Identifying dying people using data

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I see dead people

Overview

- How often do patients die in hospital

- Trajectories of death

- Dying and the deteriorating patient

- Predicting in-hospital death

- 5 ways to use data to identify dying patients
  - Big data
  - Audit of resuscitation plans
  - Audit of your end of life care MET calls
  - Morbidity and mortality meetings
  - Audits of in-hospital cardiac deaths

How often do patients die in hospital

- Not widely published

- HOPE equation
  - Risk-adjusted hospital outcome prediction equation (HOPE)
  - Victoria wide data approx. 380,000 admissions
  - In-hospital mortality = 2.5%

- Austin Hospital long stay study
  - 22,094 admissions > 24hr amongst 15,623 patients
  - Mortality = 891 (4.0%)

1. Duke etal IMJ 2009
2. O'Sullivan etal IMJ 2017

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Trajectories of death
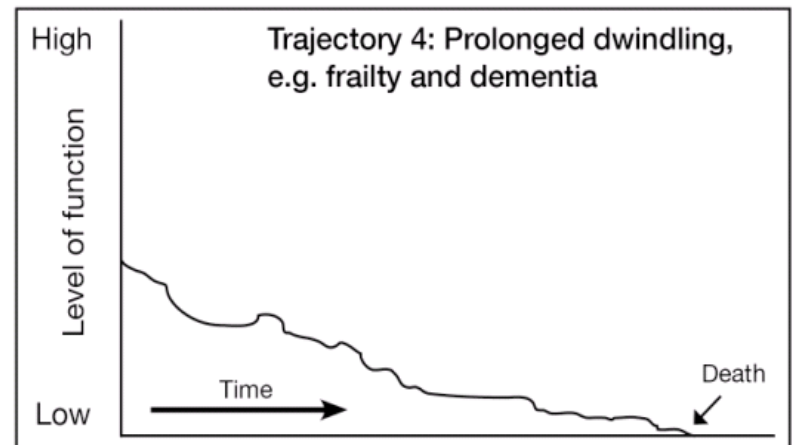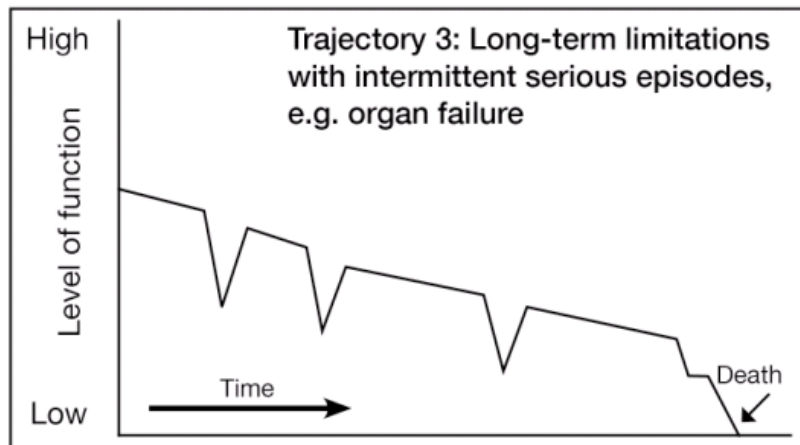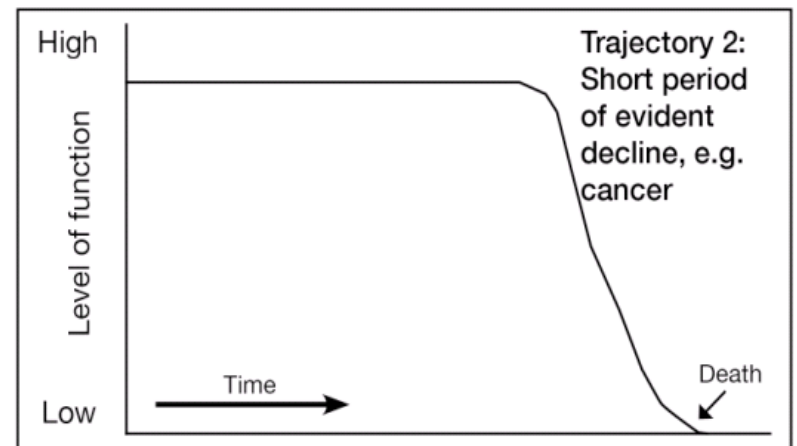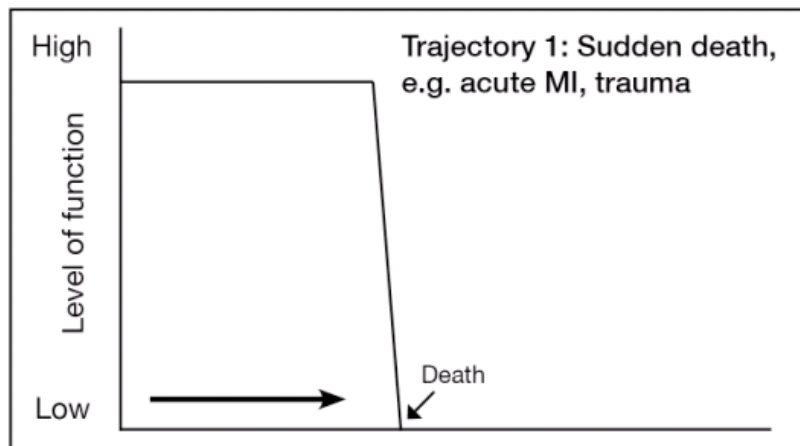
Phase of end of life care

