Prism
Predictive Risk Stratification Model

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Presentation overview

• Background to Project context
• Approach
• PRISM pilot evaluation
• Next steps
• Technical aspects of Prism
  – Data Flows
  – PRISM Tool
Background to Prism

“Designed to Improve Health and the Management of Chronic Conditions in Wales — an integrated model and framework” (April 2007) with emphasis on:

– Whole systems approach to improvement across health and social care and other partners
– Proactive, early intervention not reactive, same old, same old
– Transitional funding provided to support the development and testing of the model elements
– Targeting services at people in all four defined tiers of risk not just the top
CCM integrated health and social care model and framework

- IM&T to support information sharing
- Locality GP practice based “Clusters”
- Core Health & Social CCM Team / Service and MDT
- Locality Care Services Planning Co-ordination
- Generic integrated H&SC support worker
- Generic Care Pathway

Prism
Project approach
Partnership

Multiple partners commissioned by Welsh Assembly Government to undertake different Prism elements:

• Health Dialog - developed algorithm
• Informing Healthcare - project management
• Health Solutions Wales – exploited existing technical architecture to develop web-based system and process to ‘handle’ data feeds
• National Leadership and Innovation Agency - supporting user training needs
• Business Services Centre and Primary Care Informatics Programme – supporting GP practices
Prism pilot

• Data for building algorithm:
  – 51 GP practices (rural/urban, affluent/deprived)
  – Uniform methodology for extracting data from GP systems – Audit+
  – PEDW data (which includes HES data for Welsh residents)
  – Outpatient data (lower level of integrity)

• Differences between Prism and Combined Predictive Model
  – 37 variables vs 69
  – No A&E data/variables …yet!
  – Automated monthly data feeds from GP practices
  – Monthly updated stratified lists
  – Web-based tool
Prism pilot evaluation
Prism pilot evaluation

• 25 GP practices trialled the web-based tool for three months and looked at:
  – Functionality
  – Usability
  – Usefulness
  – “Accuracy”

• Swansea University developed evaluation framework
• Health Dialog compared the performance of Prism algorithm with Combined Predictive Model
Prism evaluation

• Month 1 - Users asked to assess risk levels for a sample of their patients
  – Risk levels assessed on a seven point scale
    (1 - highest risk down to 7 - lowest risk)
• Months 2 and 3 - Users asked to comment on month to month changes to risk scores
What can Prism tool be used for?

- Identifying those people at risk of emergency admission in levels 1-4
- **Mapping software to create visual representation of:**
  - People with chronic conditions and their Prism level, age, etc
  - Services / care settings available
  - Deprivation / Communities First areas
- Identifying gaps / duplication in services / care provision
- Supporting workforce development
- Supporting MDT approach and working practices
- **Data to use health and social services estate more effectively,** eg Luncheon clubs + toe nail cutting service!
- Data to support acute care workforce
- Aggregate data analysis, eg by GP cluster, locality, county etc, to inform service planning
- Analysing changes in risk scores as an element of service change evaluation
- Targeting specific services / interventions
- **Understanding care of complex service users currently at ‘low risk’**
Next steps - 2010/2011

• Prism will be rolled out across Wales as the national Welsh Predictive Risk Service from April 2010

• Web-based tool development following feedback from pilot evaluation to include:
  – Non care professional users
  – Aggregated dated to support local services planning
  – Further filtering options
  – Reports and analysis

• Algorithm development to include:
  – A&E data
  – Social care variables
  – Refreshing existing algorithm – it’s now 18 months old

• SDO research funding to evaluate roll out of Prism across NHS Wales
Data flows
Data flow requirements

- Requirements for development of risk tool
  - Individual-level GP practice data
    - Read codes with information about conditions, examinations, measurements and prescriptions
  - Individual-level secondary care data
    - Wide range of clinical and administrative data from hospital admissions and outpatient attendances databases
  - Pseudonymised individual-level record linkage across all 3 sources of data
  - Risk scores fed back to GP practices in suitable format
  - Adherence to information governance rules, and protection of patient confidentiality
Data flow methodology

