Virtual Wards

Dr. Geraint Lewis MA MRCP
Public Health Registrar

Maggie Ioannou MSc BA RGN RSCN RHVSc
Director of Quality, Nursing & Allied Health Professionals
Outline

- Policy Background
- Predictive Algorithms
- Virtual Wards
- Historical Cohort
Background

- BMJ in paper* in 2002 showed Kaiser Permanente in California seemed to provide higher quality healthcare than the NHS at a lower cost.

- Kaiser identify high risk people in their population and manage them intensively to avoid admissions.

*Getting more for their dollar: a comparison of the NHS with California's Kaiser Permanente BMJ 2002;324:135-143
Why haven’t we done this before?

- Key to success is in accurate identification of patients
- Clinician referrals do not work
- Threshold modelling (e.g. all patients aged >65 with 3+ admissions) does not work
- Kaiser’s method under copyright
The Department of Health has commissioned *The King’s Fund* to write **predictive modelling software** for the NHS.

- Project is in 3 Phases
King’s Fund Project

- Phase I  
  King’s Fund
  Literature Review
  Complete

- Phase II  
  New York University
  Basic Algorithm - PARR
  Available since September 2005

- Phase III  
  Health Dialog
  Advanced Algorithm
  Being launched summer 2006
In-patient data

(Patient At Risk of Readmission)

PARR* Algorithm

Intervention
Intervention

Advanced Algorithm

In-patient data
A&E data
GP Practice data
Out-patient data

Social Services data

Intervention
**Intervention**

- **Level 1**: Lower risk patients (70-80% of population)
- **Level 2**: Higher risk patients (20-30% of population)
- **Level 3**: Patients with highly complex conditions (<1% of population)
**Intervention**

- Improved quality of life
- Better disease control

**Healthier Patients**

- Fewer unplanned hospital admissions

**Net financial benefit**
Hospital Wards

- Multidisciplinary Team

- Complex
  - Infrastructure
  - Human Resources
  - Timetable

- Clinicians & patients have an intuitive understanding of how they work
Virtual Wards

- Mimic hospital ward
- Patients cared for in their own homes
- No physical ward building, hence the term virtual wards
- Patients case managed by multidisciplinary team
- Ward Team headed by Community Matron
10 Croydon Virtual Wards

- Croydon population = 340,000
- 10 virtual wards
  - Catchment population of 34,000 residents per ward
  - One ward per 15 GPs
- 100 “beds” per ward
2 Pilot Virtual Wards

- 2 pilot sites initially
- Pilots to be rigorously evaluated
- If successful then wards to be rolled-out across the borough
- Additionally there may be an eleventh, pan-Croydon, children’s ward
Virtual Ward A
Community Matron
Nursing complement
Ward Administrator
Pharmacist
Social Worker
Physiotherapist
Occupational Therapist
Voluntary Sector Helper

Virtual Ward B
Community Matron
Nursing complement
Ward Administrator
Pharmacist
Social Worker
Physiotherapist
Occupational Therapist
Voluntary Sector Helper

Specialist Staff
• Specialist nurses
  • Asthma
  • Continence
  • Heart Failure
  • etc.
• Community mental health team
• Palliative care team
• Alcohol service
Specialist Staff

Visit several wards

Analogous to diabetic nurse specialist who visits several hospital wards
Medical Input

- Community matron will be given the *bypass* telephone number to the *duty doctor* at each of the constituent GP practices.

- Community matron will be able to book appointments to see the *patient’s usual doctor*. 
“Daily” beds

“Weekly” beds

“Monthly” beds

Expert Patients Programme
100 patients per ward

“Daily”
5 Patients

“Weekly”
35 Patients

(35 ÷ 5) = 5

“Monthly”
60 Patients

(60 ÷ 20) = 3

5 + 7 + 3 = 15

= 15 patients for discussion each day
Admission to Ward

Process of admission:
- Initial checks with GP practice
- Information leaflets
- Consent
- Background data pasted into notes
- Initial assessment
Daily Timetable

- Multidisciplinary ward round
- Nursing ward round
- Ward-work
- Evening hand-over
Communication

- Ward clerk = communications hub
- Automated list of current virtual ward “in-patients” sent to partner organisations
- Poster for patients’ ‘fridge doors
- Tele-medicine & AirTexts
Discharge from Ward

- Only after a patient has spent several months as a “monthly” patient
- Patient is discharged back to GP practice
- GP practices asked to conduct quarterly (rather than annual) reviews on these patients
  - Closer monitoring
  - Richer data for re-analysis by predictive software → positive feedback loop
Predictive Algorithm

List of patients

Does patient live in a pilot area?

