APPENDIX II

CDC PREPAREDNESS APPLICATIONS AND SERVICES

This document describes CDC applications and services that can be used by public health partners to support national preparedness requirements.

Early Event Detection Functional Area

BioSense Application

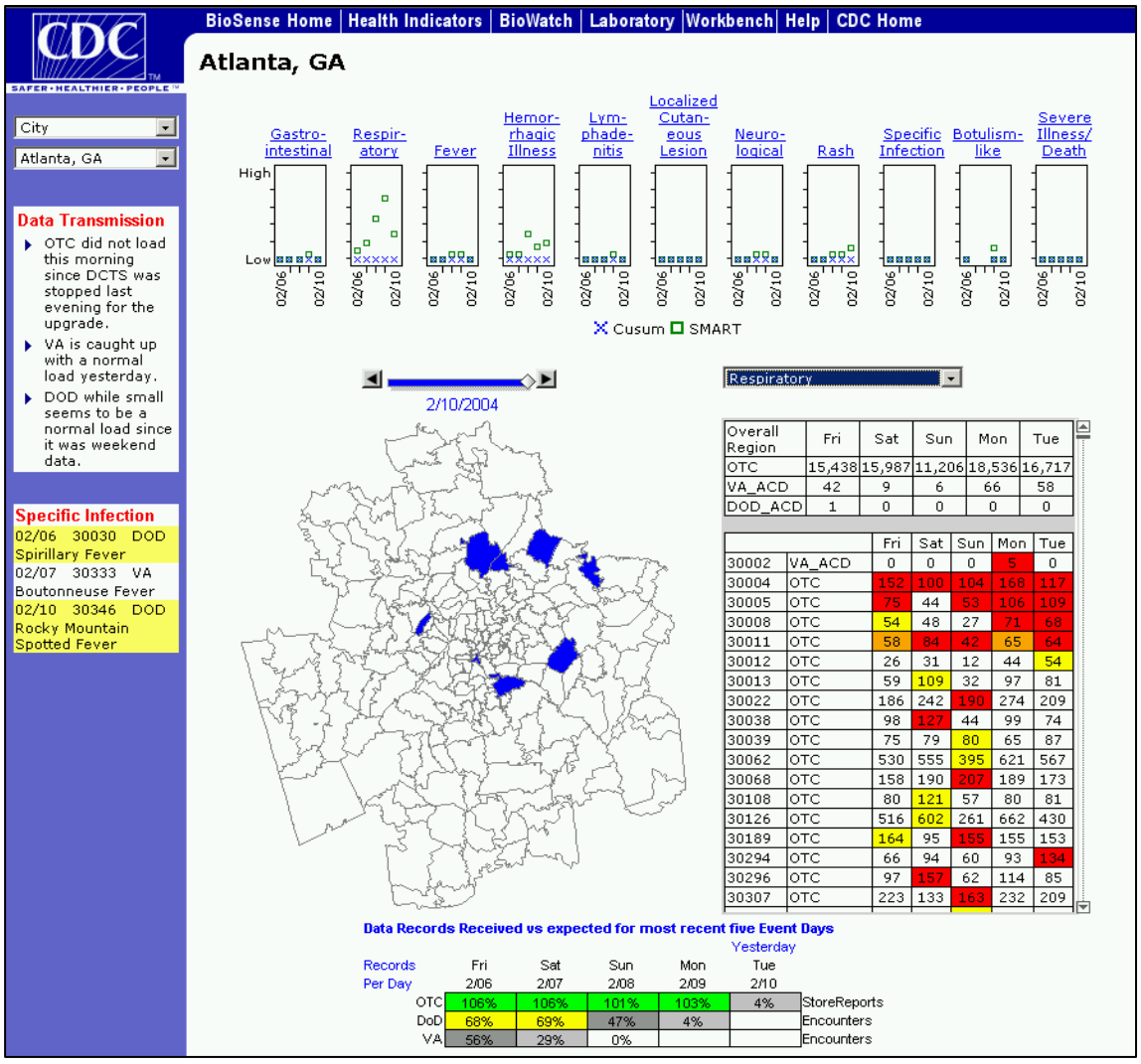


Figure 1 – BioSense Application

The BioSense application supports the CDC's biosurveillance[1,2] initiative by:

- Using timely existing data from hospital systems (including the DoD, the VA and large private networks), national labs, claims clearinghouses and other existing sources of data to provide a near real-time detailed national picture.
- Implementing real-time clinical connections with major metropolitan area hospital emergency departments.