Palliative Care Service

Advance care planning

RRT / ICU

One year

Encounters with healthcare providers

Hospitalisation but return to independant function at discharge

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Acutely deteriorating patients

• In both cases
  – Right care
  – Right place
  – Right time

Hospital inpatient → Abnormal vital signs

Early intervention + Aggressive therapy → **Reversible deterioration** → Avoid morbidity / mortality

Irreversible deterioration → Good symptom control & "spiritual care", dignity → "good death"

Early recognition of dying and avoiding "non-beneficial therapies"

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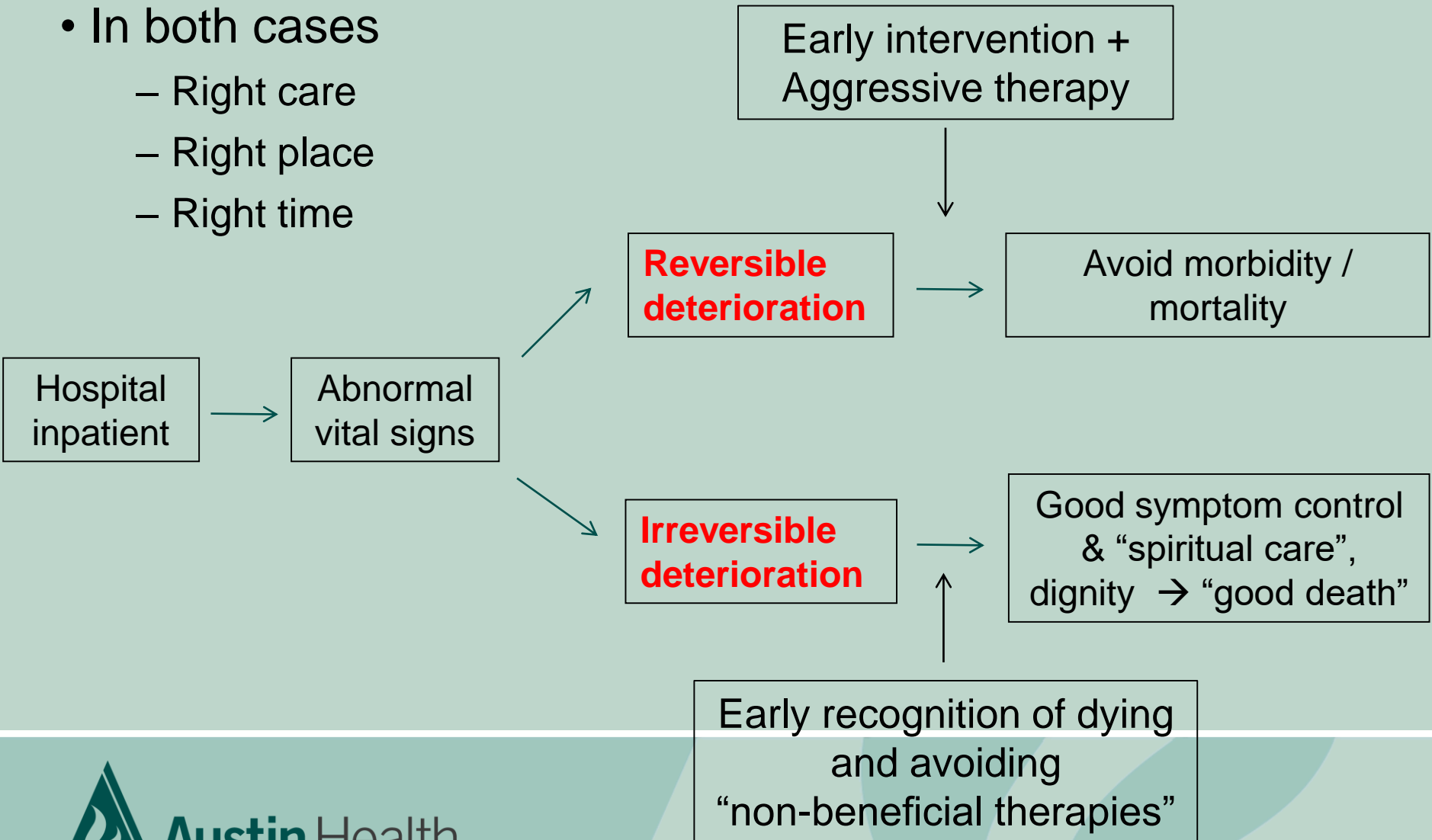
Predicting in-hospital death