Yes

Does patient consent to participating in the trial?

Yes

Patient enrolled into trial

No

Standard care

Randomization

Virtual Ward

Standard Care

Analyse & compare two groups
Financial Perspectives

- Net financial cost / benefit to be assessed from the viewpoints of:
  - PCT
  - Acute Trusts
  - Social Services
  - GP Practices
Historical Analysis

- Health Dialog kindly supplied "historical predictions"
- i.e. the output their algorithm would have produced, had it existed and been run on 1 November 2004.
Historical Analysis

- We tracked what actually happened to the top 100 people between 1 November 2004 and 31 October 2005.
- The following slides show what the experiences of these people without the intervention (i.e. without admission to a virtual ward).
Patient Turnover

<table>
<thead>
<tr>
<th></th>
<th>Ward A</th>
<th>Ward B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Moved Away</td>
<td>9</td>
<td>13</td>
</tr>
</tbody>
</table>

Patients who died or moved away were replaced immediately in the analysis by the patient at next highest risk (i.e. patient number 101 etc.)
Demographics

Virtual ward patients by age and sex, 01/11/2004-31/10/2005

Age group

Number of patients

00-04yr 05-14yr 15-24yr 25-34yr 35-44yr 45-54yr 55-64yr 65-74yr 75-84yr 85+y

Male
Female

0 5 10 15 20 25 30 35 40
### A&E Attendances

One patient had **80** A&E attendances
57% of attendances were by ambulance
51% of attendances resulted in hospital admission

<table>
<thead>
<tr>
<th>Ward</th>
<th>Number</th>
<th>Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>361</td>
<td>£31,407</td>
</tr>
<tr>
<td>B</td>
<td>303</td>
<td>£26,361</td>
</tr>
</tbody>
</table>

*rough cost, calculated at £87 per attendance
A&E attendances by diagnosis for virtual ward patients, 01/11/2004-31/10/2005

- Respiratory conditions: 20.3%
- Cardiac conditions: 5.1%
- Central Nervous System conditions (excl strokes): 3.3%
- Other: 9.8%
- Not known/not classifiable: 51.4%
- Social problem (incl chronic alcoholism/homeless): 3.0%
- Urological conditions (including cystitis): 3.0%
- Dislocation/fracture/joint injury/amputation: 17%
- Laceration: 1.5%
- Poisoning (incl overdose): 1.8%
# Hospital Admissions

One patient had **26** hospital admissions

<table>
<thead>
<tr>
<th>Ward</th>
<th>Number</th>
<th>Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward A</td>
<td>235</td>
<td>£461,305</td>
</tr>
<tr>
<td>Ward B</td>
<td>231</td>
<td>£453,453</td>
</tr>
</tbody>
</table>

* very rough cost, calculated at £1,963 per emergency admission. This is an estimate based on the non-elective national tariff by HRG: the full calculation is more complex.
Hospital Admissions

Emergency admissions by primary diagnosis (ICD-10) for virtual ward patients, 01/11/2004 – 31/10/2005

- D57 Sickle-cell disorders: 4.3%
- E10-E14, E87 Diabetes and related disorders: 2.6%
- F00-F99 Mental disorders: 2.6%
- G00-G99 Central nervous system disorders: 5.6%
- I00-I19, I26-I49, I51-I99 Other circulatory diseases: 4.9%
- I20-I25 Ischaemic heart disease: 3.4%
- I50 Heart failure: 3.9%
- J00-J99 Respiratory diseases: 15.5%
- K00-K93 Digestive system: 7.3%
- N17-N19 Renal failure: 3.2%
- S00-S99 Injuries: 3.2%
- T36-T50 Poisoning: 2.8%
- T80-T88 Complications of care: 2.8%
- Z00-Z99 Contact with health services: 1.5%

R00-R99 Symptoms (n=81) includes:
- Pain in throat and chest (22)
- Abdominal and pelvic pain (12)
- Syncope and collapse (9)
- Abnormalities of breathing (7)
- Convulsions, not classified (6)

Z00-Z99 Contact with health services (n=7) includes:
- Examination and observation
- Outcome of delivery
- Adjustment of devices
- Life-management difficulty
- Personal history of other diseases

R00-R99 Symptoms includes:
- Pain in throat and chest (22)
- Abdominal and pelvic pain (12)
- Syncope and collapse (9)
- Abnormalities of breathing (7)
- Convulsions, not classified (6)
geraint.lewis@nhs.net

virtualwards-subscribe@yahoogroups.com