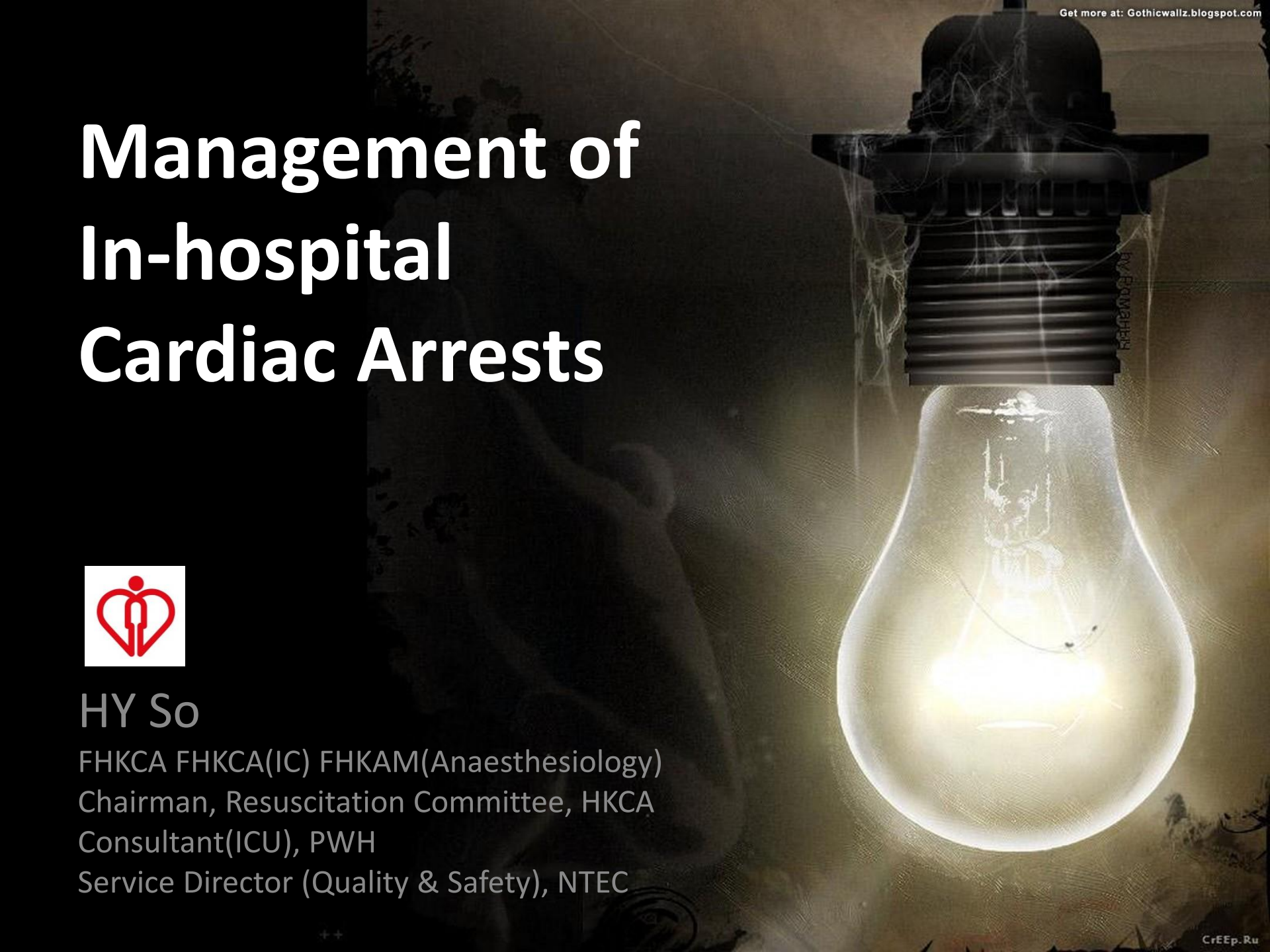
Management of In-hospital Cardiac Arrests



HY So

FHKCA FHKCA(IC) FHKAM(Anaesthesiology)
Chairman, Resuscitation Committee, HKCA
Consultant(ICU), PWH
Service Director (Quality & Safety), NTEC