Collected data is provided to public health partners through a series of graphs and drill down reports designed to support initial event detection and provide situational awareness through subsequent identification of suspect cases of illness, the geographic spread of these cases, the growth rate of suspect new cases and the etiologic factors common to suspect cases.

This relatively new form of algorithm-based secondary use data surveillance is supported not only by the CDC but also with significant work at state and local health departments, for example New York City's Syndromic Surveillance System[3].

National Electronic Disease Surveillance Base System

The NEDSS Base System designed by the CDC is available to be implemented for web-based case reporting. Case Reporting should be available 24 x 7 x 365 and can be implemented not only as web-based systems, but also call-in systems or electronically submitted HL7 messages. States can develop their own solutions as was done in Pennsylvania with their National Electronic Disease Surveillance System - PA_NEDSS[4]. Information systems for case reporting require integration with public health phone triage to notify appropriate public health officials in the event of an emergency.

Outbreak Management Functional area

Outbreak Management System

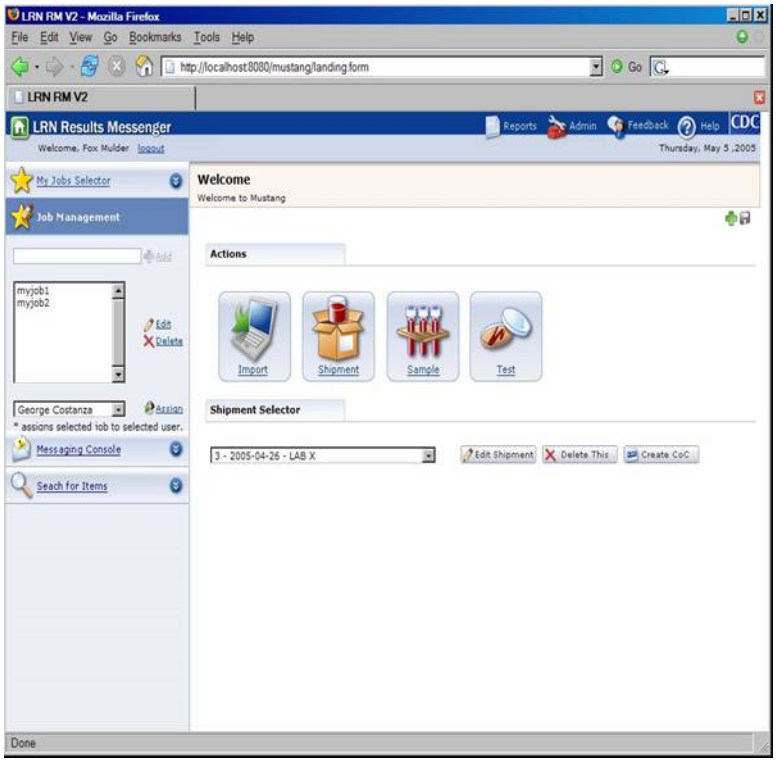
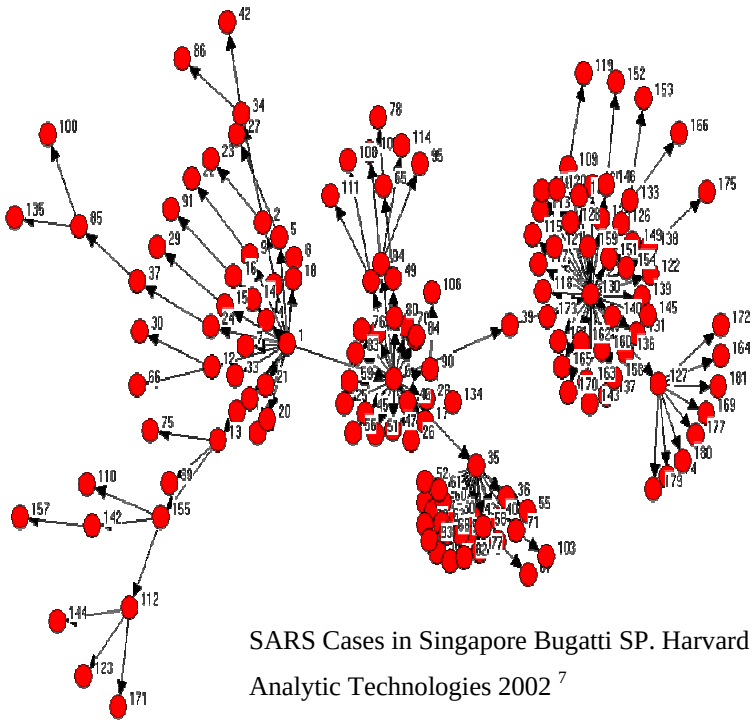


