Extracting Existing Usage-Data to Predict Future Requirements in Oncology and EMRs

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Charm Health, Brisbane, Queensland
Overview

• Background
• CharmHealth
• Objectives
• Methods
• Results
• Future directions
Background – Charm Health

Queensland based - Founded in 2000

- 17 Facilities Live + 15 Facilities Implementing
- >700 Users
- ~20 Staff

EXEC

Clinical and Client Services
Technical Services
Business Development
Project Delivery
Charm

• Originally in oncology
  – Additional functionality (eg scheduling)
• Medication management
• Expanded to radiation therapy
• Request for chronic disease management
  – Diabetes
  – Renal
  – Cardiac
Functionality

- Chronic Disease Management Using Clinical Pathways
  - Chemotherapy
  - Radiotherapy
  - Combined Chemo/RT
  - Palliative Care
- Electronic Medical Record
  - Pathology/Radiology Orders & Results
  - Medical/Surgical History
  - Medication Management/Allergies
  - Device Management
- Document Management
  - Letter/Discharge Summary Writer
  - Imports scanned documents/images
- PBS Script Management
- Pharmacy Management
  - Manufacturing
  - External Orders
  - Invoice Matching
  - Finance Extract
- Clinical Trials Management
- Day Unit/Outpatient – Scheduling

- Radiotherapy
  - Prescription
  - Treatment History
  - Scheduling
- Billing
- Clinical Practice Guidelines
  - Summaries
  - Treatment Algorithms
- Decision Support
  - Drug: Drug/Disease/Allergy
- Multidisciplinary Clinic Support
- Data Collection
  - Cancer Staging
  - Registry Interfaces
  - Research
- Dynamic Content Collection/Reporting
  - Customisable Questionnaires
  - Custom Report Generation Tool
- Interfaces with
  - PAS/Scheduling Systems/Finance
  - Pharmacy/Radiotherapy
  - Pathology/Radiology
Objectives

• Charm Health is in the process of developing Charm.Next

• To take learnings from usage of existing software functionality in development of a new generation of software for oncology medication management, CDM and EMR
Methods

• Extracted de-identified data
• From routine reporting data repositories
• Analysed using basic descriptive statistics
• Functionality usage was then compared to functional specifications for:
  – oncology management
  – general disease management
  – EMR
  – medication management

to assess future requirements
Results

- 48,000 patients
- Average age 66.1 ± 13.0
- 54.5% female
- 1,020,000 medications and blood products
- Average 20.9 medications per patient
Functionality Usage

• Over 95% of medications associated with chemotherapy treatment
  – 32% chemotherapy
  – 39% management of nausea and vomiting
  – 6% rescue and management of immune-suppression
  – 0.3% antibiotics
  – 0.9% blood products
  – 19% associated administration (e.g. fluids and electrolytes)
Key Points

- Target functionality is used most
- Functionality that reduces workload most commonly used
- Automation of complex (multistep) processes preferred
- Patient safety and errors of importance
- Communication paramount
- Use of additional functionality takes time
Clinical Trials

• >30 clinical trial medications
• >100 protocols in clinical trial
• >1000 of doses
• Tracking is complex
• Financial incentive
Assess Patient for Eligibility Into a Clinical Trial View
Patient Safety Functionality

- Decision support, drug, allergy and disease interaction checking, was used in all sites
- Calculate and adjust dosages for renal function and body surface area was routinely used by all sites
Interactions Checking

Decision Support
- Drug/Drug
- Drug/Disease
- Drug/Allergy
Medication Management

• Basic prescribing workflow
  – Medication Review
  – PBS Script Management
  – Complex Scheduling
    • Chemotherapy and Dialysis prescriptions
    • Oncology and Transplant pathways
### Patient Details

