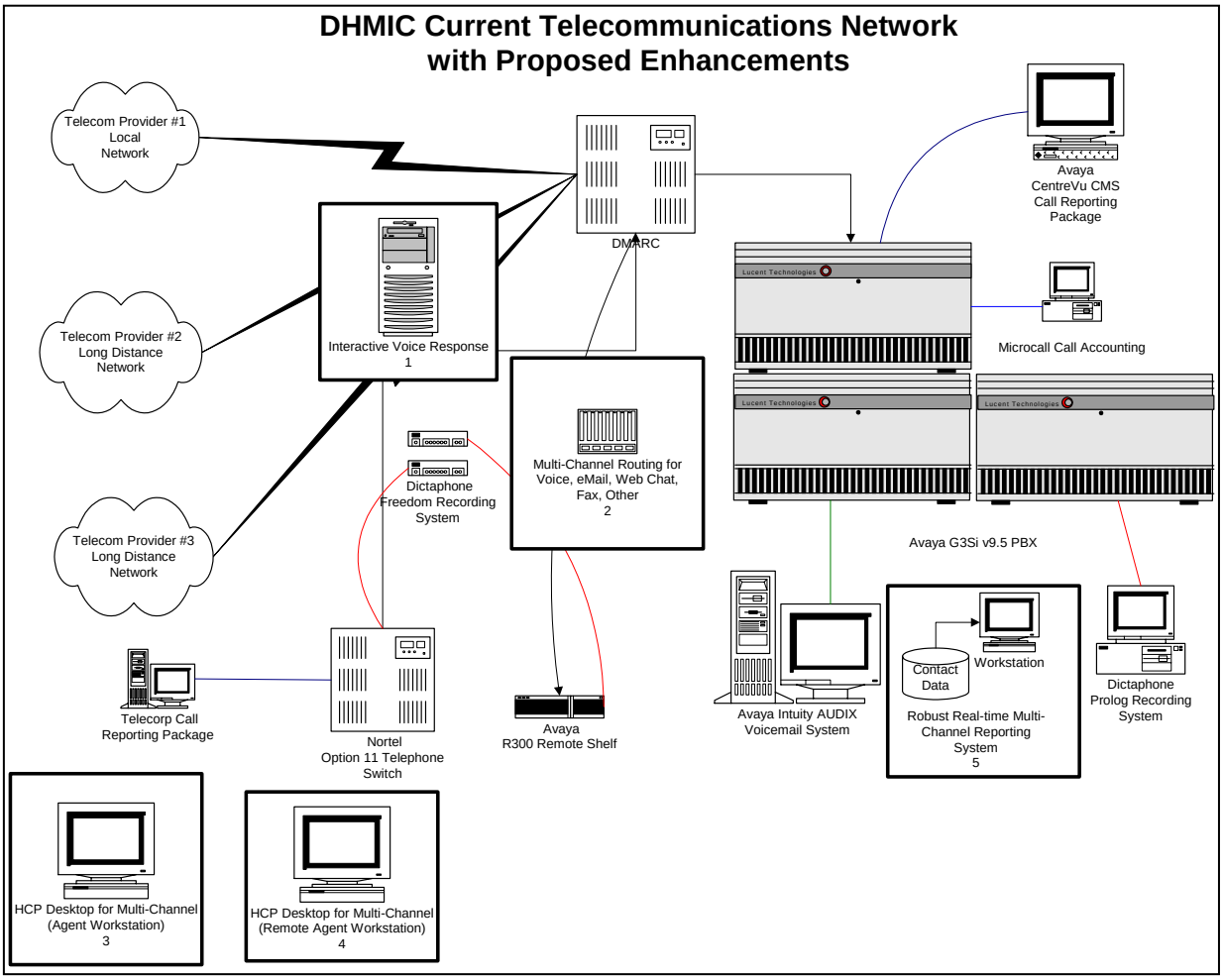
This diagram represents the current telecommunications network configuration of the Denver Health Medical Information Centers (Rocky Mountain Poison and Drug Center [RMPDC] and Denver Health Nurse Line) at the time of this report. It outlines from where the telephone lines into the center terminate at the demarcation point (DMARC) before entering the two telephone switches (Nortel® and Avaya®). The telephone switches are then connected to various voice handling equipment to provide the functionality of voicemail (Avaya Intuity AUDIX®), call monitoring (Avaya CentreVu CMS®, Telecorp), call accounting (Microcall®), and call recording (Dictaphone Freedom® and Prolog).



CMS, call management system.

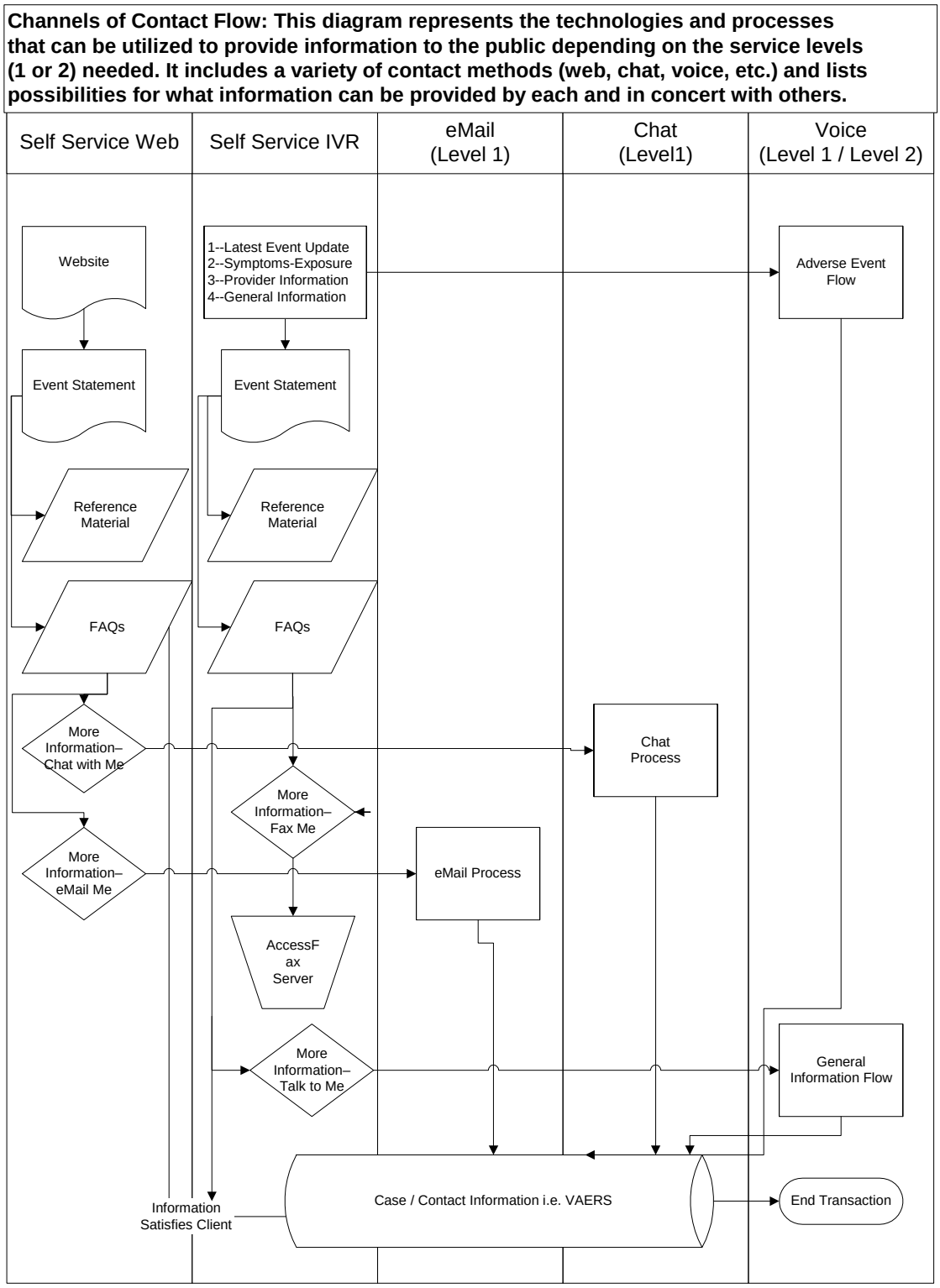
Proposed Health Emergency Assistance Line & Triage Hub (HEALTH) Systems Network

This diagram represents proposed enhancements to the current telecommunications network configuration of the Denver Health Medical Information Centers (DHMIC). It outlines from where the telephone lines into the center terminate at the demarcation point (DMARC) before entering the two telephone switches (Nortel® and Avaya®). The telephone switches are then connected to various voice handling equipment to provide the functionality of voicemail (Avaya Intuity AUDIX®), call monitoring (Avaya CentreVu CMS®, Telecorp), call accounting (Microcall®), and call recording (Dictaphone Freedom® and Prolog). The five proposed enhancements include: 1) Interactive Voice Response to be added prior to the DMARC to provide menu driven options to callers; 2) Multi-Channel Routing for various contact methods; 3) Healthcare Provider (HCP) Desktop for multiple channels; 4) Remote Agent HCP Desktop for multiple channels; and 5) Multi-Channel reporting system.



Appendix H: Channels of Contact Health Emergency Assistance Line & Triage Hub (HEALTH) Model

Channels of Contact Health Emergency Assistance Line & Triage Hub (HEALTH) Model



FAQs, frequently asked questions; IVR, interactive voice response; VAERS, Vaccine Adverse Events Report Surveillance.

Legend
Morbidity and Mortality Risk based on clinical presentation.

- Low
- Moderate
- High

Clinical Evaluation Tool for Smallpox Vaccine Adverse Reactions
Ophthalmologic Reactions / Eye Splash or Other Potential Exposure to Vaccinia Virus

Tool 5

www.bt.cdc.gov/agent/smallpox/vaccination/clineval (03-25-2003 Version)

History of potential inadvertent exposure to vaccinia virus in or near the eye(s).
No lesions or inflammation present.

History of known risk factors for smallpox vaccine adverse reactions?

Yes →

Consult with state/local health department and CDC to obtain clinical guidance and to report inadvertent exposure to vaccinia virus contained in smallpox vaccine. Management of the adverse reactions discussed in this Tool may be different when risk factor(s) are present. See Consultation and Reporting Information.

Vaccine recipients or close contacts with risk factor(s) should be reported, whether or not an adverse event develops.

Risk Factor	Adverse Reaction (Potential/ Reported Historically)
Atopic Dermatitis/Eczema (including severe atopic blepharitis	Eczema Vaccinatum
Acute Exfoliative Dermatitis	Inadvertent Inoculation
Immunocompromised including/HIV+	Progressive Vaccinia/Generalized Vaccinia (Severe form)
Pregnancy	Fetal Vaccinia and potential unknown risks to fetus
Topical Ocular Steroid Use	Autoinoculation to the eye

No ↓

Report incident of possible inadvertent inoculation in or near eye from laboratory setting or direct splash from smallpox vaccine.

Less than 7-10 days since exposure?

No → **Close observation. No immediate treatment indicated. Obtain ophthalmology consultation if symptoms develop.**

Yes ↓

See Consultation and Reporting Information

Consider immediate gentle irrigation of affected eye with sterile water or saline if exposure occurred within a few hours of presentation. Avoid irrigation under high pressure to prevent iatrogenic corneal abrasions.

Possible inadvertent inoculation in or near eye from high-risk vaccinia strain in laboratory setting (e.g. splash to eye). Laboratory vaccinia strains may be of higher concentration and greater virulence.

Request VIG consultation (see Consultation and Reporting box to obtain). Begin topical antiviral prophylaxis [1]. Close observation. Obtain immediate baseline ophthalmology consultation to assist in evaluation, management and follow-up.

Possible inadvertent inoculation in or near eye from vaccinia in smallpox vaccine (e.g. splash to eye). Vaccinia in smallpox vaccine is in lower concentration and less virulent than lab strains.

VIG not indicated. Recommend topical antiviral prophylaxis up to 5 days **[1]**. Close observation. Obtain immediate baseline ophthalmology consultation to assist in evaluation, management and follow-up.

Possible inadvertent inoculation in or near eye from vaccinia lesion in vaccine recipient or close contact. (e.g., contact with vaccine site followed by rubbing in or near eye). Obtain history of exposure to assess potential risk.

Does clinician feel there is significant risk of inadvertent inoculation?

Yes → VIG not indicated. Consider topical antiviral prophylaxis **[1]**. Close observation. Obtain baseline ophthalmology consultation to assist in evaluation, management and follow-up.

No → **Close observation. No immediate treatment indicated. Obtain ophthalmology consultation if signs/symptoms develop.**

Footnote:
1. **Topical antiviral prophylaxis:** Trifluridine eye drops - 5 times/day up to 5 days. Discontinue if no evidence of vaccinial infection is present after 5 days. Trifluridine may cause some eye redness/irritation with use. Close follow-up by ophthalmology indicated while on trifluridine to evaluate treatment.

Consultation and Reporting Information

Civilian health care providers who need clinical consultation with or without release of vaccinia immune globulin (VIG) (first line agent) or cidofovir (second line agent) for potential smallpox vaccine adverse reactions should contact their state/ local health department or the CDC Clinician Information Line at (877) 554-4625. Military health care providers (or civilian providers treating a DoD healthcare beneficiary) requesting clinical consultation should call (866) 210-6469, and if requesting VIG release should call (888) USA-RIID or (301) 619-2257. Health care providers should report smallpox vaccine adverse events to their state/ local health department and to the Vaccine Adverse Event Reporting System (VAERS) at http://www.vaers.org/ or (800) 822-7967.

