State of the Nation in Aotearoa New Zealand

Rapid Response Systems & Patient Deterioration

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND
Kupu Taurangi Hauora o Aotearoa

November 30th 2018

Alex Psirides

@psirides

PREFACE.

It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm. It is quite necessary, nevertheless, to lay down such a principle, because the actual mortality *in* hospitals, especially in those of large crowded cities, is very much higher than any calculation founded on the mortality of the same class of diseases among patients treated *out of* hospital would lead us to expect. The

Florence Nightingale

from 'Notes on Hospitals' 1863

150 years later…

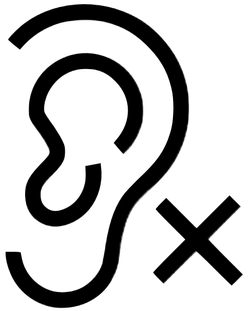
"…failure to recognise clinical deterioration in patients

…underestimating the severity of a patient's condition

…a lack of supervision of junior staff, or less experienced staff, by senior colleagues"

No-one noticed

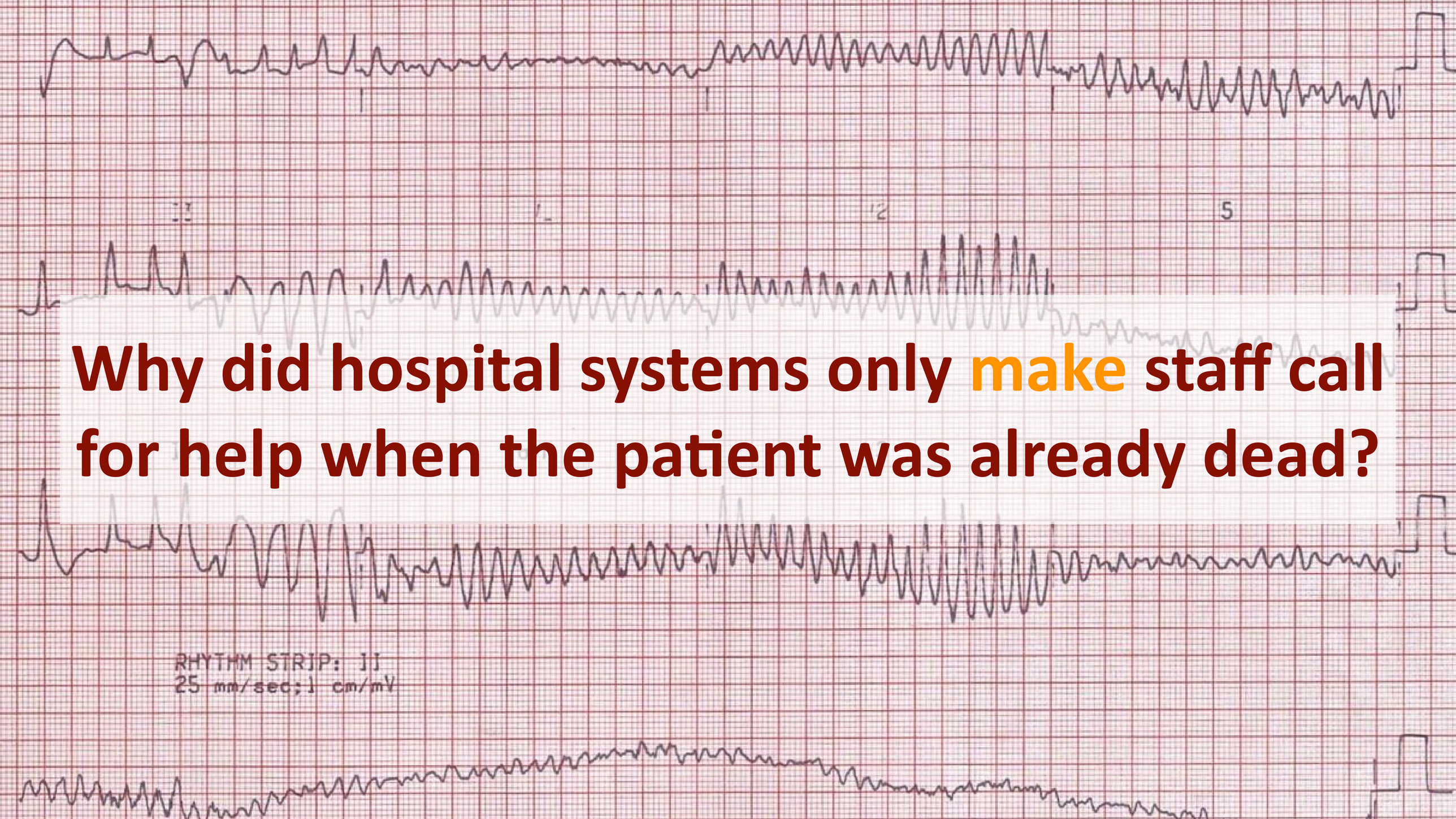
No-one listened



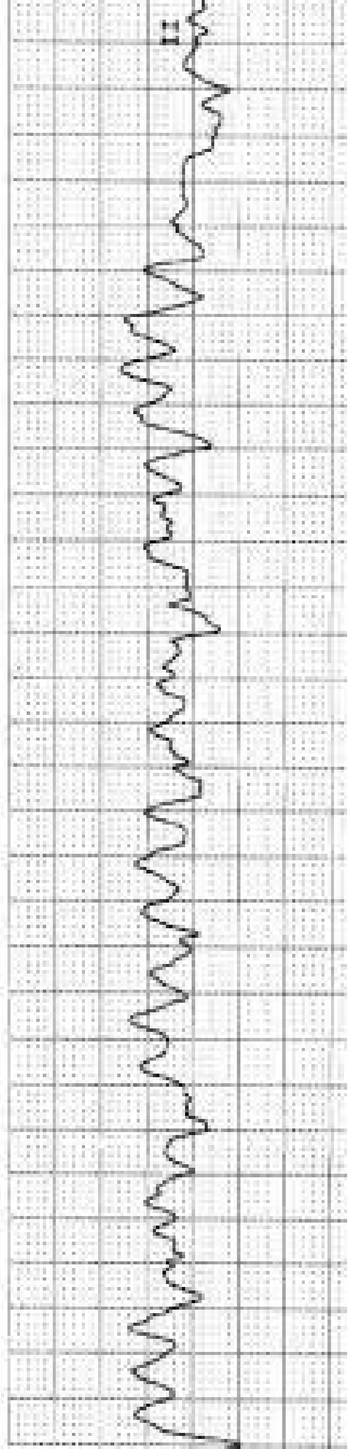
No-one wanted all of this

Patients rarely suddenly deteriorate

Clinicians often suddenly notice



Why did hospital systems only make staff call for help when the patient was already dead?



How many cardiac arrests were there in your hospital last month?

How many cardiac arrests in your hospital were preventable?

How many dying patients received futile CPR?

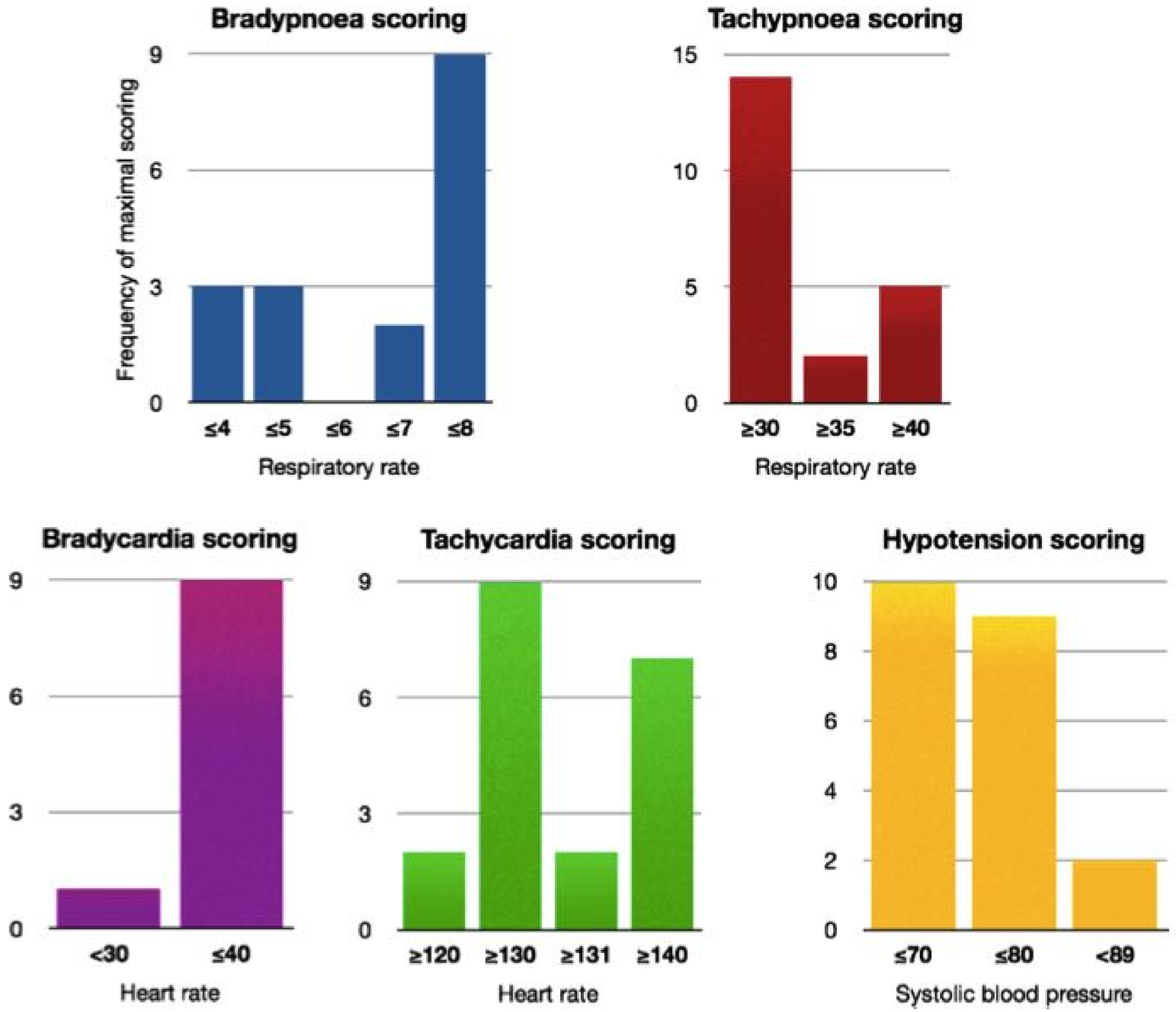
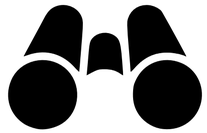


Fig. 2. Frequency of extreme vital sign parameters to which maximal early warning scores were assigned.

