IBM Drug Information System (DIS)

Overview

IBM Canada Health Care Team
Agenda

• Welcome and Introductions

• Drug facts - Medication management business drivers

• IBM’s experience with Canadian drug information systems

• Pharmaceutical Information Network (PIN) functional overview
  – What is PIN?
  – Demonstration

• Solution Components
  – Evolving to a full-function pharmaceutical information management solution

• Lessons learned

• Questions and Discussion (over wine!)
Background: IBM’s Role in Canadian Drug Information Systems

25,000 Users, 100M+ Prescriptions
Drug facts - Medication management business drivers

- In Canada, more money is spent on drugs than on physicians. (Canadian Institute for Health Information, Health Expenditure Trends 1975-2002)

- Drugs account for the second largest category of health expenditures (next to hospital services). (Canadian Institute for Health Information, Drug Expenditures in Canada 1985-2001)

- In 2001, spending on drugs was expected to have reached $15.5 billion, representing 15.2% of total health care spending. (Canadian Institute for Health Information, Drug Expenditure in Canada 1985-2001)

- Two recent Canadian studies on health reform both specified the need for Canada-wide catastrophic drug coverage. (The Health of Canadians – The Federal Role (Kirby Report, September 2001; Building on Values - The Future of Health Care in Canada, Romanow Report, November 2002)
Background: PIN in Alberta

- IBM designed, developed and deployed Seniors Drug Profile, Pharmaceutical Network and the 1st Alberta Electronic Record
- Facilitated extensive clinician engagement as part of the PIN design and implementation
- Developed support infrastructure for EMR/EPR vendor messaging implementation
- IBM has provided Transition and Change Management support and deployed all of these applications, to health care providers throughout Alberta, since 1999
- IBM is currently contracted by AH&W to deploy Alberta NetCare (AB EHR)
  - Includes EMR system messaging and Pharmacy system batch upload
Pharmaceutical Information Network (PIN)

Functional Overview
PIN Overview – Solution evolution

1999 - 2008

PIN Version 1
- Created by IBM and Alberta Health and Wellness
- Medication Profile Viewer and Electronic Prescribing
- Deployed to practitioners throughout Alberta
- Version 1 medication profile viewer deployed in Saskatchewan

PIN Version 2
- Technology Refresh and Performance Testing
- Deployed to Alberta
- Version 2 ePrescribing deployed to Saskatchewan practitioners

PIN Version 3
- Addition of Pan-Canadian standard HL7 V3 (CeRx) compliant messaging
- Update of Graphical User Interface
- Completion scheduled for March 31, 2008
PIN Overview: What is PIN?

- A solution that:
  - Links community physicians, pharmacists, hospitals and other authorized health care providers by providing them confidential shared access to patients’ active medication profiles
  - Provides online decision-support tools for prescribing, dispensing, compliance monitoring, research and policy development
  - Existing EMR or EPR CPOE functions ‘build the script’ and then communicate with PIN for interaction checking and to create the electronic prescription
  - Pharmacy systems also communicate with PIN to conduct interaction checking at dispense time
  - These prescribing and dispensing records are stored in PIN’s database for access by other providers
PIN Overview: How is PIN delivered?

• Conceptually simple:
  – Central clinical data repository for each jurisdiction
  – No duplicate data entry
  – Links existing heterogeneous systems

• Two access methods:
  – From EMRs/EPRs and Pharmacy Systems through system-to-system messaging that is transparent to users
  – Through a Web browser where system-to-system capability is not available or not required
How does PIN work in a physician’s office?

System-to-System Interface

In Alberta, PIN is currently supporting EMR system messaging with 10 EMR system vendors:

- Clinicare
- EMIS
- Jonoke
- Med-Access
- Microquest
- Nightingale
- Optimed
- Practice Solutions
- Telin
- Wolf
## PIN Overview: Functionality Summary

<table>
<thead>
<tr>
<th>PIN Web GUI</th>
<th>Messaging</th>
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<tbody>
<tr>
<td><strong>Create and Manage Prescriptions</strong></td>
<td><strong>Create and Manage Prescriptions</strong></td>
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<tr>
<td>– Hold, Release, Renew, Discontinue, etc.</td>
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<tr>
<td><strong>Create and Manage Allergies / Intolerances</strong></td>
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<tr>
<td><strong>Contraindication / Dosage Management</strong></td>
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<tr>
<td>– Drug to Drug, Drug to Allergy, Over/Under dose</td>
<td>– Drug to Drug, Drug to Allergy, Over/Under dose</td>
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<tr>
<td><strong>Masking</strong></td>
<td><strong>Masking</strong></td>
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<td><strong>Drug Monograph</strong></td>
<td><strong>Drug Monograph</strong></td>
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<tr>
<td><strong>Patient List</strong></td>
<td><strong>Patient List</strong></td>
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<tr>
<td><strong>Reports and Reference Links</strong></td>
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<tr>
<td><strong>Create and Manage Device Prescriptions</strong></td>
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<tr>
<td><strong>Record Patient Observations</strong></td>
<td><strong>Record Patient Observations</strong></td>
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<tr>
<td><strong>Record Patient Notes</strong></td>
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PIN Overview: Benefits of PIN