• Based on split file methodology
• Methodology developed jointly by HSW and the SAIL project (Swansea University) – recently published
  – The SAIL databank: linking multiple health and social care datasets
    Ronan A Lyons et al.
Audit+ PRISM software GP Practice

GP System PRISM software

Prism File 1 (Demographic)

Prism File 2 (Clinical)

De-pseudonymisation

Revised ‘at-risk’ patient list

Pseudonymisation Service

NHS Wales Data Switching Service (NWDSS)

HSW Data Warehouse (Includes pseudonymised Hospital Admission and Outpatient data)

PRISM Scoring Database

Recombine
The Prism (Welsh Predictive Risk Service) Tool
Welsh Predictive Risk Service

Together with health professionals and data analysis experts, Informing Healthcare has developed a web-based information tool – The Welsh Predictive Risk Service (WPRS). WPRS classifies GP Practice populations according to their risk of emergency hospital admission.

WPRS is now available to those GP Practices who have agreed to participate in the pilot implementation. Click the ‘Sign In’ button and follow the ‘Sign Up’ procedure to get started.

The first step is for the GP practice’s Caldicott Guardian to ‘Sign Up’. When access is granted, the Caldicott Guardian can approve ‘Sign Up’ requests from other members of staff.

At this stage, access to the tool is limited to GP practice staff only. Access by any other groups, for example case managers, is subject to agreement with GP practices.

As part of this pilot implementation, Swansea University shall be seeking opinions based on your experience of using the tool.

If you experience any difficulties in using the web-tool, please call the Support Team at Health Solutions Wales on 02920 502374.

WPRS System Messages

Service Information 27/07/2009

Final changes to the Prism Web Tool prior to evaluation are now complete.

If you are taking part in the Evaluation Phase of the Prism Pilot, the service is now available for registered users.

If you have not yet registered, please click on the ‘Sign in’ link above, and then the ‘Sign Up Now’ button on the following page.

Informing Healthcare will be issuing Month One Evaluation instructions in the week beginning 27 July.

Further Services

- WPRS Latest News
- WPRS FAQs
- My User Profile
- My local Caldicott Representatives

Help  Contact Us  Terms of Use  Software Requirements  Document Library
Sign in to the Welsh Predictive Risk Service

Username: w00000@wales.nhs.uk
Password: ************
Sign In

Forgotten your password?

New to Welsh Predictive Risk Service?

WPRS is available to users who have registered using their NHS Email as a UserID.

If you want to use WPRS follow the simple steps and sign up using the button below.

Sign Up Now

Confidentiality

The Data Protection Act (1998) and Computer Misuse Act (1990) cover data in this system. You must not pass the data to anyone who does not have a proper business need to use it.

This is a private NHS site used only under authorised access. Unauthorised access to this system or any of the services provided is unlawful under UK law and is considered an offence under the Computer Misuse Act 1990. Unauthorised access attempts to this site and services provided will be investigated and the offenders prosecuted.
Pyramid figures show Absolute Risk Score for surgery population with no WPRS Variable filters applied.

- **Level 1: Very Low Risk**
  - Absolute Risk Score from 0.00% to 10.54%

- **Level 2: Low Risk**
  - Absolute Risk Score from 10.54% to 21.25%

- **Level 3: Moderate Risk**
  - Absolute Risk Score from 21.25% to 54.67%

- **Level 4: High Risk**
  - Absolute Risk Score from 54.67% to 100.00%

Number of Patients = 3500
Prism variable filters

Welsh Predictive Risk Service

Organisation: Dummy

Pyramid figures show Absolute Risk Score for surgery population with WPRS Variable filters applied: Age Group=45-64; Patients with Asthma; Smoker; No Mental Health Disorders;

- Level 4: High Risk
  - Absolute Risk Score from 54.67% to 100.00%
- Level 3: Moderate Risk
  - Absolute Risk Score from 21.25% to 54.67%
- Level 2: Low Risk
  - Absolute Risk Score from 10.54% to 21.25%
- Level 1: Very Low Risk
  - Absolute Risk Score from 0.00% to 10.54%