There is significant national variability in how we detect deteriorating patients

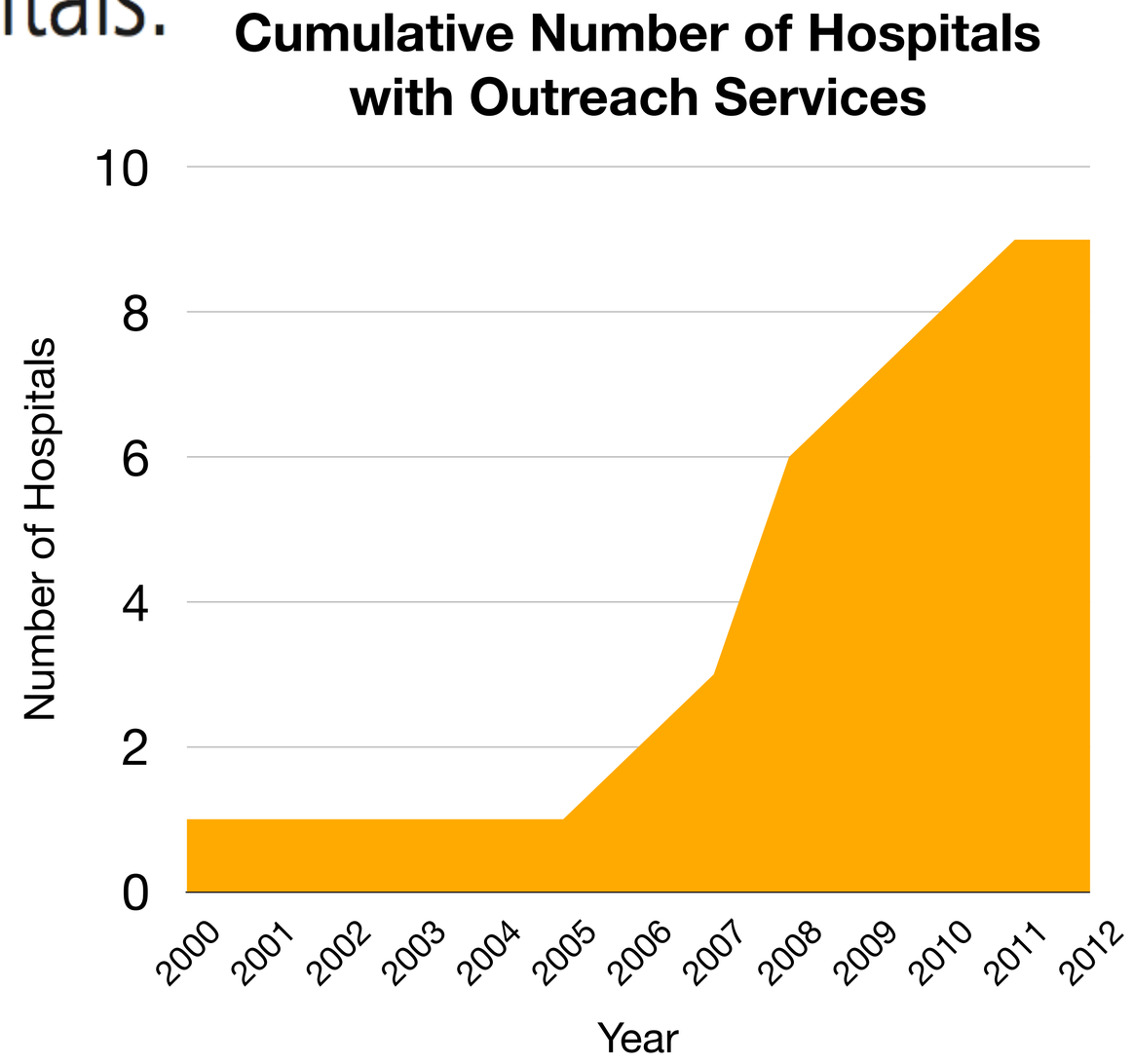


RESEARCH
doi: 10.1111/nicc.12080

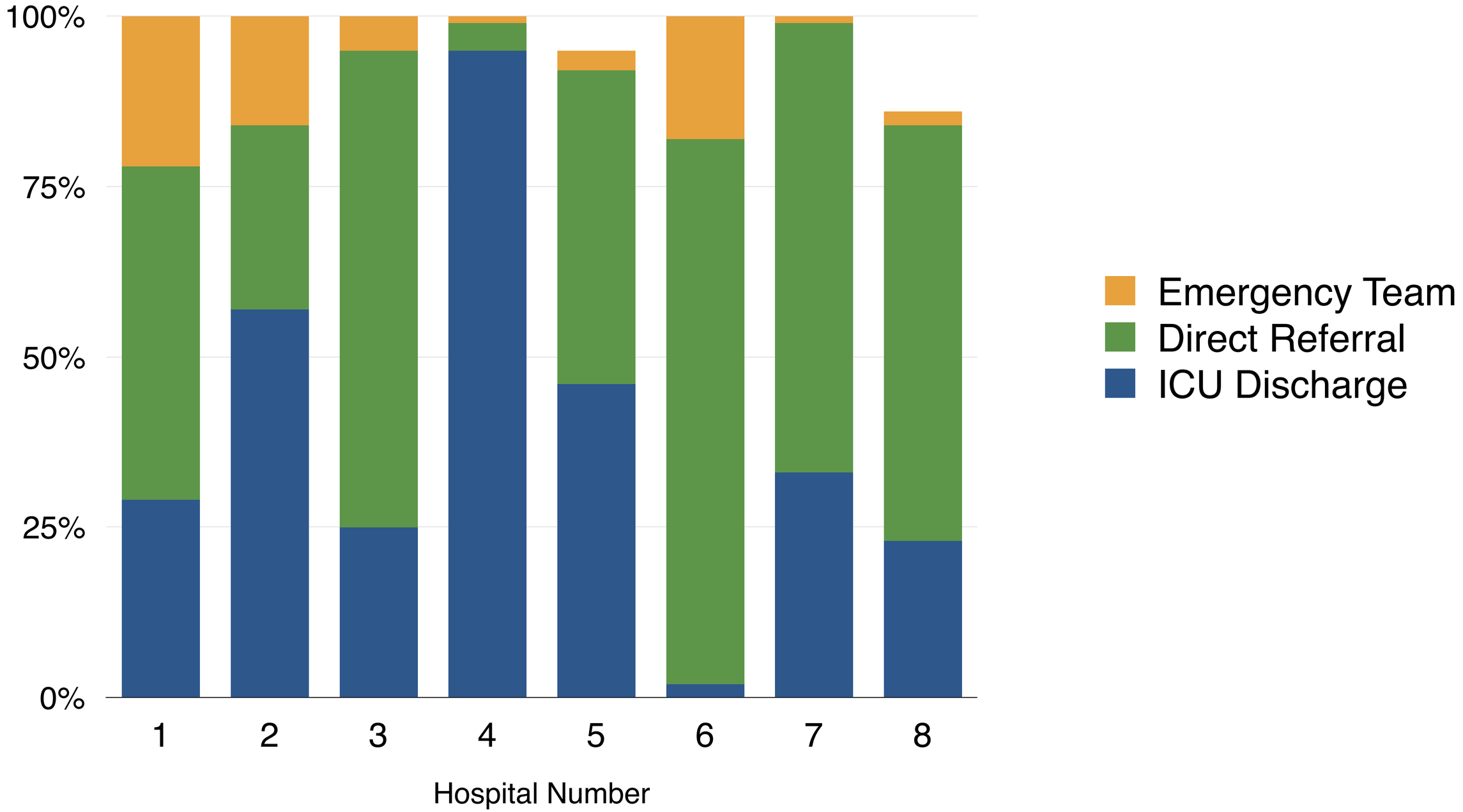
Models and activities of critical care outreach in New Zealand hospitals: results of a national census

Anne Pedersen, Alex Psirides and Maureen Coombs

Less than half of NZ public hospitals have an Outreach service despite national recommendations that every hospital use them to support the deteriorating patient



TYPE OF OUTREACH WORK BY NZ HOSPITAL



ORIGINAL ARTICLE

The effectiveness of a patient at risk team comprised of predominantly ward experienced nurses: A before and after study

Alison M. Pirret[a,b,*], Susan F. Takerei[c], Lesley M. Kazula[c]

[a] School of Nursing, College of Health, Massey University, New Zealand
[b] Critical Care Complex, Middlemore Hospital, Auckland, New Zealand
[c] Patient at Risk Team, Critical Care Complex, Middlemore Hospital, Auckland, New Zealand

Summary

Introduction: Improving care to deteriorating ward patients require systems to trigger a response and a response team. This paper describes the effectiveness of a Patient at Risk team (PART) comprised predominantly of experienced ward nurses.

Method: The study used a single site before and after historical control design. The number of medical emergency team (MET) calls, cardiac arrest calls and hospital admissions occurring prior to the establishment of the PART (January—December 2008 inclusive) were compared to those occurring after the team was established (January 2011—December 2012 inclusive). Primary outcome was the number of MET and cardiac arrest calls per 1000 hospital admissions.

Results: The introduction of the PART resulted in a significant reduction in ward cardiac arrests per 1000 admissions (MD = 0.9, 95% CI: 0.3—1.5, $p = 0.009$), hospital length of stay per 1000 admissions (MD = 294.4, 95% CI: 260.9—328.7, $p \leq 0.001$) and direct ward admissions to ICU (95% CI: 0.7—5.2) but no change in the number of MET calls per 1000 admissions (MD = 1.3, 95% CI: −2.3—4.9, $p = 0.46$).

Conclusion: A PART comprising of experienced ward nurses was associated with reduced ward cardiac arrests but no change in the number of MET calls. This suggests this team composition may be effective in providing care to the deteriorating patient.

Expert nurses reduce cardiac arrests & hospital length-of-stay

Activities of a Medical Emergency Team: a prospective observational study of 795 calls

C. F. Mullins*, A. Psirides†

Summary

Relatively few papers have examined specific causes for Medical Emergency Team (MET) review and the assessment and management undertaken by the MET. The aim of our study was to describe the type of patients who require MET review, the reasons such reviews are requested and the subsequent immediate management of these patients. Our prospective single-centre observational study was conducted in a university-affiliated tertiary hospital in New Zealand between October 2012 and September 2013. Each trigger for MET review was assessed separately to allow analysis of the main associated underlying conditions and interventions. Seven hundred and ninety-five MET calls were generated for 630 patients. Mean patient age was 64 years. Sixty percent of all calls involved medical patients. There was a marked diurnal variation in the incidence of MET calls, with MET calls more likely during the daytime and evening compared to the night. The most common triggers for MET calls were an unresponsive or fitting patient (25.2%), tachycardia (24.2%), and an Early Warning Score of 8 or more (22.8%). Neurological causes (30.7%), cardiovascular failure (hypotension, pulmonary oedema) (26.7%), respiratory failure (22.6%), and sepsis (19.2%) were the most common underlying conditions. One of these top four conditions was present in nearly all patients (99.2%). The majority of MET calls were made for a relatively small number of underlying conditions and triggers, supporting the concept of 'MET syndromes'. The pattern of interventions is predictable from the triggering condition. This may guide education and training of ward staff to improve detection of deteriorating patients and prevent or pre-emptively manage causes of such deterioration prior to MET criteria being reached. The association between time of day and crisis recognition suggests the hospital system does not reliably detect deteriorating patients. This questions the adequacy of monitoring of deteriorating patients on hospital wards.

‘MET Syndromes’: patients have predictable triggers with recurrent underlying diagnoses

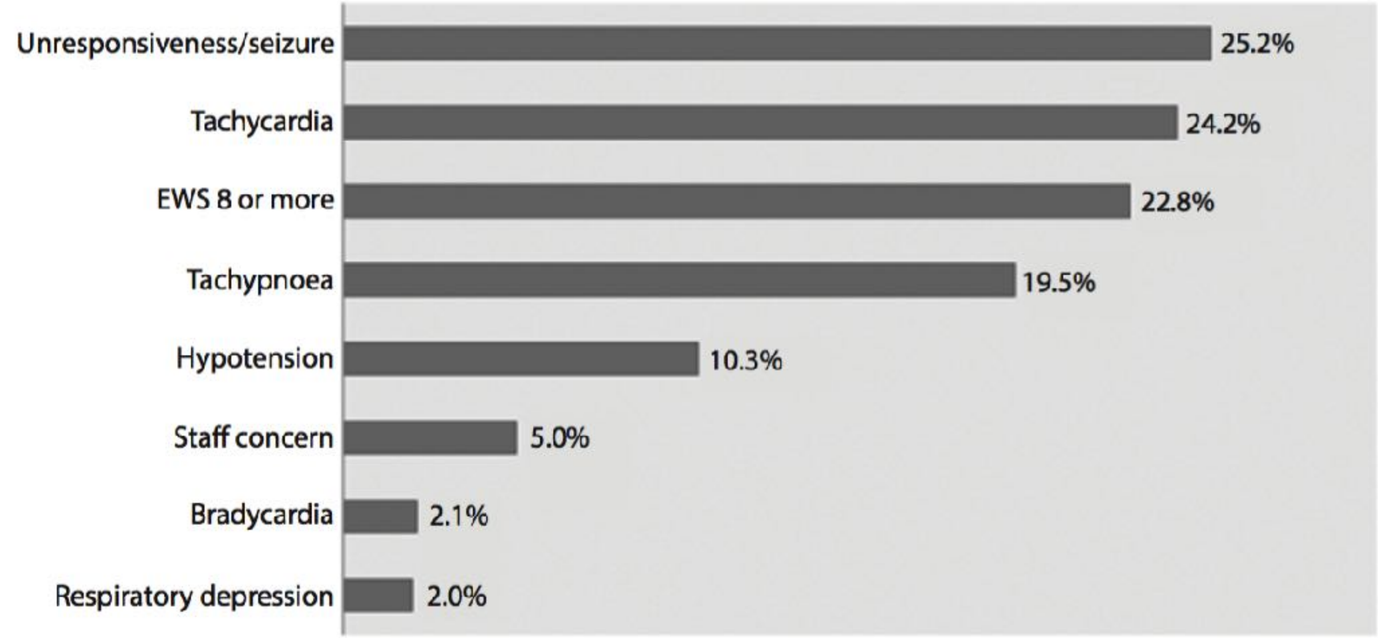


Figure 3: Triggering event for Medical Emergency Team call. EWS=Early Warning Score.