Figure 2 – Outbreak Management System

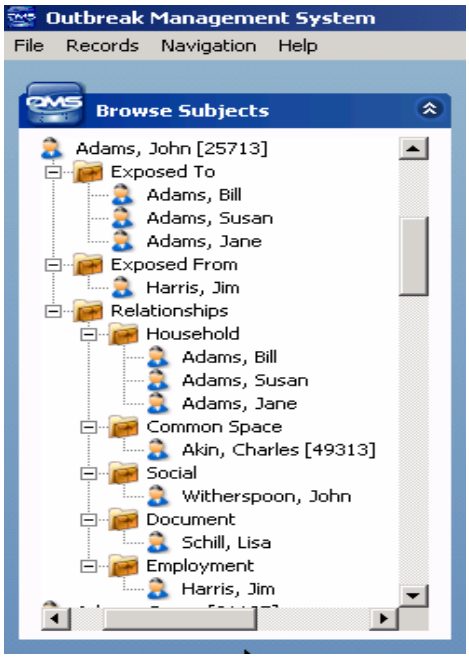
The Outbreak Management System manages complex relationships (as in the SARS Cases in Figure #3), tracks linkages and provides public health officials with the ability to know who to investigate, manage and either prophylax or treat.

The SARS outbreak in Toronto[5] and the MonkeyPox[6] response in the U.S. illustrate the benefit of systems that support investigators in tracing people possibly exposed to a person ill with a communicable disease, tracing exposures to a disease vector including physical locale, or following theoretical paths of conveyance via specific plane flights.

These contact tracing capabilities can be effectively tracked by systems such as the CDC's Outbreak Management System (OMS).



SARS Cases in Singapore Bugatti SP. Harvard Ma: Analytic Technologies 2002 [7]



Outbreak Management System Exposure Contact Tracing of Relationships such a those in the SARS cases above.

Figure #3 – Contact Tracing of SARS Cases

Connecting Laboratory Systems Functional Area

LRN Results Messenger

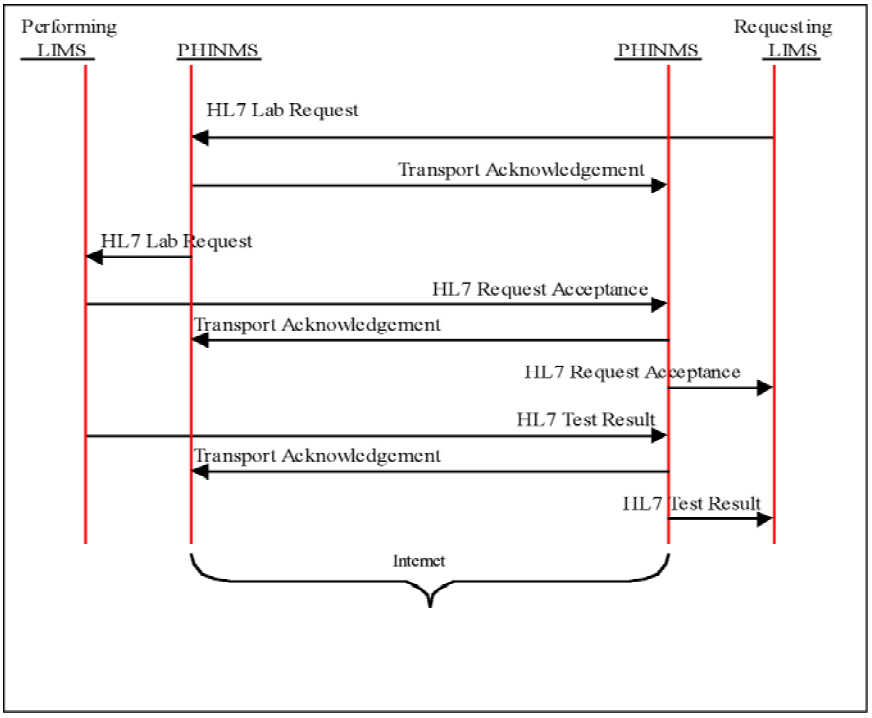


Figure 4 – Message Send and Receive

The Laboratory Results Network (LRN)[8] Result Messenger provides LRN laboratories with the ability to share Health-Level Seven (HL7) industry standard laboratory results data securely with public health partners.