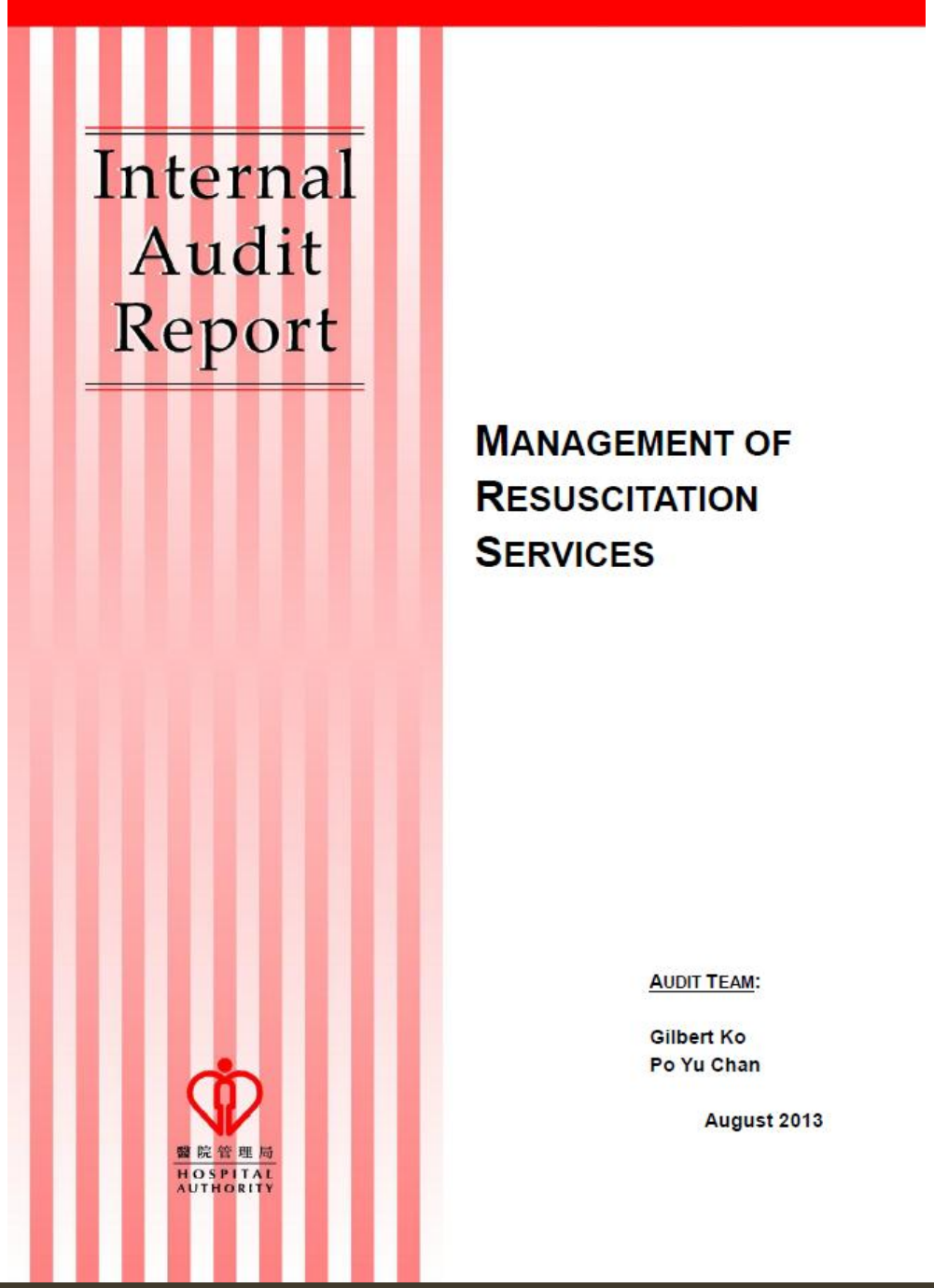
Get more at: Gothicwallz.blogspot.com

Cardiac Arrest of Inpatients

Diagnosis	Number	ROSC
Acute myocardial infarction	5	1
COAD	18	4
Congestive heart failure	9	2
CVA	1	0
Intestinal obstruction	2	0
Pneumonia	11	3
Renal failure	2	0
Septic shock	8	3
Unknown	18	5
Total	**74**	**18**

Chan SSM, So HY. Crit Care & Shock 2001; 3:145-51

The study population of both the study by Bernard et al. and the HACA study Group are patients suffering from out-of-hospital ventricular fibrillations…. There is **little published evidence** to support the use of therapeutic hypothermia following **in-hospital cardiac arrest**.



Governance
Policy/team
Training
Improvement

Hospital Authority, GIA Audit in Management of Resuscitation Services. Aug 2013.

Management of IHCA

Timely

Effective

Appropriate

Management of IHCA

Timely

Effective

Appropriate

For **every minute** that passes between collapse and defibrillation, survival rates from witnessed VF sudden cardiac arrest **decrease 7% to 10%**.

American Heart Association. . *Circulation* supplement 2005;112:IV-1-IV-211.

Early Defibrillation

ILCOR strongly encourages the development of early defibrillation programs for nonphysician in-hospital responders

- Basic life support (BLS).
- **AED training as a basic skill for healthcare**
- **Conventional defibrillators or AEDs to all appropriate nonphysician staff**
- Making conventional defibrillators or AEDs readily available in strategic areas
- Document all resuscitation efforts accurately
- Collect and review the patient variables, event variables, and outcome variables
- Establish an interdisciplinary committee

Kloeck W, et.al. Circulation 1997; 95:2183-4

There were **more survivors to hospital discharge** in the units assigned to have volunteers trained in CPR plus the use of AEDs (**30 survivors among 128 arrests**) than there were in the units assigned to have volunteers trained only in CPR (**15 among 107; P=0.03; relative risk, 2.0; 95 percent confidence interval 1.07 to 3.77**)

Use of AED NOT associated with increased survival for IHCA

	No. of Survivors/Total No. (%)		Adjusted RR (95% CI)	p Value
	AED Used	AED Not Used		
All Units				
All arrests	734/4515 (16.3)	1383/7180 (19.3)	0.85 (0.78-0.92)	<0.01
VF/pulseless VT	364/947 (38.4)	450/1132 (39.8)	1.00 (0.88-1.13)	.99
Asystole/PEA	370/3568 (10.4)	933/6048 (15.4)	0.74 (0.65-0.83)	<0.01
Monitored Units				
All arrests	488/2104 (23.2)	992/4156 (23.9)	0.87 (0.79-0.97)	.01
VF/pulseless VT	286/593 (48.2)	368/804 (45.8)	1.03 (0.89-1.18)	.71
Asystole/PEA	202/1511 (13.4)	624/3352 (18.6)	0.72 (0.62-0.85)	<0.01
Nonmonitored Units				
All arrests	246/2411 (10.2)	391/3024 (12.9)	0.82 (0.70-0.98)	.03
VF/pulseless VT	78/354 (22.0)	82/328 (25.0)	0.93 (0.63-1.36)	.71
Asystole/PEA	168/2057 (8.2)	309/2696 (11.5)	0.79 (0.65-0.96)	.02

Chan PS, et.al. JAMA 2010; 304:2129-36

We identified 11 695 patients with cardiac arrests at 204 hospitals after the introduction of AEDs.

Of these, **2079 (17.8%) had shockable rhythms (VF/pulseless VT)** and 9616 (82.2%) had nonshockable rhythms (asystole or pulseless electrical activity).