• Accurate and complete patient medication profile
  – Data from multiple sources and multiple health service providers can be viewed by any authorized user
  – Active medication profile (prospective view of treatment intent)

• Legible prescriptions
  – Reduced transcription errors
  – Reduced phone calls between pharmacies and physicians
  – Can be understood by the patient

• Decision support tools
  – Warnings for drug-drug interactions and drug-allergy interactions
  – Dosage checking
  – Duplicate therapy
  – Online reference tools
  – PIN also provides a foundation for other drug utilization review requirements
**PIN Overview: PIN V1 to PIN V2 - Technology Upgrade and Performance Testing**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Technology Upgrade Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scalability</strong></td>
<td>* Both vertical and horizontal scalability of the PIN application and database have been proven*  &lt;br&gt; * Very high transaction volumes achieved*</td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td>* PIN positioned for failover and high availability*</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>* GUI response times met all Alberta targets*</td>
</tr>
<tr>
<td><strong>Portability</strong></td>
<td>* PIN is now operating system independent and is currently running on both Windows and Unix platforms*  &lt;br&gt; * Database conversion effort has been greatly reduced due to use of Hibernate objects*  &lt;br&gt; * PIN aligned with CHI reference model through externalization of Person, Facility, Provider and Security interfaces*</td>
</tr>
<tr>
<td><strong>Vitality</strong></td>
<td>* Custom components updated to commonly used components. The utilization of commonly used open source components*</td>
</tr>
</tbody>
</table>

Extensive performance and scalability testing was executed throughout the PIN V2 development effort, resulting in the system meeting all response time and transaction volume targets.
PIN Overview: PIN V2 to PIN V3 - CeRx Messaging Support

- In November 2006, Saskatchewan Health and IBM, with funding from Canada Health Infoway, launched the PIP Phase 2.4 – CeRx project
- Enhanced PIN to support CeRx messaging
- Results - 52 messages supported, GUI updated to use new, CeRx-compliant data model
- Availability – 1st Quarter 2008
- PIN V3 - CeRx highlights
  - The solution supports V01R04.3 of the CeRx specification (Sept 11, 2006 “Stable for Use” version plus all Urgent Release updates)
  - The IBM project team worked closely with Canada Health Infoway throughout the project and requested/recommended a number of specification changes
  - Infoway has reviewed and approved the project’s CeRx requirements documentation

The project is currently in User Acceptance Testing with Saskatchewan Health. Final performance testing is in progress
PIN Deployment in Saskatchewan
The Saskatchewan Pharmacy Information Program (PIP) vision is to provide end-to-end support for the prescribing, dispensing, and claims adjudication processes.
Progress towards this vision began with the ‘All Drugs for All People’ (ADAPT) project’s extension of current business practice to include all dispensed medications.
Building on ADAPT, the initial phase of Saskatchewan’s program provided a *medication profile viewer* for clinicians.
Recent phases have introduced PIN’s prescribing support and decision support tools that subsequent phases will extend to pharmacists through functions supported by the CeRx message specification.
As it evolves, Saskatchewan’s Pharmaceutical Information Program provides an increasingly rich source of information for research, planning, and program management processes.

- Quality Council
- Academic, Research, and Professional Analysis
- Health System Analysts and Planners

Information Warehouse

Information Types
- Prescribing
- Dispensing
- Allergies
- Alerts
- Audit
- Others

<Anonymize>

Pharmacy Information Program
- Adjudication Claims History (from ADAPT)
- Complete Dispensing Record
- Medication Profile Viewer
- Clinical Decision Support Tools
- Complete Prescribing Record

- Query
- Reporting
- Analysis
PIN Demonstration
Patient Lookup

Various search options are provided.
Patient Medication Profile

1. The left-hand screen shows the patient’s current profile, the right hand shows the dispense history.

2. Details of each prescription are provided by selecting the associated link.

3. The New Rx button is selected to begin a new prescription.
Create a Short-term Prescription

The patient has presented with strep throat and will receive a short term prescription for Biaxin.
Create a Short-term Prescription

The physician can search for the formulation desired, and can also use favorites.
Create a Short-term Prescription

If a favorite isn’t used, the relevant prescribing information is filled in.
Create a Short-term Prescription

1. The resulting prescription is then shown and can be printed and provided to the patient. Multiple prescriptions can be created before saving and printing.