**Name:** ANDREW ANDERSON

**Date of Birth:** 1975-01-01

**Gender:** Male

**Address:** 123 Main St, Anytown USA

**Phone:** 555-1234

**Email:** patient@example.com

### Medical History

#### Present Problems
- **Current Problems:** Glomerulonephritis

#### Medications

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Dosage</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>Prednisone</td>
<td>5mg</td>
<td>OD 3 times a day</td>
</tr>
<tr>
<td>Cyclosporin</td>
<td>100 mg</td>
<td>OD 3 times a day</td>
</tr>
</tbody>
</table>

### Surgical History

- **Date:** 2005
- **Procedure:** Endoscopic biopsy
- **Result:** Normal

### Medical History

#### Diagnoses
- **Diagnosis:** Glomerulonephritis

#### Treatment
- **Treatment:** Prednisone and Cyclosporin

### Notes

- Maintain therapy following initiation and stabilization of treatment with cyclosporine. The patient should remain under the supervision and direction of the transplant unit and be reviewed at least once every 6 months for the first year after transplantation. The name and identity of the transplant unit must be included in this authority application.

- Prednisone and Cyclosporin should be continued indefinitely.

- Review the patient's condition periodically and adjust the dosage of the drugs as necessary.

- The patient should be monitored closely for any side effects of the medication.

### Further Information

- The patient should consult with their transplant team for any questions or concerns regarding their medical condition.

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**Suite 13, 65 MacGregor Tce, Bardon Qld 4065**

**Phone:** 3512 5300  **Fax:** 3512 5399  **Help Desk:** 1300 736 620  **www.charmhealth.com.au**
Notes

Date Medication History Taken
Who currently administers medications:
Medication Device Aids:
Medication administration issues:
Compliance / Concordance Issues:
Date of last medication supply:
Charm Drug Chart

• Orders initially proposed,
• Clinicians can order and print by clicking the hyperlink
Electronic Medical Record

Work flow –

• Review patient information (History – Medical, Surgical etc)
• Current condition
  – Current diagnoses
  – Current problems
  – Review of symptoms
  – Physical examination
  – Test results - Pathology/Radiology Orders & Results
• Determine (and document) treatment plan
• Encounters and encounter management (multidisciplinary)
• Medication Management/Allergies
  – Update medication lists, orders, prescribe
• Order tests
• Device Management
Medication History

1. Pharmacist
2. Medication History
3. Pharmacist
# Clinical Encounters - Recording Toxicities

**Current Encounter>>Notes**

**Date**: 22/02/2008

**Reason**: Chemotherapy

**Chief Complaint**: First chemotherapy

**Duration**

**Diagnosis**: Selected Drug

**Treatment**: Education and counseling

**Review in**: 3 Week

**Followup**

**Quick Notes**

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<thead>
<tr>
<th>Adverse Event</th>
<th>G1</th>
<th>G2</th>
<th>G3</th>
<th>G4</th>
<th>G5</th>
<th>SAE</th>
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<tr>
<td>Allergic reaction/hypersensitivity (including drug fever)</td>
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<tr>
<td>Allergic rhinitis (including sneezing, nasal stuffiness, postnasal drip)</td>
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<td>Anorexia</td>
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<td>CDP count</td>
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<td><strong>Constipation</strong></td>
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<td>Cystitis</td>
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<td>Diarrhea</td>
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<td>Fatigue (asthenia, lethargy, malaise)</td>
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<tr>
<td>Fever (in the absence of neutropenia, where neutropenia is defined as ANC &lt;1.0 x 10...</td>
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<td>Fibrinogen</td>
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<td>Gastritis (including bile reflux gastritis)</td>
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<tr>
<td><strong>Hair loss/alopecia (scalp or body)</strong></td>
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<td>Heartburn/dyspepsia</td>
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<td><strong>Injection site reaction/extravasation changes</strong></td>
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<td>Insomnia</td>
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<td>Leukocytes (total WBC)</td>
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<td><strong>Lymphopenia</strong></td>
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<tr>
<td>Mucositis/stomatitis (clinical exam) Oral cavity</td>
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<td>Nail changes</td>
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<tr>
<td>Nausea</td>
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<td><strong>Neutrophils/granulocytes (ANC/AGC)</strong></td>
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<td>Peripheral nerve pain</td>
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**Pathway**: 5-Fluorouracil-Charm Drug-Capcitabine-Folinic Acid-Oxaliplatin (Charm GI Trial 234Arm A)