“Hands-off” Interruption for AED

Device	Minimum Interruption, secs (Mean ± SD)	Maximum Interruptions, secs (Mean ± SD)
A	5.2 ± 0.1	8.1 ± 0.1
B	12.3 ± 0.2	15.7 ± 0.3
C	15.6 ± 0.1	16.9 ± 0.1
D	16.9 ± 0.1	18.1 ± 0.2
E	17.1 ± 0.2	18.3 ± 0.1
F	19.7 ± 0.1	22.1 ± 0.3
G	26.3 ± 0.1	28.4 ± 0.1

Snyder D, Morgan C. Crit Care Med 2004; 32(9 Suppl):S431-4

Push Hard, Push Fast

97 OHCA, 813 minutes of CPR

36.9% compression rate <80

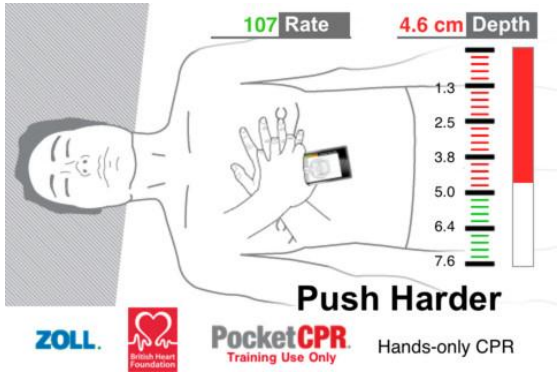
21.7% compression rate <70

Higher compression rate associated with better outcome

Abella BS, et.al. Circulation 2005; 111:428-34

Effective compression was not improved by any CPR feedback device compared to standard BLS. All feedback devices caused substantial delay in starting CPR, which may worsen outcome.

CPR meter



Zapletal B, et.al. Resuscitation, 2013, Epub Nov 8, 2013.

Autopulse Non-invasive Cardiac Support Pump

ZOLL

LUCAS 2 Chest Compression System

PHYSIO CONTROL

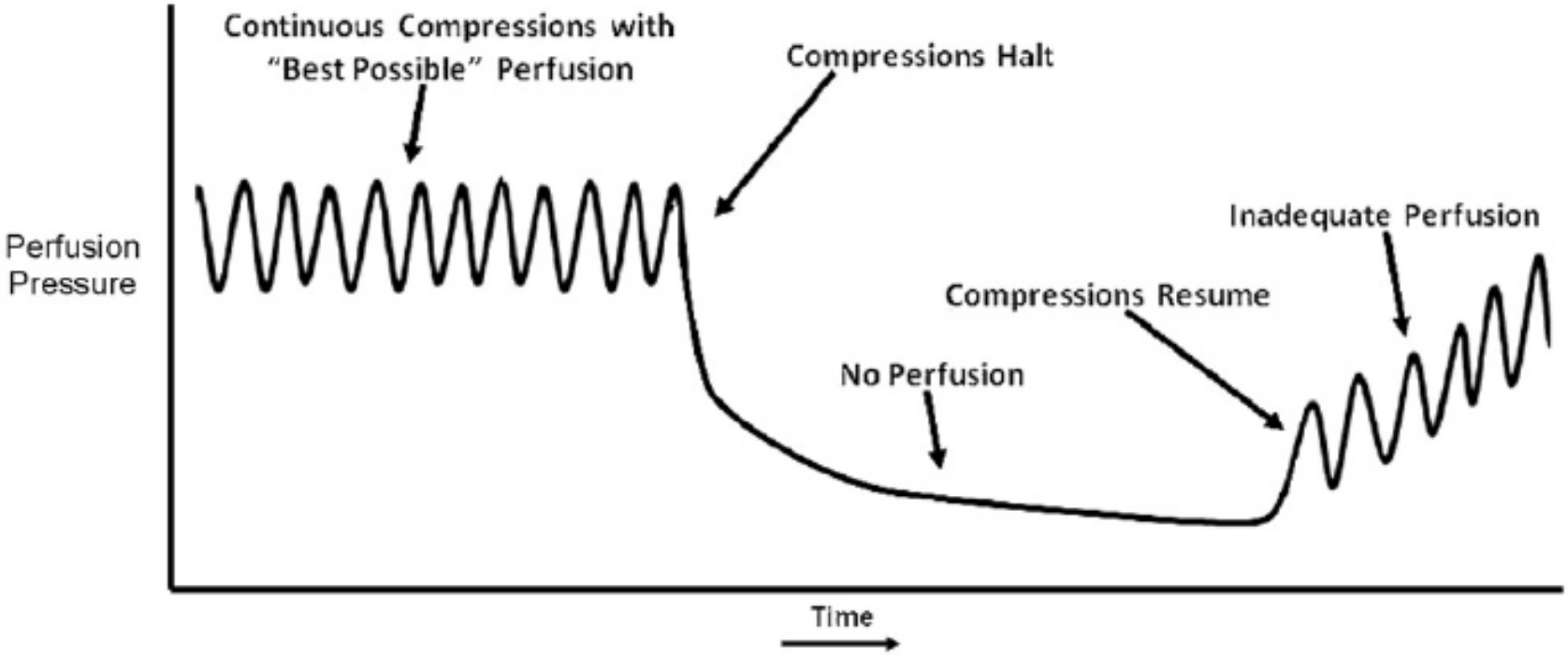
Mechanical Chest Compression

Only 4 out of 1561 articles useful

Included 868 patients

There is **not enough data** from good quality trials to answer our question and provide a recommendation on whether or not these machines should be used.