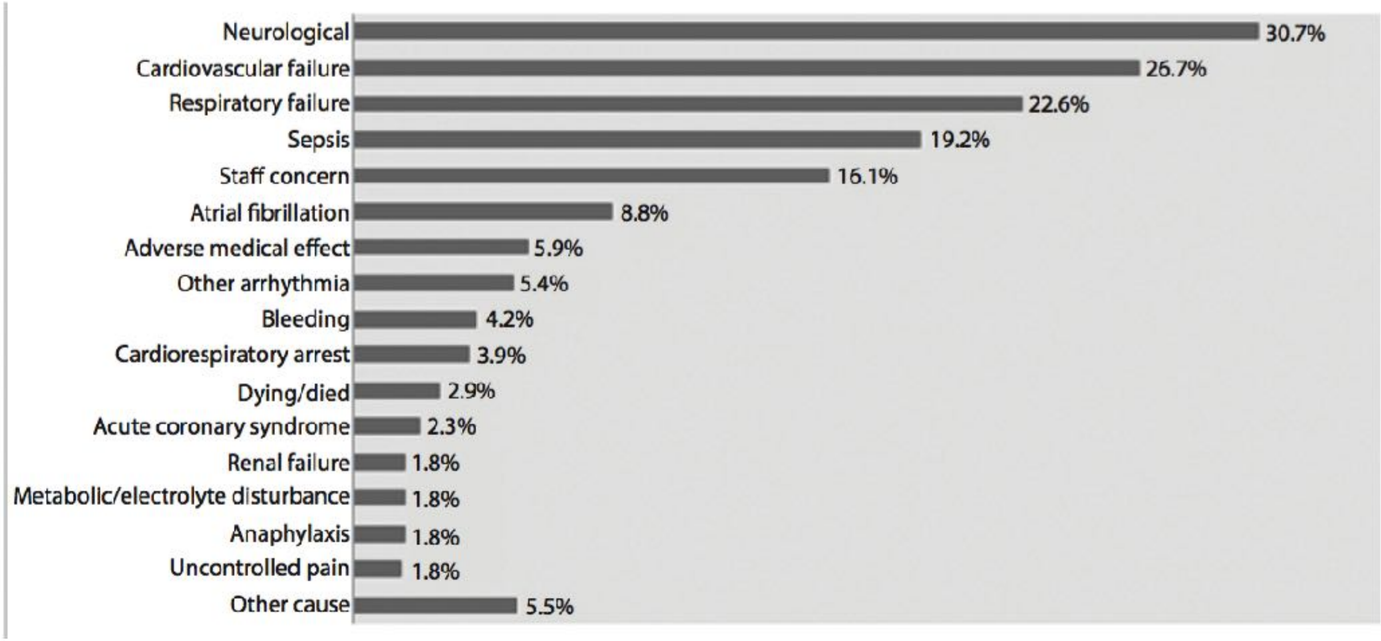
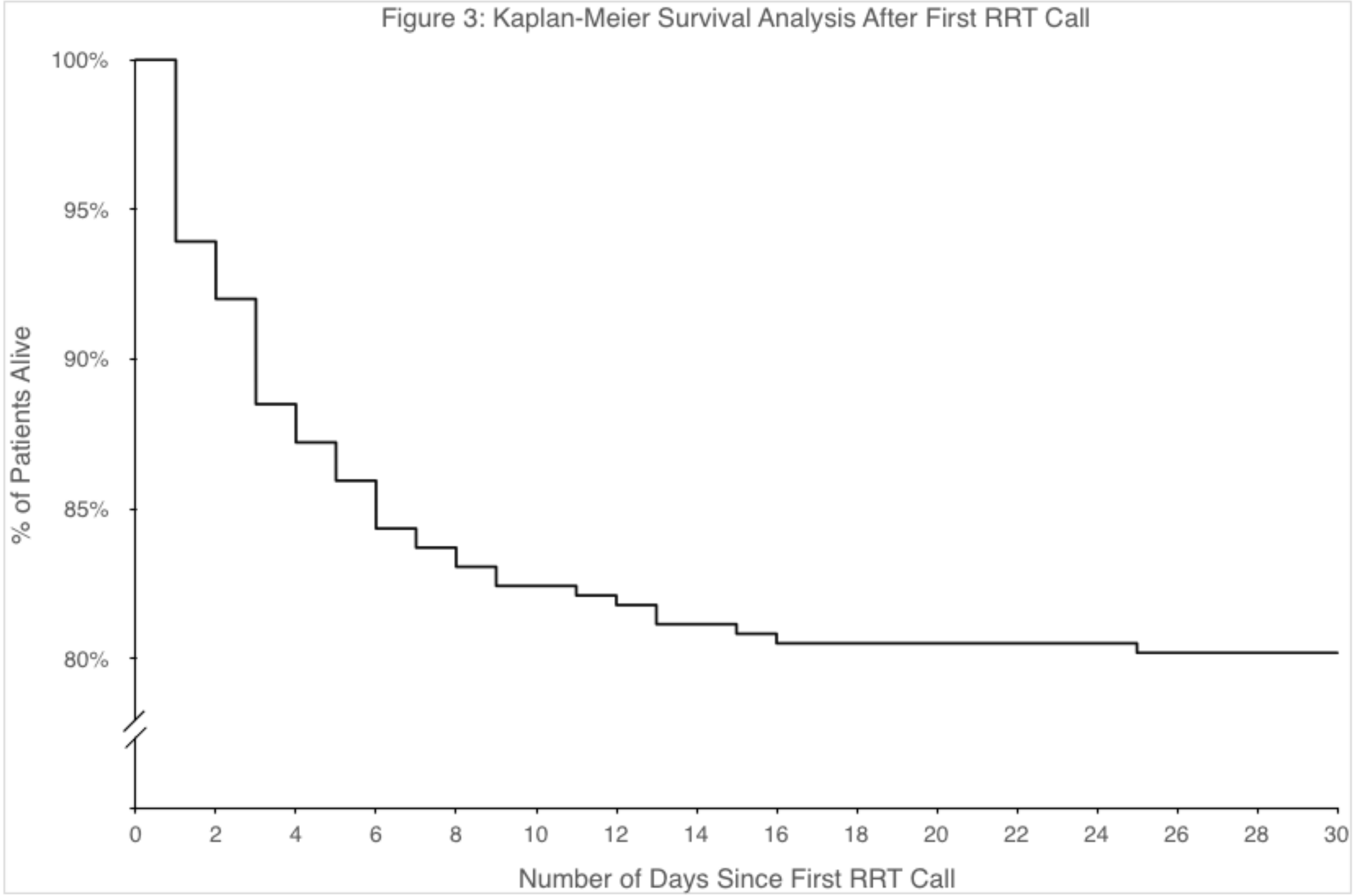


Figure 4: Underlying diagnosis at Medical Emergency Team call.



313 patients in 11 NZ hospitals over 14 days

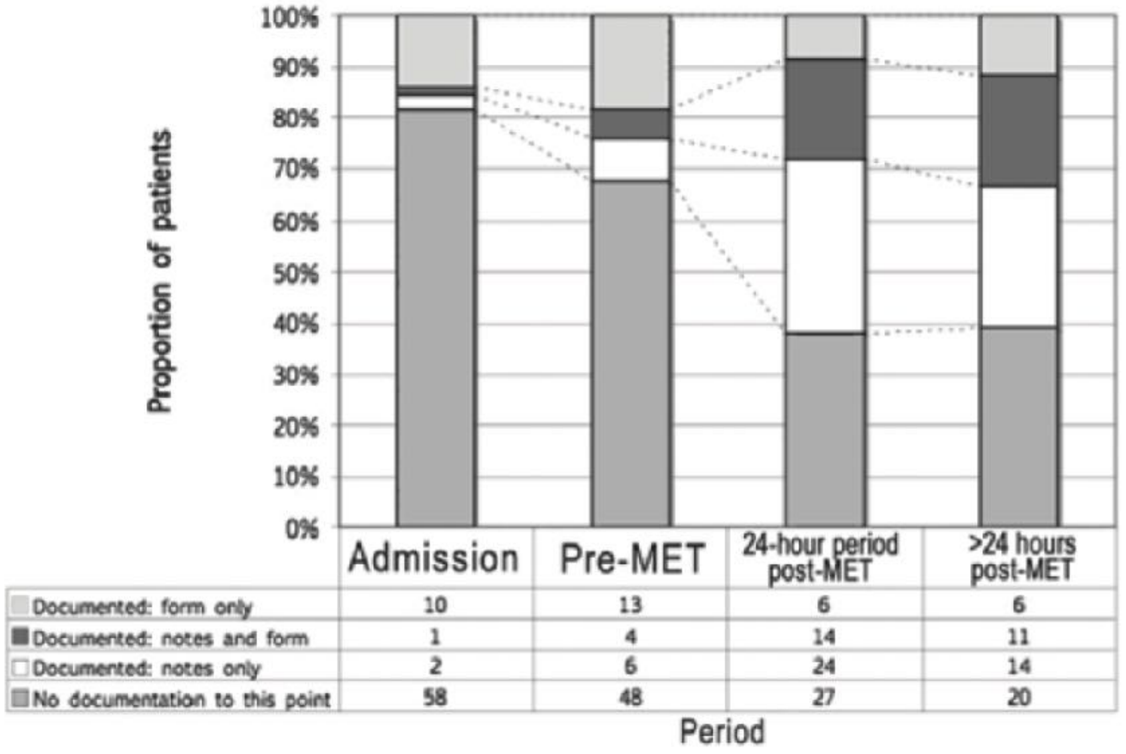
20% of NZ MET patients have died by day 30

Rapid Response Team activation in New Zealand hospitals - a multi centre prospective observational study. Psirides, Hill & Jones. Anaesthesia & Intensive Care (2016) 44:3

A retrospective cohort study of the effect of medical emergency teams on documentation of advance care directives

Cameron I Knott, Alex J Psirides, Paul J Young and Dalice Sim

Figure 3. Documentation of not-for-resuscitation directives: status changes by period*



MET = medical emergency team. * Period 4 (> 24 hours post-MET review) excludes 20 patients (2 discharged, 18 died).