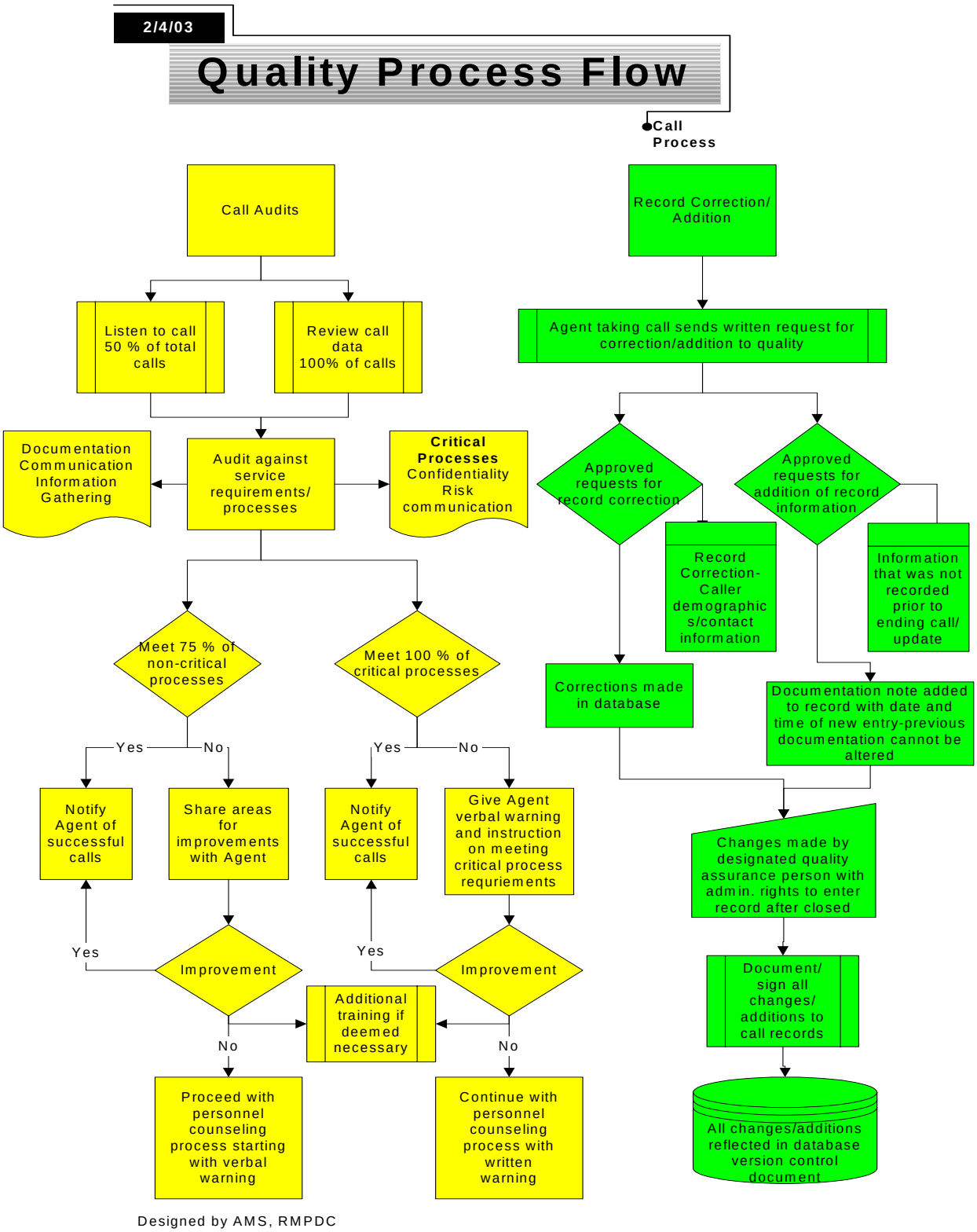
Please call (888) 246-2675 (Español (888) 246-2857, TTY (866) 874-2646) or visit http://www.bt.cdc.gov/agent/smallpox/index.asp for general public information about smallpox vaccination. Persons experiencing urgent or life-threatening medical events should seek immediate medical assistance.

Sample Decision Triage Tree

This clinical evaluation tool for smallpox vaccine adverse reactions, "Ophthalmologic Reactions/Eye Splash or Other Potential Exposure to Vaccine Virus," was developed by the Centers for Disease Control and Prevention (CDC), and is also available on the CDC's Web site at: www.bt.cdc.gov/agent/smallpox/vaccination/clineval.

Appendix J: Quality Control Process

Quality Control Process



Sample Disaster Recovery Plan

Purpose:

To outline in a sequential fashion the procedures, duties, and responsibilities of the [your agency's name here] in the event of a [disaster type (media crisis, systems outage, etc.)] disaster.

Definition:

[Disaster type] Disaster– [Give a definition of the type of disaster covered by this plan.]

Examples:

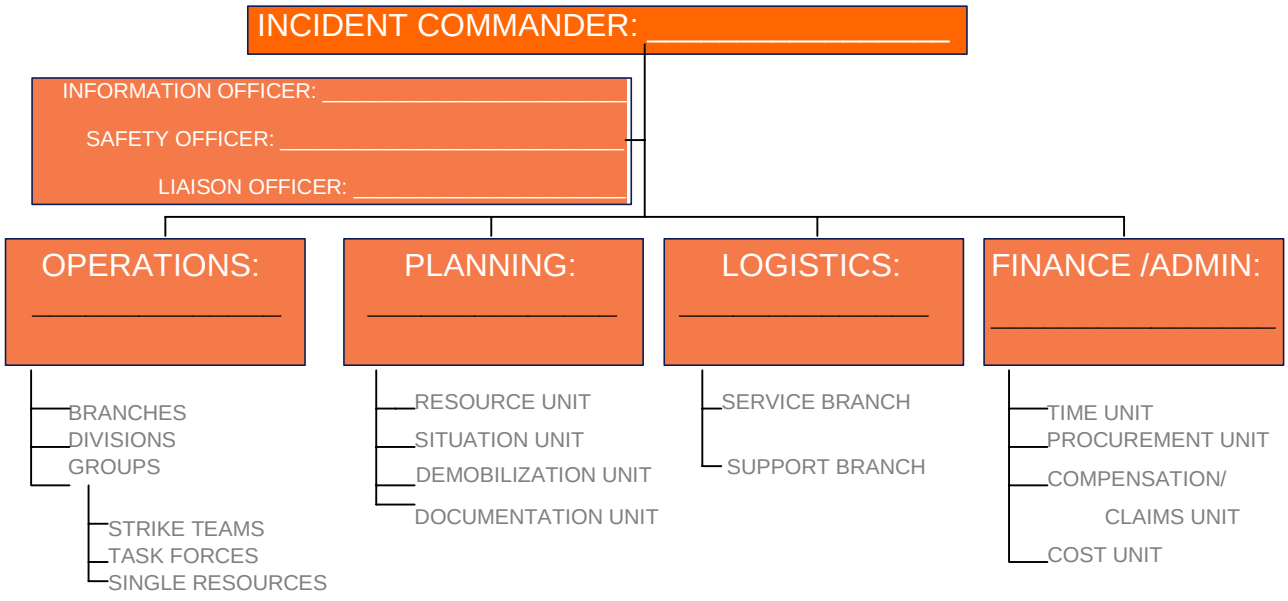
[Give examples of this type of disaster.]

Scope:

[Identify the geographical scope of the disaster that will impact your agency: i.e., severe weather will impact the agency only if it affects the geographic area that includes your facilities, staff residences, communications, or power providers; however, a national media crisis such as the anthrax bioterrorism attacks of 2001, will probably affect your entire service area.]

Chain of Command:

[Insert your agency's incident command structure, revise, if appropriate, for the disaster type.]



Personnel Notification Mechanism:

- All staff persons with notification roles are responsible for maintaining current contact information for those that they will notify.

- Upon notification of a potential or occurring disaster, the on-duty [insert title of on-duty staff person who is responsible for identifying or receiving first communications regarding this disaster type] will notify [insert title of Incident Commander] or [list second and third in command if first is not immediately available].

- [Incident Commander] will contact or delegate contacting of Incident Commanders [list titles of incident management personnel].

- Incident Commanders will contact and instruct their disaster response teams [should be identified in the chain of command diagram above].

Stages of Readiness:

Normal Readiness

Definition: No disaster is threatening. Actions consist of developing and maintaining resources, planning, training, and testing response capability.

- A written disaster plan will be maintained.

- The written disaster plan will be reviewed [annually, every 3 years, etc.].

- The written disaster plan will be presented as part of the new employee orientation.

- The written disaster plan will be reviewed [annually, biannually, etc.] with all staff members.

- The written disaster plan will be kept on file at [insert physical location or title of holder of the plan].

- A call-down list will be present with each copy of the disaster plan and with all Incident Commanders.

- The call–down list must be revised whenever changes occur in personnel or contact information.

- All staff members are responsible for keeping contact information current with management.

- Management must provide itinerary and contact information during any absence.

- All staff members working in excess of 40 hours per week due to disaster response will be paid according to [insert agency policy].

- [Describe any on-call procedures.]

Increased Readiness

Definition: The threat or possibility of a disaster has been recognized. Local government begins preparations for coordinated emergency response. No public dissemination at this time.

Example: [Give appropriate example: i.e., Poison Center receives notification of a train derailment involving hazardous cargo.]

Response Steps:

- Upon notification of potential disaster, the on-duty [title] will notify the [title of Incident Commander] or [give title for second and third in command].
- The [title of Incident Commander] will notify Incident Commander(s), [give title(s)].
- Incident Commander(s) will assume or delegate the following responsibilities:
- Ensure that all exposed or injured personnel receive the necessary medical care.
- If appropriate, prepare an information statement concerning the event after collecting necessary facts and in consultation with the appropriate responsible agencies.
- The information statement will include a summary of the event, possible effects of exposure to the toxin/products, and recommendations.
- The statement will be given to the Incident Commander as soon as possible in order to distribute to the staff.

Warning

Definition: The threat of a disaster has been recognized as imminent. The public will receive information concerning the emergency, and precautionary instructions are issued in an effort to minimize injury and the loss of life and property. Government agencies and support groups are prepared for duty or placed on standby.

Example: [Insert appropriate example: i.e., Denver Health Medical Information Center (DHMIC) is notified that a leakage of nitric acid has occurred.]

Response Steps:

- Activate Personnel Notification Mechanism if not already completed.
- All staff will be alerted through a call-down list.

Response

Definition: The disaster has occurred and necessary emergency services are provided. These may include: medical, fire, police, temporary shelter, and temporary emergency repair to essential facilities and utilities.

Example: [Insert appropriate example: i.e., witnesses identify formation of nitric acid cloud. First reports of victims are received.]

Response Steps:

1. The Incident Commander or designee will report to the [your agencies name] and assume or delegate the following duties:

    a. Notify next in command if not already notified.

    b. Call in additional staff as needed.

    c. Assure frequent follow-up with appropriate service (i.e., Office of Emergency Preparedness, Fire, Police, State Health).

    d. Update staff frequently on status of disaster.

    e. Oversee media area.

    f. Document the events of the disaster (see disaster documentation forms).

    g. Coordinate eating/rest periods for staff as needed.

2. Following notification, all staff are to report to [specify location] or [specify if your agency has an alternate site if primary facility is compromised], if appropriate and assume duties as assigned by the Incident Commanders. All staff will remain on duty until released by the Incident Commander or designee. Any staff members learning of the disaster through media sources will call in to determine if they should report for duty. Scheduling patterns may be altered during the disaster at the discretion of the Incident Commander or designee.

3. The Incident Commander or designee will be responsible for supplying media releases after collecting the necessary facts, and in consultation with appropriate agencies.

4. [Insert titles] will be responsible for keeping the Incident Commander informed of the status of the disaster.

5. [Insert titles] will assist with normal staffing and/or assume other duties as assigned by [insert titles].

6. Clerical personnel and volunteers will report to the [insert agency/facility] to assume duties as assigned by [insert titles].

Recovery

Definition: The disaster/emergency phase has ended. Recovery efforts include search and rescue, fire fighting, damage assessment, and body identification.

- All personnel will be notified that the recovery phase has begun.
- All personnel not required for duty will be released.
- Normal staffing patterns will resume.

Evaluation

Management [insert titles] will review the disaster response and prepare a written evaluation.

Level 1 and Level 2 Job Descriptions

Level 1 Job Description

Personnel Supervised:	None
Position Summary:	Provides phone consultation and education to consumers and health care professionals regarding public health information. Works under the direct supervision of a call center service leader (registered nurse [RN]).
Minimum Qualifications:	Health and/or science related studies, degree and/or experience preferred. Type 30 words per minute (wpm). Excellent phone and communication skills. Previous health call center, dispatcher experience preferred.
Education:	High school diploma, health and/or science related studies and/or degree, emergency medical technician (EMT) or paramedic course preferred. Ability to comprehend and appropriately use medical terminology.
Required License:	None.

Position Responsibilities & Performance Expectations:

Essential Job Responsibilities and Competencies:

1. Promotes positive customer relations in dealing with patients, visitors, and other employees. Competency at this specific essential responsibility shall be demonstrated by:

    - Adheres to, complies with, and demonstrates support for the mission and values of the organization.

    - Treats all customers and co-workers with courtesy, dignity, and respect; consistently displays courteous and respectful verbal and non-verbal communication with customers and co-workers.

    - Does not make negative comments regarding policies, procedures, or staff.

    - Creates and maintains a secure and trusting environment by not sharing information learned on the job except when necessary in the performance of the job responsibilities or to improve a patient's care.

2. As applicable, the incumbent within this position shall complete all duties, responsibilities, and competencies in a manner that is effective and appropriate to the age group(s) of the patients/clients to whom care/service is being provided. Competency at this specific essential responsibility shall be demonstrated by:

    - Utilizes methods, techniques, and approaches to the delivery of care that is consistent with the age group of the patient and in conformance with the specific care plan developed for each patient.

    - Demonstrates knowledge and applicability of the principles of growth and development over the life span, as well as demonstrating the ability to assess data reflecting the patient's status and interpreting appropriate information relative to the age specific needs of the patient(s) to whom care/service is being delivered/provided.

    - At a minimum, the success with which employees produce the results expected utilizing the above methods, techniques, and approaches with specific patient age groups, shall be assessed via observation, and/or competency review, and/or patient outcome assessment.

3. Asks direct questions to elicit information necessary for caller assessment and appropriate follow up. Competency at this specific responsibility shall be demonstrated by:

    - Obtains accurate demographics as required by client.

    - Obtains required information for reports as defined by client, such as "dead bird reports," adverse events related to vaccines.

    - Follows all decision trees, processes, and protocols required to deliver the service.

    - Provides all information accurately as written in answers to frequently asked questions (FAQs).

    - Communicates verbally in a calm manner to offer support and information.

    - Demonstrates ability to triage incoming calls, and manage in order of priority, and to manage increased numbers of incoming calls during periods of high call volume.

4. Collects appropriate and required information and documents this information in call record.

    - Documents notes in a clear and easily understood style.

    - Collects demographic and other information used to generate statistics on calls.

- Call reviews pass routine and other quality reviews, including chart and tape audits and peer review.

5. Possesses technical and mathematical skills to manage cases. Competency at this specific essential responsibility shall be demonstrated by:

   - Ability to type 25-30 wpm.

   - Knowledge of computers utilizing Windows® 95 or higher based format, including mouse, click on/drop down boxes, scrolling, moving between multiple databases, etc.

6. Provides public education.

   - Gives information from pre-approved FAQs.

7. Follows policies and procedures for attendance, participation at staff meetings, and required certifications. Competency at this specific essential responsibility shall be demonstrated by:

   - Attends required number of mandatory staff meetings per poison center policy.

   - Adheres to policies, including attendance, punctuality, and dress code.

   - Participates in meetings, training, and case reviews.

8. Performs other related duties as assigned.

Level 2 Job Description

Personnel Supervised:	Clerical personnel
Position Summary:	Performs telephone triage under conditions that may be demanding, stressful, and repetitious. Functions independently to collect data and make assessment, develop a working diagnosis and determine interventions and disposition per guidelines. Guides evaluation including instructing patient/caller how to evaluate normal/abnormal symptoms, effectiveness of treatment, and when to call back. Documents symptoms/complaints, nursing assessment, advice, and patient/caller response. Follows policies, procedures, and protocols to ensure consistency and departmental effectiveness, as well as improve health care outcomes of patients/callers and their access to appropriate health care.

Minimum Qualifications:

Education:	Associate Degree in Nursing
Experience:	At least 2 years of recent nursing experience. Spanish speaking, computer or keyboard skills (able to type 35 wpm) and telephone triage experience preferred. OR an equivalent combination of education and experience.
Required License:	Registered Nurse in the State of Colorado

Position Responsibilities & Performance Expectations:

Essential Job Responsibilities and Competencies:

1. Promotes positive customer relations in dealing with patients, visitors, and other employees. Competency at this specific essential responsibility shall be demonstrated by:

    - Adheres to, complies with, and demonstrates support for the mission and values of the organization.

    - Treats all customers and co-workers with courtesy, dignity, and respect; consistently displays courteous and respectful verbal and non-verbal communication with customers and co-workers.

    - Does not make negative comments regarding policies, procedures, or staff.