Chest Compressions During Cardiac Arrest
Magnitude of Perfusion Resulting from Chest Compressions



40-45 seconds elapse during continuous CPR before the development of the "best possible" level of perfusion

Minimally Interrupted Cardiac Resuscitation (MICR)

Outcomes	No/Total No (%) of Patients		Odds Ratio (95% CI) Adjusted	Significant Covariates
	Before MICR	After MICR		
Primary outcomes				
Survival-to-hospital discharge	4/218 (1.8)	36/668 (5.4)	**3.0** (1.1-8.9)	Witnessed arrest & VF
Survival with witnessed VF	2/43 (4.7)	23/131 (17.6)	**8.6** (1.8-42.0)	Intubation
Secondary outcomes				
ROSC	34/218 (15.6)	154/668 (23.1)	**1.3** (0.8-2.0)	Witnessed arrest, VF, ETT, site
Survival-to-hospital admission	35/218 (16.1)	113/668 (16.9)	**0.8** (1.5-1.2)	Bystander CPR, witnessed arrest, VF, ETT, dispatch-to-arrival time

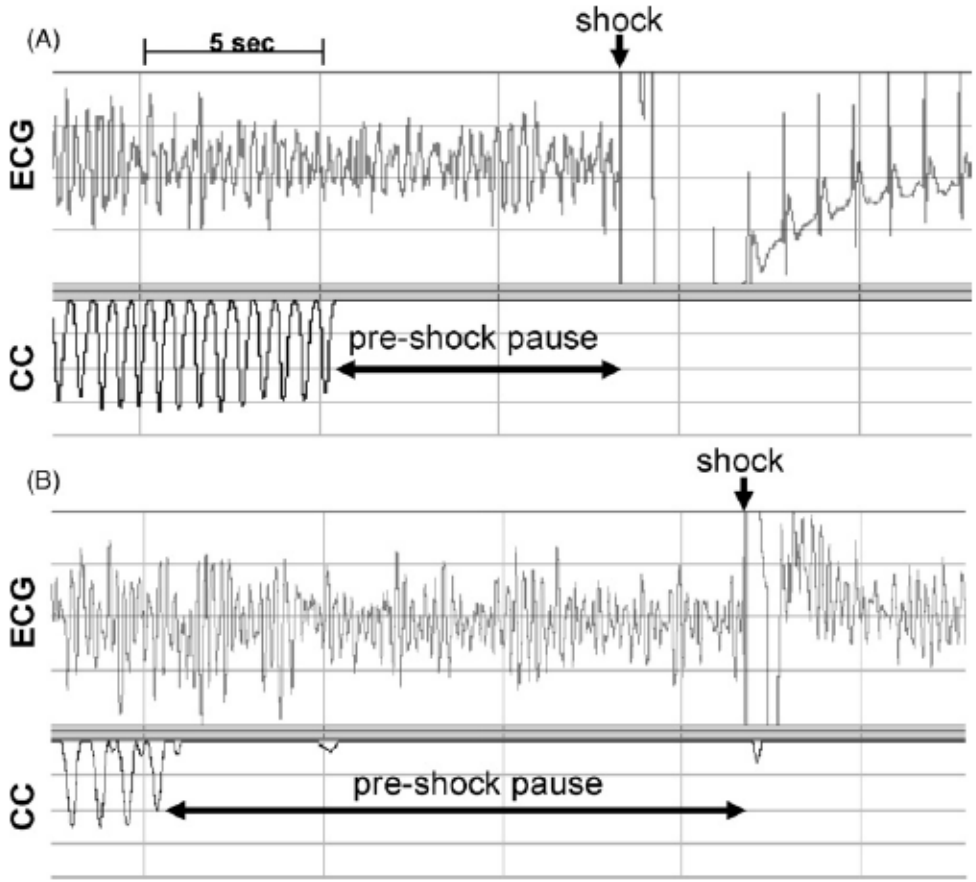
Bobrow BJ, et.al. JAMA 2008; 299:1158-65

Avoiding Interruptions

Interruption Cause	Time Impact	Potential Solution
Pulse determinations	Small	Observe for signs of life Use ET-CO2 monitoring to detect ROSC
Cardiac rhythm analysis	Small	Rapid determination of rhythm with compression discontinuation Use of artifact-reduction ECG analysis
Electrical defibrillation	Small-intermediate	Charge defibrillator before discontinue CC Hands-on approach
Airway management	Intermediate-large	"Passive" airway management Defer intubation to later phase Place ETT during active CC Avoid excessive ventilation rates and VT
Parenteral access	Small-large	Defer vascular access to later phase Place vascular access during active CC Use IO device Defer placement of CVC

Cunningham LM, et.al. Am J Emerg Med 2012; 30:1630-8

	Success	Failure	p-Value
Pre-shock pause (s), median (IQR) [n=53]	11.9 (6.8-19.4)	22.7 (15.6-37.7)	0.002
Compression depth (mm), mean (SD) [n=47]	39 (11)	29 (10)	0.004



Edelson DP, et.al. Resuscitation 2006; 71:137-45

	Pause to Charge (n=217)	Charging during compression (n=345)	p-Value
Compression depth before shock	47.1±10.6 mm	47.3±10.0 mm	0.81
Compression rate before shock	106±12 min^{-1}	109±11 min^{-1}	0.002
Pre-shock pause	13.3 (8.6-19.5) s	2.6 (1.3-2.7) s	<0.001
Post-shock pause	2.3 (1.7-3.9) s	1.9 (1.3-2.7) s	0.01
Hands-off time 30s before shock	14.8 (11-19.6) s	10.3 (6.4-13.8) s	<0.001
Inappropriate shocks	20.0%	20.1%	0.97
Shocks to rescuers	0/217	1/345	0.43