- HOPE equation
  - Risk-adjusted hospital outcome prediction equation (HOPE)

Table 3 Top 10 primary diagnostic categories according to mortality rate

| Description	ICD-10AM	Frequency, n (%)	Died[†]
Pneumonia	J100-J199	10 225 (2.7)	681 (7.2)
Stroke	I630-I699	4946 (1.3)	580 (6.1)
Secondary malignancy	C760-C799	5044 (1.3)	551 (5.8)
Myocardial infarction	I210-I219	9264 (2.4)	498 (5.3)
Heart failure	I50-I599	7421 (1.9)	471 (5.0)
Intracranial haemorrhage	I600-I629	1573 (0.4)	442 (4.7)
Septicaemia	A40-A499	2868 (0.8)	421 (4.4)
Chronic pulmonary disease	J400-J449	9561 (2.5)	376 (4.0)
Respiratory malignancy	C30-C399	2361 (0.6)	298 (3.1)
Upper gastrointestinal malignancy	C150-C219	4276 (1.1)	271 (2.9)
Subtotal		57 539 (15)	4589 (48)

[†]Absolute number (percent of all deaths). ICD-10AM, International Classification of Diseases, version 10, Australian modification.

1. Duke etal IMJ 2009

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Calculation of hospital outcome prediction equation (HOPE)

	Variable	Definition	Format
A	Age	Patient age	Years
B	Primary Diagnosis	Diagnosis on admission to hospital	Diagnostic coefficient (available on request)
C	Inter-hospital transfer	Transfer from another acute health care facility	Yes = 1; No = 0
D	RACF	Resident from an aged care facility prior to admission	Yes = 1; No = 0
E	Unplanned admission	Admission that was not planned, booked, or elective	Yes = 1; No = 0
M	Sex	Male	Yes = 1; No = 0

Machine learning – real time algorithms

- E-CART
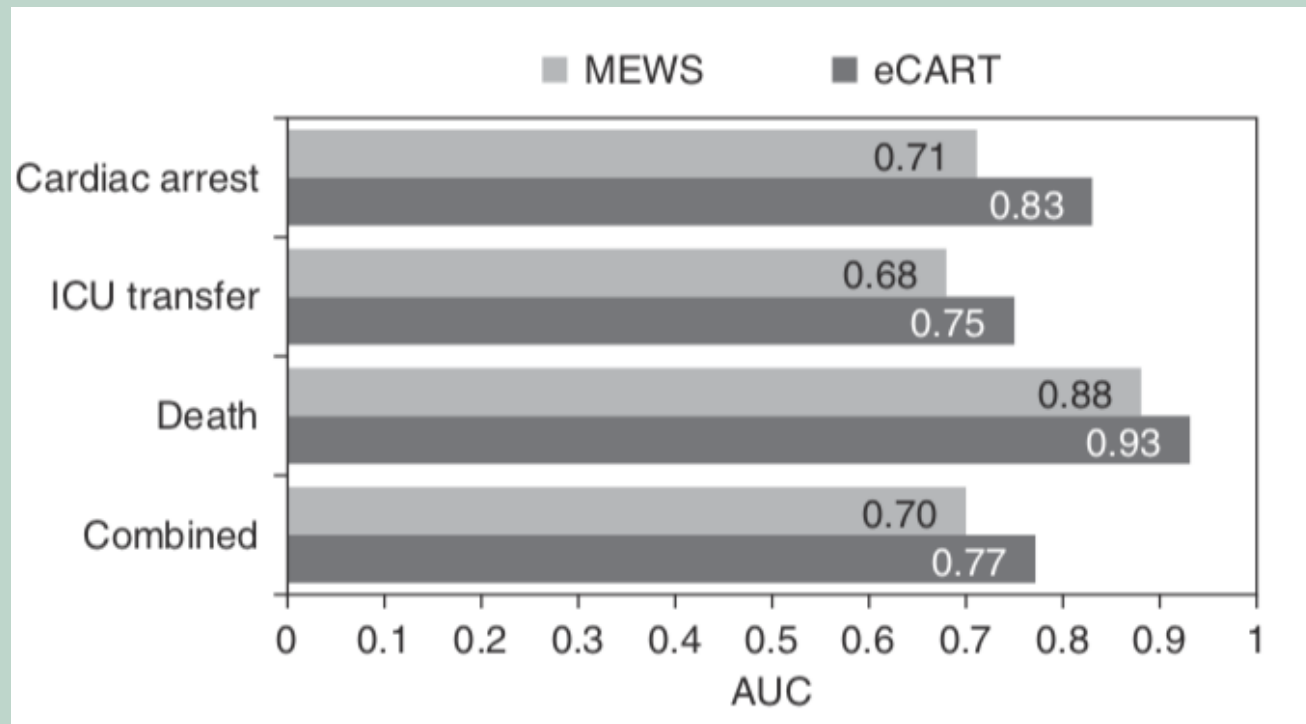
5 ways to use data to identify dying patients