MET review doubles treatment limitation decision making

Resuscitation 81 (2010) 932–937

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

ViEWS—Towards a national early warning score for detecting adult inpatient deterioration☆

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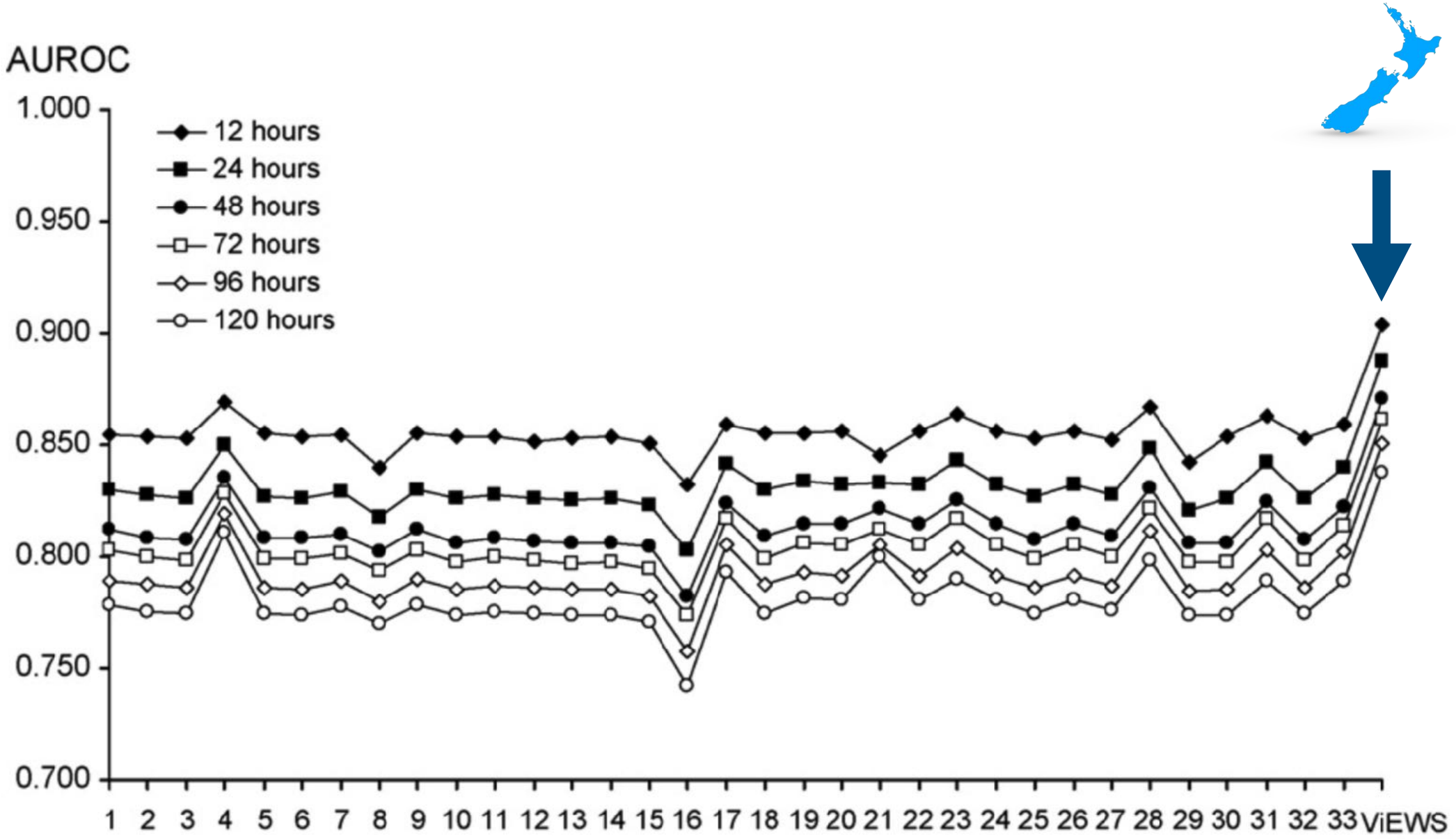
ABSTRACT

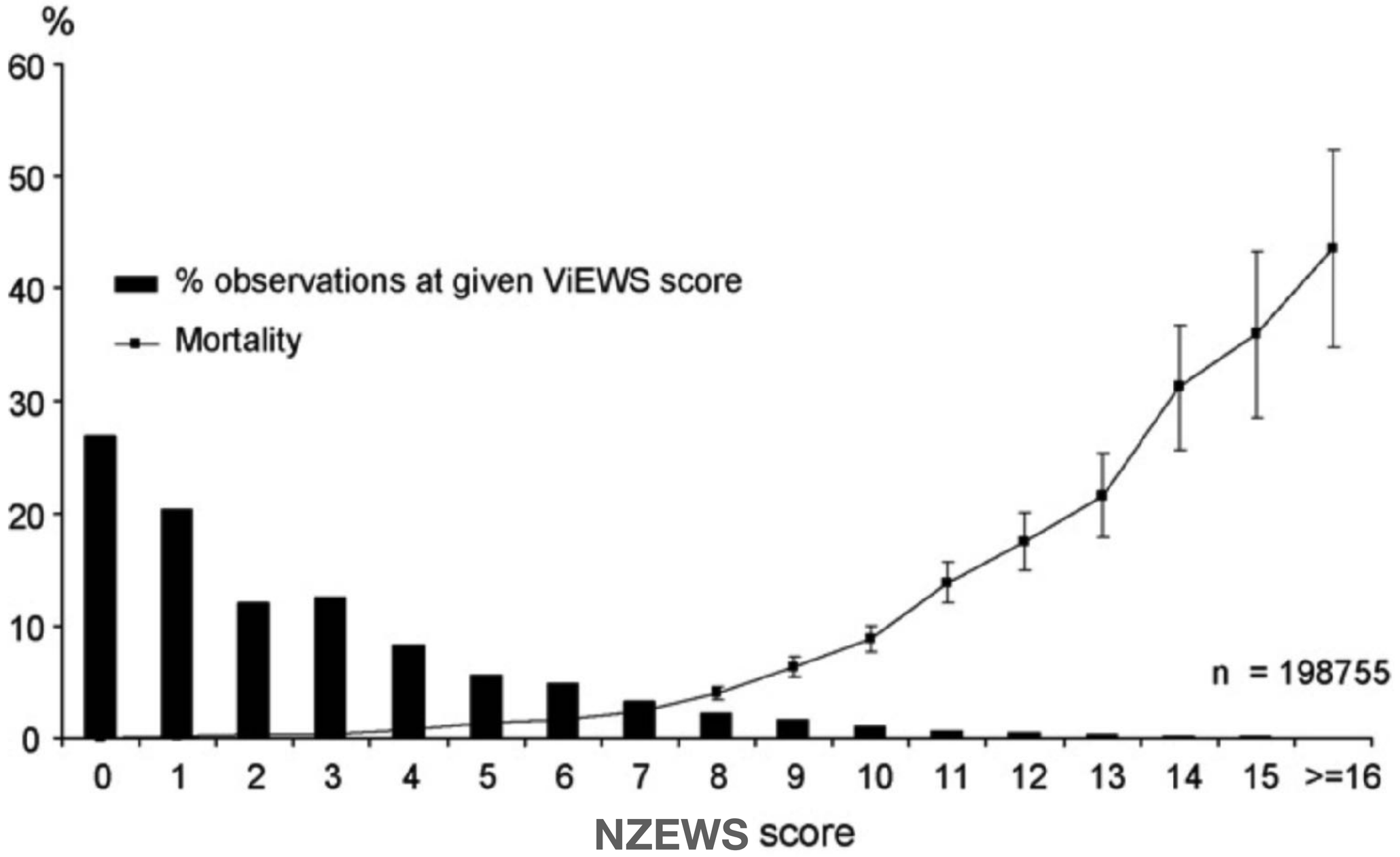
Aim of study: To develop a validated, paper-based, aggregate weighted track and trigger system (AWTTS) that could serve as a template for a national early warning score (EWS) for the detection of patient deterioration.

Materials and methods: Using existing knowledge of the relationship between physiological data and adverse clinical outcomes, a thorough review of the literature surrounding EWS and physiology, and a previous detailed analysis of published EWSs, we developed a new paper-based EWS – VitalPAC™ EWS (ViEWS). We applied ViEWS to a large vital signs database (n = 198,755 observation sets) collected from 35,585 consecutive, completed acute medical admissions, and also evaluated the comparative performance of 33 other AWTTSs, for a range of outcomes using the area under the receiver-operating characteristics (AUROC) curve.

Results: The AUROC (95% CI) for ViEWS using in-hospital mortality with 24 h of the observation set was 0.888 (0.880–0.895). The AUROCs (95% CI) for the 33 other AWTTSs tested using the same outcome ranged from 0.803 (0.792–0.815) to 0.850 (0.841–0.859). ViEWS performed better than the 33 other AWTTSs for all outcomes tested.

Conclusions: We have developed a simple AWTTS – ViEWS – designed for paper-based application and demonstrated that its performance for predicting mortality (within a range of timescales) is superior to all other published AWTTSs that we tested. We have also developed a tool to provide a relative measure of the number of "triggers" that would be generated at different values of EWS and permits the comparison of the workload generated by different AWTTSs.

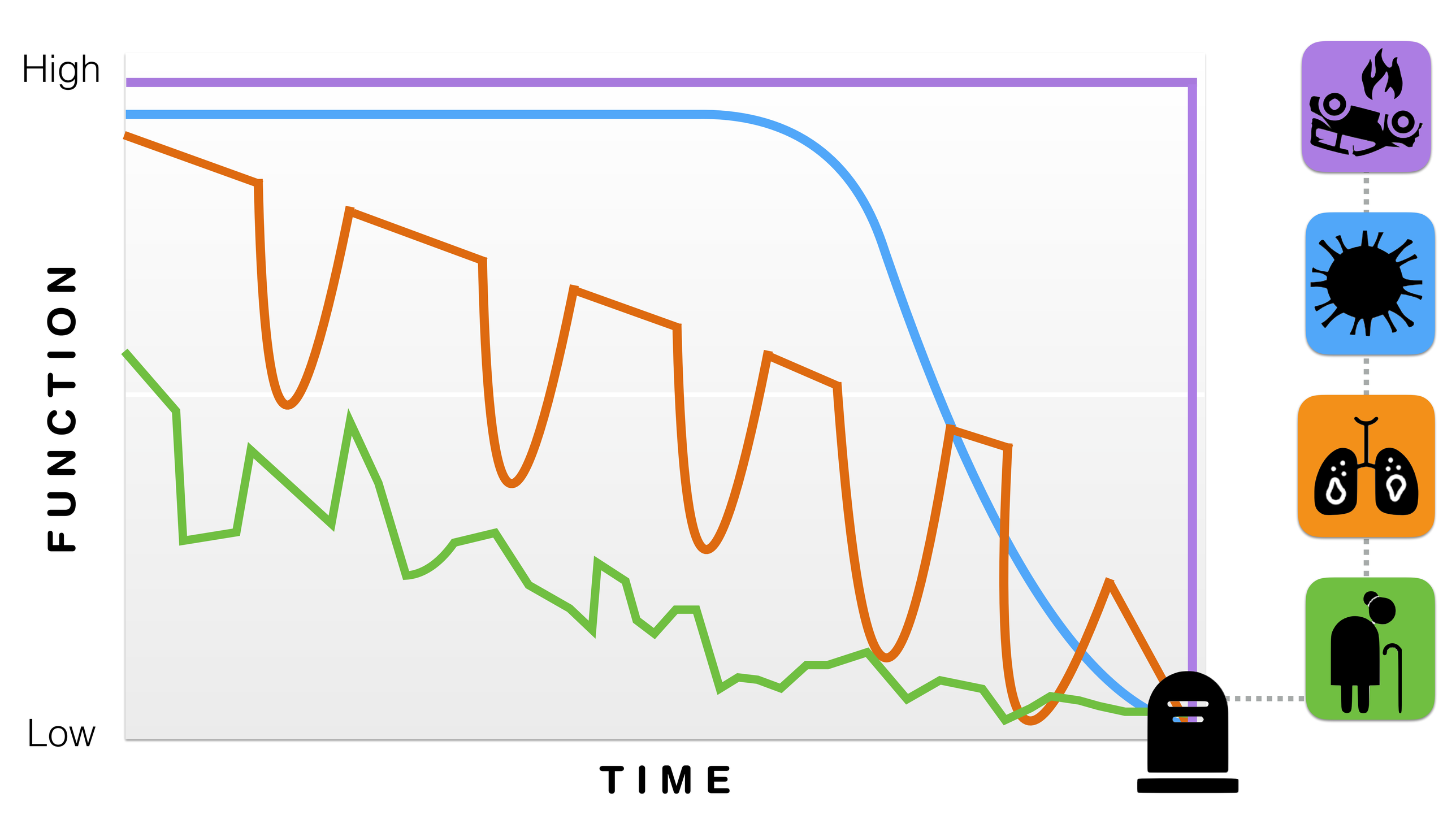

AUROC
1.000
0.950
0.900
0.850
0.800
0.750
0.700
12 hours
24 hours
48 hours
72 hours
96 hours
120 hours
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
ViEWS

