Concurrent Session #2
PHIN and Vaccine Administration - The Smallpox Experience

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Presenters

- Vicki Kipreos, PMP
  - Lead IT Specialist, CDC/IRMO/OD
- Warren Williams
  - Lead Public Health Analyst, CDC/NIP/DMD
- Gianfranco Pezzino, MD, MPH
  - State Epidemiologist
  - Kansas Department of Health and Environment

Objectives of Session

- Present background of requirements for vaccine administration information support
- Discuss CDC and state implementations of vaccine administration support systems
- Describe data exchange requirements that were developed for standardized data collection
- Discuss future plans for the use of HL7 messaging
- Discuss the integration with state vaccination registries
- Solicit ideas of how PHIN can support integration efforts with these CDC and state systems

Vaccine Administration Functional Needs (Developed in conjunction with clinic modeling)

- Organization Information Management
  - Identification of Individual Clinics within Public Health Entity
- Vaccine/Diluent Batch Management
  - Vaccine and Diluent Manufacturer Information
  - Vaccine and Diluent Lot Information
  - Diluent Strength
  - Reconstitution Date
- Patient Information
  - Demographics
  - Contact Information

What is PVS?

- A vaccine administration support system
- Manages vaccine administration, lot and diluent usage, take tracking
- Initially designed to support administration of IND vaccine
- Developed under a very short time period for implementation
- Provides one part of the total solution for managing pre-event vaccination
- May be other solution elements, including registries, adverse events hotlines, case management, and surveillance data analysis/reporting
- Provides Web-based system to clinics, at no cost
- Manages secure data transmission and storage
- Provides pre-defined reports required for evaluation and monitoring of clinics
- Provides secure data views for ad-hoc reporting

PVS Overview

- Administration and Management
  - Clinic contact information
  - User roles and security
  - Digital certificate management (authentication)
- Vaccine/Diluent Batch Management
  - Vaccine and diluent lot management through National Pharmaceutical Stockpile
- Patient Management
  - Patient Demographics
  - Vaccination history
  - Current Vaccination
  - Take Response

PVS Overview (cont.)

- Pre-Defined Reports
  - Clinic Daily Activity Log
  - Vaccinations by Lot
  - Take Response Callback List
  - History Form Batch Information Block
  - Public Health Reports
    - Referring Organization Summary
    - Response Team Contact List
    - Residence Totals
- System Access Authentication
  - SDN logon and authentication
  - Application logon and authentication

CDC Data Import Requirements

- For states choosing to not use PVS
- Data exchange required for monitoring program nationally
- States must transmit one extract per week
- XML-based format for extract transmission to specified repository provided by CDC
- States will utilize and return Patient Vaccination Numbers (PVNs) supplied by CDC or equivalents
- Unique patient and clinic identifiers, generated to specific standards, will be used for all records

PVS vs. Non-PVS Grantees

- Grantees vaccinating as of 5/2/03: 55
- Grantees not transmitting data: 7
- Grantees using PVS system: 47
- Grantees using non-PVS systems: 15
- Total records in PVS datamart as of 5/2/03: 31,106
- Records represent 87% of all vaccinations reported to EOC by grantees

Types of Systems Used

- All data transmitted to the CDC via the Secure Data Network (SDN)
  - PVS
  - Modified Vaccine Registry
  - Commercial (Virtual Alert, STC)
  - Home-grown

Methods of Communication with Grantees

- Web Board
- Monthly Surveys
- PVS Helpdesk
- ASTHO/NACCHO Conference Calls
- Others?
- How can PHIN help in the future?

XML and HL7 Messaging

- Why use XML and not HL7 Messaging?
  - Emergent implementation needs created limited timeframe for development
  - CDC supports moving in this direction
  - HL7 in the midst of converting to XML
  - CDC has mapped PVS data into HL7 messages
  - CDC working to get HL7 messaging available

Future Plans - HL7 Messaging

- Presenter: Warren Williams
  - Lead Public Health Analyst, CDC/NIP/DMD

The Potential Use of Health Level 7 to Capture PVS Data

Warren Williams, MPH
Ron Van Duyne
National Immunization Program

Wednesday May 14, 2003
Public Health Information Network Conference

Acknowledgements

- Committee for Immunization Registry Standards and Electronic Transactions (CIRSET)
- American Immunization Registry Association (AIRA)
- Susan Abernathy (retired)

Outline

- Background on Immunization Registries
- Background on HL7
- HL7 use in Immunization Registries
- Why Bother Map PVS Elements to HL7
- Methods and Results of the examination
  - National Code Sets Usage
- Consideration for Feedback and Discussion

