Can GPs predict the death of their older patients using intuition or a predictive tool?

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Hugh Senior (University of Queensland)
Josephine Clayton (University of Sydney)
Sharleen Young (University of Queensland)
The silver tsunami
70% of people die with a deteriorating phase amenable to end of life care

About 50% do not have cancer

But: 80-90% of people treated in specialist palliative care have cancer

What happens to the rest?
Unpredictable end of life illness trajectories

Organ failure

Cancer

GP has 20 deaths per list of 2000 patients per year

Acute

Dementia, frailty and decline

Function

High

Low

Months or years

Weeks, months, years

Function

High

Low

Function

High

Low

Many years

Death

Death

Death

Unpredictable end of life illness trajectories
Defining ‘end-of-life’ phase and ‘dying phase’

<table>
<thead>
<tr>
<th>THE END OF LIFE</th>
<th>THE DYING PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MONTHS</strong></td>
<td><strong>LAST DAYS</strong></td>
</tr>
<tr>
<td>At risk of dying in 6 – 12 months, but</td>
<td>2 – 14 days</td>
</tr>
<tr>
<td>may live for years</td>
<td></td>
</tr>
<tr>
<td><strong>SHORT WEEKS</strong></td>
<td><strong>LAST HOURS</strong></td>
</tr>
<tr>
<td>2 – 9 months</td>
<td>0 – 48 hours</td>
</tr>
<tr>
<td><strong>DISEASE(S)</strong></td>
<td><strong>DYING BEGINS</strong></td>
</tr>
<tr>
<td><strong>RELENTLESS</strong></td>
<td>Deterioration is</td>
</tr>
<tr>
<td>Progression is less reversible</td>
<td>weekly/daily</td>
</tr>
<tr>
<td>Treatment benefits are waning</td>
<td></td>
</tr>
<tr>
<td><strong>CHANGE UNDERWAY</strong></td>
<td><strong>ACTIVELY DYING</strong></td>
</tr>
<tr>
<td>Benefit of treatment less evident</td>
<td>The body is</td>
</tr>
<tr>
<td>Harms of treatment less tolerable</td>
<td>shutting down</td>
</tr>
<tr>
<td><strong>RECOVERY LESS LIKELY</strong></td>
<td>The person is</td>
</tr>
<tr>
<td>The risk of death is rising</td>
<td>letting go</td>
</tr>
</tbody>
</table>

M A Dervir et al. Heart doi:10.1136/heartjnl-2014-306724
Conceptual map of Advance care planning

Advance Care Planning

- Patient wishes
- Advance Health Directive

Clinical Care Planning

- Care delivery
1. Find the patients

1. Develop care plan

1. Enact care plan
Cancer Trajectory

Disease modifying treatment

All patients

27 Diagnosis

No. of weeks before death

7 5

Death

25% not on Palliative Care Register (PCR)
75% on PCR
69% Specialist PC

Zheng 2013 – Eur J Palliat Care
Frailty Dementia

Disease modifying treatment

100%

All patients

159wk
Diagnosis of Frailty/Dementia

Time

2wks
Death

2.4

Palliative Care

No. of weeks before death (median)

80% not on Palliative Care Register (PCR)

20% on PCR

5% Specialist PC

Zheng 2013 – Eur J Palliat Care

www.primarysecondarycre.com
Can patient death be predicted reliably in the mid-term (Months)?

Is the ability to identify patients at risk of dying enhanced by a predictive tool?

Can predictive tools be used to screen for risk of dying in general practice?
Forty GPs from 19 practices in two Australian states

Generate patient lists
- all patients over 70 seen by that GP in last 2 years

Randomise GPs

Predict death using Intuition

Predict death using SQ/ SPICT

6 /12 months follow-up Who died? (State death registries)
Two or more indicators of deteriorating health

<table>
<thead>
<tr>
<th>Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional ability deteriorating due to progressive metastatic cancer.</td>
</tr>
<tr>
<td>Too frail for oncology treatment or treatment is for symptom control.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dementia/ frailty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to dress, walk or eat without help.</td>
</tr>
<tr>
<td>Eating less; difficulty maintaining nutrition.</td>
</tr>
<tr>
<td>Urinary and faecal incontinence.</td>
</tr>
<tr>
<td>Unable to communicate meaningfully; little social interaction.</td>
</tr>
<tr>
<td>Fractured femur; multiple falls.</td>
</tr>
<tr>
<td>Recurrent febrile episodes or infections; aspiration pneumonia.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neurological disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressive deterioration in physical and/or cognitive function despite optimal therapy.</td>
</tr>
<tr>
<td>Speech problems with increasing difficulty communicating and/or progressive dysphagia.</td>
</tr>
<tr>
<td>Recurrent aspiration pneumonia; breathless or respiratory failure.</td>
</tr>
</tbody>
</table>