2. Once the pharmacist has entered the prescription through their pharmacy system, this status will be change to “filled”.
Multiple Drug Renew

1. The patient will be away for an extended period and requires all continuous prescriptions to be renewed.

2. The physician can choose the **Multiple Rx Options** button to perform activities on multiple prescriptions at a time.
Multiple Drug Renew

The physician selects the drugs to renew and then selects the **Renew** button.
Multiple Drug Renew

The physician enters the desired therapy end date or duration of therapy, and all selected drugs are renewed appropriately.
Multiple Drug Renew

The renewed prescriptions are now ready to save and print.
Support for Allergy Information

PIN can capture allergy information for a patient, and use it to warn physicians of potential allergy to drug interactions.
Based on user feedback, PIN V3 has been enhanced to include a dispense view and report.
To facilitate the prescribing process, practitioners can save “favorites” that can be selected and pre-populate the fields during PIN’s prescribing functions.
User Preferences

The receipt of warnings and the requirement to manage drug interactions and overdose situations can be customized on a per-user basis.
A very successful addition to PIN’s functionality has been the Medication Reconciliation Form which is being used by hospitals in Saskatchewan to provide preadmission drug information.

### Medication Reconciliation Form

**CHANA, Roy**  
2 GILL WAY  
Regina, Saskatchewan S0N6O6  

**HSN: 010 079 505**

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**PREADMISSION MEDICATION LIST / PHYSICIAN ORDER FORM**

*Keep this form with the Physician Orders*

- **Allergy / Intolerance to Medications & Food**
  - No Known Allergies
  - Unable to obtain (Pharmacy to flag on MAR)
  - Allergies as follows (describe reaction)

*Note: The above sections MUST be completed before the orders are sent to the Pharmacy.*

List all Prescription, Over the Counter (nonprescription), and Herbal Medications taken prior to admission. 4 month dispensing history including most recent fill date provided by PIP as of 2008-Feb-15. This list may NOT be all inclusive. Review each medication with patient/designee to ensure completeness.

<table>
<thead>
<tr>
<th>Medication Name</th>
<th>Dose</th>
<th>Route</th>
<th>Interval</th>
<th>Time / Date of Last Dose</th>
<th>Physician Orders for Individual Medications on Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>APERBOLINE 25MG TABLET (Hydrazine HCL) 2007-Oct-23</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td>Continue</td>
</tr>
<tr>
<td>ASPIRIN 325MG TABLET (Acetylsalicylic Acid) 2007-Nov-10</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADVIL 200MG TABLET (Ibuprofen) 2007-Nov-24</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TYLENOL 325MG TABLET (Acetaminophen) 2007-Dec-22</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLAVIL 50MG TABLET (Amoxicillin HCL) 2007-Dec-22</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PHENOIBARBITAL 100MG</td>
<td>Oral</td>
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</table>
Pharmaceutical Information Management
Solution Components
Pharmaceutical Information Management solution components

- **Provider and Patient Access**
  - Pharmacy Office System
  - Physician Office System
  - Hospital Information System
  - Clinical Viewer
  - Patient Access

- **System – to – System Access**
  - Provider and Patient Portal
  - Secure Network

- **Clinical Pharmaceutical Information Management**
  - Prescribing Functions
  - Knowledge and CDS Tools
  - Dispensing Functions

- **Integration Broker and Message Switch (EHR)**
  - Prescribing Messages
  - Dispensing Messages

- **Registries (EHR)**

- **Public and Private Claims Adjudication and Administration**
  - Dispensing and Claims Information

- **Standards**
PIN as an Infoway Drug Information System (DIS)
PIN as an Infoway Drug Information System (DIS)

PIN can use the security and privacy services provided by Ontario’s EHR.

PIN will use the security and privacy services provided by Ontario’s EHR.

PIN is currently available to Alberta NetCare users through the Orion portal.

Physician and Pharmacy office systems will interact with PIN via CeRx HL7 V3 messages an HL7 V3 system to access and populate its Drug Repository.

A jurisdiction’s Client and Provider Registry data is accessed through PIN’s external interface.

PIN can also integrate with an Ontario Provider and Client Portal.