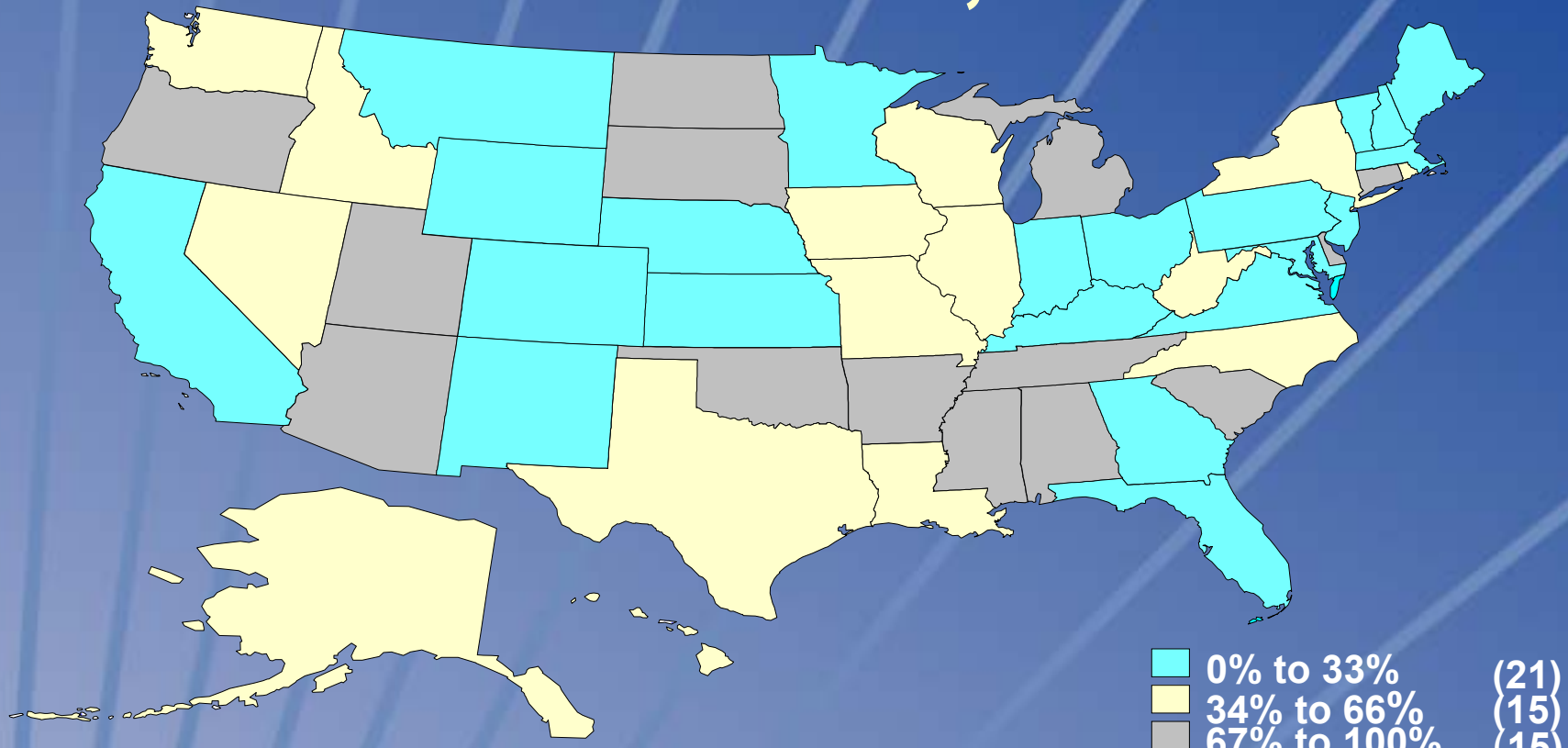
Immunization Registries

- Defined as confidential, computerized system that contains information about immunizations and children

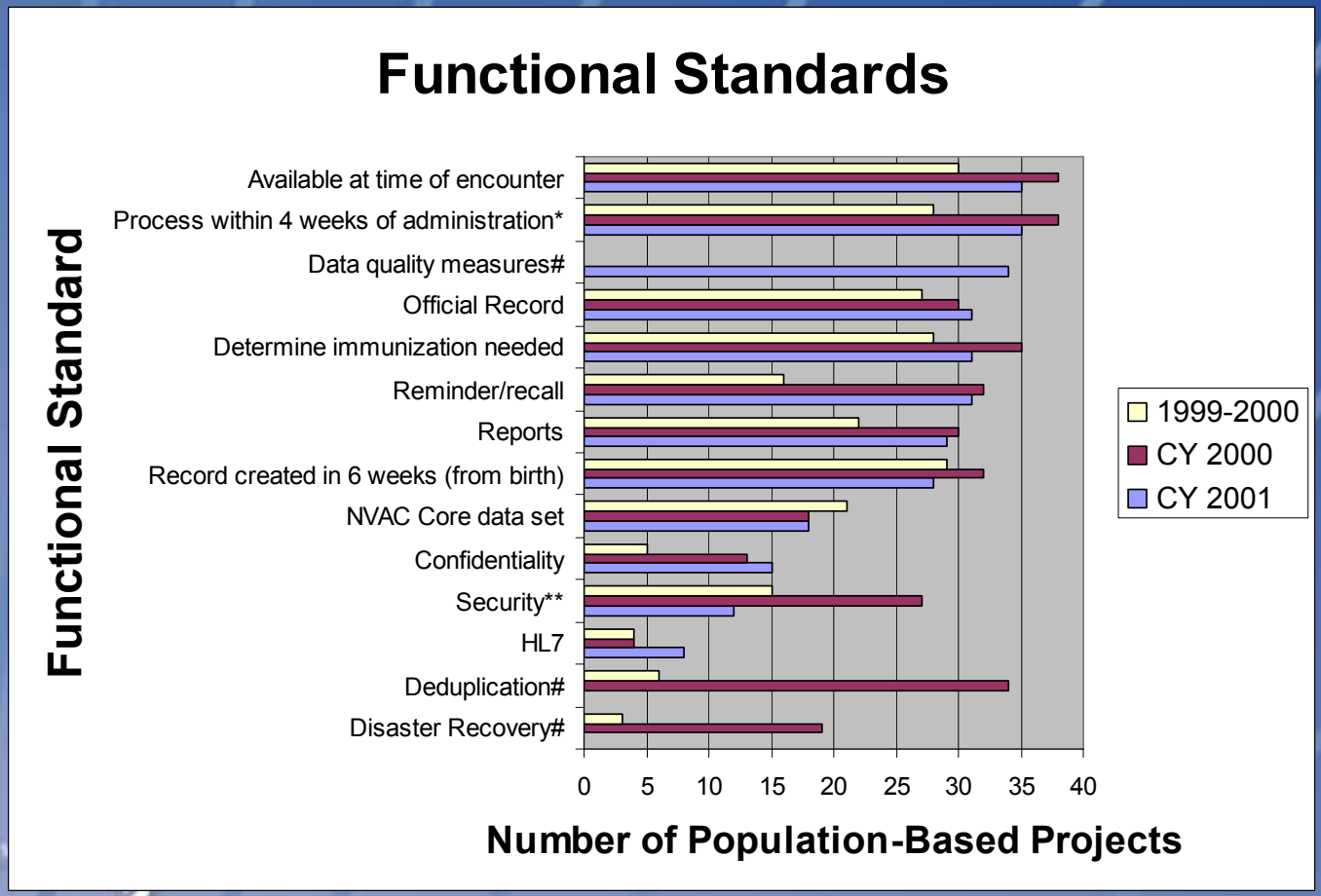
A Brief History of Immunization Registries

- 1970s: Registry built in Delaware
- 1980s: AIMS installed in 10 states/cities
- 1990s:
  - RWJ and NIP fund development
  - CDC-sponsored registry software
  - Community/state-based registries
  - Presidential directive: Immunization Registry Initiative

Children < 6 years with 2+ Immunizations, 2001



Functional Status Achievement of Immunization Registries



Health Level 7

- Accredited Healthcare Standards Developing Organization (SDO)
- Not-for-profit, volunteer SDO
- Participation: includes providers, vendors, payers, consultants, government, others
- Domain focus: Clinical & Administrative Data

4 Current HL7 Immunization Messages

Message	Trigger Event	Message Type	Description
Query for Vaccination Record	V01	VXQ	a query from one system for a patient's vaccination record that is held in another system
Response to Query with Multiple PID Matches	V02	VXX	A response to a query reflecting more than one match to the patient identifiers in the query
Vaccination Record Response	V03	VXR	a response to a query containing the vaccination record
Unsolicited Update to Vaccination Record	V04	VXU	an unsolicited update to a vaccination record