**Date**: 10.3.2007  
**Attribution**: Probable
EMR Findings

• Sites gained confidence and increased usage of EMR functionality the longer they had used the product
• Information on diagnosis was recorded for 39.6% of patients (N=19,351)
• Two facilities, contributed over 90% of completion rates for these data
  – strong clinical champions
  – over four year’s experience
• Co-morbid medical conditions were only recorded for 2.9% of patients
Pathology Order Sets

Order Set Details:
- Category: Pathology
- Service Provider: Auslab Pathology
- Code: PD
- Full Description: Routine Peritoneal Dialysis

Add Codes:
- UCE: Urinalysis and Electrolytes
- CP: Calcium and Phosphate
- FBC: Full Blood Count
- MSU: Mid Stream Urine
- UP: Urine Protein and Albumin Levels
Pathology and Radiology
- Results
- Graphing
- Orders
Document & File Management
Review and Triage Referral
Information, Knowledge and Intelligence

- Data collection
  - Customisable Questionnaires
  - Disease Staging
  - Performance Status
  - Registry Interfaces
  - ANZdata
  - Research
  - Clinical Trials
- Interfaces with
  - PAS/Scheduling Systems/Finance
  - Pharmacy/Radiotherapy
  - Pathology/Radiology
- Data reporting
  - Dynamic Content Collection/Reporting
  - Custom Report Generation Tool
  - Customised data extraction routines
- Knowledge management and development
  - Clinical Practice Guidelines
  - Treatment Summaries / Pathways
  - Treatment Algorithms
  - Decision Support
    - Drug: Drug/Disease/Allergy
- “Intelligent” clinical services
Comprehensive cancer data collection:
- Cancer Registry Notification
- Research / organisation reporting
Multidisciplinary Clinic Support

Questionnaire

- Presenting Clinician: Prof. Hart
- Pathology Slides Presented: Yes, explained by pathologist
- Explained by Radiologist: Yes, discussion input: GP
- Discussion Input: Med Onc: Yes, discussion input: rad onc
- Discussion Input: Radiologist: Research discussed
- Other Details: Full histopathology attached
- Patients Psychosocial situation: Discussion summarised: Yes
- Comments: For chemotherapy followed by radiotherapy

Pathway:

Date: 22/02/2008

Attribution: Probable

Save Selected Toxicities
Implementing Findings

• Oncology migration
• Renal
• Medication management
• Chronic disease management
• Charm.Next
Charm Renal

• Referral Management
  • Import referrals
  • Triage
  • Waitlist
• EMR – Documenting and managing renal disease
  • Patient History
  • **Medication Management**
  • Order Entry and Results
    • Anaemia, proteinuria and albuminuria
    • Serum Creatinine
    • Calcium, phosphate and PTH
• Access Device Management
• GFR, BSA, IBW calculation and monitoring
• Planning for end-stage disease
  • Scheduling/Prescriptions
    • Dialysis – peritoneal/haemodialysis
    • Transplant
• Treatment Algorithms
• Data collection (ANZData)
Conclusions

Key Findings
• Users favoured functionality for which they achieve greatest workflow efficiencies
• Success factors
  – Sites with a dedicated resource (such as a Charm Project Officer)
  – Longest exposure to the software used more of the functionality
  – Experience is a factor in the adoption of new work practices
• Patient safety and business benefits
  – Sites using more extensive functionality in disease and medication management
• Analysis of requirements
  – Management of oncology requires functionality in excess of that required for most other disease management,
  – Requirements for electronic medication management, electronic medical records and chronic disease management are
    • easily met within existing functionality
• Many sites are now requesting and undertaking broader application of existing functionality
Thank you