PIN is currently available to Alberta NetCare users through the Orion portal.

Physician and Pharmacy office systems will interact with PIN via CeRx HL7 V3 messages an HL7 V3 system to access and populate its Drug Repository.
Lessons Learned

• Stakeholder engagement at both advisory and working group-levels provides valuable guidance in release and change management planning
  – Physicians, pharmacists, and other providers and their respective professional associations
  – Claims administration and health sector clinical information management representatives

• Early availability of clinically relevant medication information is invaluable to jump start adoption
  – All Drugs, All People – Community dispensed medications initially, followed by inpatient medications

• Pharmaceutical information is core data for many clinical health information initiatives; the pharmaceutical information program must align with other Ontario health sector initiatives
  – Primary Care Teams, Community Health Centres, Chronic Disease Prevention and Management

• Implement the full-function pharmaceutical information solution through a series of complementary projects
  – Ensure each project provides stakeholder business value

• Develop a strong change management program to encourage early adoption and sustain use
  – Communication planning and materials, implementation planning and installation services, training materials and support, post-implementation evaluation and issue resolution
PIN Value Summary

- Provides functions and information that address key business drivers
  - Improve patient care and quality and provide clinicians with information to support appropriate drug therapy

- Integrate with provincial investments and provide an Infoway-compliant Drug Information System (DIS)
  - Can be implemented as a standalone system or as an Infoway-compliant EHR Data and Service Drug Information System (DIS) provider

- Support ePrescribing through both Web GUI and Infoway-compliant CeRx HL7 V3 message interfaces

- Proven solution backed by IBM experience and integration capability
  - First installed in 2002, two versions since then have modernized the solution and expanded its function
  - Production installations in both Alberta and Saskatchewan
Questions?
Supporting Material
Phase 1 - CeRx Messages – 33 of 52

• Prescribing
  – Create New Prescription
  – Clinical Pre-Determination
  – Stop Prescription
  – Hold Prescription
  – Release Prescription
  – Revoke Dispensing Permission
  – Record Non-Prescribed Drug
  – Update Non-Prescribed Drug

• Dispensing
  – Fill Prescription
  – Transfer Prescription
  – Prescription Pickup
  – Abort Fill
  – Record non-Fill of Prescription

• Consent
  – Mask Clinical Data
  – Unmask Clinical Data
  – Record Consent

• Common Functions
  – Retract Request
  – Add Record Note

• Patient Queries
  – Get Dispenses for a Drug Prescription
  – Get Single Drug Dispense Details
  – Get Patient Medication Details
  – Get Patient Medication Summary
  – Get Patient Other Medication Details
  – Get Medication Profile Generic Query
  – Get Patient Drug Contraindications

• Allergies/Intolerances
  – Add Allergy, Intolerance
  – Update Allergy, Intolerance
  – Get Patient Allergies, Intolerances
  – Get Allergy, Intolerance Change History

• Drug Queries
  – Get Drug Documentation Information
  – Search Drug Products
  – Query Drug Detail
  – Contraindication Checking Against a Full Set of Drugs
Phase 2 - CeRx Messages – 19 of 52

- **Patient Queries**
  - Get Patient Drug Dispense History
  - Get Patient Prescriptions, Never Dispensed
  - Get Patient Prescriptions with Remaining Dispenses
  - Get Patient Drug Prescription Order Summary
  - Get Prescription Drug Order with No Dispenses
  - Get Drug Prescription Event History

- **Device Prescribing/Dispensing**
  - Create Device Prescription
  - Fill Device Prescription
  - Get Dispenses for a Device Prescription
  - Get Patient Device Dispense History
  - Get Single Device Dispense Details
  - Get Patient Device Prescription Order Summary
  - Get Prescription Device Order with No Dispenses
  - Get Device Prescription Event History

- **Patient Observations**
  - Record Basic Patient Observations
  - Review Basic Patient Observations

- **Patient Notes**
  - Add Patient Note
  - Remove Patient Note
  - Query Patient Notes
Pharmaceutical Information Management Solution

Transition States
Current state - Starting point

Pharmacy Connectivity

Pharmacy Office System

System – to – System Access

Secure Network

Pharmaceutical Claims Administration

Public and Private Claims Adjudication and Administration

Dispensing and Claims Information

Comprehensive record of dispensed medications?
Transition state 1 – Medication Profile – Alternative 1 – Existing Claims Administration System
Transition state 1 – Medication Profile – Clinical Pharmaceutical Information System
Transition state 2 – Prescribing support
Transition state 3 – Dispensing support (full ePrescribing) and patient access