Why Bother Translating PVS to HL7? (business justifications)

- Determine whether or to what extent current HL7 messages can be used for PVS
- Show value to registry both to collect data & send to PVS
- Reduce cost & duplication of separate structure, function, & system development
- Builds registry capacity for potential BT or other related vaccination programs
- Promote registries as the single point of vaccination information

Why Bother Translating PVS to HL7? (technical justifications)

- Utilize an existing, ANSI-approved standard
- Utilize existing Code Sets, e.g., LOINC, CVX, race-ethnicity, explore others
- Encourages local flexible data need/use/access
- Build bridge to next appropriate version of HL7
- Utilize and work with industry standards, standards, standards

Methods of Examination

- Grass roots level examination so that immunization registries could use existing standards to meet these needs.
- A mapping document and guide were drafted
- Partnership vetting and discussion
- It is still a “WIP” (work in progress)

Examined Two HL7 Structures

- ORU used as an Unsolicited Report.
  - Electronic Laboratory Reporting
  - Adverse Event Reporting
  - Cancer Registries
- VXU used an Unsolicited update of to a immunization record
- Similar Electronic Structure

Overall Comparison HL7 VXU and ORU Structures

(VXU) Unsolicited Vaccination Record Update	(ORU) Unsolicited Transmission of an Observation	HL7 Chp
MSH Message Header Segment	MSH Message Header Segment	2
PID Patient Identification Segment	PID Patient Identification Segment	3
NK1 Next of Kin/Associated Parties	NK1 Next of Kin/Associated Parties	3
ORC Common Order Segment	ORC Common Order Segment	4
RXA Pharmacy Administration		4
	OBR Observations Report ID	7
OBX Observation/Result	OBX Observation/Result	7
NTE Notes and comments (about ORC, RXA, or OBX)	NTE Notes and comments (about OBX)	2
Optional Segments and Fields not described		

HL7 to PVS Mapping (extract)

HL7 IG231 Msg-Seg-Field-DT; LENGTH	HL7 Code Set	PVS #	PVS Data Element Name	PVS Description	PVS Data Type
RXA-5; CE-100	CVX	6	Vaccine Type	Name of vaccine given to pt	Char.
OBX	LOINC 30948-4	9	Adverse Event Text	Text for any adv. Event w/current vaccination	Text
PID-10; CE-80	HL7 (see CDC race & ethnicity table)	36	RACE-Asian	Indicates if Pt. is Asian or part Asian	Boolean

National Code Set Usage

Code Set	PVS element	Mapping
CVX for Vaccine Type	28	CVX 105=Vaccinia
Race/Ethnicity		Asian=2028-9, White=2106-3, Am Indian=1002-5

Logical Observations Identifiers Names and Codes (LOINC) for PVS

- Used to identify items in name pair structures such as an HL7 clinical observation, XML tag
- Examples:
  - Vaccine Lot Number (30959-1)
  - Text items (30954-2)
  - Manufacturer (30957-5)

National Code Set Usage

Code Set	PVS element	Mapping
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Results of Mapping Examination Between HL7 and PVS

- The VXU message was mapped
  - Consideration of other message ORU
- Most PVS elements found a direct structure in an existing HL7 message
- PVS elements unique to SMALLPOX could be added to existing code sets
- Code sets can be expanded to meet needs easier than modifications to electronic structures

Potential Topics for Feedback and Discussion

- What will it take to promote and evolve the immunization registries to meet "PVS-like" reporting as part of the PHIN?
- Why should "code sets" be used to capture and/or identify data in the PHIN?
- What considerations (technical and non-technical) should be factored into the evolution of PVS and HL7?

Smallpox Immunization Information Management System

One State Approach (Kansas)

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Background

- December 2002
  - CDC announces development of centralized S.I.S. (PVS)
  - Available to all states for free
  - Secure online access
  - System to be deployed in time for pre-event immunizations
  - States allowed to use state-based systems
    - Need to be certified
    - Must upload records to PVS using XML schema

The Dilemma - Should we use the CDC PVS system?

PROS	CONS
Cheap	Online only
Standardization assured	Secure Digital Certificate required
Burden of development and maintenance on CDC	Concerns about patients' identifiable information
	Concerns about not retaining full control of our records
	History of late delivery of CDC centralized Information Systems
	Training on newly developed system
	No integrated adverse reactions surveillance information system

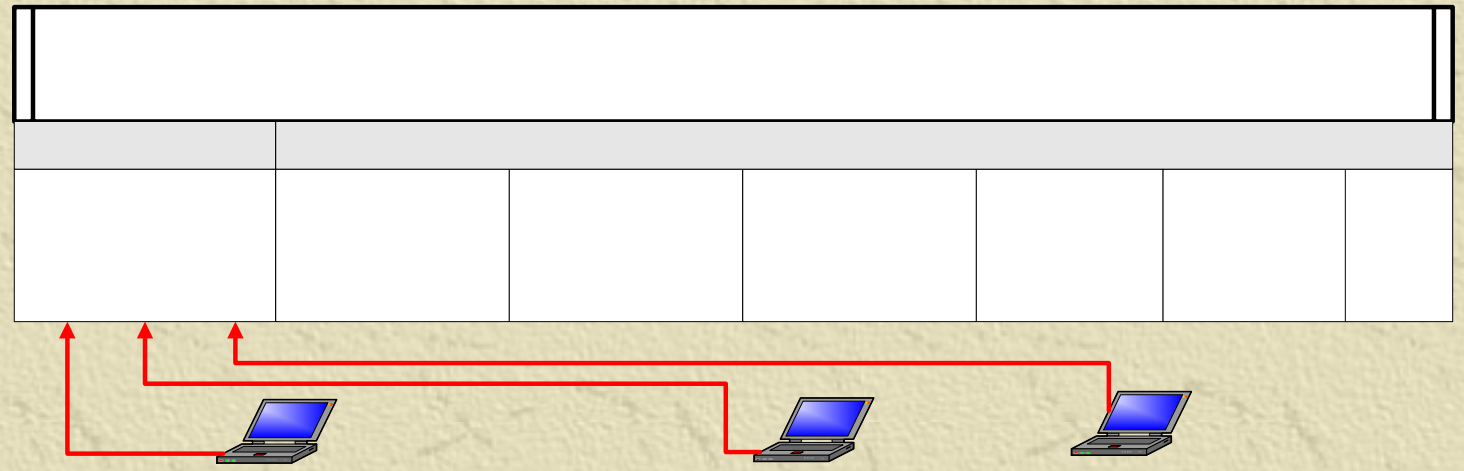
Current Information Systems for Epidemiology in Kansas