    - Creates and maintains a secure and trusting environment by not sharing information learned on the job except when necessary in the performance of the job responsibilities or to improve a patient's care.

2. As applicable, the incumbent within this position shall complete all duties, responsibilities, and competencies in a manner that is effective and appropriate to the age group(s) of the patients/clients to whom care/service is being provided. Competency at this specific essential responsibility shall be demonstrated by:

    - Utilizes methods, techniques, and approaches to the delivery of care that is consistent with the age group of the patient and in conformance with the specific care plan developed for each patient.

    - Demonstrates knowledge and applicability of the principles of growth and development over the life span, as well as demonstrating the ability to assess data reflecting the patient's status and interpreting appropriate information relative to the age specific needs of the patient(s) to whom care/service is being delivered/provided.

- At a minimum, the success with which employees produce the results expected utilizing the above methods, techniques, and approaches with specific patient age groups, shall be assessed via observation, and/or competency review, and/or patient outcome assessment. Passes unit specific competencies essential for job performance at orientation and annual review.

3. Assessment

- The nurse collects patient health data in order to identify relevant and unique patient/caller needs.

- Performs initial assessment for _____neonatal, _____ pediatric, _____adolescent, _____ adult, and/or _____ geriatric patients. (Check all that apply.)

- Differentiates normal from abnormal findings, including potential problems.

- Identifies patient needs and basic understanding of assessment findings as they relate to the practice of telephone triage.

- Acts appropriately in critical situations.

- Identifies unique learning needs of patient/caller and participates in their education through care advice and repeat by patient/caller understanding.

4. Diagnosis/Determination of Needs

- The nurse systematically analyzes the assessment data in order to choose the correct guideline to determine plan of care most appropriate for the needs of the patient/caller.

- Analyzes assessment data to determine most appropriate guideline selection for patient/caller.

- Evaluates care advice for appropriateness for age of patient/caller.

- Assesses for signs of abuse and makes appropriate referrals.

- Reviews medications/drug dosages and allergies with health history and ensures immunizations are up-to-date as appropriate.

5. Outcome/Planning

- The nurse in conjunction with the patient/caller identifies realistic disposition for the patient/caller.

- Advises appropriate disposition for guideline selection for patient/caller.

- Demonstrates the ability to adjust (override) the disposition according to the unique needs/situation of the patient/caller.

6. Implementation

- The nurse implements care advice based on prioritized patient/caller needs.
- Implements nursing interventions based on care advice, priority of needs, unit/department guidelines and standards, and hospital policy and procedures.
- Triages calls in order of priority.

7. Evaluation

- The nurse evaluates care advice based on patient/caller understanding and goals of advice.
- Redefines priorities for care based on evaluation of patient's/caller's response or changing condition and makes appropriate updates to care advice/plan.

8. Documentation

- Assures all nursing assessment and care advice is documented concisely, clearly, and completely.
- Documentation is clear and concise and reflects assessment and care advice given. Also reflects any deviations and reason.
- Performs quality improvement (QI) and documentation audits.

9. Quality of Care

- The nurse assumes accountability for evaluating quality, effectiveness, and efficiency of nursing care provided to patients/callers.
- Integrates quality improvement activities into practice.
- Assists in identifying ways to promote quality care and in collecting data needed to promote process and operational improvements.
- Demonstrates a basic understanding in the role of the nurse as provider of care and information.

10. Ethics and Ethical Manner

- Maintains patient/family and staff confidentiality.

- Acts as a patient advocate.

- Delivers care in a non-judgmental, non-discriminatory manner that preserves patient's rights.

- Participates in the ethical decision making process.

11. Knowledge of Safety and Infection Control Practice

- Maintains a safe environment by practicing sound safety practices according to organization policies.

- Identifies and responds to safety issues and infection control issues.

12. Performance Appraisal

- The nurse evaluates his or her practice in relation to professional standards, statutes, regulations, hospital and department policies, and standards of care.

- Accepts constructive peer input.

- Actively solicits constructive feedback regarding performance.

- Assumes accountability and responsibility for working towards and achieving goals set forth by the manager, educator, preceptor, and themselves for the next evaluation period.

- Provides peer feedback as requested.

13. Education

- The nurse actively seeks out activities to maintain and improve their current knowledgebase and skills for their nursing practice.

- Attends all mandatory in-services, staff meetings, and annual skills review, including safety, infection control, disaster, fire, and cardiopulmonary resuscitation (CPR).

- Recognizes self-learning needs and plans to meet them.

- Incorporates new knowledge obtained into practice.

14. Collegiality/Collaboration

- The nurse contributes to development of nursing personnel and clerical support. He or she collaborates with the patient/caller and other health care providers in

providing care.

- Interacts with colleagues and the public in a manner consistent with the standards set forth in "Excellence in Service," and with the mission of the agency.
- Shares information with others.
- Participates in peer review when requested and ensures comments are constructive.
- Assists in promoting and maintaining a positive attitude toward the unit and institution.

15. Performs other related duties as assigned.

HEALTH Contact Center Assessment Tool Set Description*

Bioterrorism & Public Health Emergency Planning and Preparedness Tool Summary

HEALTH Contact Center Assessment Tool Set	
Purpose	The HEALTH Contact Center Assessment Tool Set provides ways to understand the magnitude of an emergency event from a risk communication perspective, and the staff, resources, and technology needed to meet information demands. • Contact Surge Calculator- Provides a simple way to predict the amount of contacts (phone, Web site, e-mail, fax) that may be expected by a public health agency due to a bioterrorism or emergency event. • Staffing/Resource Calculator- Provides a simple way to determine personnel needed to handle an expected amount of contacts based on industry standards. This tool will help agencies understand staffing and basic resource requirements for an internal contact center or hotline. • Capital and Technology Expense Calculators- Provide a means to assess the facilities, technology, and equipment needed to handle an expected amount of contacts. The tool calculates the potential capital needed for resources not currently available. This tool will help agencies understand potential costs associated with an internal contact center or hotline. • Surge Options Matrix- Provides a simple way to assess your agencies capabilities for implementing an emergency contact center or hotline and suggests potential options.
Intended Users	State and local public health and health care agencies.
Format	Microsoft® Excel workbook and narrative user guide.
How it Works	• In the fall of 2001, the intentional release of anthrax spores in the Eastern United States caused much fear and panic. The Denver Health Medical Information Centers (the Rocky Mountain Poison and Drug Center and the Denver Health NurseLine) experienced a 10 percent increase in call volume without an actual incident in the five-state service region (CO, HI, ID, MT, NV). o What would your agency do to accommodate a surge in contacts from a public trying to get information? o Could you adequately predict the potential volume? o How would you begin to identify staff and other resource needs? • Understanding the potential information demands related to public health emergencies and developing strategies to handle these surges is important for all public health and health care agencies. • The user will enter data into the tools or view sample calculations to determine resources needed to meet potential risk communication demands related to public health emergencies. • The user will review different options and strategies for handling these risk communication demands and better understand the requirements and resources for each option.

How to Obtain the Tool Set	• Tools are available on the AHRQ Web site at: http://www.ahrq.gov/research/health/. • AHRQ Grant Principal Investigator: Gregory Bogdan, PhD Research Director & Medical Toxicology Coordinator Rocky Mountain Poison & Drug Center – Denver Health Street Address: 990 Bannock St., 4th Floor Mailing Address: 777 Bannock St., Mail Code #0180 Denver, CO 80204 Phone: 303-739-1239 Fax: 303-739-1119 Greg.Bogdan@rmpdc.org

*This tool was developed by Denver Health Medical Information Centers under Contract No. 290-00-0014, AHRQ Task Order No. 6, for the U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality.

Rocky Mountain Regional Health Emergency Assistance Line & Triage Hub (HEALTH) Model: Contact Center Assessment Tool

This interactive tool is available on the AHRQ Web site at: http://www.ahrq.gov/research/health/.

Requirements Document

Table of Contents

Background

In August 2002, the Denver Health Medical Information Centers (DHMIC – the Rocky Mountain Poison & Drug Center and the Denver Health NurseLine) submitted a proposal to the Agency for Healthcare Research and Quality (AHRQ) to provide a Health Emergency Assistance Line & Triage Hub (HEALTH) model. The goal of the proposal was to determine the requirements, specifications and resources needed for developing the HEALTH model, a public health emergency contact center. The purpose of the model is to examine the effects of the regional care models and their impact on resources allocation and capacity in the event of a potential bioterrorist event. DHMIC was awarded the grant in September 2002.

The cornerstone of the grant request is the model development of a business process and computer application systems to identify:

- Requirements for surge capacity: facilities, equipment, and personnel.
- Lessons learned for bioterrorism preparedness from other regional models of care (for example, cardiac or trauma care).
- Linkage with local public health and emergency preparedness infrastructures.

The objective of this model is to address the public health emergency information needs of Colorado and Hawaii as a starting point for a regionally exportable model. This contact center may include e-mail, fax, phone, or Web chat as an interface to the public. The model must be scalable to provide exportability to six states of Region VIII and the states of Idaho, Nevada, and Hawaii.

Specifications/Requirements

Functional Requirements

The following functional requirements have been identified for the HEALTH model. The requirements will be directed toward telephony interaction with the customer, but is not limited to telephony as a means to communicate with the customer.

HEALTH Telephony Solution

Integration of Telephony solution

- The HEALTH Telephony solution must be capable of integrating with the existing Avaya Telephone Switch. (see Appendixes III)

- The HEALTH Telephony solution should be capable of integrating with multiple switch platforms such as Cisco, Alcatel, or Nortel in order to be exportable to other states.

- The HEALTH Telephony solution must provide reporting and data transfer in a manner that can be exported to State and Federal agencies.

- The HEALTH Telephony solution must be consistent with the DHMIC long-term vision of becoming a Multi-Media Contact Center (see Appendix IV). This vision includes the ability to accept and respond using multiple communication methods in addition to the telephone. This includes faxes, e-mails, and Web chats.

Telephony Functionality

- The HEALTH Telephony solution must provide Interactive Voice Response (IVR) with the customer contact.

- The HEALTH Telephony solution must be able to replicate the existing functionality of the current telephony systems, including Automated Call Distribution (ACD) and the use of Expert Agent Skills (EAS).

- The HEALTH Telephony solution must provide call-tracking metrics.

- The HEALTH Telephony solution should be capable of sending multiple types of data formats including, but not limited to, Microsoft® Access and Excel.

Telephony Management Functionality

- The HEALTH Telephony shall be able to be managed remotely.

- The HEALTH Telephony solution must be able to replicate the existing management functionality of the current telephony systems.

- The HEALTH Telephony solution must support remote agents.

Telephony Performance

- The HEALTH Telephony solution must be initially able to receive 1,000 calls per hour.

- The HEALTH Telephony solution must be available 24 hours per day, 7 days per week. The amount of availability should be no less than 99.99 percent.

Telephony Scalability

- Initially DHMIC envisions low call volumes for the center, but the number of calls could rise quickly in a bioterrorism event.

- The HEALTH Telephony solution must support simultaneous 75 to 100 agents.

Telephony Ease of Use

- The HEALTH Telephony solution must have a Graphical User Interface (GUI) look and feel.

Telephony Security

- The HEALTH Telephony solution must comply with Denver Health's security policies for Telephony systems.

Telephony Manageability

- This system must have an "ease of administration" sense to it; hence, DHMIC staff should not have to complete extensive training on the usage and manageability of the system prior to its installation.

- DHMIC needs to have the ability to perform remote administrative duties on the HEALTH Telephony solution.

- DHMIC uses both Microsoft® Windows NT and 2000; therefore, both platform based interfaces are required.

HEALTH Triage Solution

Integration of HEALTH Triage solution

- The HEALTH Triage solution must have the ability to process multiple methods of incoming work using a single user interface for the agent to document work including the contact and protocols used during the contact.

- The HEALTH Triage solution must be capable of providing a single user interface to existing telephone triage software or DHMIC software such as LVM Systems' e-Centaurus application (see Appendix II) and CasePro software (see Appendix I).

- The HEALTH Triage solution must be capable of integration with the HEALTH Telephony solution to allow information collected in the telephony solution to be used in the Triage solution.
- The HEALTH Triage solution must provide reporting and data transfer in a manner that can be exported to State and Federal agencies.

HEALTH Triage Functionality

- The HEALTH Triage solution must be able to replicate the existing functionality of the current triage systems.
- The HEALTH Triage solution must be able to support 20 remote agents.
- The HEALTH Triage solution must provide contact-tracking metrics.
- The HEALTH Triage solution should be capable of sending multiple types of data formats including, but not limited, to Microsoft® Access and Excel.

Triage Management Functionality

- The HEALTH Triage solution must provide IVR with the customer contact.
- The HEALTH Triage solution must be able to replicate the existing functionality of the current telephony systems.
- The HEALTH Triage solution must provide call-tracking metrics.

Triage Solution Performance

- The HEALTH Triage solution must be initially able to handle the same amount of users, records, and data interfaces as existing systems such as CasePro and LVM Systems' e-Centaurus.
- The HEALTH Triage solution must be compatible with current Local Area Network (LAN) infrastructure and not erode current performance levels.

Triage Solution Scalability

- The Triage solution must be able to support 90 customer contacts at any one time.
- The Triage solution must be able to support 20 remote agents.
- The Triage solution must be able to support 90 agents at anytime.

Triage Solution Ease of Use

- The Triage solution must have the look and feel of existing user interfaces such as CasePro and LVM Systems' e-Centaurus.

Triage Solution Security

- The Triage solution must comply with Denver Health system security policies.

- The Triage solution must be HIPAA (the Health Insurance Portability and Accountability Act of 1996) compliant.

Triage Solution Manageability

- This system must have an "ease of administration" sense to it; hence, DHMIC staff should not have to complete extensive training on the usage and manageability of the system prior to its installation.

- DHMIC would like to have the ability to perform remote administrative duties on the solution.

- DHMIC would like to use a Microsoft® Windows® 2000 based solution so the Information Technology department can best manage the system.

Appendix I – CasePro

CasePro is an online patient record used by the Rocky Mountain Poison Center (RMPC) for data collection, case management, tracking, and reporting. Its current functionality includes the following:

- Call center application to record and track incoming calls to the RMPC.
- Toxic Exposure Substance Surveillance (TESS) compliant. The American Association of Poison Control Centers uses TESS for data collection and reporting. Any poison center system must be TESS compliant.
- FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) compliant. The RMPC has clients that are required to submit reports to the U.S. Environmental Protection Agency (EPA).
- Public and industry reporting. The RMPC has other public and industry clients with client specific reporting requirements.
- Quality assurance. CasePro is used to review cases for completeness, quality, and accuracy.
- Case entry/storage and retrieval.
- Fast.
- Durable.
- Decision support. There is logic built in to decrease data entry errors and help assure accurate reporting.

Client Environment

HW Requirements (with Failover) RMPDC is currently using Dell™ PowerEdge 4300 with 1 gigabyte Random Access Memory (RAM) and a 455 megabyte processor dedicated to CasePro. They run two instances, one for backup and one for restore.

Maintenance Support Most changes can be planned in advance. Currently, there are few emergencies that require immediate attention. Major events (i.e., an anthrax outbreak) would require immediate changes to the application. There is generally a 1 to 2 month lead time for changes.

Users There is an average of 6 users, 15 during peak periods and 2 during low periods.

