Predicting and Preventing ‘Triple Fail’ Events in Health Care Systems

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Triple-Fail Events in Health Care

- Bad Patient Experience
- High Health Care Cost
- Poor Population Health
Triple-Fail Events in Health Care

High Health Care Cost

Nursing home admissions

Bad Patient Experience

Poor Population Health
Triple-Fail Events in Health Care

- Bad Patient Experience
- Readmission to hospital
- High Health Care Cost
- Poor Population Health
prevents costly events **before** they occur
Targeting Preventive Care

Chronic disease management to.. prevent hospitalisation

Home health care to.. prevent nursing home admission

Healthy eating programs to ... prevent metabolic syndrome
How well do health care systems choose people for preventive services?
Three main methods

1. Clinical judgement

2. Threshold models

3. Predictive Risk Models
Clinical Judgement

- Evidence that physicians are poor at being able to assess re-hospitalisation risk

Source: Allaudeen, N., J. Schnipper, et al., 2011
Clinical Judgement

Hospital clinicians in a US hospital asked to judge:

“ which patients more likely to be readmitted?”
Hospital clinicians in a US hospital asked to judge:

“ which patients more likely to be readmitted?”

<table>
<thead>
<tr>
<th>Area under the ROC curve and 95% c.i</th>
<th>Attending Physician</th>
<th>Resident Physician</th>
<th>Intern</th>
<th>Case Manager</th>
<th>Nurse</th>
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<tr>
<td>0.58 (0.46–0.69)</td>
<td>0.58 (0.47–0.70)</td>
<td>0.59 (0.47–0.70)</td>
<td>0.50 (0.38–0.63)</td>
<td>0.55 (0.44–0.67)</td>
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[1] Note that at Area under the ROC curve of 0.5 indicates that the prognostic power is equal to chance. Source: Allaudeen, N., J. Schnipper, et al., 2011

No better than tossing a coin!
Clinician Judgement

• Would recruit the **wrong patient** for preventive services
Why are physicians so poor at predicting utilisation risk?
✓ Single disease orientation

... high cost individuals have multiple diseases

... High cost elderly have multiple complex condition
Age and complexity of Health Needs

- The Charlson Index measures the complexity of conditions.

Over 70’s have 4 times more complex admissions than Under 70.

Source: New Zealand Hospital Episode Statistics, NMDS, 2009-10
Three main methods

1. Clinical judgement
2. “Threshold models”
3. Predictive Risk Models
Threshold Models

Recruit patients on the basis of a few characteristics

“Aged over 65 years old and has 2 or more admissions in the past 12 months”

Admissions criteria for a US hospital avoidance program called Evercare
Is Past utilisation a good measure of future utilisation?
Future Admissions vs, Past Admissions

Admissions in the next 60 days (mean)

Admissions in the past 180 days (mean)

Source: Auckland hospital episode statistics (2009-10)
Future Admissions vs, Past Admissions

Little difference in future use between high and low

Source: Auckland hospital episode statistics (2009-10)
Future Admissions vs. Past Admissions

...even some negative correlation

Source: Auckland hospital episode statistics (2009-10)
Why?

✓ Most diseases are self-limiting
✓ Intense users are likely to die (or become better)
✓ “Regression to the mean”
Three main methods

1. Clinical judgement

2. “Threshold models”

3. Predictive Risk Models
What is Predictive Risk Modeling?

• Using *routinely collected* episode data

• Algorithm to *predict* the probability that a person will have an expensive adverse event

• Helps health care systems target preventive care to patients who will be at high risk of becoming expensive
Age and Expenditure on Hospitalisation

High cost elderly are very expensive.
Age and Expenditure on Hospitalisation

Low cost elderly are similar to low cost young
Not all elderly are high cost

→ predict the high cost elderly

→ offer them “preventive programs”
Case Finding...

Identification of patients for programs
NEW ZEALAND’S PREDICTIVE RISK MODEL
New Zealand

- Has a National Health system
- Hospitals are mainly public
- Taxpayer funded
- Has relatively **high discharge** rates
- Concerned about re-hospitalisation rates
Auckland PRM model (365 days)

• When patients arrive at hospital they will be risk scored
• The score indicates the risk of re-hospitalisation within 365 days
• Risk score will be sent to the General Practitioner (Medical home)
• Case review high risk patients
Source: New Zealand Hospital Episode Statistics, NMDS, 2009-10
Advantages

✓ Automated

✓ Classifies according to future risk

✓ Match programs to risk class

✓ Can develop a Business Case for avoidance programs
PROSPECTS FOR LONG TERM CARE
The potential LTC crisis...

Growth in public expenditure on long-term care (health), 2000-09 (or nearest year)

- Korea: 58.6%
- Spain: 21.9%
- Estonia: 18.0%
- Poland: 7.4%
- Netherlands: 7.3%
- Iceland: 7.1%
- Belgium: 6.4%
- Japan: 6.0%
- France: 6.0%
- Czech Republic: 5.6%
- Luxembourg: 5.3%
- Switzerland: 5.2%
- Norway: 5.1%
- Slovenia: 4.7%
- Denmark: 4.5%
- New Zealand: 4.3%
- United States: 4.0%
- Australia: 3.9%
- Finland: 3.5%
- Canada: 3.3%
- Austria: 3.2%
- Sweden: 3.0%
- Portugal: 2.9%
- Germany: 1.0%
- Hungary: 0.2%
Predictive Risk Modeling in the Elderly?

Where are there prospects?

✓ Reduction in Length of Stay (LOS)

✓ Targeting of home care for the elderly
Why long length of stay?

Shortage of nursing home beds

“Social hospitalisation” – long stay due to failure in social care
What to do about long stays?

At admission identify patients at “risk” of long LOSs

→ commence discharge planning immediately

→ arrange “step-down” nursing care

→ reward hospital for shorter than predicted LOS
Targeting Home Health Services

Majority of elderly want to be cared for at home

...Comprehensive home care services is labour intensive
Targeting Home Health Services

OECD countries rely on immigrant nursing and allied professionals

(23% of all New Zealand nurses are foreign born)

With shrinking labour force and low fertility →

need to target home help
Home help, day care, respite care are aimed at reducing functional decline and keeping people out of nursing homes.
…. So should be given to people at risk of functional decline

Is it?
Targeting of home help is typically very poor

Predicting “the cascade to dependency” in the elderly

Acute illness and lengthy hospitalisation

Fall in the home

Principal caregiver moves away

Onset of dementia
Allows prevention services to be implemented

- Acute illness and lengthy hospitalisation
- Fall in the home
- Fall monitoring and house redesign
- Principal caregiver can’t cope
- Daycare and respite services
- Onset of dementia

Discharge Planning to Reduce LOS

Time

Cost
Predicting Functional Decline

When first enrolled for LTC patient risk rated for functional decline

→ Care package based on risk profile

→ risk rating constantly updated

→ Providers monitored on actual decline vs. predicted decline
Can decline be routinely predicted?

• What data sets are available?
Conclusion

✓ Predictive Risk Models help target patients

✓ Targeting in long term care is generally very poor

✓ Benefit from exploring a predictive risk model in targeting long term care
Further Reading