- HAWK (1999)
  - Electronic disease reporting system
  - Secure, online access
    - MS SQL database
  - Used by local health departments and KDKE staff for reportable diseases (including TB and vaccine-preventable)
- PHIX (Public Health Information Exchange, 2002)
  - Alert, notification
- Immunization registry
  - Currently not very functional
  - New Web-based system under development

The Decision: Kansas Smallpox Patient Vaccination System

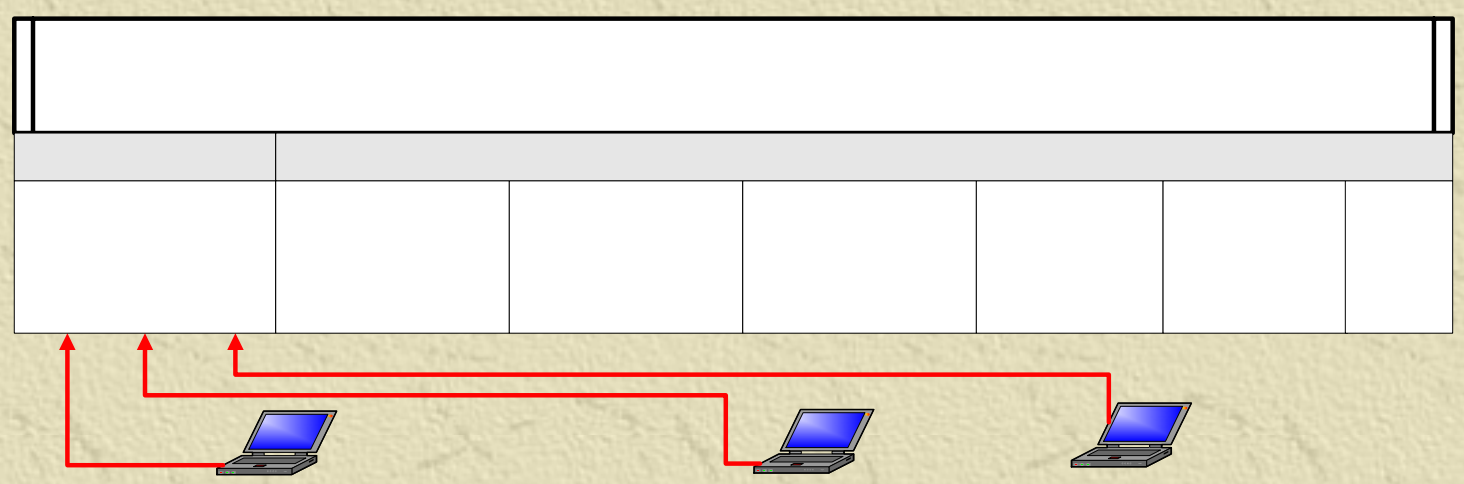
- Built around HAWK architecture
  - Secure online access
  - Solid, well tested MS SQL database
  - KDHE and LHD's users already familiar
- Includes:
  - Main MS SQL database
  - Online access to main database
  - Offline ("disconnected") data entry application
  - Data import function from disconnected application to main database
  - Data export (XML) to CDC

Kansas Patient Vaccination System Architecture

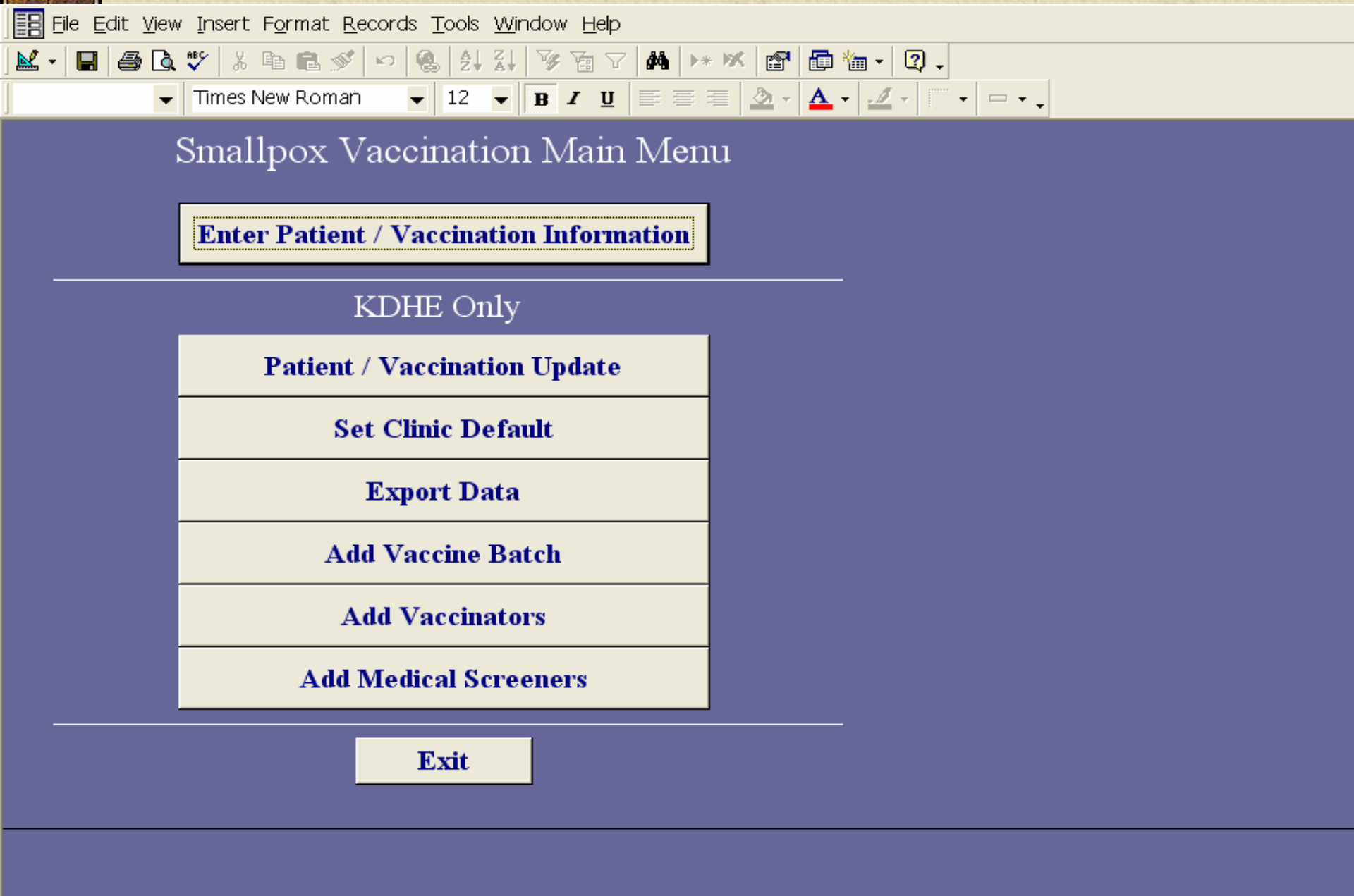


Kansas SPVS – 1) Disconnect Application

- Enable offline data entry for **NEW RECORDS**
- MS Access database copied onto 4 individual laptops
- Functions:
  - Generate new patient, vaccination record
  - Generate records on clinic, vaccine batch, vaccinators, medical screeners (ADMIN FUNCTIONS)
  - Export records to MS SQL central database