Appendix II – LVM Systems' e-Centaurus

http://www.lvm-systems.com/

LVM e-Centaurus Nurse Telephone Triage software is an online patient record used by the Denver Health NurseLine (DHNL) for data collection, case management, tracking, and reporting. LVM e-Centaurus software offers three sets of standardized nurse guidelines: Schmitt Pediatric guidelines, Thompson Adult guidelines, and the American Institute for Preventive Medicine guidelines. With the software product, "Nurse Guidelines for Telephone Triage," you can cost-effectively use standardized guidelines to triage and track each call.

Easy to use, straight forward system:

- Ability to track questions asked, caller's responses, advice given, appointments made, and follow-up information.
- Standardized guidelines to ensure each call is handled in an appropriate manner.
- Ability to modify guidelines to fit your needs as well as your clients' needs.
- Each guideline is supplemented with Nurse Additional Information.
- Manageable guideline topics such as chest pain, fever and chicken pox.

Client Environment

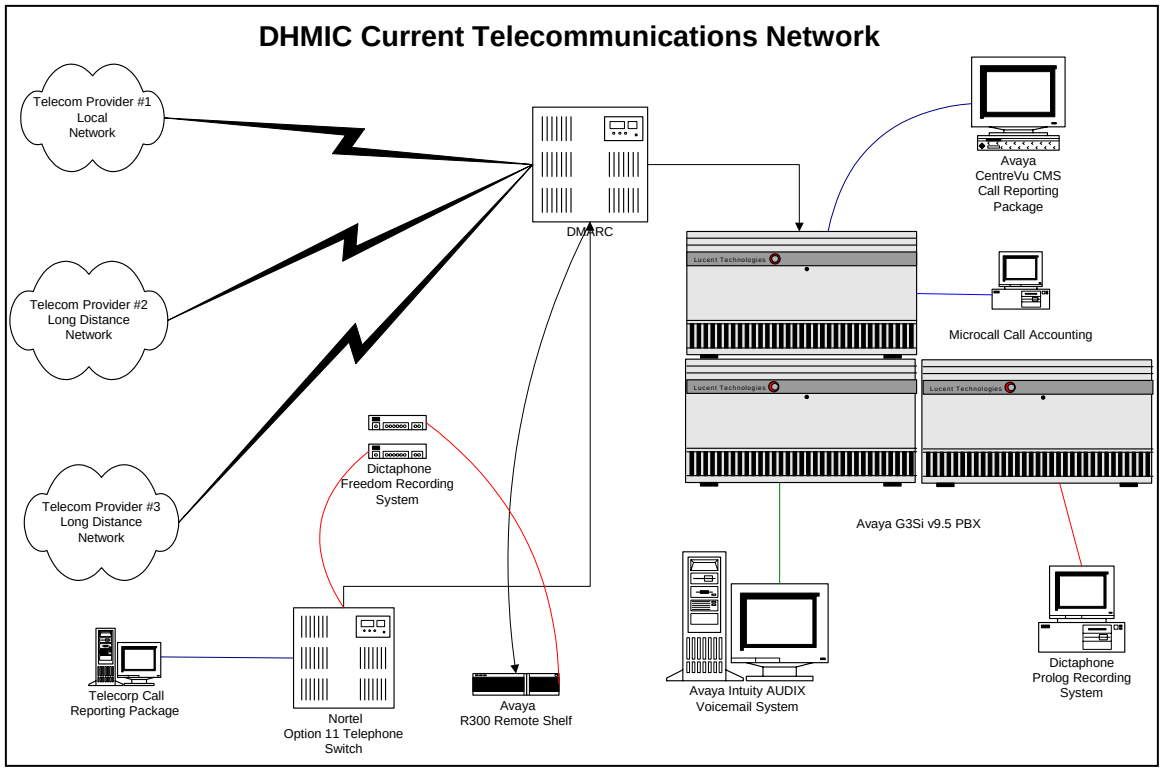
HW Requirements (with Failover) DHNL is currently using Dell PowerEdge 4300 with two gigabytes random-access memory (RAM) and 455 megabyte processor dedicated to LVM e-Centaurus. The server houses the FoxPro Database; application/component drivers reside at the desktop.

Maintenance Support Most changes can be planned in advance. Currently there are few emergencies that require immediate attention. There is generally a 1 to 2 month lead time for changes/enhancements which are negotiated directly with LVM e-Centaurus System Support.

Users There is an average of 7 concurrent users, 10 during peak periods and 4 during low periods.

Appendix III – Current Infrastructure

This diagram represents the current telecommunications network configuration of the Denver Health Medical Information Centers (Rocky Mountain Poison and Drug Center [RMPDC] and Denver Health Nurse Line) at the time of this report. It outlines from where the telephone lines into the center terminate at the demarcation point (DMARC) before entering two telephone switches (Nortel® and Avaya®). The telephone switches are then connected to various voice handling equipment to provide the functionality of voicemail (Avaya Intuity AUDIX®), call monitoring (Avaya CentreVu CMS®, Telecorp), call accounting (Microcall®), and call recording (Dictaphone Freedom® and Prolog).



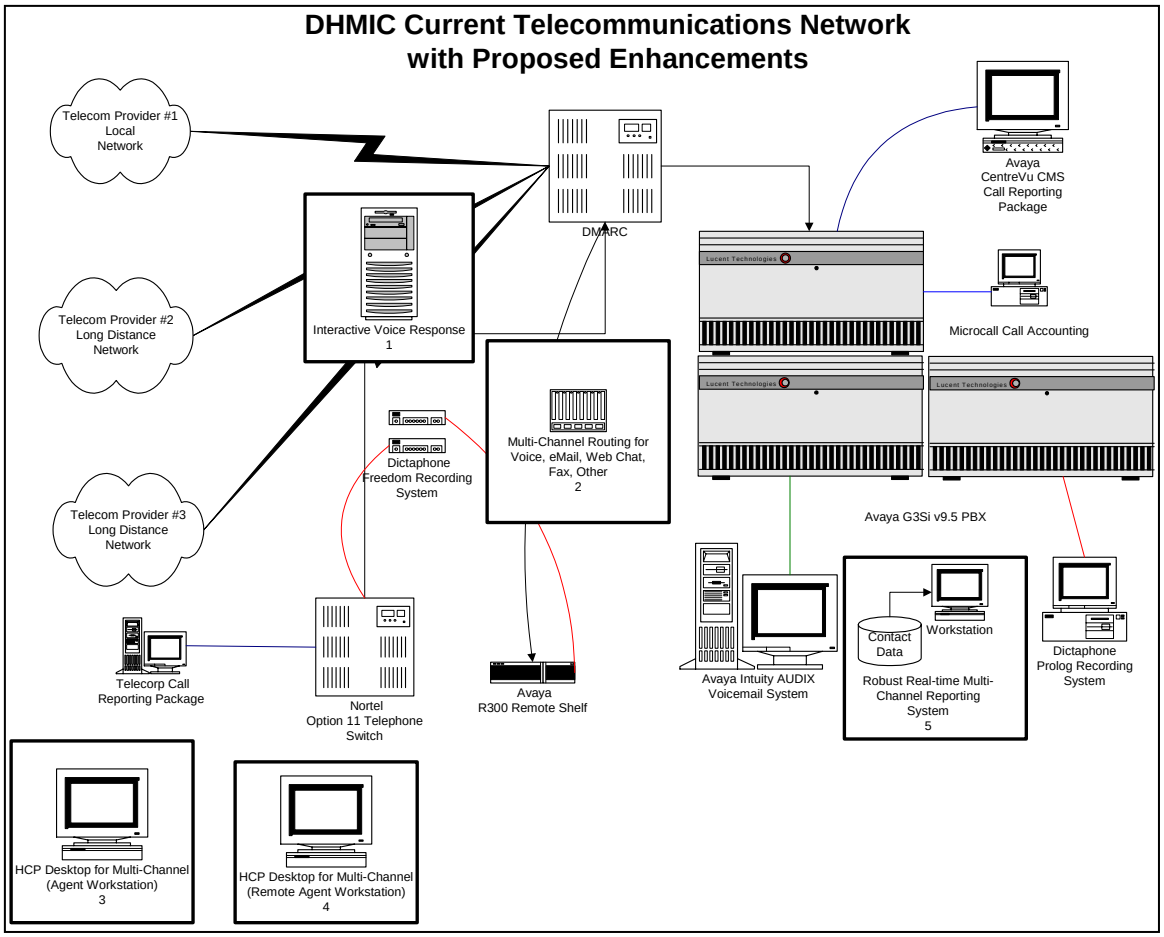
CMS = call management system.

Notes:

- In August, 2003 the three call centers moved to a new location in Denver, Colorado.
- In August, 2003 the Avaya™ G3Si was upgraded to an Avaya™ S8700 Media Server.
- In August, 2003 a RightFax server solution was implemented in the new call center.

Appendix IV – Proposed Changes to Infrastructure (Components)

This diagram represents proposed enhancements to the current telecommunications network configuration of the Denver Health Medical Information Centers (DHMIC). It outlines from where the telephone lines into the center terminate at the demarcation point (DMARC) before entering two telephone switches (Nortel® and Avaya®). The telephone switches are then connected to various voice handling equipment to provide the functionality of voicemail (Avaya Intuity AUDIX®), call monitoring (Avaya CentreVu CMS®, Telecorp), call accounting (Microcall®), and call recording (Dictaphone Freedom® and Prolog). The five proposed enhancements include: 1) Interactive Voice Response to be added prior to the DMARC to provide menu driven options to callers; 2) Multi-Channel Routing for various contact methods; 3) Healthcare Provider (HCP) Desktop for multiple channels; 4) Remote Agent HCP Desktop for multiple channels; and 5) Multi-Channel reporting system.



CMS = call management system.

Notes:

- Components are placed on the diagram for illustrative purposes only.
- Components:

1. Interactive Voice Response (IVR)

    - Capable of Automatic Number Identification (ANI) capture and Computer Telephony Integration (CTI) (capture, store, write to other applications; i.e., LVM e-Centaurus and CasePro).

    - Capable of interfacing with Web applications.

    - Capable of Natural Speech Recognition.

    - Touchtone or "Speak" input/prompt capture.

2. Multi-channel Routing Solution

    - Capable of routing voice, e-mail, Web/chat, and fax work items.

3. Health Care Professional (HCP) (contact center agent) Desktop

    - Ability to have a "screen-pop" of captured information from IVR or other routed channels in local databases/applications (LVM e-Centaurus and CasePro).

4. HCP (call center agent) Desktop remote workstation

    - Business plan requires HCP's ability to work remotely with fully functional workstations by December, 2003.

5. Robust Real-time and Historical Reporting System

    - Ability to consolidate reports to show all activities performed by a contact center representative, including contact center productivity on phone, e-mail, and Web.

    - Ability to export data into popular file formats (i.e., Microsoft® Excel and Access).

    - Ability to access reports via the Web.

Multi-Channel Contact Center System Concept

Table of Contents

Management Summary

Wood Associates' consultant conducted a best-in-class assessment at the offices of Rocky Mountain Poison and Drug Center (RMPDC) in April 2003 in conjunction with the Agency for Healthcare Research and Quality (AHRQ) Health Emergency Assistance Line and Triage Hub (HEALTH) Grant and System Concept Specification data gathering for the proposed Multi-Channel Contact Center. It is part of RMPDC's vision to become a multimedia call center, and the threat of a major bioterrorism event provides significant impetus to put the strategy and planning into place.

Wood Associates reviewed operations from a people, process, and technology standpoint. The high-level readout from the assessment document can be found herein under the section "Best-in-Class Comparisons/Components."

This document is laid out in five sections; the five sections are Management Summary, "HEALTH" Concept Specifications, Component Pricing Estimates and Assumptions, Key Performance Metrics, and Appendixes. It is not the intent of this engagement to be a full contact center assessment of operations at RMPDC; rather, the results were kept at a high level due to minimum access and review of current call center processes. The purpose of the engagement, and the following document, is to provide a roadmap for developing a multi-channel contact center from a system concept and planning perspective. Technology should enable contact center personnel to deliver a high-quality of service to clients, meeting and exceeding client expectations on a regular basis.

Current State Review

Three call centers are in operation at RMPDC today—Poison Center, Drug Center, and NurseLine. The focus of the review was on people and process, and how technology might better enable the workflow at each of the centers. Overall, the professionalism of the staff, both from a knowledge and caring approach for the client, is exhibited. The documentation required in each organization for each contact varies and, depending on the case, can be quite extensive. Processes in the NurseLine seem to flow better with the use of LVM e-Centaurus; however, there are several paper processes that could be streamlined. The screening of callers when all of the nurses are on calls is placed in the Centaurus system; however, the call does not flow to the nurse once the caller is transferred. A new case has to be opened, and the transfer is a verbal "across the room" announcing the caller. This process should be streamlined in that the Centaurus case is opened by the screener, and then passed through call/case transfer to the nurse that is available in the queue. This would be automated, both from a telephony and process perspective, reducing at least two steps and client hold time.

The Poison Center was quite impressive from the amount of calls and the amount of work (case documentation) that was accomplished, while balancing multiple callers at the same time (up to three). The downside to this was that the individual health care professionals (HCPs) (general information specialists in poison information [SPI], and certified specialists in poison information [CSPI]) had to choose how to balance the incoming calls. This led to multiple "hold" times for the callers and extended wrap-up time documenting the case in CasePro. It was

observed that several callers hung-up while the HCP had them on hold, and with continued queuing of calls without the chance to properly "wrap-up" the call, the case notes became confusing when updating at a later point. It is strongly recommended that callers be queued into a single line appearance, and a "one and done" strategy should be incorporated that includes after call work (ACW) as a tool to wrap-up the case notes.

Within the Drug Center, the main client Pfizer dictates the call flow, form requirements, and quality control. It is understood that a request has been made to several vendors to provide a contact management tool that will streamline the use of forms and attaching required information to the contact. It would benefit RMPDC if this effort could be expanded to include all of their call centers with a focus on consolidated reporting efforts and a common data repository.

In all of the call centers, current call center statistics available from the Avaya™ Call Management System (CMS) were only in moderate use. There is a wealth of information on calling statistics; a review of current call flows would be in order. It is unclear from this short visit how management was utilizing the call center data to make decisions and for future planning based on call trends and queues.

Process documentation in each of the call centers needs to be matured. Starting with each caller type, a process flow should be documented, and then reviewed for efficiency. Quite frequently, significant improvement efforts can be gleaned from mapping just one of the caller types.