Number of Patients = 34
## Welsh Predictive Risk Service

**Organisation:** Dummy

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Age Group</th>
<th>Gender</th>
<th>Number of Chronic Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - High Risk</td>
<td>65-84</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NHS Number</th>
<th>Forename</th>
<th>Surname</th>
<th>Gender</th>
<th>Date of Birth</th>
<th>Post Code</th>
<th>Risk Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>6083101141</td>
<td>GRACE</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Feb 1937</td>
<td>PR99 1SM</td>
<td>87.13 %</td>
</tr>
<tr>
<td>6178301141</td>
<td>RUBY</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Apr 1925</td>
<td>PR99 1SM</td>
<td>80.74 %</td>
</tr>
<tr>
<td>6462198041</td>
<td>HARRY</td>
<td>PRISM</td>
<td>Male</td>
<td>01 Oct 1930</td>
<td>PR99 1SM</td>
<td>69.35 %</td>
</tr>
<tr>
<td>6612693561</td>
<td>DANIEL</td>
<td>PRISM</td>
<td>Male</td>
<td>01 Apr 1942</td>
<td>PR99 1SM</td>
<td>64.88 %</td>
</tr>
<tr>
<td>6293688041</td>
<td>OLIVIA</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Mar 1928</td>
<td>PR99 1SM</td>
<td>59.25 %</td>
</tr>
<tr>
<td>6784401141</td>
<td>LILY</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Jul 1937</td>
<td>PR99 1SM</td>
<td>58.79 %</td>
</tr>
<tr>
<td>6394151141</td>
<td>EMILY</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Feb 1926</td>
<td>PR99 1SM</td>
<td>55.00 %</td>
</tr>
<tr>
<td>6754001141</td>
<td>LILY</td>
<td>PRISM</td>
<td>Female</td>
<td>01 Aug 1925</td>
<td>PR99 1SM</td>
<td>54.99 %</td>
</tr>
</tbody>
</table>

First (Page 1 of 1) << Previous Next >>

- Risk group unchanged since last month
- Risk group increased since last month
- Risk group decreased since last month
### Welsh Predictive Risk Service

#### Risk History with Risk Variables

- **Nhs Number**: 6178301141
- **Name**: PRISM, RUBY
- **Date Of Birth**: 01 Apr 1925
- **Gender**: Female
- **Post Code**: PR99 1SM
- **Predictive Risk Score**: 80.74

#### Demographic Variables in Risk History

<table>
<thead>
<tr>
<th>Risk Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>83</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>Deprivation</td>
<td>23.70</td>
</tr>
</tbody>
</table>

#### GP Variables in Risk History

#### Hospital Admission Variables in Risk History

#### Outpatient Variables in Risk History

#### Chronic Conditions in Risk History
# Welsh Predictive Risk Service

## Demographic Variables in Risk History

- **Nhs Number**: 6178301141
- **Name**: PRISM, RUBY
- **Date Of Birth**: 01 Apr 1925
- **Gender**: Female
- **Post Code**: PR99 1SM
- **Predictive Risk Score**: 80.74