Disconnect Application – Main Menu



Disconnect Appl – Patient and Vaccination record

File Edit View Insert Format Records Tools Window Help

Times New Roman 12 B I U

Patient Vaccination Number (from sticker)

SECTION A: PATIENT DEMOGRAPHIC INFORMATION

First Name **Middle Name**

Last Name **Suffix**

Street Address **Apt. #**

City **State** **Zip Code**

County

Contact Information:

Home Phone **Work** **ext.**

Occupation

Date of Birth **Gender**

Ethnicity

Race (Check all that apply): ☐ African American ☐ American Indian or Alaskan ☐ Asian ☐ Hawaiian ☐ White

SECTION B: VACCINATION AND MEDICAL HISTORY

Vaccination History

Did you ever receive the smallpox vaccine?

Previous Vaccination Date (document _recall only)

Previous Vaccination Scar? ☐ Yes ☐ No or Don't Know

Previous Vaccination Adverse Events? ☐ Yes ☐ No or Don't Know

If yes, describe reaction

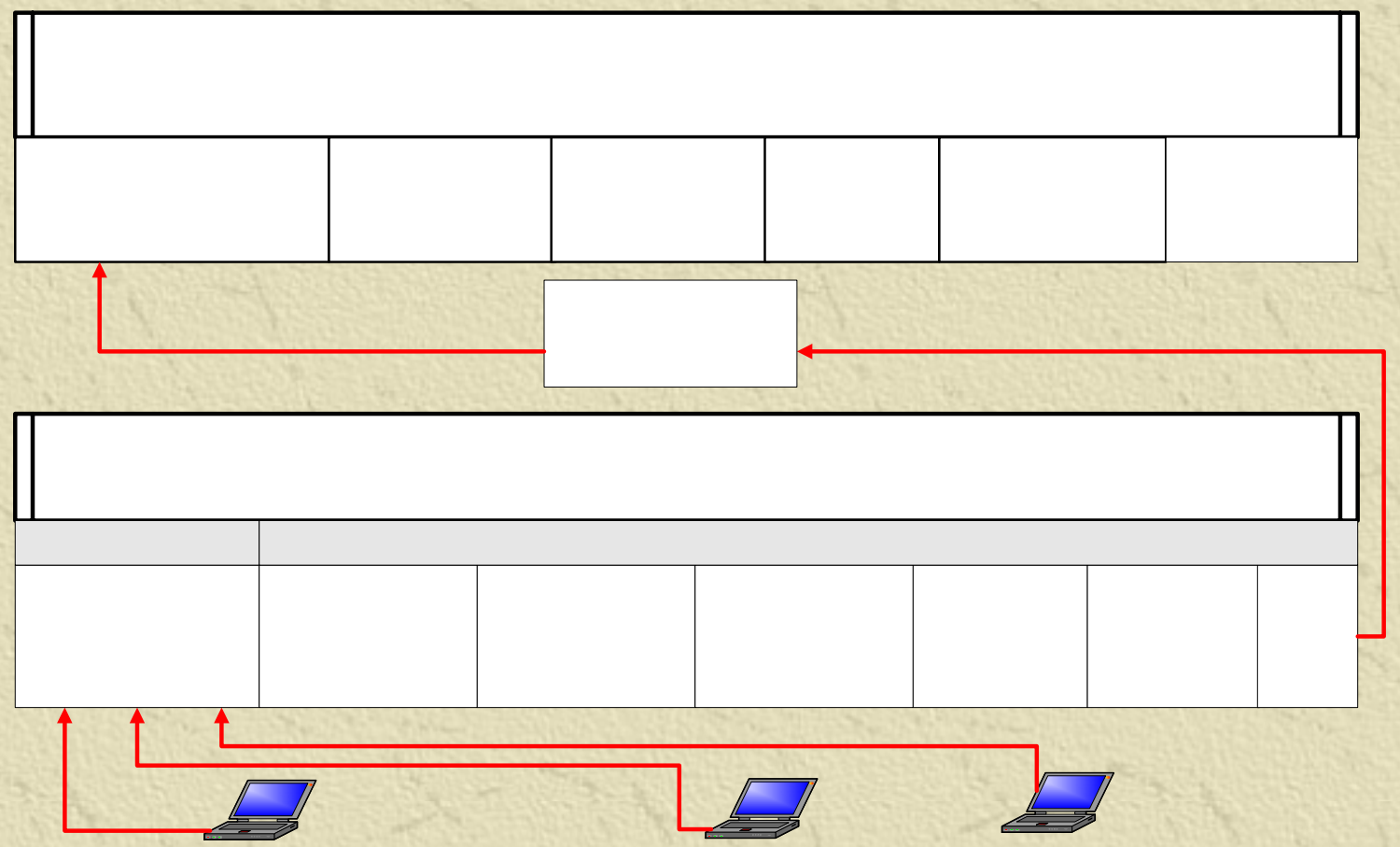
Medical History

Have you received chickenpox (varicella) vaccination in the last month? ☐ Yes ☐ No