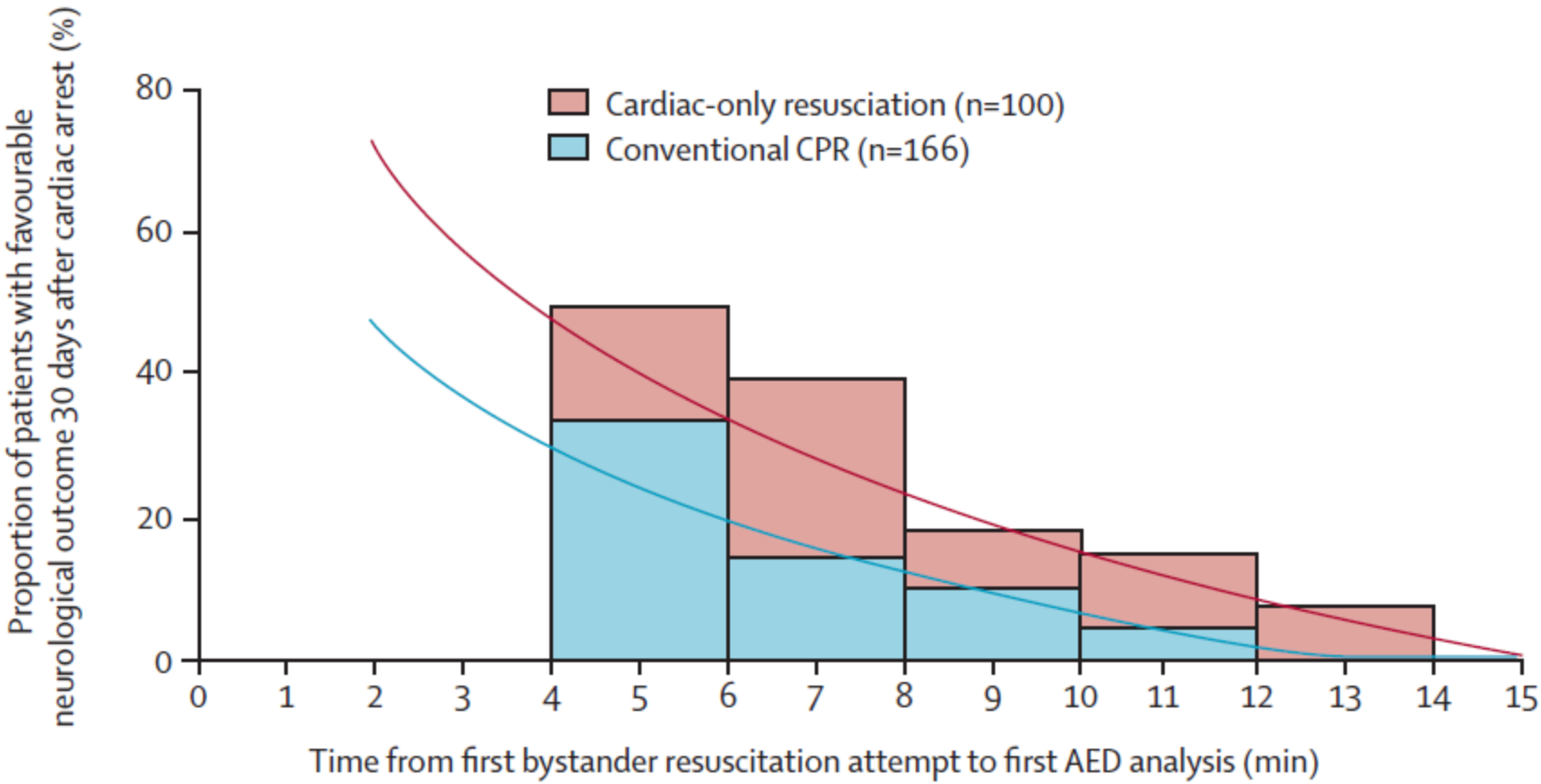
Charging during compressions is associated with decreased hands-off time preceding defibrillation, with minimal risk to patients or rescuers.

Edelson DP, et.al. Resuscitation 2010; 81:1521-6

Rationale for limited PPV in Witnessed CA

- Bystanders reluctant to provide mouth-to-mouth ventilation
- Prolonged interruptions in chest compression
- Increased intrathoracic pressure reduce venous return
- Risk of regurgitation
- Blood in arterial system remained oxygenated at onset of VF
- Gasping of subjects provide ventilation

Ewy GA. Curr Opin Cardiol 2008; 23:579-84



SOS-KANTO study group. Lancet 2007; 369:920-6

Benefits of uninterrupted chest compressions outweigh the benefits of rescue breathing—at this early stage of resuscitation—because the physiology of cardiac arrest differs from that of asphyxial arrest, where breathing is initially more important.

Ewy GA. Lancet 2007; 369:882-4

Systematic review of 63 articles:

Team coordination – planning, leadership and communication – are well studied and highly relevant factors predicting CPR performance quality.

Non-technical Skills

- Leadership
- Communication
- Mutual performance monitoring
- Maintenance of standards and guidelines
- Task management