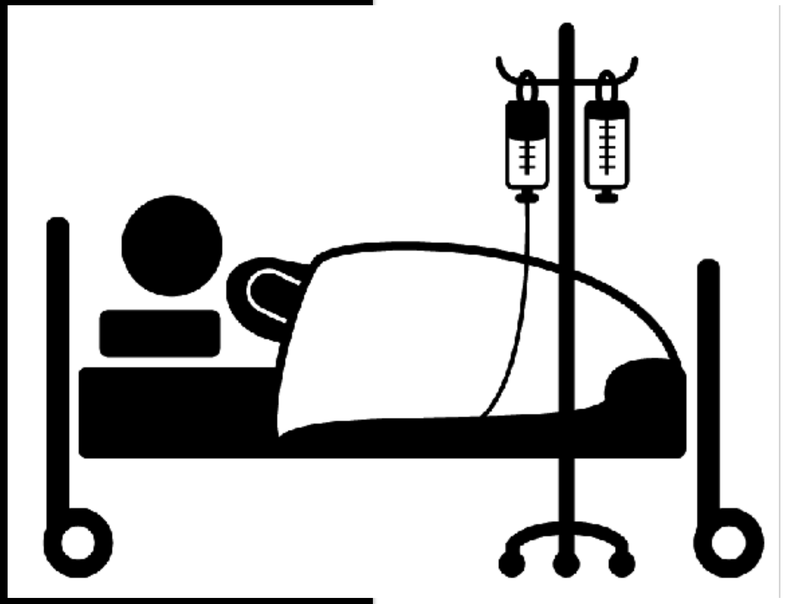

%
60
50
40
30
20
10
0
% observations at given ViEWS score
Mortality
n = 198755
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
>=16
NZEWS score

SCORE	RRT	3	2	1	0	1	2	3	RRT
ZONE	BLUE	RED	ORANGE	YELLOW	WHITE	YELLOW	ORANGE	RED	BLUE
Resp Rate	<5	5-8		9-11	12-20		21-24	25-35	>35
SpO_2		≤91	92-93	94-95	≥96				
Supplemental O_2			YES		NO				
Temp			<35.0	35.0-35.9	36.0-37.9	38.0-38.9	≥39.0		
Sys BP	<70	70-89	90-99	100-109	110-219			≥220	
Heart Rate	<40		40-49		50-89	90-110	111-129	130-139	≥140
Level of Consciousness					Alert			Voice or Pain	Unresponsive or fitting

You can’t die without meeting the MET

International Mortality

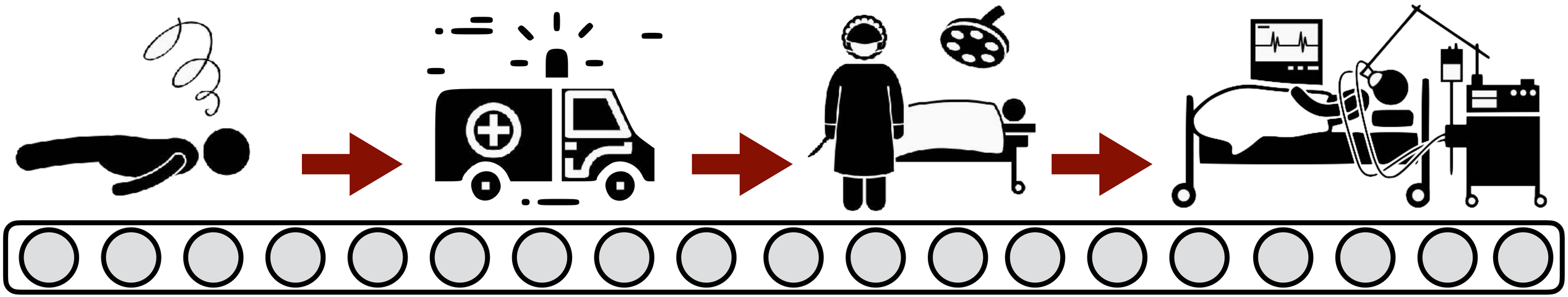

High
FUNCTION
Low
TIME

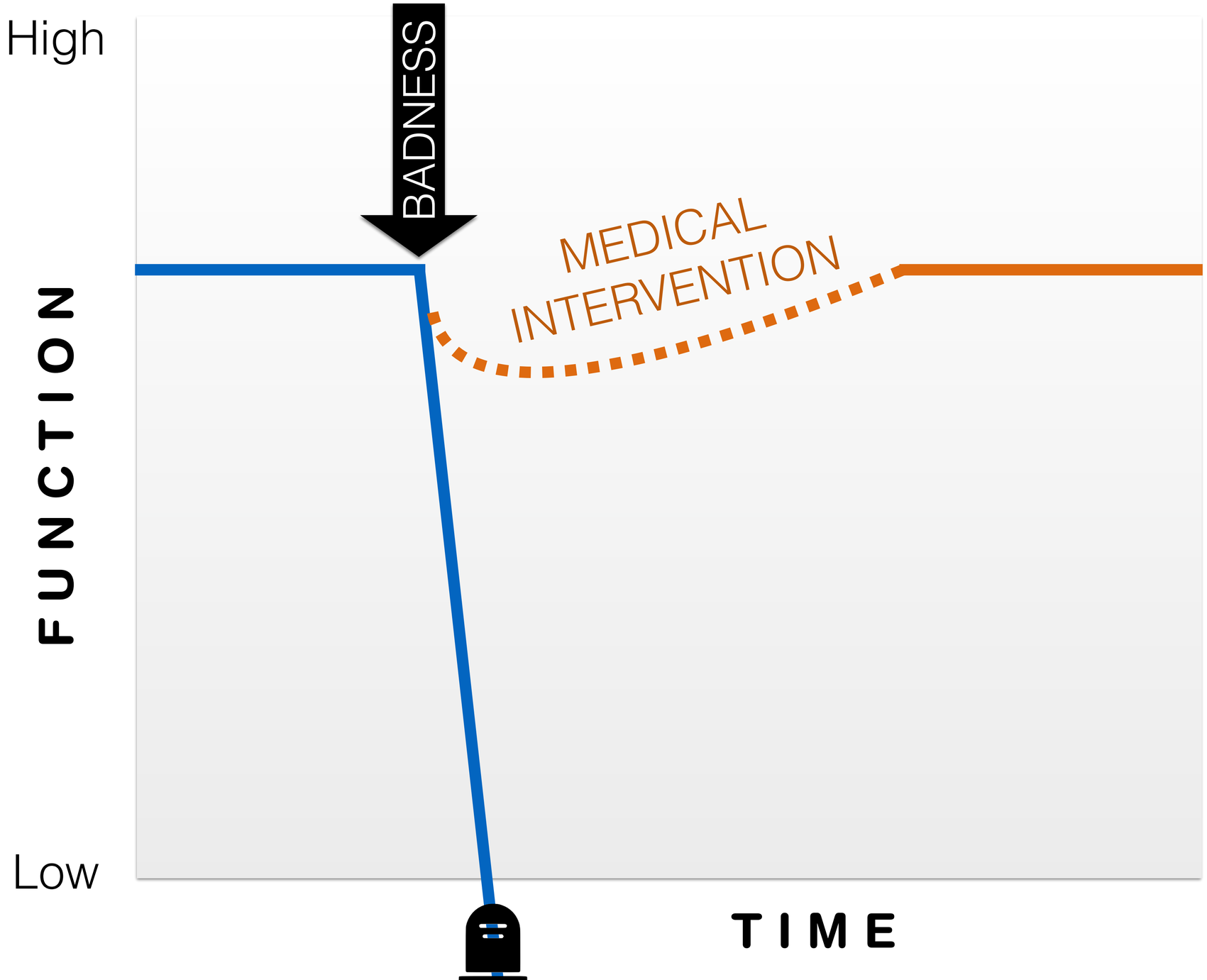


dying person with an irreversible process who would benefit from palliative care

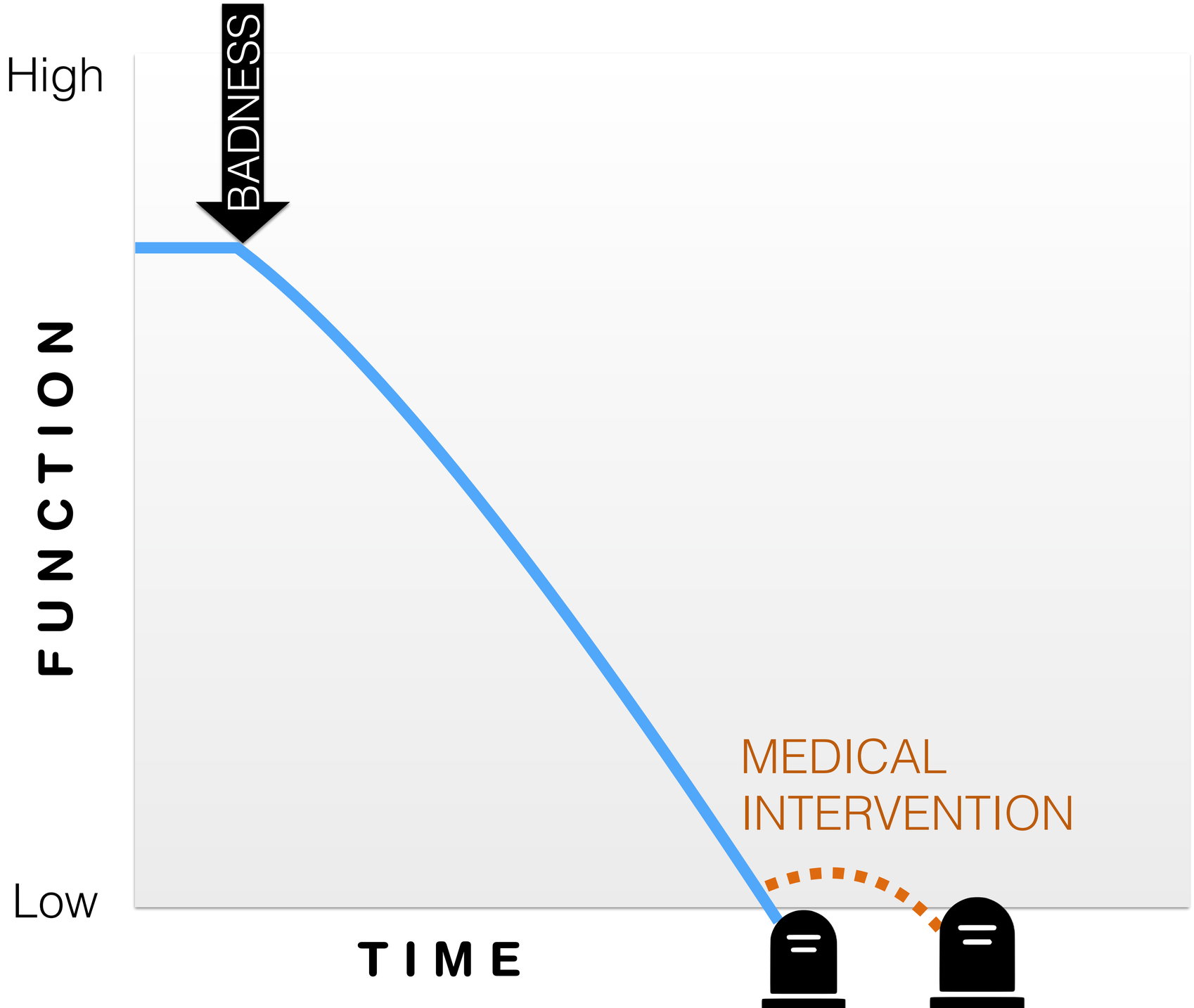
sick person with a reversible process who would benefit from aggressive care