Are you currently taking medications? ☐ Yes ☐ No

If yes, list medications

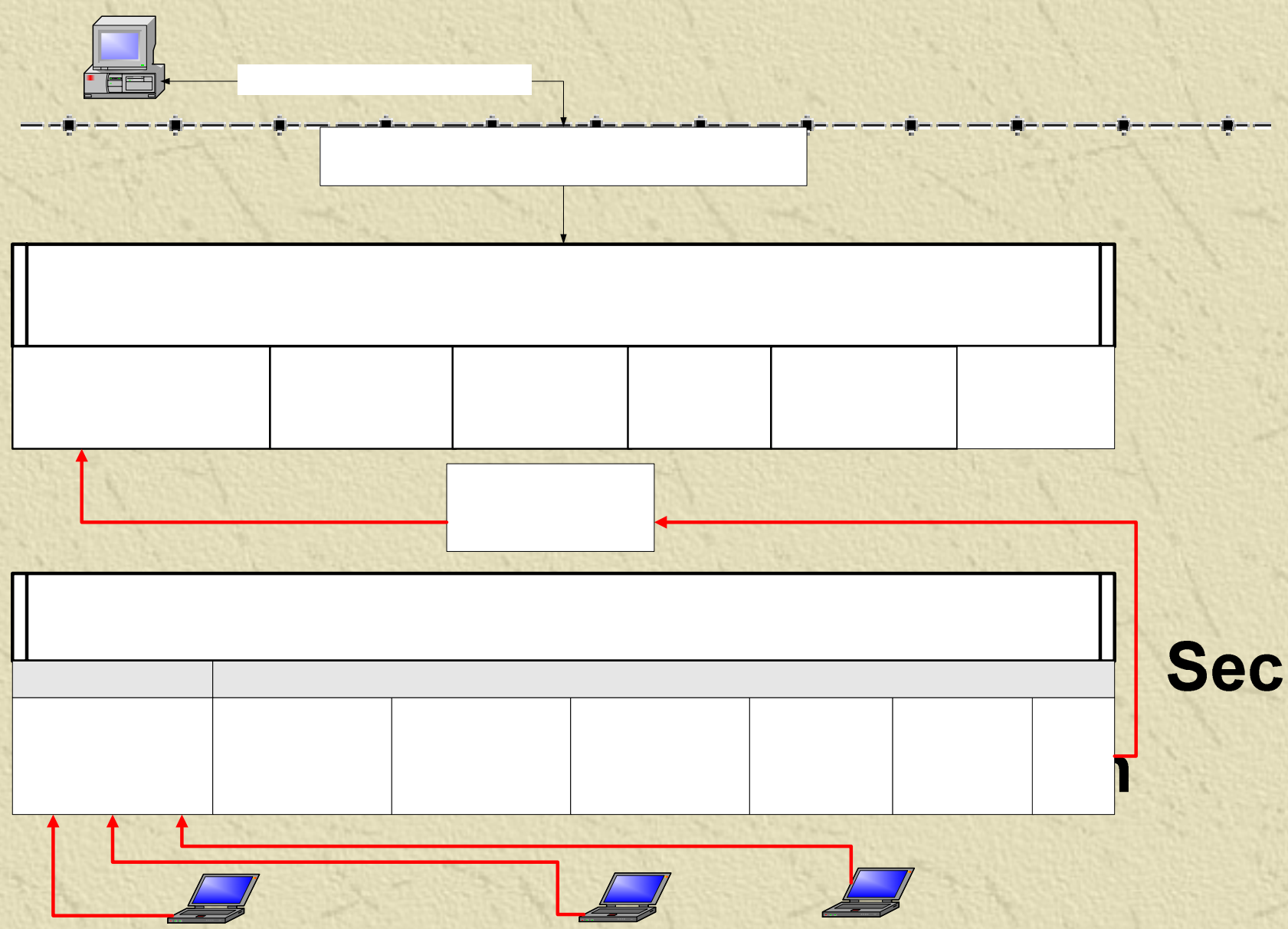
Kansas Patient Vaccination System Architecture



Kansas SPVS – Import function

- Moves records from MS ACCESS databases to one central MS SQL database
- Used at the end of each clinic day
- **One-way, one-time process**:
  - ACCESS replaces existing record with same PVN
    - No record updates possible through this system
  - No information transfer from SQL to Access

Kansas Patient Vaccination System Architecture



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Kansas SPVS – 2) Online Application

- Based on MS SQL database
- Uses same HAWK architecture, views
- Receives input from :
  - Disconnect Application (new records)
  - Online users
    - Take response
    - Reports
  - Active Surveillance records
    - Entered **through** Access interface
    - Part of MS SQL central database

Online Application – Main Menu

allpox Vaccination - Microsoft Internet Explorer

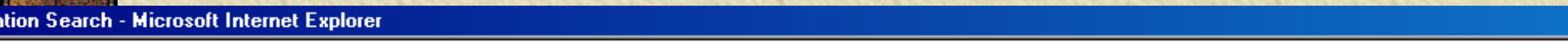
Vaccination | Change Password | Administrator Menu | Reports | Exit

Take Response

KANSAS SMALLPOX VACCINE SITE

**KDHE's mission is to optimize the promotion
and protection of the health of Kansans through efficient and effective
public health programs and services and through preservation, protection,
and remediation of natural resources of the environment. **

Online Application – Record Location



Smallpox Vaccine

Add/Update

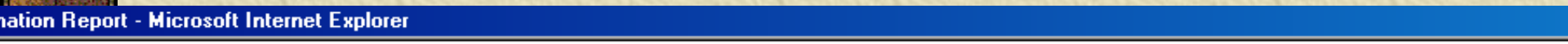
Last Name: pez

First Name:

PVN:

Search Main Menu

Online Application – Record Location



Back MainMenu Exit

Individuals that match your criteria

Add Patient	Initial PVN	Name	Birthday	County Residence
View	1003896086	Pezzino, Gianfranco	6/12/1954	SHAWNEE

Online Application – Patient Information

tInfo - Microsoft Internet Explorer

Back | Smallpox Vaccination | MainMenu | Exit

PATIENT INFORMATION AND MEDICAL HISTORY

SECTION A: PATIENT DEMOGRAPHIC INFORMATION

Initial PVN: 1003896086

Name Information

First: Gianfranco Middle:

Last: Pezzino Suffix: MD

Occupation: Physicians and Surgeons, All Other

Day Phone: (785) 296-6536 ext.