Andersen PO, et.al. Resuscitation 2010; 81:695-72

Leadership

Recommended Behavior

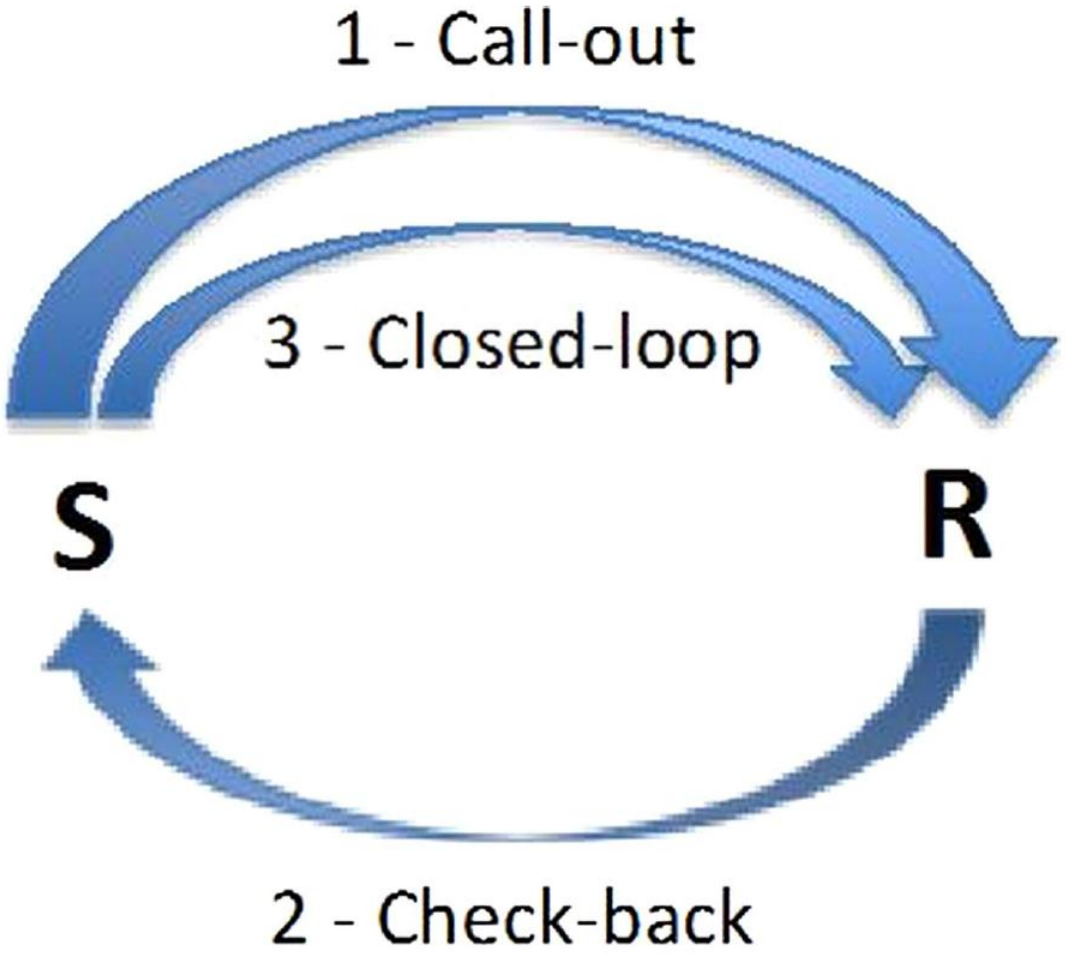
- Clearly identifiable
- Clinically experienced
- Communicate efficiently
- Delegate tasks to other team members
- Gather information

Barriers

- Gradient in team authority makes other person team leader
- Clinical inexperience makes team insecure
- Team leaders with lack of authority ignored by members
- Inexperienced leaders expected to lead and learn at same time

Andersen PO, et.al. Resuscitation 2010; 81:695-72

Closed-loop Communication

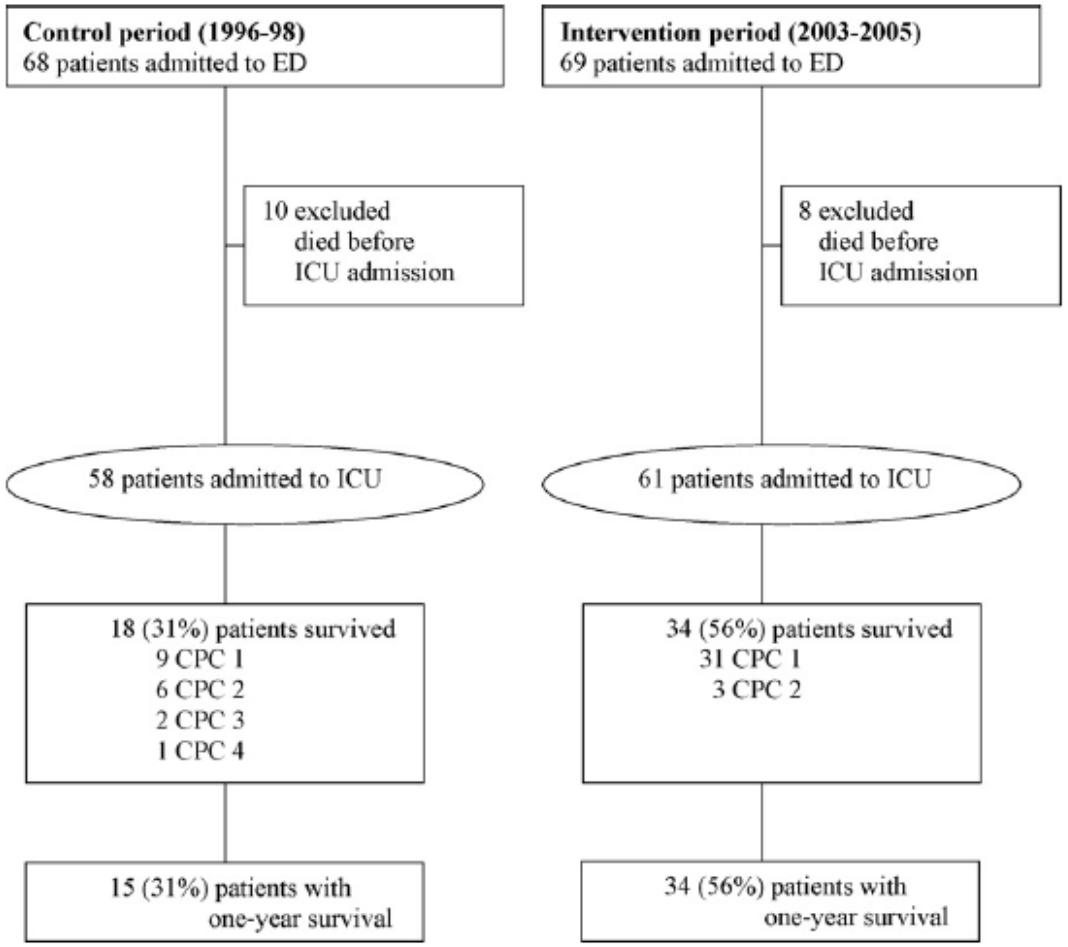


Wilson KA, et al. Hum Factors 2007;49:243–56.