At least one clinical indicator of an advanced medical condition

- Plan ahead if the patient is at risk of loss of capacity.
- Handover: care plan, agreed levels of intervention, CPR status.
- Coordinate care using the GP/primary care register.
GPs assessed for eligibility - 40

GPs randomised - 39

**Intervention GPs - 19**
- Excluded: 6
  - Too busy: 5
  - Lost to followup: 1

**Control GPs - 20**
- Excluded: 6
  - Too busy: 2
  - Lost to followup: 1

**Intervention GPs data at 6 months - 13**
(1522 patients analysed)

**Control GPs data at 6 months - 17**
(2838 patients analysed)
GP predictions of deaths

4383 persons

Predictor tools 1522
At risk of death 179 (11.8%)

Intuition 2838
At risk of death 154 (5.4%)

P<0.001
Deaths at 12 months
Death records

142 deaths / 4365

Predictor tools
47 deaths/1522
(3.1%)

Not predicted
22 (46.8%)
Predicted 25
(53.2%)

Intuition
95 deaths/2840
(3.3%)

Predicted 32 (33.7%)
Not predicted 63 (66.3%)

P=0.026
### Test parameters

12 months

<table>
<thead>
<tr>
<th></th>
<th>Intuition</th>
<th>SQ+ / SPICT</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.34</td>
<td>0.53</td>
<td>0.008</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.95</td>
<td>0.90</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Positive Predictive Value</td>
<td>0.20</td>
<td>0.14</td>
<td>0.412</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>0.98</td>
<td>0.98</td>
<td>0.141</td>
</tr>
</tbody>
</table>
Chance of dying at 12 months:

when SQ found positive - 14%
Using intuition with no prompts- 20%

P=0.412
### 12 month False positives and negatives

<table>
<thead>
<tr>
<th></th>
<th>Intuition</th>
<th>SQ screening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>False Positives</strong></td>
<td>128/162</td>
<td>154/179</td>
</tr>
<tr>
<td></td>
<td>80%</td>
<td>86.0%</td>
</tr>
<tr>
<td><strong>False Negatives</strong></td>
<td>63/2686</td>
<td>22/1343</td>
</tr>
<tr>
<td></td>
<td>2.3%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

P-values: p 0.412, p 0.141
Two step screening
Deaths at 6 months

Death records

91 deaths / 4383

Predictor tools
30 deaths/1522
2.0%

- Not predicted
  15 (50%)
- Predicted
  15 (50%)

Intuition
61 deaths/2838
(2.1%)

- Predicted
  16 (26.2%)
- Not predicted
  45 (73.8%)

P=0.024
SQ+ then applying the SPICT to that group is twice as discriminating as SQ+ alone.

- SQ+ screening prediction: 11.8%
- SQ+ / SPICT+: 5.1%
Deaths at 6 months

Death records

91 deaths / 4383

Predictor tools
30 deaths/1522

Predicted
15 (50%)

Not predicted
15 (50%)

SQ+ / SPICT-
5

SQ+ / SPICT+
10 (67%)

Intuition
61 deaths/2838

Predicted
16 (26.2%)

Not predicted
45 (73.8%)

P=0.003
Test parameters SQ/SIPICT vs Control 6 months

<table>
<thead>
<tr>
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<th>Intuition</th>
<th>SQ+ / SPICT</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.262</td>
<td>0.667</td>
<td>0.024</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.950</td>
<td>0.997</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Positive Predictive Value</td>
<td>0.104</td>
<td>0.128</td>
<td>0.529</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>0.983</td>
<td>0.997</td>
<td>0.168</td>
</tr>
</tbody>
</table>
There is a 13% chance of a person identified as at risk of deterioration to death actually dying within 6 months.

Intuition with no prompts - 10%
Doing anything is better than nothing
Impact of screening using any method

Intuition

Systematic screening
Conclusions

Can patient death be predicted reliably in the mid term (months)?

Doing anything to identify deterioration is much better than doing nothing.

But

Identifying people at risk of deterioration to death is still difficult.
Is the ability to identify patients at risk of dying enhanced by a predictive tool?

SQ screening good at identifying people at risk of deterioration to death but only modestly good at predicting death itself.

SPICT is marginally better.
Can predictive tools be used to screen for risk of dying in general practice?

Many false positive predictions of actual death, no matter what process used.

Challenge is managing the planning process for large numbers of identified patients.
Is predicting death the right approach?

Or is perceived risk a call to action?

What is the right response?

Sliding Scale of action to counter low PPV?

Is it possible to refine potential predictors of dying?
The last word...

If your GP says you are not going to die in next 12 months, you probably won’t!
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