Laboratory results are a critical component of public health practice and preparedness. During the anthrax events of 2001, for example, over 125,000 samples representing more than one million laboratory tests were reported. The management of data for this event was complex and unsupported by electronic exchange between organizations involved in the response. The LRN Results Messenger was designed in response to the difficulties

that were experienced, and supports communications and collaboration among laboratories and public health.

Countermeasure and Response Administration Functional Area

Countermeasure and Response Administration System

Figure 5 – Countermeasure and Response Administration

The CDC's Countermeasure and Response Administration System (CRA) supports management and tracking of measures taken to contain an event or outbreak, and to provide protection against a possible event or outbreak. The Smallpox Vaccination Program in 2002[9] and the MonkeyPox outbreak of 2003[6], coupled with the recent flu

vaccine shortage of 2004, made it evident that there are times when a more involved process is required to adequately manage and track Investigational New Drugs (INDs), drug products that are in short supply or isolation and quarantine requirements. When a countermeasure is delivered as prophylaxis for a population group such as healthcare responders during the Smallpox Vaccination Program, CRA is useful in providing the prophylaxis status of potential response team members. During the SARS event, isolation and quarantine played a significant role is controlling disease spread. Isolation and quarantine requirements are supported by systems such as Minnesota's Isolation and Quarantine System[10]