CRITICAL CARE CONVEYOR BELT

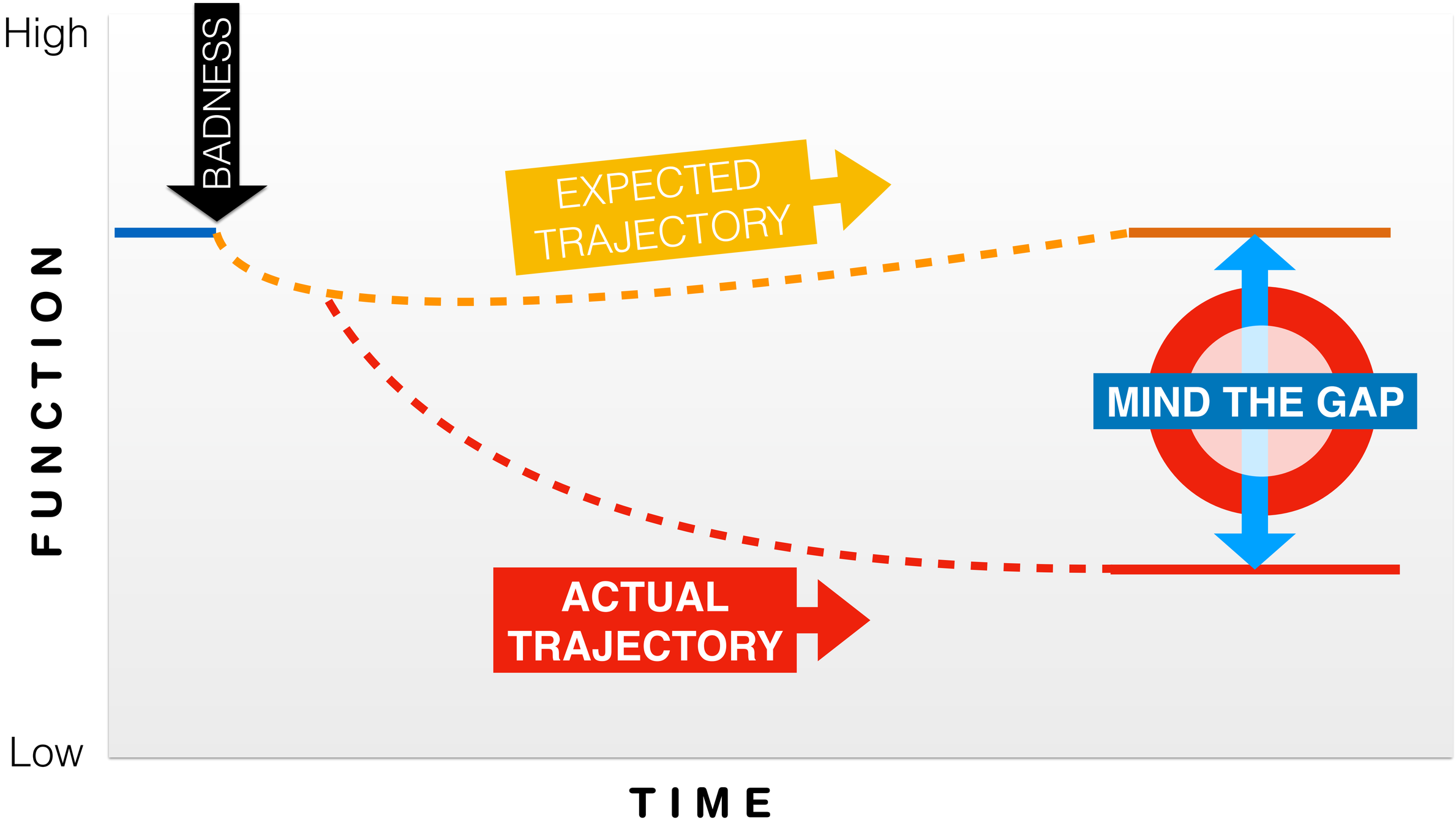


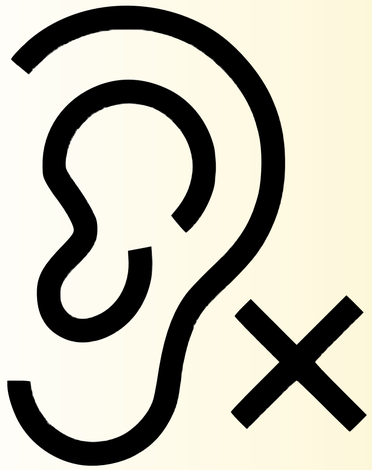


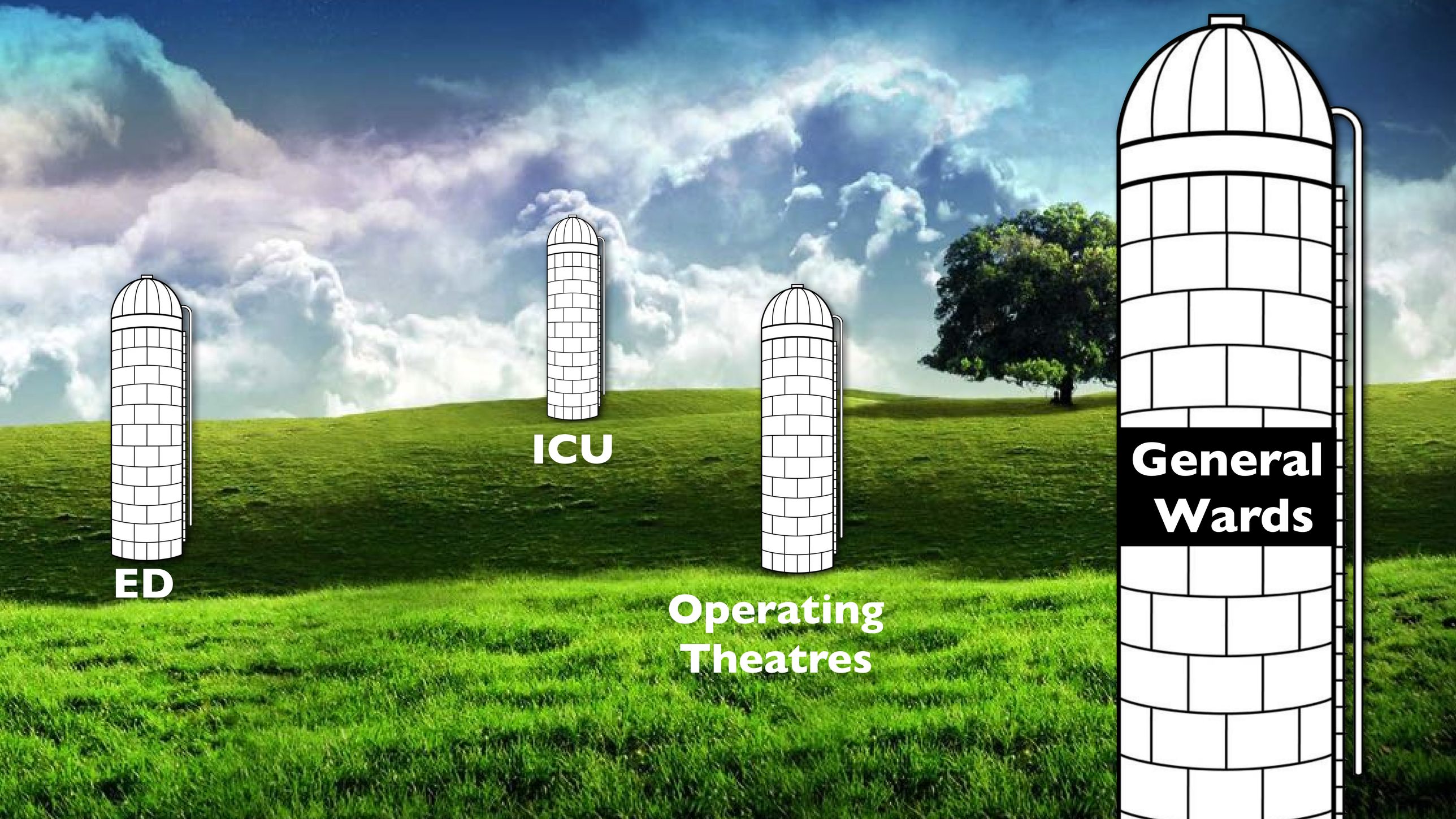
APPROPRIATE MEDICAL INTERVENTION



INAPPROPRIATE MEDICAL INTERVENTION


High
BADNESS
EXPECTED TRAJECTORY
MIND THE GAP
ACTUAL TRAJECTORY
Low
FUNCTION
TIME

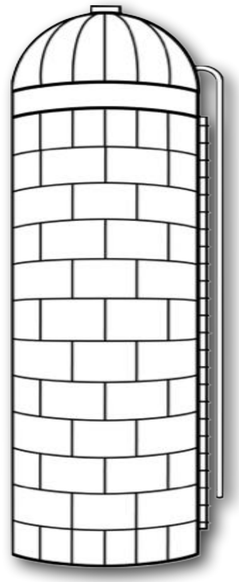



ED
ICU
Operating Theatres
General Wards

SILO FAILURE

Healthcare is grouped by silos

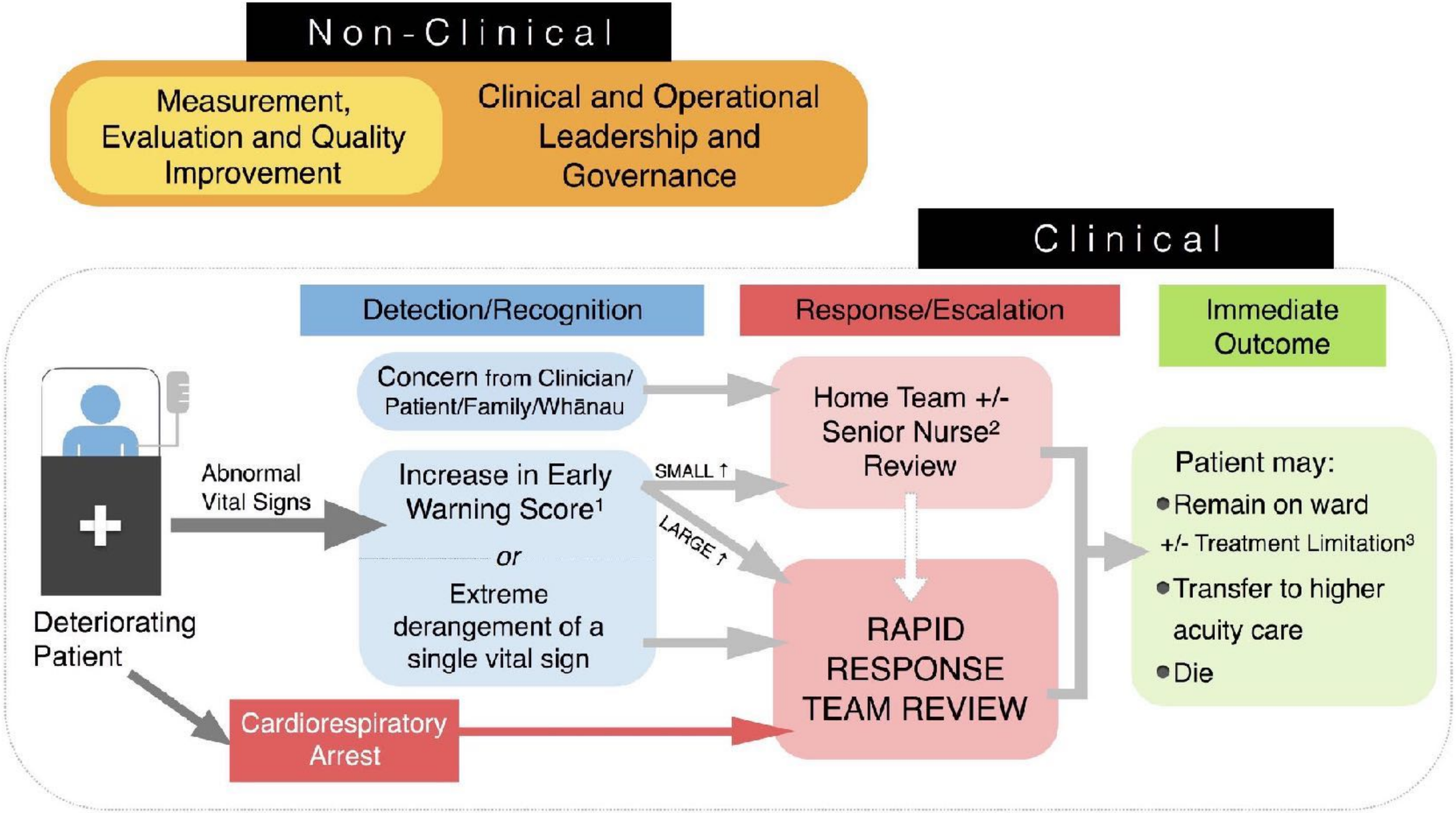
- Professional silos
- Geographic silos
- The solar-powered silo