Optimize haemodynamics/ oxygenation

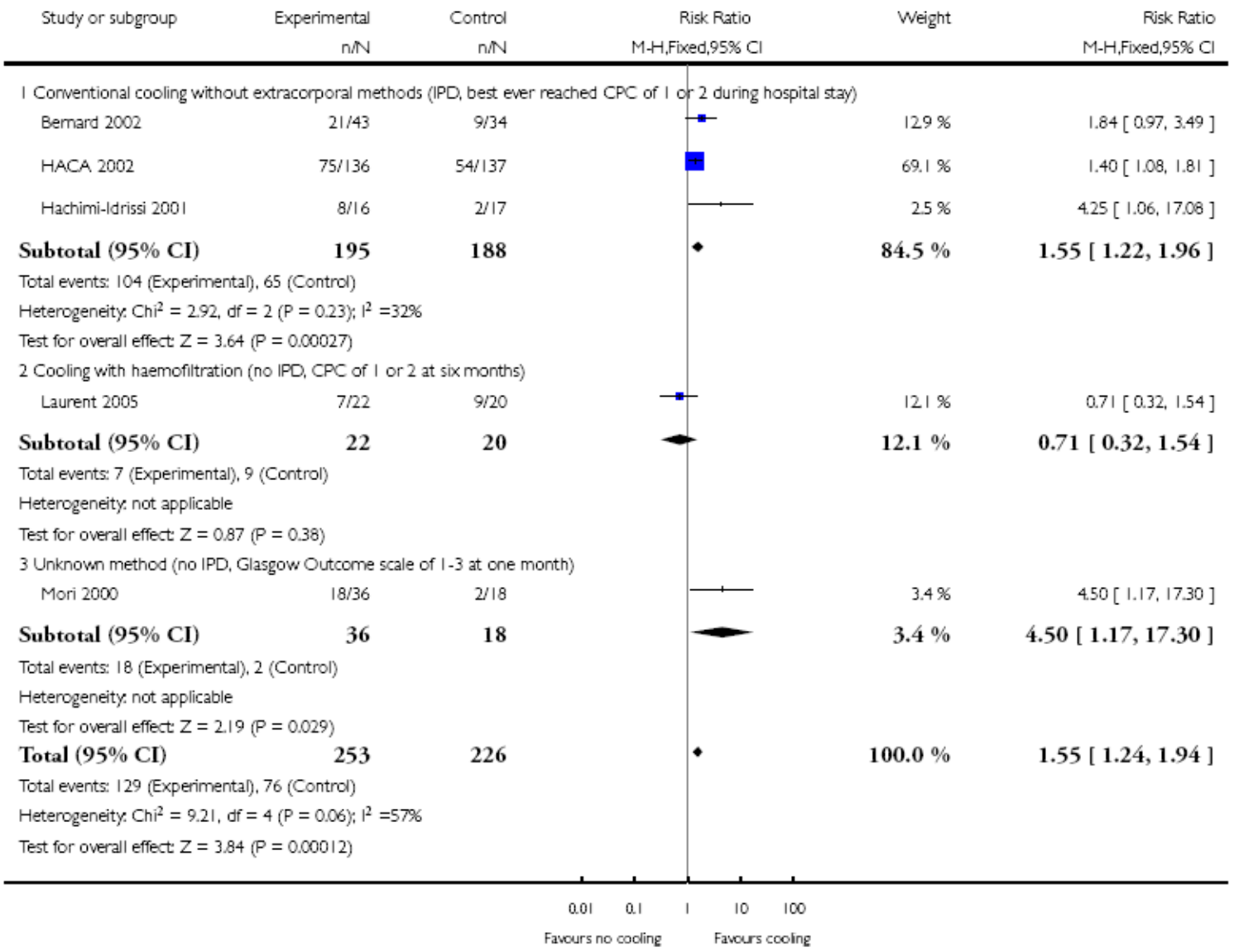
Treat the cause of arrest

Therapeutic hypothermia



Sunde K, et.al. Resuscitation 2007; 73:29-39

Neurologic Outcome



Several studies have reported the **use of TH for IHCA with variable results** likely due to small sample size, varying patient severity, and poor TH implementation.

67, 498 patients in 538 hospital in Get With the Guidelines Resuscitation database 2003-9

TH used in 2%

0.7% in 2003, 3.3% in 2009

Target temperature (32-34^{o}C) NOT achieved in 44.4%

Overcooled in 17.6%

Mikkelsen ME, et.al. Crit Care Med 2013; 41:1385-95

Management of IHCA

Timely

Effective

Appropriate

At present, such committees tend to focus on the procedural aspects of CPR, such as time to first defibrillation, and whether the selection of medications and their sequential administration were appropriate for the corresponding rhythm disturbances.

Committees do not regularly scrutinize CPR attempts for appropriate clinical indications.

This approach differs from continuous quality improvement activities for other invasive procedures, such as bronchoscopy and coronary angiography. This difference in approaches is particularly striking, given the high morbidity and mortality associated with CPR.

Why is CPR assessed with less rigor?

A decision about whether resuscitation should or should not be attempted was documented on admission in only 10% of cases.

Our Advisors thought DNACPR should have been documented in a further 20%.

In short, **resuscitation was wrongly attempted in many of these cases because nobody had recognised that they were in danger of a cardiac arrest**.

…today we stand at a crossroads. To the left lies a destiny familiar from America where 60% of us will die in an ICU and we will spend 50% of NHS expenditure in the last six months of life, much of it seeking to postpone the inevitable.

This will happen, not because the patient has asked for it or because someone has taken a calculated decision that it is in the patient's interest to make the attempt, but because **the doctors think that they have a duty to do everything that they can to prolong the process of dying**.

"The success of intensive care is not to be measured only by the statistics of survival, as though each death were a medical failure. It is to be measured by the quality of lives preserved or restored, **the quality of the dying of those in whose interest it is to die** and by **the quality of relationships involved in each death**."

Dunstan GR: Hard questions in intensive care. Anaesthesia 1985, 40:479-482

31 198 of 64 339 (48·5%) patients with IHCA achieved ROSC and 9912 (15·4%) survived to discharge.

The GMC recognises that CPR should be administered in an emergency, but it is not good medical practice to fail to anticipate the needs of the patient before an emergency arises.