Partner Communications and Alerting

Partner Alerting Service

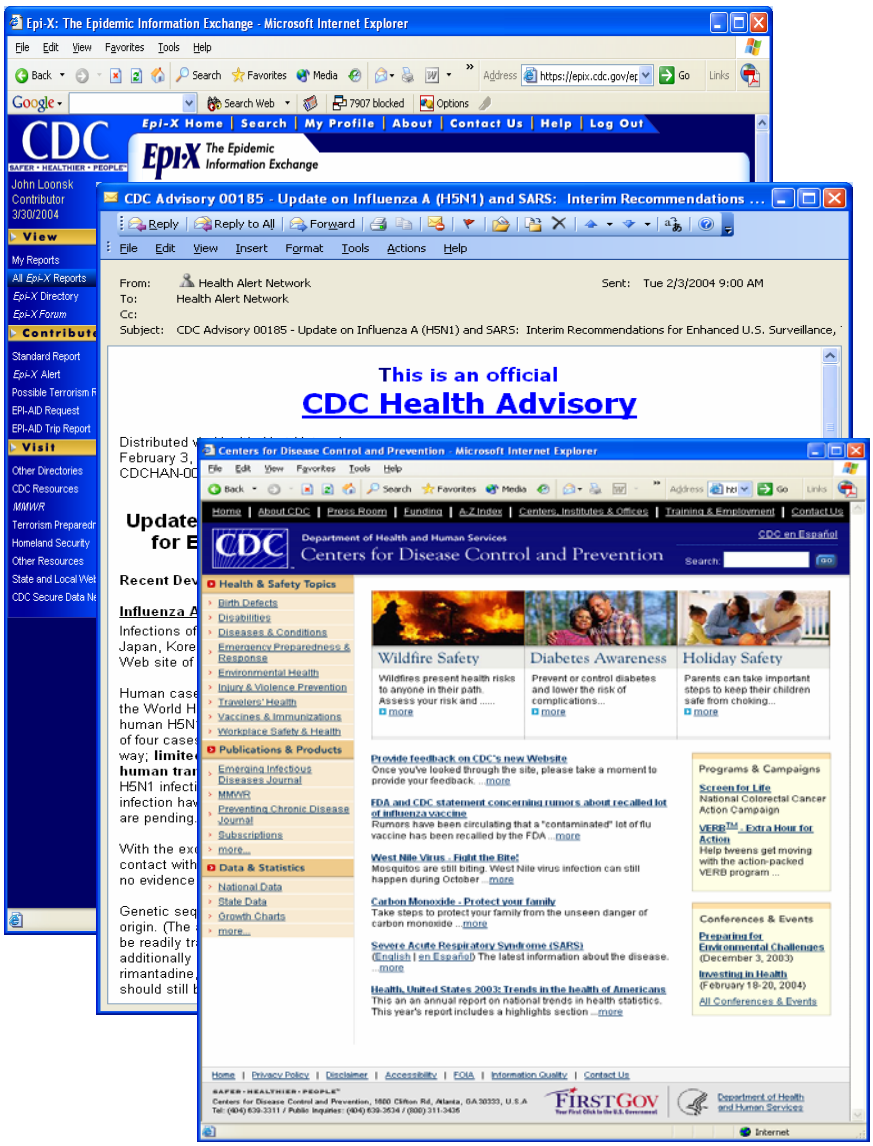


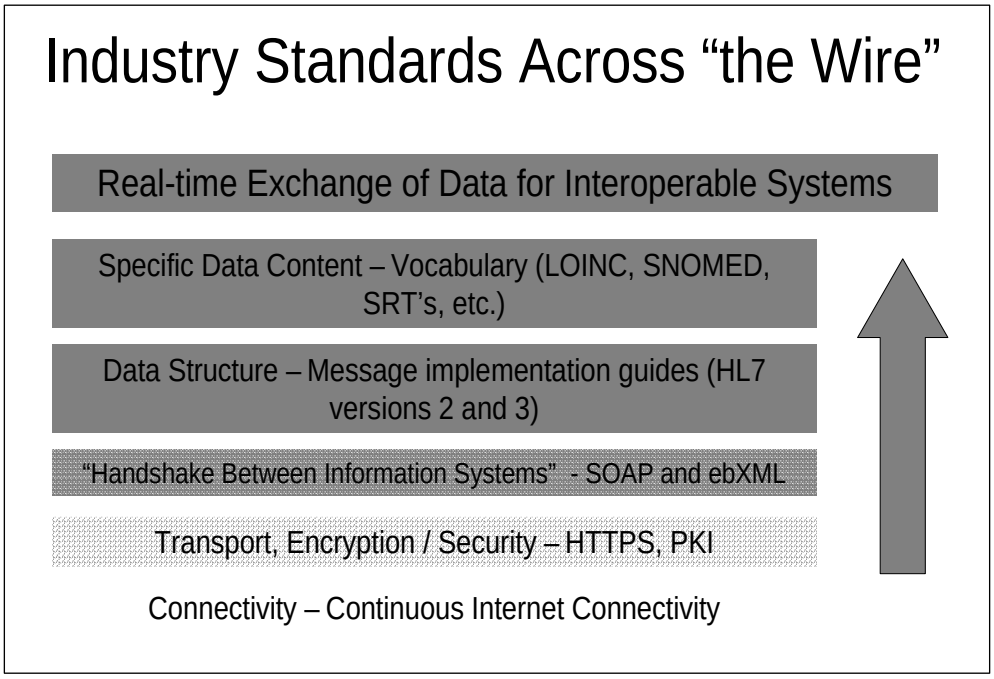
Figure 6 – HAN Alert, Epi-X Secure Communications, CDC Website

Public health communications extend from the rapid distribution of health alerts, to collaborative communications among a defined set of public health professionals involved in an outbreak or event, to the broad sharing of information with the public. Alerts and communication disseminated to public health partners (workers, primary care

physicians, public health laboratorians, the public etc.) may be urgent or non-urgent requiring support for multiple channels of distribution, including e-mail and secure web sites.

Alerting systems, such as that promoted by the CDC's Health Alert Network (HAN) (see Figure #7), support communication of health alerts on a 24 x 7 basis by maintaining a continuous high-speed Internet connection to quickly broadcast messages. The CDC's Epi-X[11] and Florida's EpiCom[12], provide secure web sites to help facilitate on-line collaborations between health professionals resulting in a faster response to the event. Authorized members log into the site using their user name and password, and join their partners in secure, online discussions about the event. Public information requires an open method of broad communication, such as that provided by CDC's public internet site: www.cdc.gov. Together, alerting systems, secure collaboration, and public websites ensure timely communications with the appropriate audience.

Cross-functional Capabilities and Components Functional Area



Several technical capabilities and components are common across each of the functional areas and are necessary to fully support the PHIN Preparedness requirements. These components include: secure message transport, public health directory and directory exchange, message addressing, the use of object identifiers (OIDs), vocabulary standards, data modeling standards, operational policies and procedures, system security and availability, and privacy requirements.

Each of these components helps formulate a system's infrastructure and ultimately ensure that systems can remain available and dependable, exchange data, protect private information, and support national standards, as illustrated in Figure 7 above.