HOSPITALS ARE NOT BUILT AROUND PATIENTS

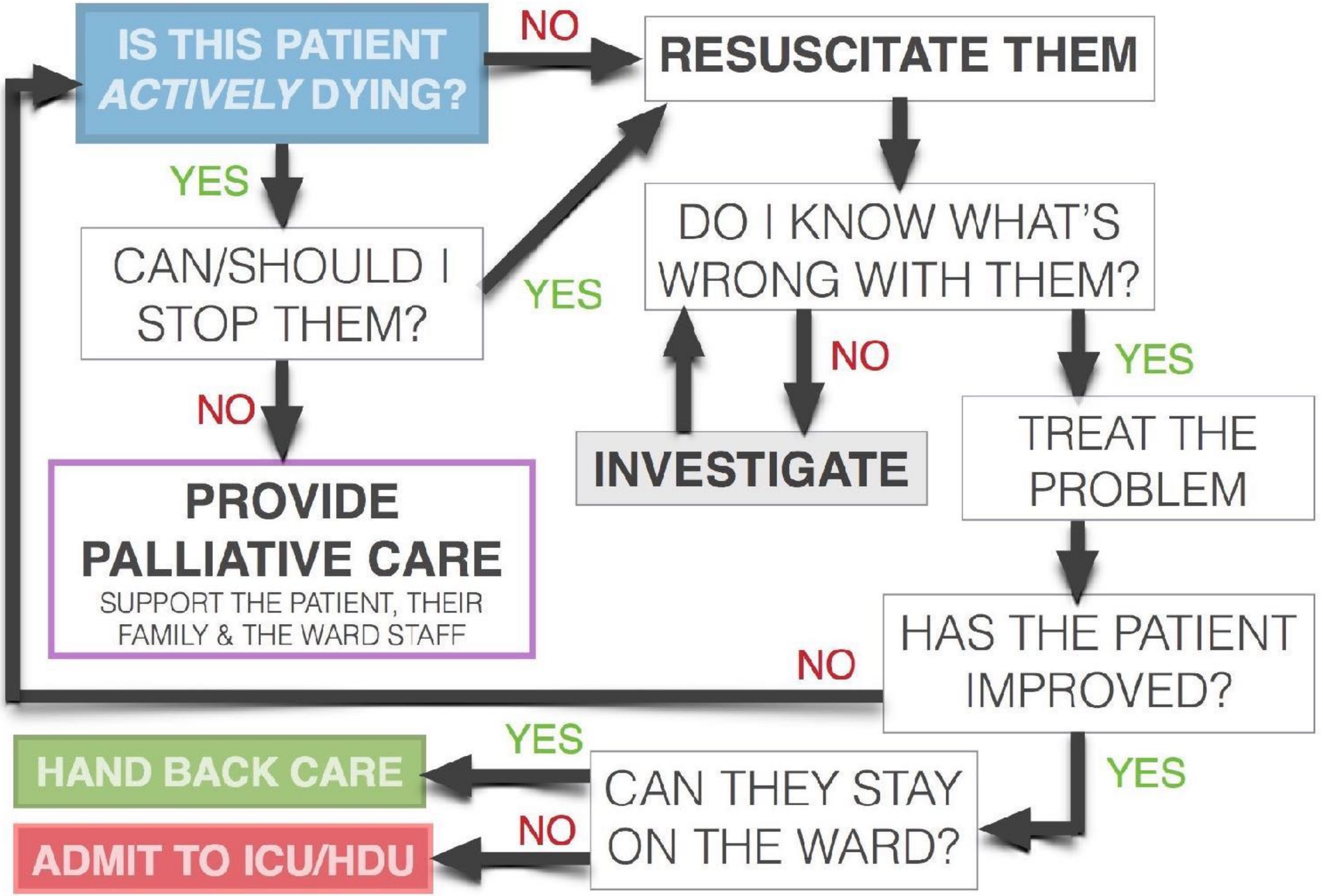
“there’s no such thing as the ‘surgical’ patient; there is only a medical patient with a scar”

Rinaldo Bellomo



A Rapid Response System

RRT DECISION TREE



NATIONAL PATIENT DETERIORATION PROGRAMME AIM

Reduce harm from failures to recognise and respond to acute physical deterioration in adult inpatients by 2021

Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa

PROGRAMME OUTLINE

5 years

July 2016 - June 2021

NATIONAL

Early Warning Score & Vital Signs Chart

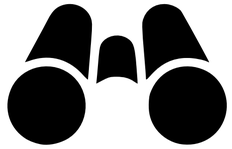
Kōrero Mai

Shared Goals of Care

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

Kupu Taurangi Hauora o Aotearoa

No-one noticed



NATIONAL EWS & VSC

No-one listened

KŌRERO MAI

No-one wanted all of this

SHARED GOALS OF CARE

NATIONAL EWS

SCORE	RRT	3	2	1	0	1	2	3	RRT
ZONE	BLUE	RED	ORANGE	YELLOW	WHITE	YELLOW	ORANGE	RED	BLUE
Resp Rate	<5	5-8		9-11	12-20		21-24	25-35	>35
SpO_2		≤91	92-93	94-95	≥96				
Supplemental O_2			YES		NO				
Temp			<35.0	35.0-35.9	36.0-37.9	38.0-38.9	≥39.0		
Sys BP	<70	70-89	90-99	100-109	110-219			≥220	
Heart Rate	<40		40-49		50-89	90-110	111-129	130-139	≥140
Level of Consciousness					Alert			Voice or Pain	Unresponsive or fitting

NATIONAL VSC

Adult Vital Signs Chart side 1

Family Name:
Given Name:
Gender:
AFFIX PATIENT LABEL HERE
NHI#:
Date of Birth:

Organisational document identifier

Vital Signs	Date / Time (24 hour)	EWS	Date / Time (24 hour)
Respiratory Rate (breaths/min) *write RR value in box*	≥ 36	RRT	≥ 36
	25-35	3	25-35
	21-24	2	21-24
	12-20	0	12-20
	9-11	1	9-11
	5-8	3	5-8
	≤ 4	RRT	≤ 4
Oxygen (L/min)	Room air ✓	0	✓ Room air
	Supplement (L/min)	2	Supplement (L/min)
Oxygen Saturation (%) *write SpO_2 value in box*	≥ 96	0	≥ 96
	94-95	1	94-95
	92-93	2	92-93
	< 91	3	< 91
Heart Rate (bpm) *mark HR with X write value if off scale*	Write if ≥ 140	RRT	Write if ≥ 140
	130s	3	130s
	120s	2	120s
	110s		110s
	100s	1	100s
	90s		90s
	80s	0	80s
	70s		70s
	60s		60s
	50s		50s
	40s	2	40s
	30s	RRT	30s
Blood Pressure (mmHg) *score systolic BP value only*	Write if ≥ 220	3	Write if ≥ 220
	210s	0	210s
	200s		200s
	190s		190s
	180s		180s
	170s		170s
	160s		160s
	150s		150s
	140s		140s
	130s		130s
	120s		120s
	110s		110s
	100s	1	100s
	90s	2	90s
	80s	3	80s
	70s		70s
	60s	RRT	60s
	50s		50s
Temperature (°C) *mark Temp with X write value if off scale*	≥ 39s	2	≥ 39s
	38s	1	38s
	37s	0	37s
	36s		36s
	35s	1	35s
	≤ 34s	2	≤ 34s
Level Of Consciousness mark LOC with ✓	Alert	0	Alert
	Voice	3	Voice
	Pain		Pain
	Unresponsive	RRT	Unresponsive
EARLY WARNING SCORE TOTAL			EWS TOTAL

Insert organisational logo or identifier here

Family Name:
Given Name: Gender:
AFFIX PATIENT LABEL HERE
Date of Birth: NHI#:

CALL 777 FOR ANY PATIENT YOU, THEY OR THEIR FAMILY ARE WORRIED ABOUT, REGARDLESS OF VITAL SIGNS OR EARLY WARNING SCORE

Mandatory escalation pathway

Total Early Warning Score (EWS)	Action
EWS 1-5	
EWS 6-7 Acute illness or unstable chronic disease	
EWS 8-9 *or* any vital sign in red zone. Likely to deteriorate rapidly	
EWS 10+ *or* any vital sign in blue zone. Immediately life threatening critical illness	

Modification to Early Warning Score (EWS) Triggers

The EWS can be changed to prevent chronic disease incorrectly triggering escalation. All modifications must be made in line with hospital policy and regularly reviewed by the primary team.

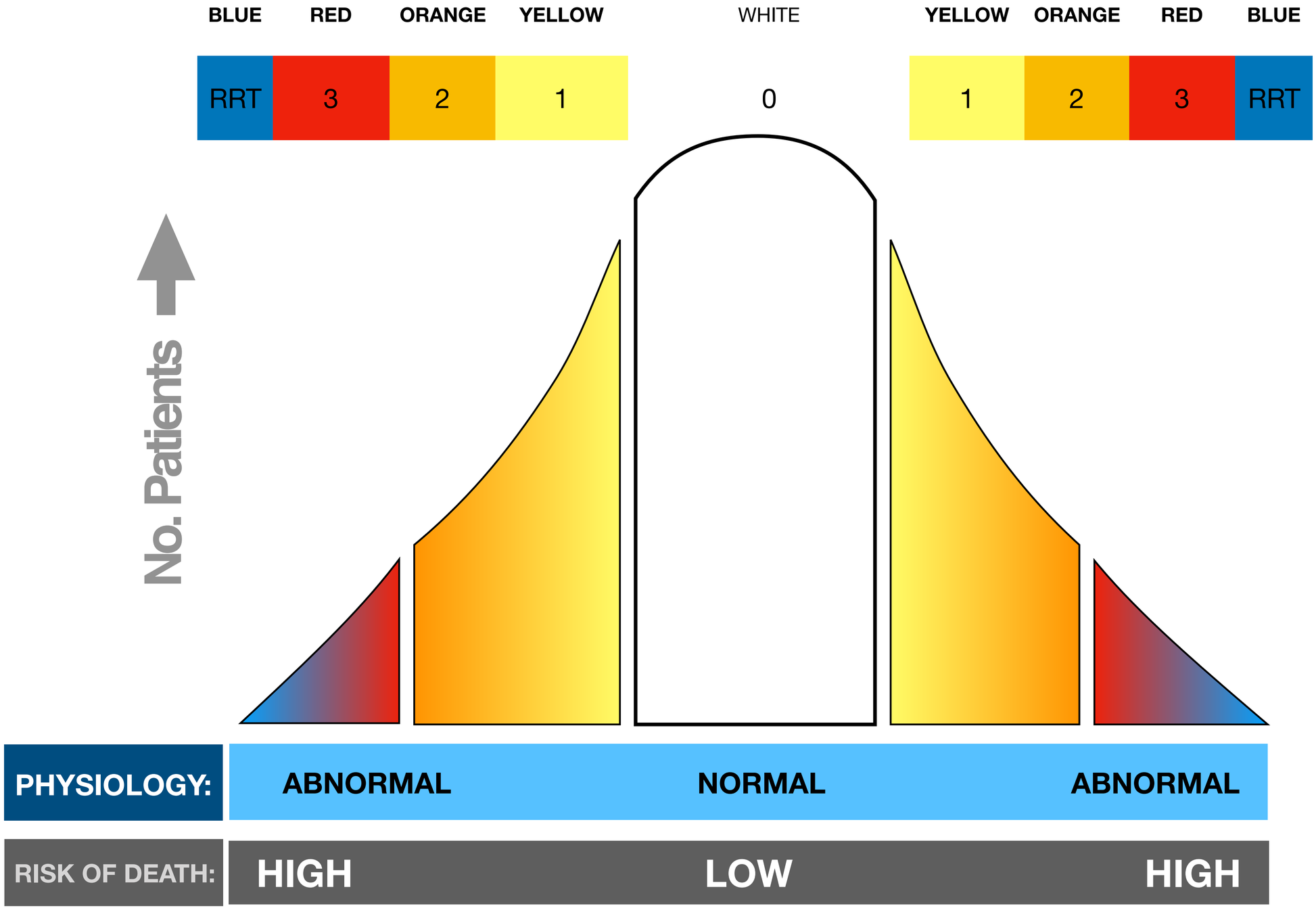
Ignore any modification that is not signed and dated.