1. Big-data – e.g. E-CART, HOPE equation

2. Audit of your resuscitation plans
   - Do you have a policy for completion
   - How often are they completed
   - Are they completed in accordance with policy
   - Are they completed in patients who have died
   - Timeliness of completion (in relation to admission & death)

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3. Audit of your end of life care MET calls
  – Approx. 1/3 MET calls have EOLC issues
  – Mortality ≈ 50-60% cf: ≈ 10-15% if no EOLC issues
  – Some teams over-represented
    » Focus of QI initiatives to improve ACP and EOLC
  – Did the patient have a limitation of medical Rx
    » Before the call / After the call
  – Nature and quality of palliative care given
  – ? Agreement between MET and parent team
  – What were the in-hospital outcomes

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4. Morbidity and mortality meetings

–   "The clinicians who provided the care should ideally not be the people who decide if the death was preventable"

–   Regular

–   Transparent and open

–   Standardised tool

–   Peer review

–   Free from blame – focus on learnings and QI cycle

–   Process of escalation

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SARC = surgical audit review committee

- Unit meetings = internal review

- Regular M+M Thurs morning with all surgeons
  - Deaths presented in open forum (up to 100)
  - Robust discussion
  - Notes documented

- Tool completed & Case summarized → submitted to SARC

Admission Diagnosis	Pydoderma gangrenosum/chronic leg ulcers		
Cause of Death (on death certificate)	Respiratory failure		
Discussion at Weekly Surgical Audit	Nil issues identified.		
Are any of the following present?		Yes	No
Coroner's Case			X
Autopsy Requested			X
Death within 24 hrs admission (unless known palliative on admission)			X
Was death anticipated on admission			X
Did death occur during a procedure			X
Death in Operating Theatre			X
Death in Cardiac Cath Lab			X
Death during diagnostic procedure			X
Age <50 and death NOT from chronic illness			X
Sentinel event occurred (a clear cut events that occur independently of a patient's condition and result in unanticipated death or serious physical/psychological injury to patient – see below)			X
Elective surgical admission		X	
Did the Patient have an Advanced Care Plan/Directive		X	
Did CPR occur?			X
Was the patient transferred from external healthcare facility			X
- Did the transfer occur out of hours?			X
Death following readmission <72 hours post discharge (incl. ED)			X
Death following transfer between hospitals sites (unless to Palliative Care Unit/Aged Care with expectation of death)			X
Readmission to ICU <24 post discharge to ward			X
Complications/Adverse events (unexpected / resulting in) death		X	
Death Status – Select the most appropriate			
Expected death no care management issues			
Expected death with care management issues			
Unexpected death which occurred despite taking all necessary preventative measures		X	
Preventable death where steps may not have been taken to prevent it			
Unexpected death resulting from medical intervention			

Thurs M+M

↓

SARC

↓

Patient review committee (PRC)

↓

Executive / Legal

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Audit of in-hospital cardiac arrests

- Recommended
    - ACHS
    - ACSQHC
    - iSRRS

- Need to have a process to identify / capture
    - ICU most likely method = attend all

- How many do you have?

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- Utstein template for audit of cardiac arrests

- Simplified version
  - Demographics
  - Co-morbidities / functional status
  - Shockable / non-shockable
  - Measure of quality of resuscitation
  - Antecedent warning signs (e.g. MET criteria)
  - Was the MET activated ?

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Summary

- In-hospital mortality 2-4%

- 4 common trajectories of death

- Predictive equations exist

- 5 ways to use date to identify dying patients
    - Big data
    - Audit of resuscitation plans
    - Audit of your end of life care MET calls
    - Morbidity and mortality meetings
    - Audits of in-hospital cardiac deaths

- Audit processes need to be transparent / open & have process for escalation

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