Summary of Recommendations

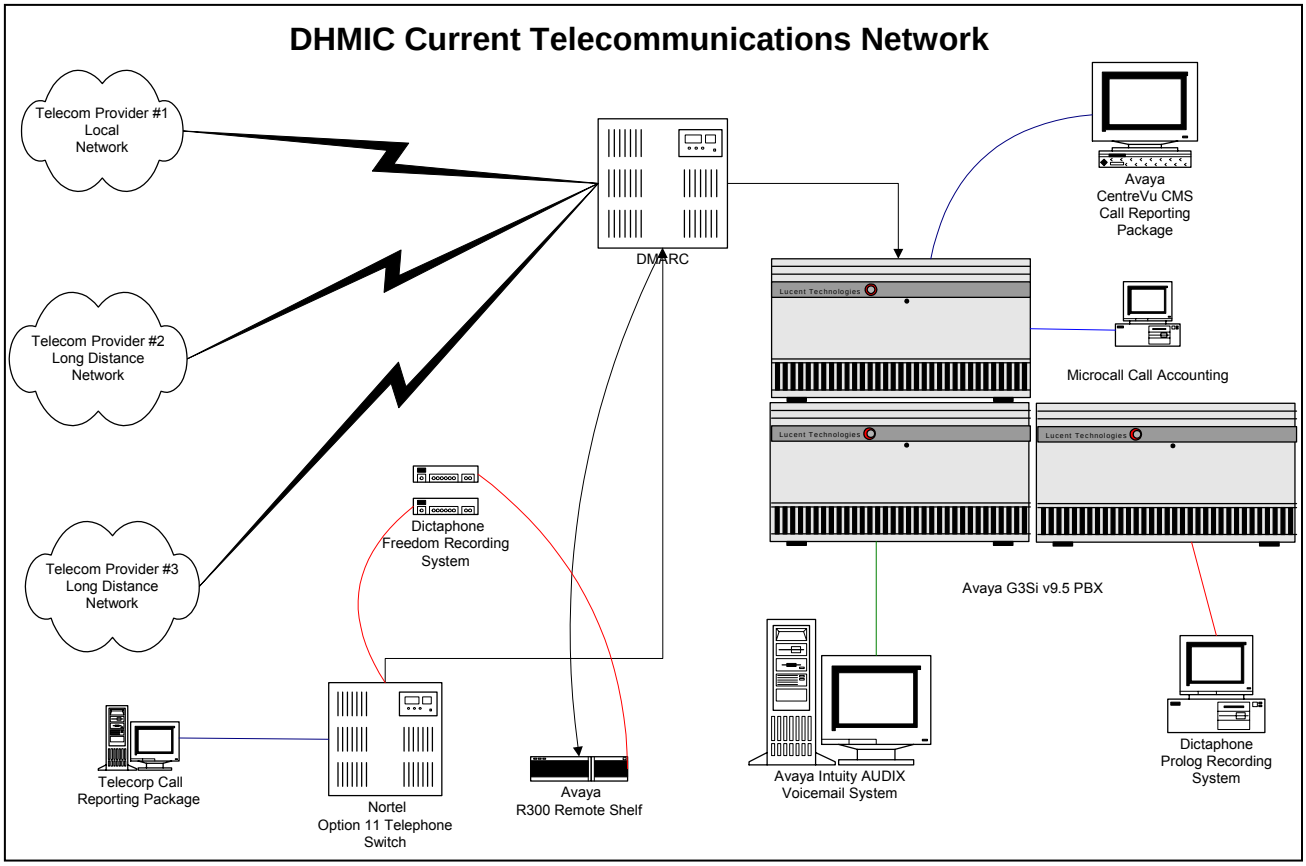
Recommendation	Benefits
Document current processes	Record of process current state Documentation for training efforts Record of process for identifying improvement opportunities
Organization development—leadership and management training to promote change	Manager to coach/mentor Empowerment of workforce Decision-making closer to the client
Condense line appearances to one in Poison Center, utilize ziptone to announce caller	Callers answered in order of queue Promote "one and done" strategy Accurate call statistics for workforce planning Confusion avoidance for documenting case information Associate satisfaction in focusing on single case and wrap-up
Centaurus case populated for hand-off	Streamlined call flow Efficient use of resources Verbal hand-off not required
Case notes/contact information database	Uniform across call centers Access to information by all designated HCPs Streamlined contact flow

The current technology in use at RMPDC, especially from a telephony standpoint, is state of the art with current releases. A well-trained, process oriented information technology (IT) staff supports this infrastructure, and there is little system unavailability. The processes in place with RMPDC's vendors are well documented, as are disaster recovery plans. It would be good to

have a test of the disaster recovery plans on a regular basis, such as a "fire drill" or other simulated event, to test system back-ups and failure planning. It is of high importance that the call centers continue to formalize their staffing plans in a disaster recovery scenario.

Visio documentation is kept current, and an example of the telephony infrastructure (Figure 1) was provided to the consultant on the first day of the engagement. The infrastructure is capable of handling more calls/transactions than are currently being used, and is well-positioned to migrate to a multi-channel contact center with best-in-class considerations. Although the current infrastructure (telephony) is not taxed, its robust qualities are not being fully used (i.e., CMS reporting).

Figure 1. Telephony infrastructure example



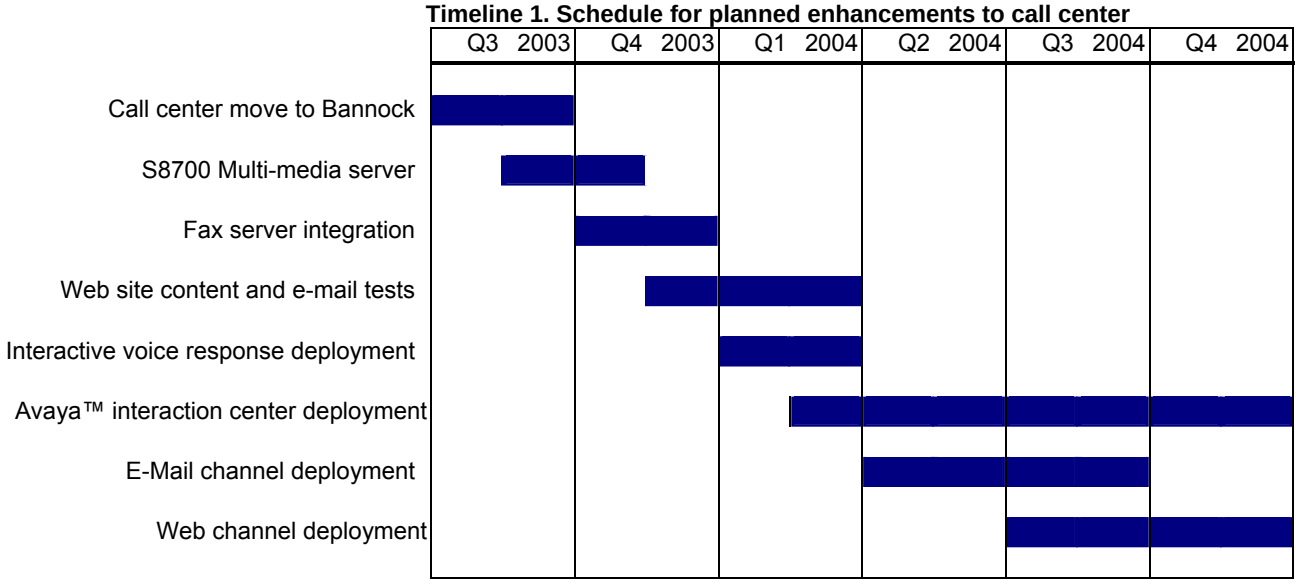
In conclusion, RMPDC is positioned for the future with a well-trained, professional workforce enabled by state of the art telephony. While process documentation is weak, there is opportunity to remove non-value added work by changing some of those processes and more fully utilizing the technology currently in place.

The biggest challenge will be championing change management within the call centers and utilizing change agents with supportive leadership. Without this crucial step in organizational development, any new technologies may be perceived to fail without being given a full chance to enable the workforce with next generation multi-channel contact center tools.

Timeline Considerations

The timeline below depicts both planned enhancements to the call center and recommendations on a schedule to move to a full multi-channel contact center. Although full integration of technology components can happen within 60 to120 days, it is Wood Associates' view that a conservative timeline be placed on the migration with an emphasis on cultural transformation for the personnel leading, managing, and staffing the call centers.

Timeline 1. Schedule for planned enhancements to call center



Q, quarter.

Proposed Elements of "HEALTH" Multi-Channel Contact Center

It is estimated that in the event of a bioterrorism threat or incident, the six million resident population of Region VIII may correlate to 1000 plus contacts per hour from those seeking information from State public health departments.

Chart 1. Established system sources of client stress

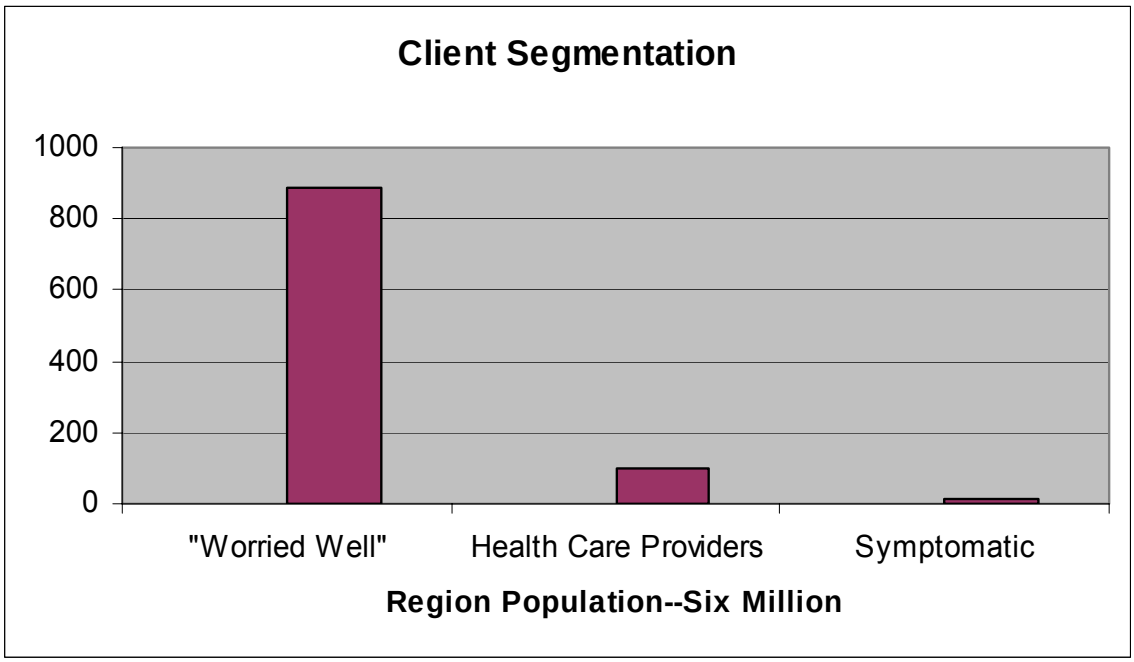
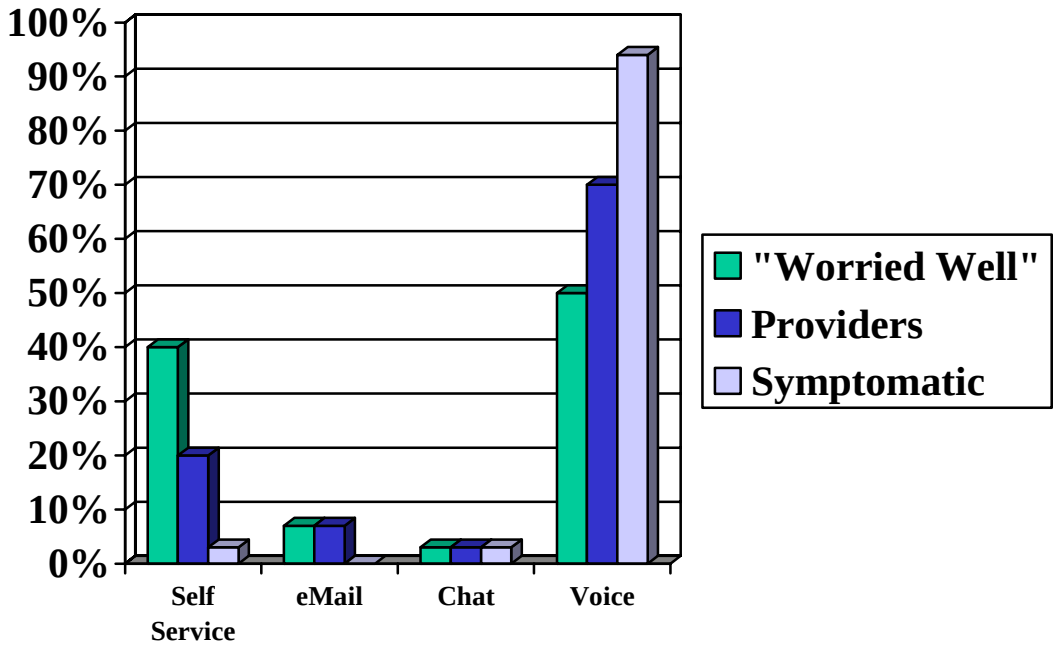


Chart 1 shows that of the total population, those "Worried Well" are the largest group of clients and would put the most stress on established systems, including those health organizations locally staffed. The Health Care Providers are the second largest group followed by those symptomatic—or believed symptomatic—, which could greatly increase based on the level and location of exposure.

For a health call center today, the resulting traditional voice traffic would overwhelm facilities and staffed personnel. By proposing to offer multiple, non-traditional access points to information, the population will be able to access succinct information regarding the event through Interactive Voice Response (IVR), the Internet (e-mail, Web chat and Web content) and automated fax-back. In Chart 2A, estimates of which client segment would use the various channels are displayed.

Those "worried well" of the general population will be able to access information from the Web (i.e., http://www.rmpdc.org/) or through a self-service application on an IVR that will provide the latest information regarding the event. Frequently Asked Questions (FAQs) can be posted for use by the public either on the Web or through the IVR and updated as additional statistics and information are gathered from those reporting on the event.

Chart 2A. Client mode of accessing information



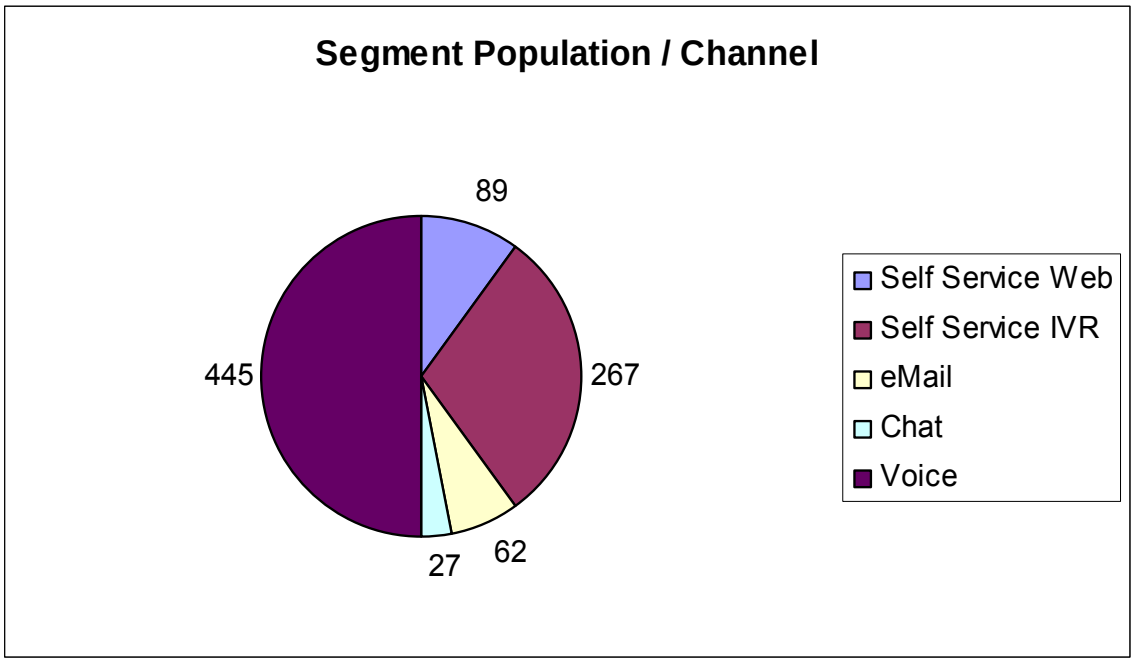
It is estimated that up to 40 percent of the general public would be satisfied with FAQs and IVR. FAQs and IVR provides a way of deflecting traditional voice calls, which could overwhelm contact center resources.