Vital sign (use abbreviation)	Accepted values and modified EWS	Date and time	Duration (hours)	Name and contact details
		/ /		
Reason:				
		/ /		
Reason:				
		/ /		
Reason:				

NOT FOR CPR ☐ NOT FOR RRT ☐ / /

Any treatment limitations must be documented in the patient's clinical record.

A full set of vital signs with corresponding EWS must be taken and calculated each time at a frequency stated in hospital policy. If there is no timely response to your request for review, escalate to the next coloured zone.

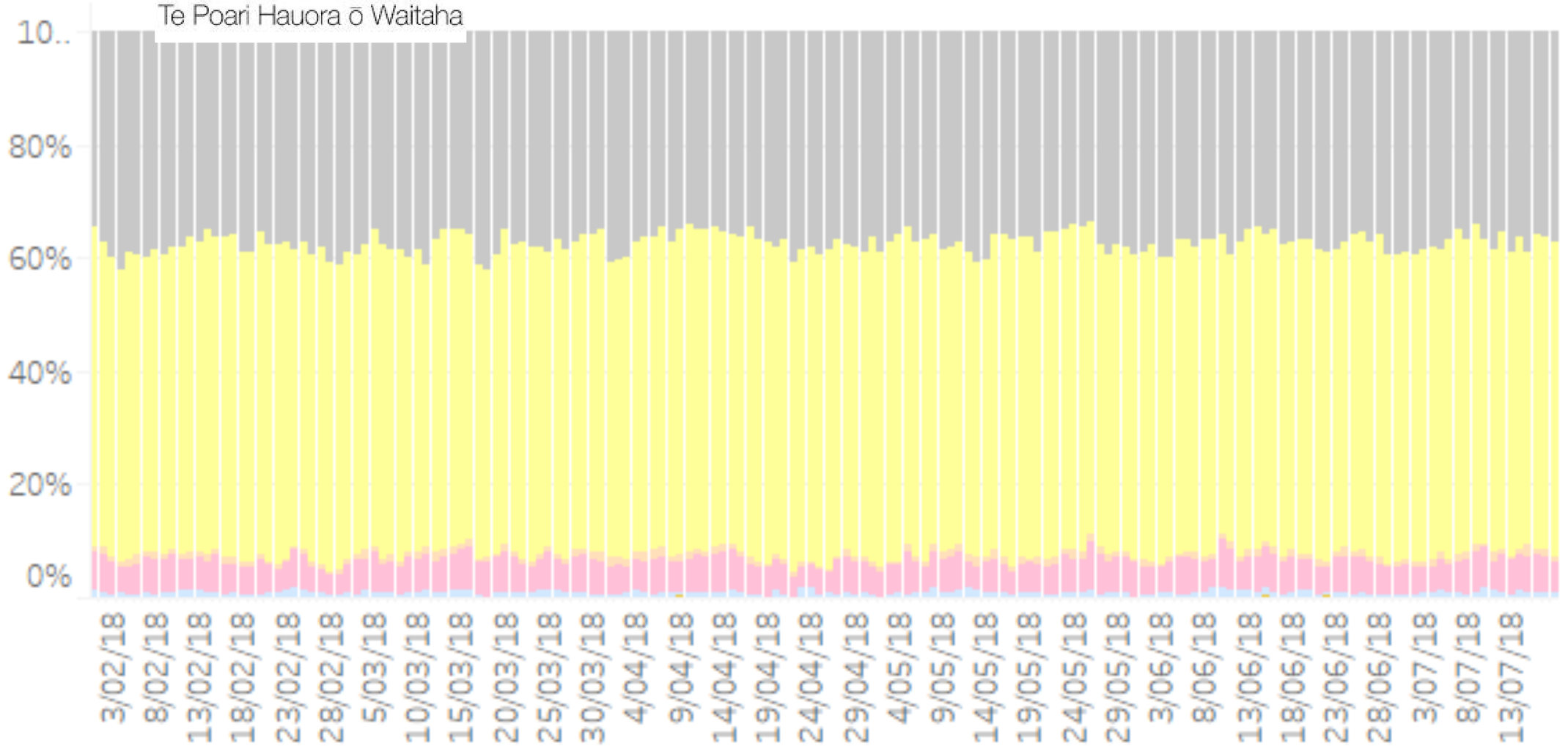

BLUE
RED
ORANGE
YELLOW
WHITE
YELLOW
ORANGE
RED
BLUE
RRT
3
2
1
0
1
2
3
RRT
No. Patients
PHYSIOLOGY:
ABNORMAL
NORMAL
ABNORMAL
RISK OF DEATH:
HIGH
LOW
HIGH

NZEWS	% Patients within NZEWS range	% Mortality within 24 hours of NZEWS range		Pathophysiology	NZEWS Banding
0	**27**	<1		*Nil*	*Nil*
1 to 5	**59.2**	0.3-1.5		Normal low level response to illness	**YELLOW**
6 to 7	8.5	1.8-2.6		Acute illness or unstable chronic disease	**ORANGE**
8 to 9	3.1	4.1-6.4		Likely to deteriorate rapidly	**RED**
10 to 16	2.2	9.0-43.5		**Immediately life threatening critical illness**	**BLUE**

94.7% of acute patients scored 7 or less

Canterbury District Health Board
Te Poari Hauora ō Waitaha

CDHB NZEWS Working Group

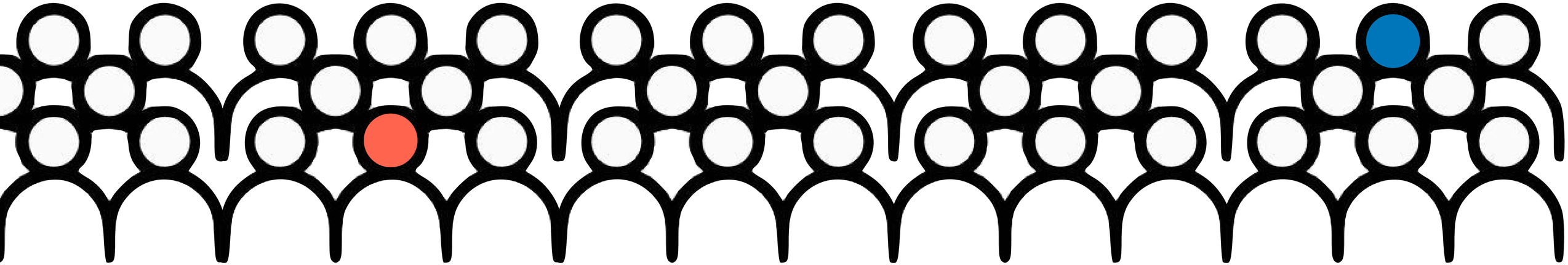


3500 EWS sets per day

Early Warning Scores don't create sick people.

They were always there.

Now you know **where**.



NATIONAL PATIENT/ FAMILY/WHĀNAU ESCALATION

Kōrero mai

Talk to me

Patients are rarely wrong.
Clinicians occasionally are.

Kōrero mai is just another vital sign

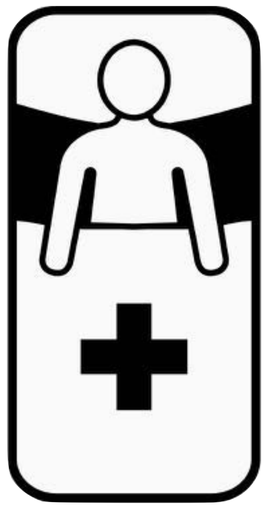
NATIONAL SHARED GOALS OF CARE

2 weeks in ICU can save you 1 hour of difficult conversation

Dr.Will Cairns

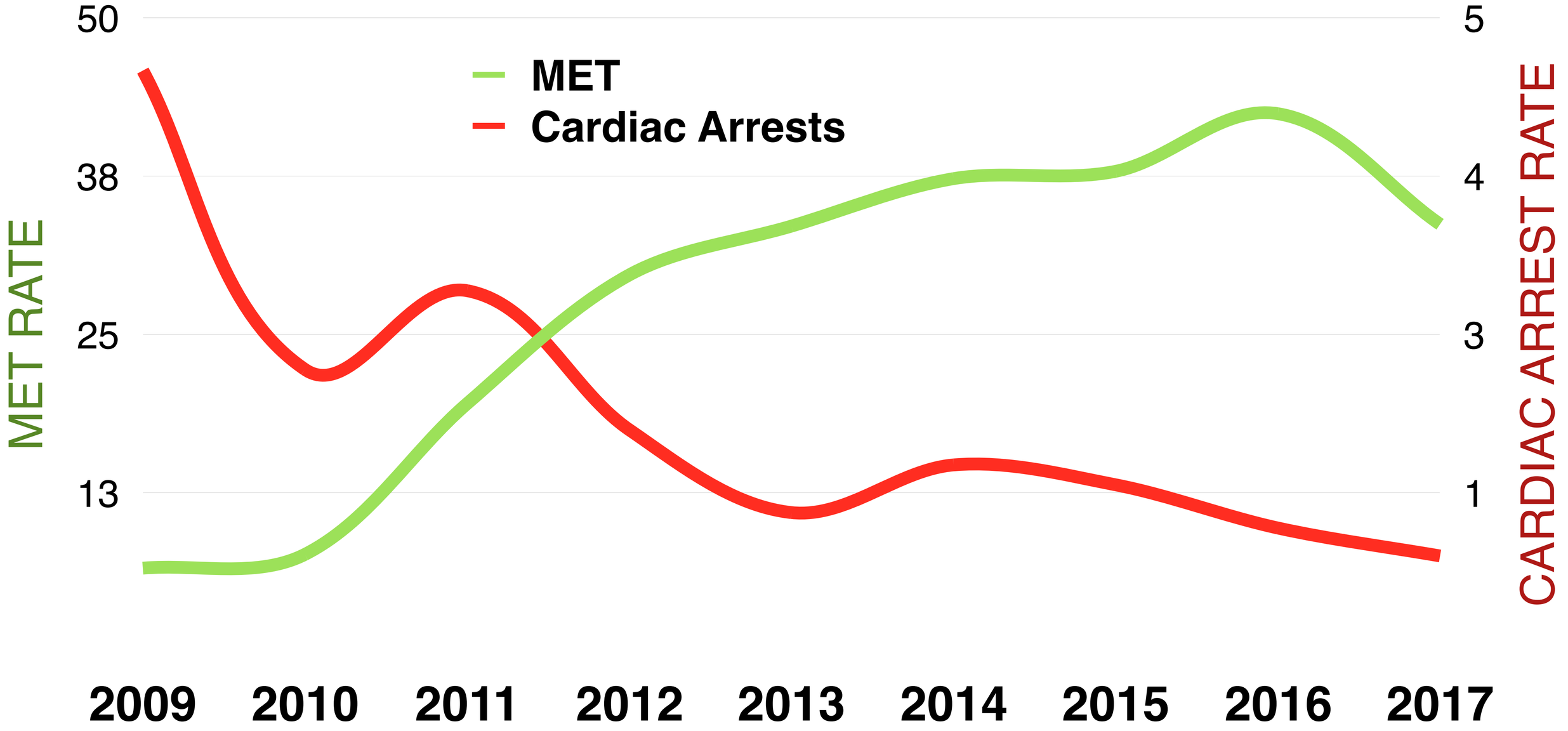
BUT IT DOESN'T KILL PATIENTS WHO DON'T HAVE SEPSIS

Dr. Cliff Reid



patient A

EVENTS PER 1000 PATIENT ADMISSIONS



MEAN INTERVAL BETWEEN 777 CALLS

YEAR:	2009	2017
MET Calls	69 hours	**7 hours**
Cardiac Arrests	98 hours	**302 hours**

POOR COMMUNICATION CAUSES HARM

Managing Deteriorating Patients

1st edition 2018

Chalwin Jones Psirides Radford

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HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

Kupu Taurangi Hauora o Aotearoa

THANK YOU

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hqsc deteriorating patient