The CDC has developed component modules including:

- PHIN Vocabulary Access and Distribution Systems (PHIN VADS) that allows partners to register new vocabularies, or to download approved, standardized vocabularies for their use.
- Public health directories, such as the CDC's PHIN Directory (PHIN DIR), to provide well-defined directories of people in multiple roles, organizations, and jurisdictions that can be used both to address messages, and distribute alerts.
- Directory exchange protocols to allow jurisdictions to exchange directory information that would be used to send communications across jurisdictions.
- PHIN Messaging Service (PHIN MS) to support secure transport of electronic messages among exchange partners.

REFERENCES

1. Loonsk J. BioSense: A National Initiative for Early Detection and Quantification of Public Health Events. Morbidity and Mortality Weekly Report. 2004;53:53-55.
2. Broome C, Loonsk J. Public Health Information Network - Improving Early Detection by Using a Standards-Based Approach to Connecting Public Health and Clinical Medicine. Morbidity and Mortality Weekly Report. 2004;53:199-202.
3. Heffernan R., Mostashari F, Das D, et al. System Descriptions New York City Syndromic Surveillance System. Morbidity and Mortality Weekly Report. 2004;53(Suppl):23-27
4. Pennsylvania Department of Health, PA-NEDSS – Functionality Available from URL: http://www.dsf.health.state.pa.us/ [Accessed May 2005]
5. Wallington T, MD, Berger L, MD, et al. Update: Severe Acute Respiratory Syndrome --- Toronto, Canada, 2003 Morbidity and Mortality Weekly Report. 2003: 52(23);547-550
6. State and local health departments. Monkeypox investigation team, CDC. Update: Multistate Outbreak of Monkeypox --- Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin, 2003. Morbidity and Mortality Weekly Report. 52(25);589-590
7. Bogatti SP. Netdraw 1.0 Network Visualization Software, Harvard, Ma. Analytic Technologies, 2002.
8. Centers for Disease Control and Prevention, Atlanta, Ga. The Laboratory Response Network Partners in Preparedness**.** Available from URL: http://www.bt.cdc.gov/lrn/. [Accessed May 2005]
9. Centers for Disease Control and Prevention, Atlanta, Ga. Supplemental Guidance for Planning and Implementing the National Smallpox Vaccination Program (NSVP)

Available from URL: http://www.bt.cdc.gov/agent/smallpox/vaccination/supplemental-guidance-nsvp.asp . [Accessed May 2005]

10. Como-Sabetti K. Isolation and Quarantine: Monitoring in and Age of Technology. Proceedings of the 2004 PHIN Conference, Atlanta, Ga. Available from URL: http://www.cdc.gov/phin/04conference/05-26-04/Session_6A_Kathy_Como-Sabetti.pdf [Accessed May 2005]
11. Centers for Disease Control and Prevention, Atlanta, Ga. Epi-X. Available from URL: http://www.cdc.gov/epix/. [Accessed May 2005]
12. Garner P. Florida Department of Health, Tallahassee, Fl. April 18, 2003. EpiCom Goes Live. Available from URL: http://www.doh.state.fl.us/disease_ctrl/epi/Epi_Updates/Epi_Weekly/04-18-03.htm [Accessed May 2005]
13. Health Level Seven, Inc. Health Level Seven. Ann Arbor, MI: Health Level Seven, Inc., 2001. Available from URL: http://www.hl7.org [Accessed May 2005]
14. Regenstrief Institute, Inc. Indianapolis, IN. Logical Observation Identifiers Names and Codes (LOINC®). Available from URL: http://www.regenstrief.org/loinc/ [Accessed May 2005]
15. SNOMED International Northfield, IL. Systematized Nomenclature of Medicine (SNOMED®), Available from URL: http://www.snomed.org/index.html [Accessed May 2005]

16. World Health Organization, Geneva, Switzerland. International Classification of Diseases (ICD-10) for Mortality, Available from URL: http://www.who.int/classifications/icd/en/ [Accessed May 2005]

17. World Health Organization, Geneva, Switzerland. International Classification of Diseases (ICD-9CM) for Morbidity, Available from URL: http://www.who.int/classifications/icd/en/ [Accessed May 2005]

18. Organization for the Advancement of Structured Information standards (OASIS). Billerica, MA. Available from URL: http://www.oasis-open.org/home/index.php [Accessed May 2005]

19. U.S. National Library of Medicine, 8600 Rockville Pike, Bethesda, MD. Available from URL: http://www.nlm.nih.gov/pubs/factsheets/umlsmeta.html [Accessed May 2005]