Health care providers could also use these self-service options; this would cause a 50 percent reduction of usage by the general population.

A small percentage of those symptomatic, or perhaps self-determined, could be satisfied with these self-service options.

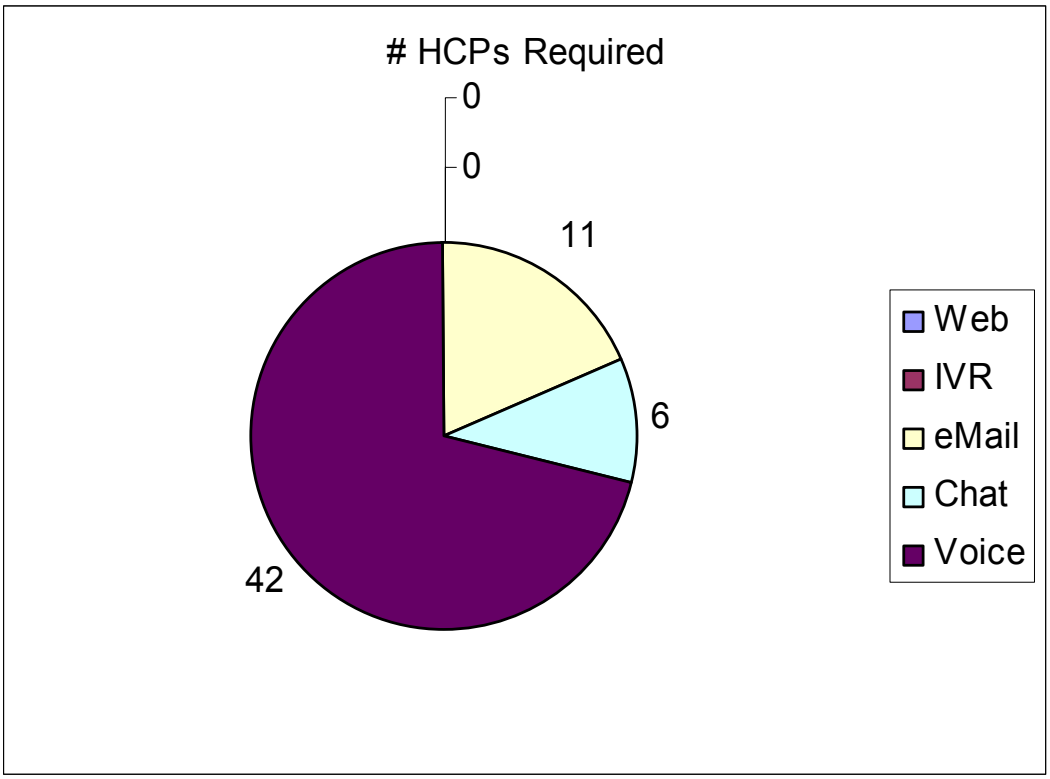
During the initial week of a bioterrorism event, contact volumes could exceed 1,000 per hour. Although current telephony systems in place at RMPDC could handle the traffic, blockage would begin to occur immediately due to staffing (headcount) constrictions. In Chart 2B, we have plotted how contact volumes might be segmented by channel of choice and by client segments requiring information regarding the event. As shown in Chart 2A and 2B, there will still be a significant request for information via the traditional voice channel; however, the IVR augmenting of the voice channel will help to deflect part of the traditional voice-channel volume.

Chart 2B. Contact volumes by channel of choice and segment population



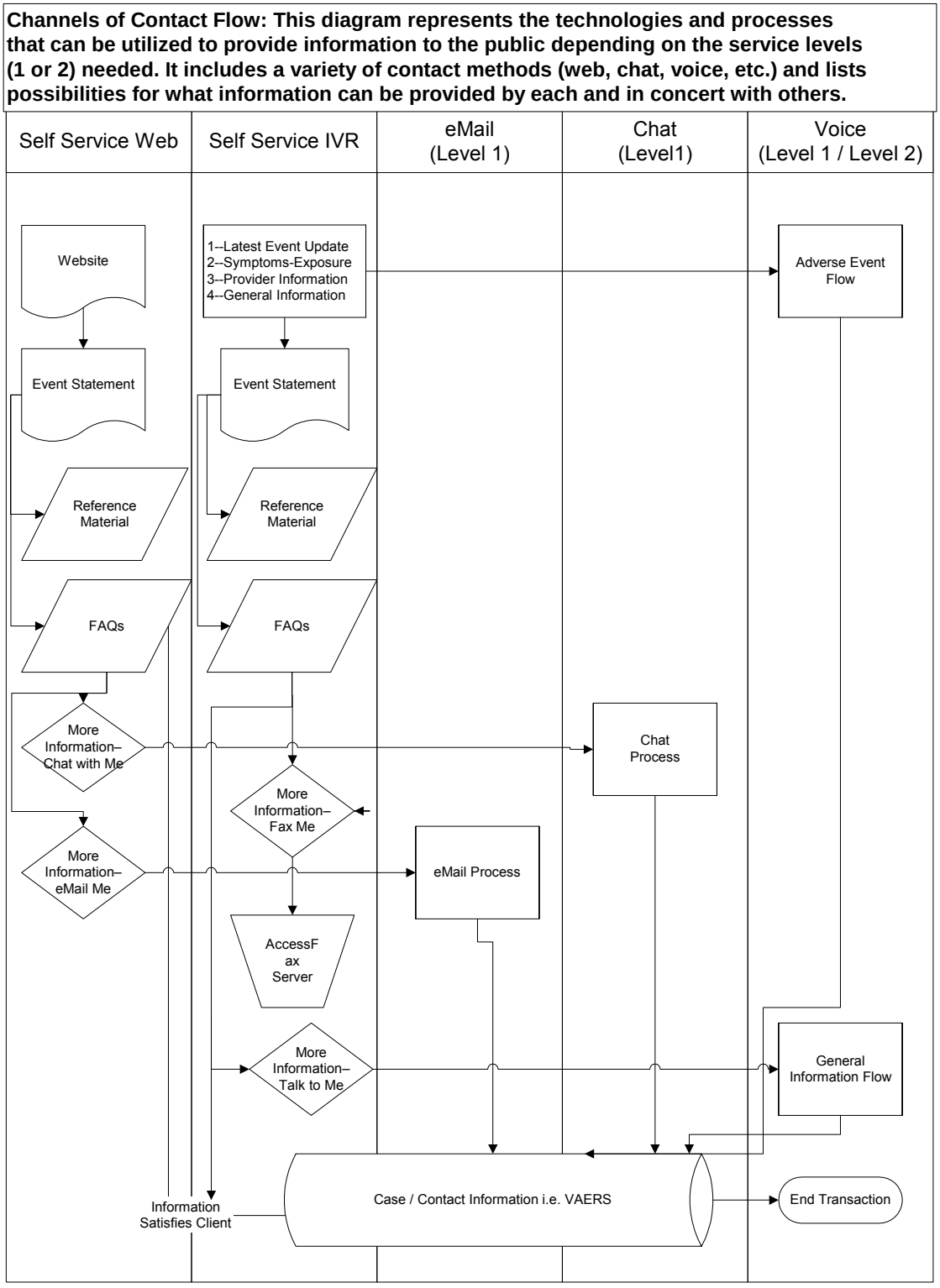
Overall, the self-service options for the Web and IVR could reduce the need for agents by 53 percent, or 47 full-time equivalents (FTE). The actual need without any alternative channels for contact is 89 FTE—thus, the resulting 42 FTE required is shown in Chart 3. Contact center agents, as depicted in Chart 3, are identified as health care professionals (HCPs). Currently, these are Level 2 personnel that perform a complex set of services. As a bioterrorism event unfolds, it has been identified that most initial contacts will be handled by general information specialists or Level 1 personnel. At a future point, RMPDC will determine who will staff the e-mail and Web-chat channels.

Chart 3. Number of employees needed during a busy hour



During the high volume periods, primarily at the outbreak and initial 1 to 2 weeks of an event, there will still be significant challenges placed on the resources staffing the HEALTH contact center. As depicted in Chart 3, a requirement of 42 FTE for traditional voice traffic can be expected during a busy hour. Resource planning and augmentation strategies will be essential to managing traditional channels, as well as enhanced channels, in an event. There will be additional challenges, just as crucial, managing the knowledge capital of the content placed on the Web and then activated for delivery through the self-service IVR channel.

Figure 2. Logical flow of contacts into multi-channel contact center—HEALTH model

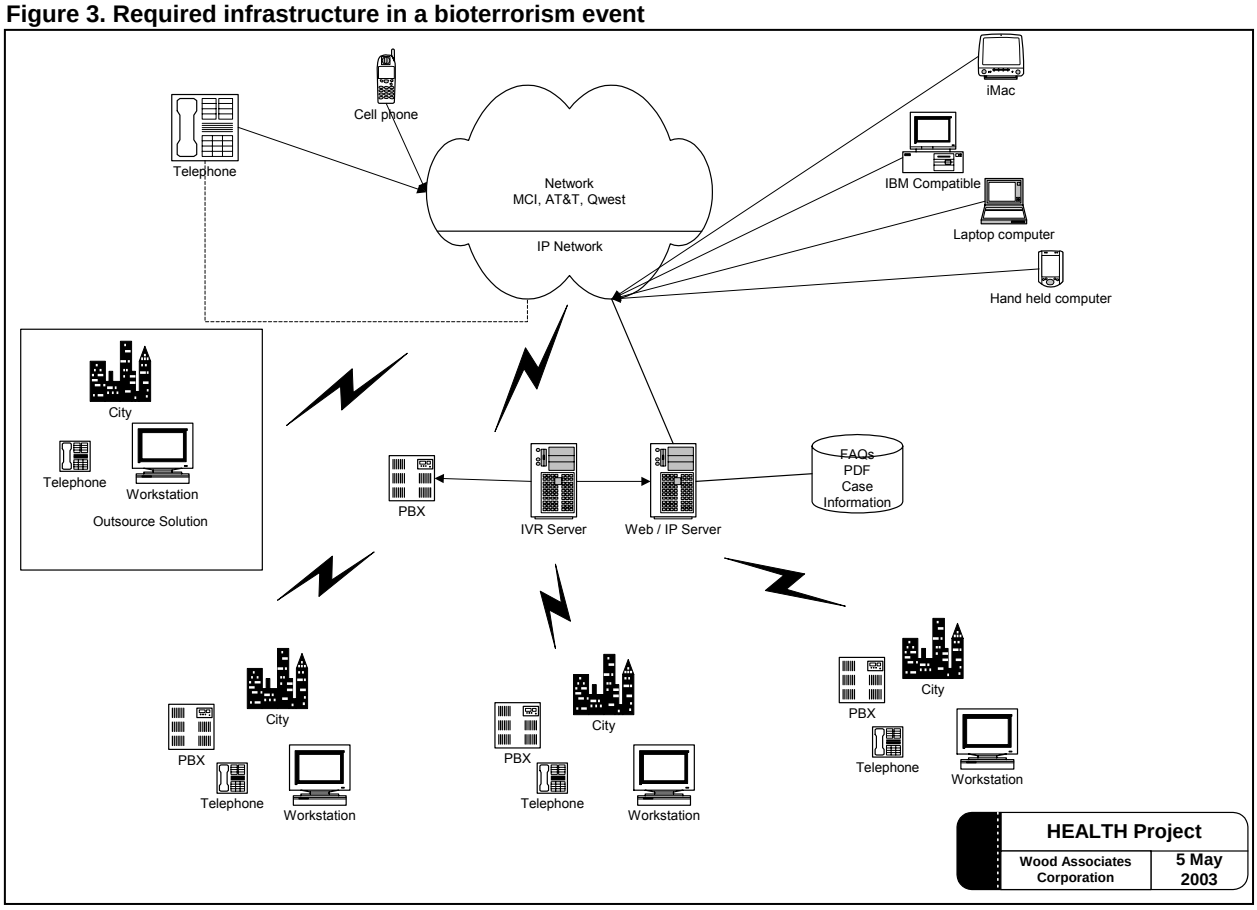


FAQs, frequently asked questions; IVR, interactive voice response; VAERS, Vaccine Adverse Events Report Surveillance.

"HEALTH" Concept Specifications

In Figure 3 below, the HEALTH Core Team, through meetings in April and May of 2003, discussed a high-level concept for the infrastructure that would be required in a bioterrorism event.

Figure 3. Required infrastructure in a bioterrorism event



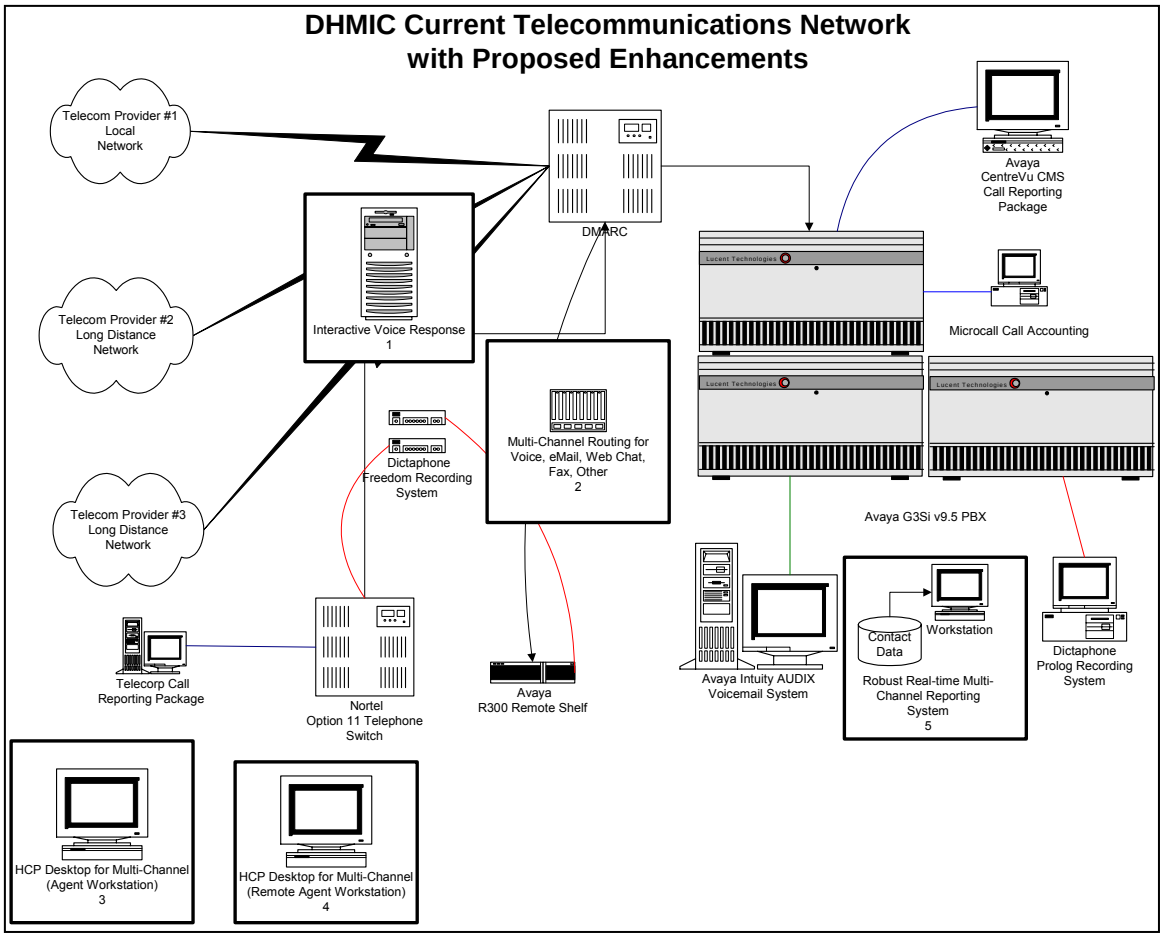
FAQ, frequently asked questions; IP, internet provider; IVR, interactive voice response; PBX, private branch exchange; PDF, portable document format.