Evening Phone: (785) 233-3037

Latest Address Information

Address1: 201 SW Greenwood Address2:

City: Topeka

Zip Code: 66606 State: KANSAS

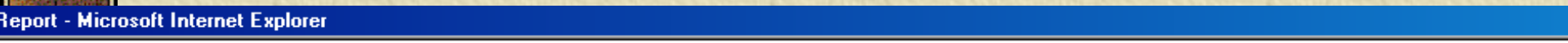
County: SHAWNEE

Race/Sex/Age Information

Race(Check all that apply):

- ☐ American Indian or Alaska Native
- ☐ Black or African American
- ☐ Asian
- ☑ White

Online Application – Vaccine Information



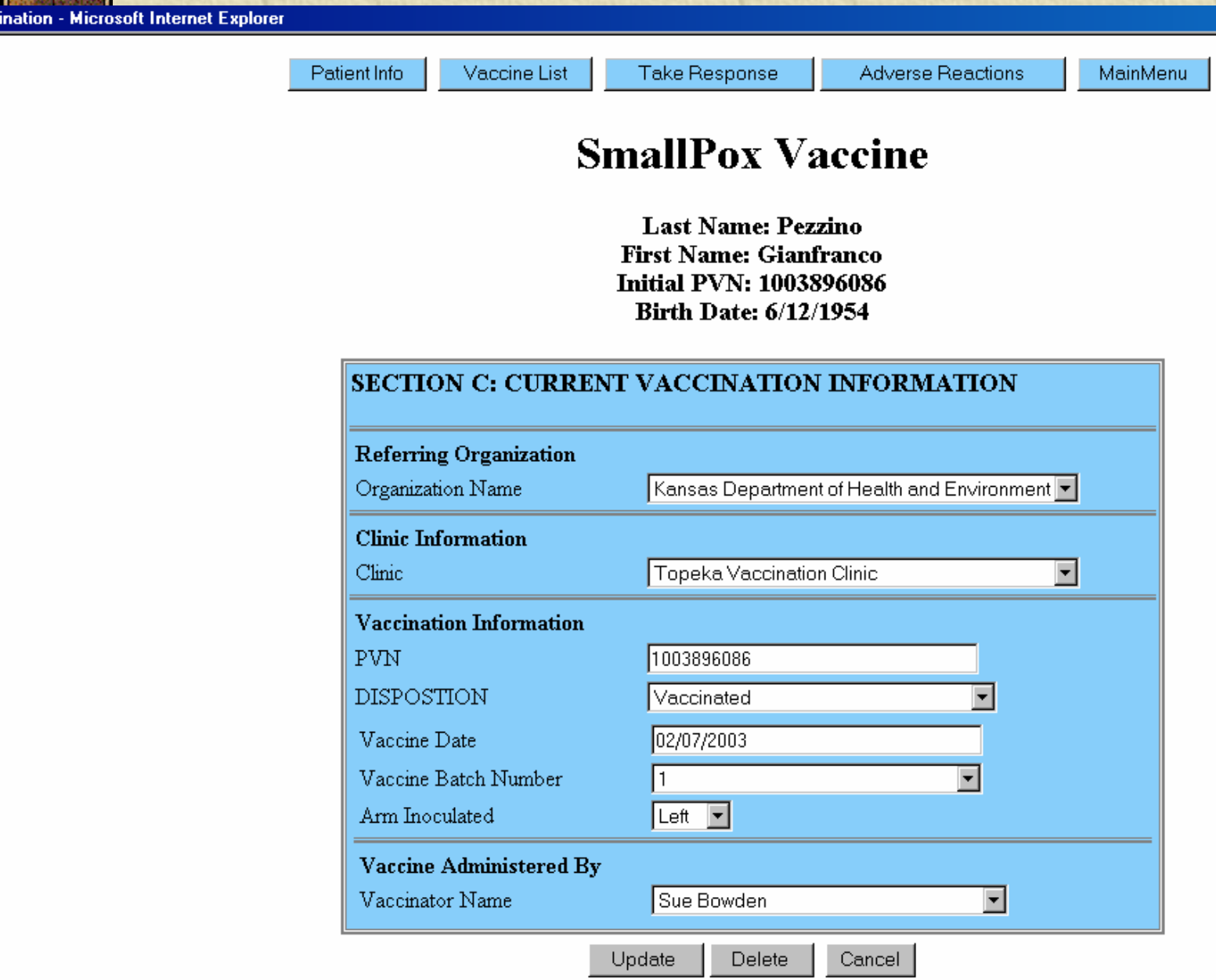
Back MainMenu Exit

Smallpox Vaccination List

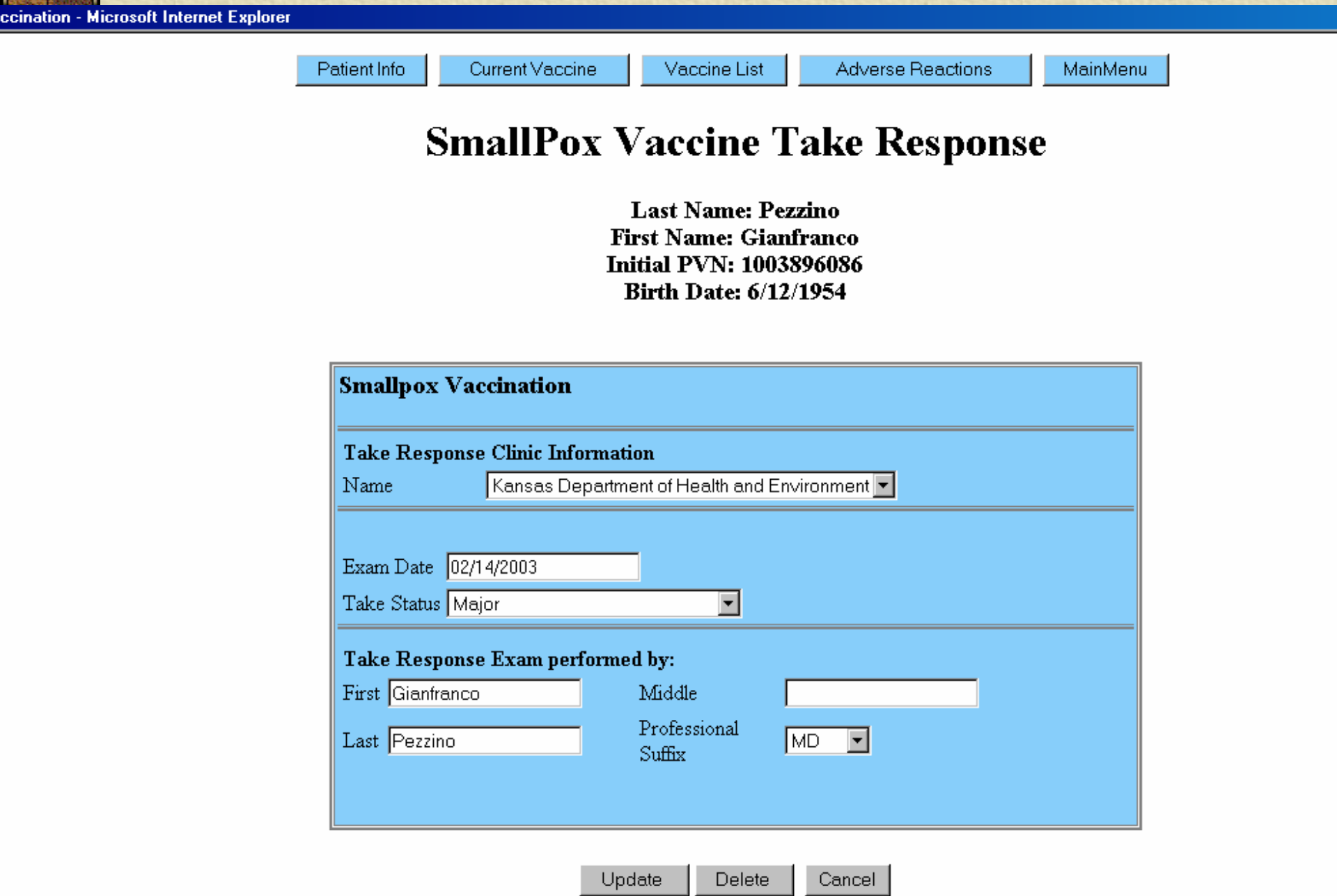
Last Name: Pezzino
First Name: Gianfranco
Initial PVN: 1003896086
Birth Date: 6/12/1954