## GP Variables in Risk History

<table>
<thead>
<tr>
<th>Risk Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurotic, personality and other nonpsychotic disorders</td>
<td>No</td>
</tr>
<tr>
<td>Poisoning</td>
<td>No</td>
</tr>
<tr>
<td>Sprains and strains of joints and adjacent muscles</td>
<td>No</td>
</tr>
<tr>
<td>Mental and behavioural disorders</td>
<td>Yes</td>
</tr>
<tr>
<td>GI disorders</td>
<td>No</td>
</tr>
<tr>
<td>Corticosteroid Clinical Use</td>
<td>No</td>
</tr>
<tr>
<td>Loop Diuretics</td>
<td>Yes</td>
</tr>
<tr>
<td>Narcotic Analgesics</td>
<td>No</td>
</tr>
<tr>
<td>Other Antidepressant Drugs</td>
<td>Yes</td>
</tr>
<tr>
<td>Penicillinase Res Penicillins</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulphonamides &amp; Trimethoprim</td>
<td>No</td>
</tr>
<tr>
<td>Ulcer Healing Drug</td>
<td>No</td>
</tr>
<tr>
<td>Risk Variable</td>
<td>Value</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Inpatient admission with diagnosis Cerebral Palsy and other paralytic syndromes</td>
<td>No</td>
</tr>
<tr>
<td>Inpatient admission with diagnosis Symptoms and signs involving the circulatory and respiratory systems</td>
<td>Yes</td>
</tr>
<tr>
<td>Inpatient admission with diagnosis Symptoms and signs involving the digestive system and abdomen</td>
<td>No</td>
</tr>
<tr>
<td>Inpatient admission with diagnosis Abnormal findings on examination of urine, without diagnosis</td>
<td>No</td>
</tr>
<tr>
<td>Inpatient admission with Alcohol related diagnosis</td>
<td>No</td>
</tr>
<tr>
<td>Emergency admissions in last 12 months of history period</td>
<td>4</td>
</tr>
<tr>
<td>Non-emergency admission</td>
<td>No</td>
</tr>
<tr>
<td>Inpatient day &amp; night cases</td>
<td>No</td>
</tr>
<tr>
<td>Nhs Number</td>
<td>Name</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>6178301141</td>
<td>PRISM, RUBY</td>
</tr>
</tbody>
</table>

**Demographic Variables in Risk History**

**GP Variables in Risk History**

**Hospital Admission Variables in Risk History**

**Outpatient Variables in Risk History**

<table>
<thead>
<tr>
<th>Risk Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP visit following an emergency admission</td>
<td>Yes</td>
</tr>
<tr>
<td>OP visit with referral from a GP</td>
<td>Yes</td>
</tr>
<tr>
<td>OP visit with outcome - Another appointment given</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Chronic Conditions in Risk History**
# Welsh Predictive Risk Service

<table>
<thead>
<tr>
<th>Nhs Number</th>
<th>Name</th>
<th>Date Of Birth</th>
<th>Gender</th>
<th>Post Code</th>
<th>Predictive Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>6178301141</td>
<td>PRISM, RUBY</td>
<td>01 Apr 1925</td>
<td>Female</td>
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<td>80.74</td>
</tr>
</tbody>
</table>

## Demographic Variables in Risk History

## GP Variables in Risk History

## Hospital Admission Variables in Risk History

## Outpatient Variables in Risk History

## Chronic Conditions in Risk History

<table>
<thead>
<tr>
<th>Risk Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>Yes</td>
</tr>
<tr>
<td>Coronary Heart Disease</td>
<td>Yes</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Yes</td>
</tr>
<tr>
<td>CHF (LTC)</td>
<td>No</td>
</tr>
<tr>
<td>COPD (LTC)</td>
<td>No</td>
</tr>
<tr>
<td>Epilepsy (LTC)</td>
<td>No</td>
</tr>
</tbody>
</table>
Pyramid figures show Absolute Risk Score for surgery population with no WPRS Variable filters applied.

Number of Patients = 3500

Level 1: Very Low Risk
Absolute Risk Score from 0.00% to 10.54%

Level 2: Low Risk
Absolute Risk Score from 10.54% to 21.25%

Level 3: Moderate Risk
Absolute Risk Score from 21.25% to 54.67%

Level 4: High Risk
Absolute Risk Score from 54.67% to 100.00%

Filter Results by WRPS Variables:
- Age Group
- Gender
- No of Chronic Conditions
- Diseases
- Emergency Admissions
- Smoker
- Mental Health
Other new tool enhancements

• General purpose filtering tool (query builder)
  – Filtering by any combination of model (or non-model) variables (Boolean expressions – AND, OR, NOT)

• Case history extract
  – Chronological list of all the patient’s records from GP and Hospital data (summarised descriptions only)
  – Some colour coding to help users identify health events which specifically impact on the model variable values and ultimately their risk score

• Case flagging
  – Allow users to flag and then filter patients they believe to be “out of scope” (e.g. palliative care)
  – Identify patients already being case managed