The network "cloud" is segmented into two distinct networks—that of traditional voice through either Public Switched Telephone Network (PSTN) or Private Networks (PNs) and that of the Internet Protocol (IP) Network. The team understood that those attempting to get information from the HEALTH Multi-Channel Contact Center would try to gain access through a variety of telecommunication modes.

Further, the infrastructure required to handle multi-channel transactions would be a combination of Web and Interactive Voice Response (IVR) self-help coupled with "live" Web chat, e-mail, fax and perhaps recorded voice (voicemail or IVR capture). All data from these transactions would need to be stored and accessed in real time. The current HCPs and general information specialists at the existing call centers would need to be augmented by adding other health care organizations' (volunteer and direct) personnel and perhaps an outsource provider during high-volume or surge periods.

To satisfy these needs, the HEALTH Core Team identified five components required for the development of the multi-channel contact center. They are identified in Figure 4. These five component requirements were included in the Request for Information (RFI) submitted to the vendors outlined in Section III.

Figure 4. Five required components for multi-channel contact center development



Notes:

Components are placed on the diagram for illustrative purposes only.

Components:

1. Interactive Voice Response
   - Capable of Automatic Number Identification (ANI) capture and Computer Telephony Integration (CTI) (capture, store, write to other applications; i.e. LVM Centaurus and CasePro)
   - Capable of interfacing with Web applications
   - Capable of Natural Speech Recognition
   - Touchtone or "Speak" input/prompt capture
2. Multi-Channel Routing Solution
   - Capable of routing voice, e-mail, Web/chat, and fax work items
3. Health Care Professional (HCP = contact center agent) Desktop
   - Ability to have a "screen-pop" of captured information from IVR or other routed channels in local databases/applications (LVM Centaurus and CasePro)
4. Health Care Professional (call center agent) Desktop REMOTE workstation
   - Business Plan requires HCPs ability to work remotely with fully functional workstations by 12/2003
5. Robust Real-time and Historical Reporting System

Proposed Option 1

Development of Multi-Channel Contact Center

Desktop Specifications

Hardware Component	Microsoft® Windows®
Hardware architecture	IBM compatible
Central processing unit (CPU)	500 megahertz (MHz) Pentium II
Random-access memory (RAM)	256 MB
Disk Space	400 MB
Recommended monitor resolution	1280 x 1024 (256 colors)
Minimum monitor resolution	1024 x 768 (256 colors)

Note: Specifications per Avaya/Expanets RFI Response.

Hardware and Software Specifications

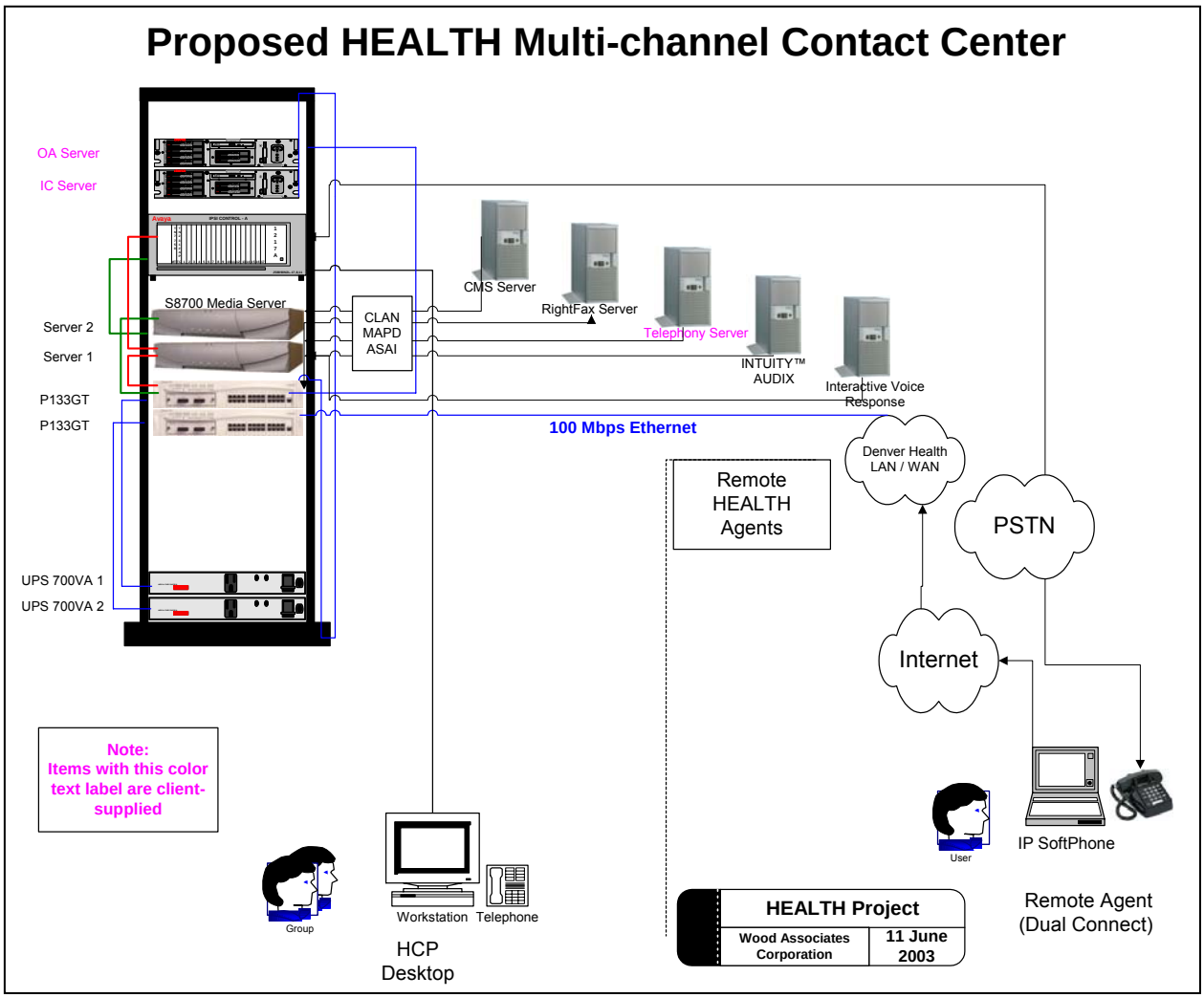
Count/Number of Seat Licenses	Description
90	Avaya Interaction Center 6.0 foundation software
2	Basic supervisors
2	Advanced supervisors
90	Voice channel users
20	E-mail channel users
20	Web chat and collaboration users
1	Interactive voice response (IVR) connector
1	Content analysis for e-mail package
1	Advanced Web tool upgrade

Network and Server Architecture

Hardware Component	Hardware Component	SUN Solaris
Hardware architecture	IBM compatible	SUN Sparc (Solaris on Intel is not supported)
Central processing unit (CPU) 1.4	GHz Pentium III	900 MHz UltraSparc III
Rating	648 SPECint_base2000	648 SPECint_base2000
Minimum representative model	Dell PowerEdge 1500SC with an Intel Pentium III at 1.4 GHz	Sun Fire 280R with an UltraSparc III at 900 MHz
Random-access memory (RAM)	1.5 GB	1.5 GB
Disk space	60 GB	60 GB
Load device	CD-ROM	CD-ROM

Note: Server identified above is a RMPDC-supplied hardware component, and is not included in pricing estimates.

Figure 5. Telecommunications System Architecture



ASAI, adjunct switch application interface; CLAN, controlled local area network; CMS, call management system; HCP, health care professional; HEALTH, Health Emergency Assistance Line and Triage Hub; IC, interaction center; IP, internet protocol; LAN, local area network; OA, operational analyst; PSTN, public switched telephone network; WAN, wide area network.

Multi-Channel Reporting Options

Feature	Avaya™ Operational Analyst	Genesys Suite 6 Call Center (CC) Pulse & Call Center Analyzer	Aspect Customer Data Mart	Cisco Intelligent Call Management, Enterprise Reporting
Real time monitoring across all channels	Yes, via Basic Reports	Yes, via CC Pulse	Yes	Yes
Historical reporting across all channels	Yes, via Basic Reports and also in Advanced Reports	Yes, via CC Analyzer	Yes, via Customer Data Mart	Yes
Same interface for real time and historical	Yes, via Basic Reports	No	No	Yes

Appendix P: Multi-Channel Contact Center System Concept (continued)

Feature	Avaya™ Operational Analyst	Genesys Suite 6 Call Center (CC) Pulse & Call Center Analyzer	Aspect Customer Data Mart	Cisco Intelligent Call Management, Enterprise Reporting
Online analytical processing	Yes, via Advanced Reports (Cognos)	Yes, via CC Analyzer (Brio)	Yes, via Seagate information	Yes, via Sybase PowerSoft InfoMaker
Tabular reports	Yes	Yes	Yes	Yes
Graphical reports	Yes	Yes	Yes	Yes
3-D visual reports	Yes, via Basic Reports	No	No	No
Web based	Yes	No, for CC Pulse; Yes, for CC Analyzer	NR	Yes
Multi-site real time reporting	Yes	No	Yes	NR
Multi-site historical reporting	Yes	Yes	Yes	NR
Custom historical report creation	Yes, in Basic via Java Toolkit, in Advanced via GUI Wizard and via IC Report Writer & IC Report Wizard	Yes, via CC Analyzer Report Wizard	NR	Yes, via a Report Writer
Unlimited historical data storage	Yes (user configurable)	No, about 1 year for CC Analyzer	NR	NR
Update frequency for historical reporting	As soon as transaction completes for Basic Reports; generally nightly for Advanced Reports	CC Analyzer updated Nightly	As soon as transaction completes for Customer Data Mart	NR
Pre-summarized historical data	30 min, daily, weekly, monthly in Basic Reports; user specifiable and predefined at 5 min, 15 min, 30 min, 60 min, daily, weekly, monthly in Advanced Reports	CC Analyzer provides 5 min, 15 min, 30 min, 60 min, daily, weekly, quarterly, annual	5 min, 15 min, 30 min, 60 min, daily in Customer Data Mart	5 min, 15 min intervals
Multimedia real time DBMS	Yes, high performance in-memory DBMS for real time (times ten)	Partial, separate real time data/objects, not really an RDBMS	Yes, separate real time DBMS	No, same database shared with historical, based on SQL Server (this may be performance limited)
Historical multimedia customer interaction repository	Yes, normalized logical model	Yes	Yes, for Customer Data Mart	Yes, normalized
Extensible data model	Yes	Yes	Yes	NR
Open interfaces	Yes, ODBC and JDBC	Yes	Yes, ODBC for Customer Data Mart	Yes, ODBC
Ability to take in data from other sources	Custom	Custom	Custom	Ability to take in WFM data
Exportable data	6.1 Data Export API to WFM systems, wallboards, word processing applications	Stat server real time export interface, open interfaces to the database	Contact server real time export interface; Customer Data Mart data exportable to word processing applications	NR

Feature	Avaya™ Operational Analyst	Genesys Suite 6 Call Center (CC) Pulse & Call Center Analyzer	Aspect Customer Data Mart	Cisco Intelligent Call Management, Enterprise Reporting
Predefined integration to Avaya CMS	Yes, complete CMS ECH and 30 min summary interval data, as well as predefined reports across up to 30 CMS systems	No	No, custom (note they claim to integrate to CMS but this is a custom effort and gets a limited set of CMS data & have no predefined reports)	No
Blended CMS and multimedia Reports	Yes (cradle to grave CMS and IC report)	No	No	No
Multi-vendor switch reporting	Yes, supports same list of switches as IC (e.g., Avaya, Aspect, Nortel, Siemens)	Yes, supports same list of switches as Genesys TServer	Aspect, Avaya, Nortel	NR
Multiple DBMS support	Yes, Oracle 8i, SQL Server 2000, DB2 UDB 7.2 (with 6.1)	Yes, Oracle, SQL Server, DB2	Yes, Oracle, SQL Server	SQL Server only
Multiple platform operating system support	Solaris 8, Windows 2000, AIX 5.1 (w/ 6.1)	Solaris, Windows, AIX	NR	NR

AIX, IBM operating system product; API, application program interface; CC, call center; CMS, call management system; DBMS, database management software; ECH, external call history; IC, interaction center; JDBC, Java database connectivity; NR, not reported; ODBC, open database connectivity; RDBMS, relational database management software; SQL, structured query language; UDB, universal debugger; WFM, workforce management.

Proposed Option 2

Outsourcing of Multi-Channel Contact Center Components

Desktop Specifications

Client Workstations	Minimum	Recommended
Processor	Pentium II	Pentium III
Processor speed	300 MHz	350 MHz
Random-access memory (RAM)	128 MB	128+ MB
Hard disk drive	4 gigs (IDE or SCSI)	4+ gigs (IDE or SCSI)
CD-ROM drive	None	None
Monitor	Color SVGA	Color SVGA
Network interface card	1 (10/100 MB)	1 (10/100 MB)
Screen resolution	800 x 600 full screen	1024 x 768 full screen
Operating system	Windows 98, Microsoft Windows NT Workstation, Release 4.0, Windows 2000, Windows XP	Windows 98, Microsoft Windows NT Workstation, Release 4.0, Windows 2000, Windows XP

Other Software	Minimum	Recommended
Installed on clients	Microsoft Internet Explorer 5.0	Microsoft Internet Explorer 5.5 SP2

IDE, integrated development environment; MB, megabyte; MHz, megahertz; SCSI, small computer system interface; SVGA, super video graphics adapter.

Note: Specifications per Ineto Services, Inc. RFI Response

Hardware and Software Specifications

No changes identified to current infrastructure. See Proposed Option 1, Hardware and Software Specifications.

Network and Server Architecture

Network Round Trip Time	Minimum	Recommended
Network (trace route) round trip time between agent's workstation and Ineto	Sustainable avg. round trip ≤ 500 ms; packet loss of ≤ 5% on any single hop	Sustainable avg. round trip ≤ 250 ms; packet loss of ≤ 1% on any single hop

Telecommunications System Architecture

Not provided by vendor.

Multi-Channel Reporting Options

Reporting and Customer Analytics:

Gain real-time insights into your service center performance and your customers' needs with our integrated reporting and analytical capabilities. Metrics Autosurvey enables you to automatically generate closed incident surveys in order to gauge customer satisfaction with each service interaction, your service organization, and your company.

Proposed Option 3

Combination Development of Multi-Channel Contact Center and Outsourcing

Desktop Specifications

See –Proposed Option 2, Desktop Specifications.

Hardware and Software Specifications

See –Proposed Option 2, Hardware and Software Specifications.