Add Vaccination	PVN	Name	Date Of Vaccination	County Residence
Edit/View	1003896086	Pezzino, Gianfranco	2/7/2003	SHAWNEE

Online Application – Vaccine Information



Online Application – Take Response



Online Application – Reports

SmallPox Reports

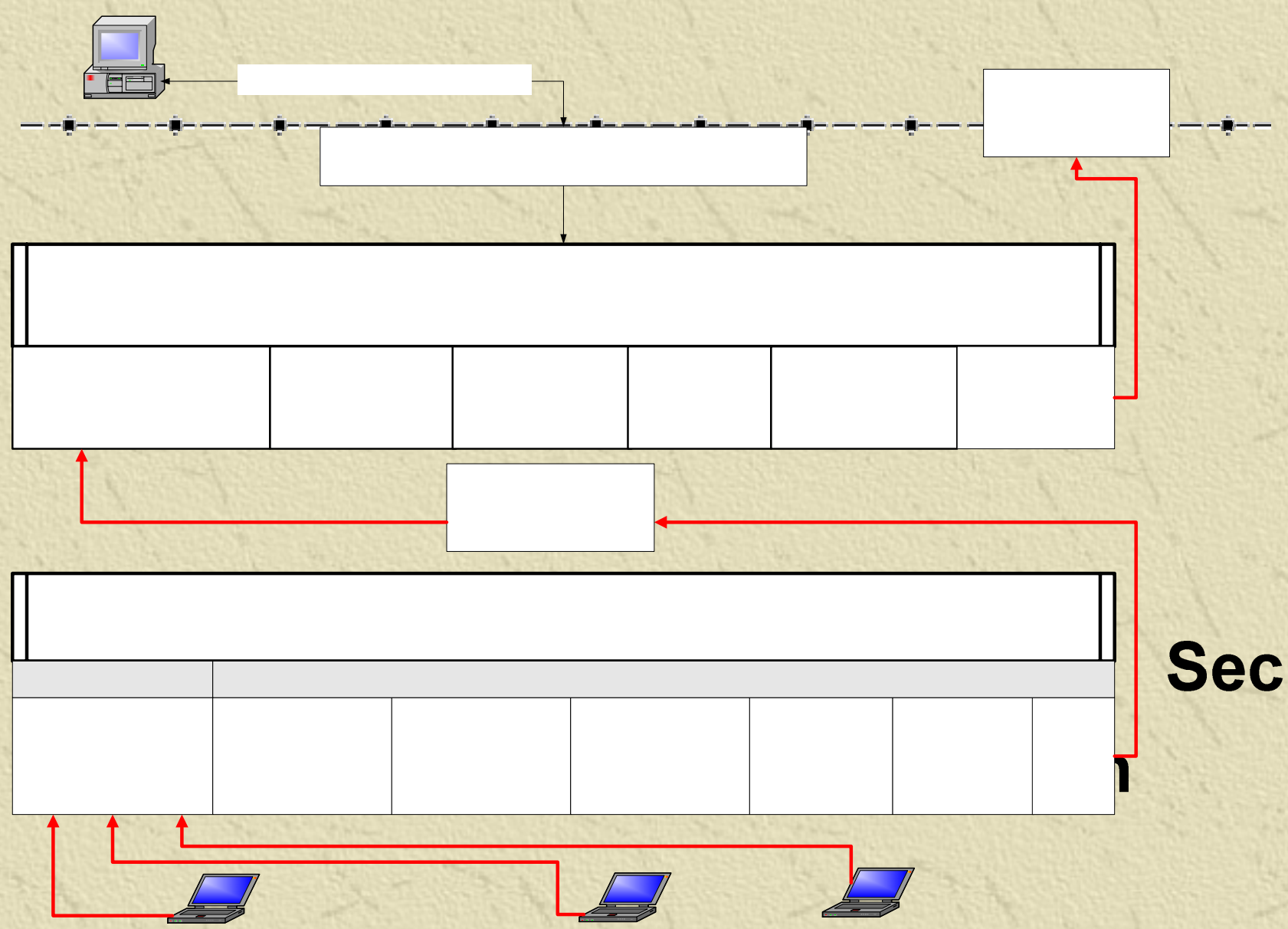
Vaccination Listing

No Take Response Listing

Up To Date Vaccination Counts

back

Kansas Patient Vaccination System Architecture



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Kansas SPVS – 3) Export Function

- Uploads Kansas records to CDC PVS
- Personal identifiers removed
- XML schema:
  - specifications provided by CDC
  - Program written by KDHE

KPVS System Development

- System implementation:
  - Start: mid-December 2002
  - Offline data entry: mid-February
  - Online take response: end February
  - Limited online reports: beginning March
  - Full online record management: May
- One HAN coordinator, 2 full time system developers, 4 part time developers
  - Total about 1200 hours of work

KS SPVS – Results (as of 5-8-2003)

- Records imported onto online application from 12 clinics
  - 448 individual, 453 vaccination vaccination records created
- All records updated online with take response
- Weekly uploads to CDC (XML)
  - CDC implemented internal validation rules after export
  - Some state records rejected
    - State and CDC numbers mismatched

Conclusions

- A state-based system was developed successfully in a short time *following CDC standards*
- Advantages:
  - Quick implementation
  - Flexibility, usability
  - Full control over information flow
  - Potential for integration into disease reporting, immunization registry systems
  - Technical, professional growth is state asset
- Disadvantages:
  - Resources for development and support
  - Tight timeline for development, changing directions and standards
- Role of NEDSS-CDC standards essential

Today's dilemma

Should CDC invest more resources into development of centralized data systems,

OR

Should CDC maintain a central role in establishing data and communication protocols and standards, and redirect resources into state-based systems?