Network and Server Architecture

See –Proposed Option 2, Network and Server Architecture.

Telecommunications System Architecture

See –Proposed Option 2, Telecommunications System Architecture. Remove Avaya® Interactive Center (AIC) components, keep IVR.

Multi-Channel Reporting Options

See –Proposed Option 2, Multi-Channel Reporting Options.

Component Pricing Estimates and Assumptions

RFI Submittal

Based on the information gathered from the existing three call centers and the AHRQ HEALTH Grant Core Team a RFI document was created and submitted to six vendors for high-level pricing, specifications and concept design validation. The following is the list of the vendors contacted and those in bold, responded. Their responses can be found as appendixes to this document.

Vendor List

Alpine Access
Steve Rockwood
1536 Cole Blvd., Suite 350
Golden, CO 80401
303-279-0585
E-mail: srockwood@alpineaccess.com

Aspect
Larry Sells
Vice President, Government Sales
571-633-3316
E-mail: larry.sells@aspect.com

Avaya/Expanets
Jerry Tracy
Voice: 720-873-5890
Fax: 720-873-5962
E-mail: jerry.tracy@expanets.com

Ineto Services, Inc.
Web site: http://www.ineto.com/
Tim Moore
2600 Via Fortuna Dr., Suite 320
Austin, TX 78746
Office: 512-651-9792
Fax: 512-330-1694
E-mail: tmoore@ineto.com

Nortel
Kevin J. Gates
NextiraOne
Contact Center Account Executive
Cisco IP Telephony Specialist
Nortel Certified Account Specialist
303-267-3104 Voice
303-267-3150 Fax
303-598-3725 Cell
E-mail:
KEVIN.GATES@NEXTIRAONE.COM

TeleTech
Web site: http://www.teletech.com
Chris Varrone
Vice President, Health Care Solutions
TeleTech Holdings, Inc.
303-397-8144
Cell: 303-808-8360
E-mail: Chris.Varrone@teletech.com

Avaya/Expanets, Nortel, and Aspect are call center equipment and integration vendors. Ineto Services, Inc. is an application services provider (ASP) that hosts outsource solutions for call center clients. Alpine Access and TeleTech are call center outsource providers that deliver turnkey solutions, including personnel for call centers. Alpine Access and TeleTech chose not to respond due to the size (FTE headcount numbers) of the proposed solution and the non-immediate need for resources. They quoted the challenges of keeping a "trained" workforce standing ready for what would be only temporary surges and required usage. There was no response, or indication to respond, from Aspect.

Pricing Estimates

Proposed Option 1

Development of Multi-channel Contact Center

Avaya/Expanets

Item	Hardware	Software	Professional Services	Maintenance	Other
IVR	Included	Included	$145,000.00		Training included
AIC 6.0		$198,632.00	$264,362.00	1 yr	
Remote agent		NP	NP	NP	
Reporting		Included	Included		
Totals	$ -	$198,632.00	$409,362.00	$ -	$ -
Grand total					$607,994.00

AIC, Avaya® Interactive Center; IVR, interactive voice response; NP, not provided.

Nortel/NextiraOne

Item	Hardware	Software	Professional Services	Maintenance	Other
IVR	NP	NP	NP	NP	
Genesys MM		$101,452.50	$77,412.97	$20,424.32	
Genesys IC		$117,685.00	$116,859.46	$24,622.22	
Remote agent		Included	Included	Included	
Reporting		Included	Included	Included	
Totals	$ -	$219,137.50	$194,272.43	$45,046.54	$ -
Grand total					$458,456.47

IC, interaction center; IVR, interactive voice response; MM, multimedia; NP, not provided.

Proposed Option 2

Outsourcing of Multi-channel Contact Center Components

Ineto Services, Inc.

Item	Hardware	Software	Professional Services	Maintenance	Other
E-service 36-50	NA	NA	$30,000.00	$4,380.00	$87,600.00
Usage	NA	NA		$8,394.10	$167,882.09
RightNow	NA	NA	$1,000.00		
Web application	NA	NA	NP	NP	
E-reporting	NA	NA	500.00		$1,200.00
Totals	$ -	$ -	$31,500.00	$12,774.10	$256,682.09
Grand total					$300,956.19

Note: Pricing (other than professional services) provided is recurring yearly cost

NA, not available; NP, not provided.

Proposed Option 3

Combination Development of Multi-channel Contact Center and Outsourcing

Item	Vendor	Hardware	Software	Professional Services	Other
IVR	Avaya/Expanets	Included	Included	$145,000.00	Training included
Web/e-mail	Ineto			$30,000.00	$175,921.04
Remote agent	Avaya/Expanets	NP	NP	NP	
Reporting	Ineto	Included	Included	$500.00	$1,200.00
Totals	$ -	$ -	$ -	$175,500.00	$177,121.04
Grand total					$352,621.04

Note: Pricing (other than professional services) provided is recurring yearly cost for Ineto Services, Inc.

IVR, interactive voice response; NP, not provided.

Key Performance Metrics

Best-in-Class Comparisons/Components

Appendix I at the back of this document displays 30 elements with associated best-in-class metrics. This same appendix appears as a summary for each call center we visited. Appendix II in the back of this document contains a glossary defining calculations and the importance of each of the best-in-class elements.

For comparison between call centers, we captured operational statistics from July 2002 to March 2003. This was the period most recently completed prior to the consultant visit. This will remain consistent unless otherwise noted within the specific call center analysis.

Many of the elements will contain an "NA" (not available) listed next to the element. Due to the abbreviated assessment portion of the engagement, some elements marked "NA" might currently be tracked by the organization, but were not provided or observed during the engagement. A further review of each "NA" is in order for the call centers.

Although some of the element targets may vary by industry and most surely by function within various call centers, they serve as a benchmark to review current operational statistics and strategies.

These 30 elements help to structure the following major categories[1]:

- Leadership Strategies for Success
- Information Management and Analysis
- Planning
- Human Resource Management
- Process Management
- Business Results
- Customer Focus and Satisfaction

Chart 4 plots these seven categories based on a macro summary of the processes feeding the three call centers reviewed. This is a somewhat subjective assessment, as some call centers are more strongly aligned with a specific category of performance. This snapshot targets certain areas that RMPDC may choose for further review and investigation.

[1] C**ategories taken from**: *Putting Customers First; Serving the American Public: Best Practices in Telephone Services.* Prepared by the National Performance Review, Federal Consortium, 1995.

Chart 4. Plot of seven categories based on macro summary of processes feeding the three call centers review

How to read Chart 4:

Wood Associates conducted a subjective assessment based on initial observations by our consultant during the four week information exchange process. We interviewed leadership, management, and observed HCP telephone interaction during various times of the day within the three call centers. Each of the 7 categories contains a mixture of the 30 element matrix as outlined in Appendix I. Assuming that best-in-class metrics for each category would be 100 percent, the top part of the bar shows the level of perceived defect by category—the greater the top bar, the greater the amount of defects. Strengths in the "overall" comparison would point to leadership, planning, and customer focus.

Introduction to Best-in-Class Components

Review of over 400 call centers across major verticals has revealed that successful operations can be identified across 30 consistent elements. These identified elements link strongly to higher customer satisfaction ratings for call centers. The discovery process, unfortunately at too high a level for this engagement, drove at uncovering current practices that may be in alignment with components of best-in-class metrics. For RMPDC as a whole current CMS reports were downloaded, and any performance feedback metrics or current planning documents were reviewed. These reports indicate areas of tracking for the call centers.

Each of the 30 elements represented in the "Best-in-Class Elements" matrix call for an in-depth analytical engagement from a performance management, business consulting, or technology development company. The next steps for the call centers consist of identifying those elements contained within the matrix that are key performance indicators supporting the vision of RMPDC. Those elements directly link with actionable items supporting each call center mission. The glossary within Appendix II will help at uncovering a basic calculation of the metric. What will be beneficial to each call center will be the discovery mission that will take

place in realizing the performance behind the metric (the “result” of processes). Such a discovery mission usually uncovers many deficiencies in the supporting processes.

Appendix I: Best-in-Class Categories

Rocky Mountain Poison and Drug Center (RMPDC)

Category/Element	Best-in-Class Metric	RMPDC	Gap	Directions Yes /No/OS
Average speed of answer (ASA)	15 seconds	37	-	Yes
Queue time	15-20 seconds	NA		OS
Blockage	< 1%	NA		Not provided
Abandon calls	3-4.5%	10%	-	OS
Outbound calls	variable	37%		OS
Transferred calls	≤ 15%	8%	+	OS
After call	≤ 65 seconds	27	+	Improperly utilized
IVR call handling	≥ 40%	NA		Yes
Call forecasting accuracy	≥ 99%	85% +		Consistent call volume
Future call forecasting	12 month min.	As needed		Client focused
Schedule adherence	≥ 90%	NA		Not provided
Occupancy	85%	NA		Not provided
Available time	75%	NA		Not provided
Attrition rate	3-7%	Very low	+	Unsure
First call resolution	85-95%	NA		Not measured
Repeat calls	≤ 16%	NA		Not tracked
Customer satisfaction	≥ 95%	NA		Infrequent
IS availability	99.99%	99%+	+	Most systems
Performance feedback	Monthly	Yearly		Need frequency
Outcome based pay for performance	Yes	NA		Not provided
Strategic plan	Communicated	Leadership	-	Expand to all levels
Vision/mission	Displayed	Displayed	+	Exhibited
Cost per call (by minute)	≤ $1.00	NA		Not provided
Training time	≥ 3 weeks	10 weeks +	-	Needs streamlined
Recognition plans	Yes	NA		Unsure
Customer knowledge data	Yes	NA		Yes
Customer contact automation	Yes	NA		Yes
Attendant prompting	4 options	< 4	+	Yes
IVR prompts	4 layers	NA		Yes
"0" to live attendant	Yes	NA		Yes

IVR, interactive voice response; IS, information systems department; NA, not available, or not provided during WAC consultants' visit; OS, Not in business plan to address or out-of-scope for project(s).

Note: April 2003-June 2003

Appendix II: Best-in-Class Categories Calculations/Descriptions

	Metric Heading	Calculation/ Description	Importance
1	ASA	Average length of time taken to live answer a call offered to a group	First experience of a customer with a call center, the longer the wait the greater the frustration
2	Queue time	Length of time a call/caller is in queue waiting for a live answer	"Maximum Delay" is sometimes used in tracking the longest amount of time a single caller is held in queue; may indicate problems with call routing strategies, or other interactive application problems
3	Blockage	Percent of calls receiving a forced busy, either from the network or within the PBX	Higher percentages will contribute to customer loss, lower customer satisfaction, or lengthened handling once customer does get a connection
4	Abandon calls	Calls abandoned while in queue divided by total calls offered (answered plus abandoned)	Lost opportunities to service customers—some "natural" abandons will occur; higher numbers indicate poor call routing, inefficient staffing levels, or inappropriate agent occupancy
5	Outbound calls	Calls made to internal extensions (other departments) and "out" to other parties/customers	Inbound centers track the efficiency of processes by lowering the percentage of outbound calls to inbound calls; Inbound efficiency is directly linked to the availability of telephone representatives
6	Transferred calls	Calls handed internally/externally to another group, organization or supplier	Indicates inefficiency of call routing, or inability of telephone representatives to handle call to resolution

	Metric Heading	Calculation/ Description	Importance
7	After call	Time telephone representative spends "after (the) call" performing wrap-up, data entry, or further customer research	Higher after call work times suggest incomplete process issues, inability to perform functions while on calls, or customer record systems not designed to "pace" with the call
8	IVR call handling	Number of completed calls within IVR (successful transactions) divided by total offered calls	Higher successful IVR transactions relate to reduced cost per call (on total), customer satisfaction improvement, and reduced staffing expenses
9	Call forecasting Accuracy	Forecast calls divided by actual calls	One of three key elements in a staffing model; the higher the accuracy, the more accurate the staffing model resulting in efficient use of telephone personnel
10	Future call Forecasting	Predictability of future call/work volumes for at least 12 mo	Provides ability for staffing/budget preparation and allocation of resources
11	Schedule adherence	Availability of telephone representatives in alignment with scheduled requirements	Staffing availability and accountability during forecast call volume periods
12	Occupancy	Utilization of call center telephone representatives (i.e., talk time plus after call divided by staff time [varies by site/call center software])	Key for inbound call centers, as economies of scale are utilized, insuring uniform usage of telephone representatives while avoiding "burnout" through over-utilization

	Metric Heading	Calculation/ Description	Importance
13	Available time	Percent of staff time waiting for a call	Available time needs to be balanced with occupancy, also coupled with occupancy insuring there is some balancing of load (calls time/talk time)
14	Attrition rate	Percent of total staff "turned over" in budget period (varies by call center site)	Needed metric in understanding training needs/expense, as well as planning for high volume work periods
15	First call Resolution	Calls determined by customer as "resolved" divided by total calls answered	Used to barometer success of call center solution process, efficiency rating for customer satisfaction
16	Repeat calls	Calls determined by customer as a "repeat" to resolve same problem/concern/information divided by total calls answered	Repeat calls are indication of incomplete processes, poor service delivery strategies, telephone representative training issues
17	Customer Satisfaction	"Overall" satisfaction rating delivered objectively to sampling agency/process	Prime indicator of business health and key provider of business improvement opportunities
20	Outcome based pay for performance	Pay incentives aligned with performance objectives	Key to getting desired operational results; need to be aligned with key drivers of the business and communicated simply and uniformly to build coach/player relationships

	Metric Heading	Calculation/ Description	Importance
21	Strategic plan	Strategic road-map for success of organization	Used during performance feedback, team development, and celebrations of success; this element uniformly communicated drives the business forward to attain objectives
22	Vision/mission	High level communication of business direction	Uniformly displayed and communicated through the leadership ranks, a key "motivator" driving a uniform success strategy
23	Cost per call (by minute)	Total expenses associated with the call center (hardware, software, telecom, facilities, management, training, system support, etc.) divided by actual answered calls	Indicator of success in call delivery and solution delivery processes; sometimes used as indicator of telephony vendor contracts and telephone representative system/job abuse
24	Training and development	Weeks of training provided (some use "informal" training within the calculation) to telephone representative annually	Helps build qualified workforce, encourages telephone representatives to perform at higher levels, provides "relief" in front-line organizations
25	Recognition plans	Awards, acknowledgments for accomplishments of the telephone representatives	Encourages higher levels of performance, improves personal accountability

	Metric Heading	Calculation/ Description	Importance
26	Customer knowledge data	"Know-me" database, either prompted via call routing, ANI-matches, or IVR prompting	Key to a "customer intimacy" model that suggests a proactive record keeping and accounting for all transactions with a customer
27	Customer contact automation	Automatic system capture of IVR prompting and call transaction data in "knowledge" database	Reduces talk time and set-up by telephone representative allowing swift movement to trouble/contact resolution; greatly improves employee and customer satisfaction
28	Attendant prompting	Choices offered to a customer upon entering call center telephone switch	Simple, few, understandable, and informative prompts allow customers quicker access to desired location for enhanced information and streamlined transactions
29	IVR prompts	Choices offered to a customer to complete transactions "interactively" with on-line systems	Simple, few, understandable, and informative prompts allow customers quicker access to desired location for enhanced information and streamlined transactions
30	"0" to live attendant	Default to live telephone representative	Streamlines movement for "lost" or frustrated customers to get live agent help

ANI, automatic number identification; ASA, average speed of answer; IVR, interactive voice response; PBX, private branch exchange.