If the failure is deliberate or reckless then I suggest that it is arguably criminal.

Year	Hospital 1	Hospital 2
1998	524	?
1999	425	?
2000	330	2063
2001	282	1572

According to the GIA Audit in 2013, there are ~4,000 resuscitations per year in HA hospitals.

Hospital Authority, GIA Audit in Resuscitation Arrangement. July 2002.

Was CPR an appropriate medical therapeutic option?

If CPR is not medically appropriate then why was it used?

Berger JT. JAMA Internal Medicine 2013; 173: 1859-60

Did the attending physician overestimate the potential benefit of CPR?

Is there inadequate knowledge about the natural history of progressive diseases, such as CHF and dementia?

The standard of care and the boundaries of normative practice should be continually refined.

Berger JT. JAMA Internal Medicine 2013; 173: 1859-60

Was CPR an appropriate medical therapeutic option?

If CPR is not medically appropriate then why was it used?

Berger JT. JAMA Internal Medicine 2013; 173: 1859-60

Barriers to Excluding CPR

- **Physician**
- **Patient or surrogate**
- **Hospital/Health system**

Barriers to Excluding CPR

- **Physician**
  - Unclear about their ethical responsibility and professional license to make medical assessments about CPR?
  - Limited communication skills?
  - Uncomfortable with discussions of prognosis and mortality?
  - Personal moral, religious or cultural influences make EOL discussions particularly uncomfortable?

Berger JT. JAMA Internal Medicine 2013; 173: 1859-60

Frontline Talk: Do Not Resuscitate

Review Online

NTEC Patient Relations & Engagement Service

Part I

Dr Catherine CHUI (M&G,TPH)

Powerpoint

Video

Attendance and Evaluation

Part 2

Dr YK KO (MED,NDH)

Powerpoint

Video: episode 1, 2, 3, 4

Dr CY CHAN (A&E,AHNH)

Powerpoint

Video: episode 1, 2, 3, 4

Dr Danny CHAN (NS,PWH)

Powerpoint

Video: episode 1, 2, 3, 4, 5

© Cambridge University Hospitals NHS Foundation Trust

Universal Form of Treatment Options

Addressograph

Relevant information about patient's situation:

Details of discussion (and/or reasons for not having one, if none has taken place):

Please continue overleaf

This patient is for the following treatment plan: *(please sign one of the below boxes, add documentation where appropriate, complete the resuscitation box, and sign and date)*

ACTIVE TREATMENT
e.g. investigations, surgical and medical interventions and treatments, referral to on-call doctors or outreach in event of deterioration

Signature……Date……

OPTIMAL SUPPORTIVE CARE
e.g. analgesia and other comfort measures. This includes minimally invasive treatments (such as paracentesis) to improve symptom control/quality of life. **The patient's comfort should be the priority in determining care.**

Signature……..Date……..

Active Treatment usually includes:
Organ Support or High Dependency Unit if needed and appropriate
(NIV, dialysis, inotropes, venous monitoring, cardioversion, etc.) *and*
Intensive care if needed and appropriate
(intubation and ventilation, support of multi-organ failure, etc)

If you wish to provide guidance on specific interventions please do so below:

This patient is **FOR attempted CARDIOPULMONARY RESUSCITATION** in the event of a cardiac arrest Signature……..	This patient is **NOT FOR attempted CARDIOPULMONARY RESUSCITATION** in the event of a cardiac arrest Signature……..

This form is for review: NO / YES, at the following frequency:

Name	Signature	Date and Time	Designation
			ST3 or above (consultant to countersign within 72 hours)
			Consultant
			Nurse Informed

(Note: if the form is unfilled, unclear, unsigned or missing, the patient is FOR consideration of all active treatments including resuscitation)

Instructions for Review: *Signature of Doctor overleaf indicates that this form is valid as at the time of signing.*
If any alterations are made to original decisions, then please sign changes. If review boxes are full below, a new form must be started.

Note: This form may be temporarily revoked in the context of a procedure which may induce cardiac arrest eg pacing, angiogram, other (please specify):

REVIEW has taken place on

Date and time	Name	Signature	Designation

FREE TEXT for clinical team, patient and next of kin/lasting power of attorney, to include details (attaching relevant documents to the form where appropriate) of advance decisions, personal health plans, preferred priorities of care, and any other specific treatment(s) for which the patient does or does not wish to be considered, as well as details of discussions which have taken place.	**Signature and Date**

Fritz Z, et.al. PLOS One 2013; 8:e70977

Barriers to Excluding CPR

- **Patient or surrogate**
  - Cognitive, emotional and social concerns
  - Health literacy
  - Coping capabilities
  - Preparation for consequences of illness
  - Nonmedical goal for CPR (e.g. to protect family from distress)

Attitude towards life-sustaining treatment

Statements*	Mean† (SD)	P value	Attitude‡
1. If life-prolonging technology exists, it should always be used. (-)	2.98 (1.30)	0.172	Agrees
2. Doctors should generally try to keep their patients alive on machines for as long as possible, no matter how uncomfortable the machines are. (-)	2.81 (1.11)	0.027	Agrees
3. If a patient is expected to die, it is best not to prolong their lives by any means. (+)	2.61 (1.26)	0.011	Disagrees
4. Under no circumstance should life-sustaining machines be stopped. (-)	2.90 (1.22)	0.115	Agrees
5. It is a doctor's duty to stop life-prolonging treatments of patients if a patient does not want them anymore. (+)	3.27 (1.13)	0.024	Agrees
6. When a person is in a vegetative state, medical treatments should not be used to keep them alive. (+)	2.80 (1.23)	0.089	Disagrees
7. If a patient is unable to breathe without a breathing machine, it would be wrong to take them off the machines (even if the condition is hopeless) because that would be killing the patient. (-)	2.77 (1.19)	0.054	Agrees
8. Even if my condition is hopeless, I would want my life prolonged as much as possible, even if it requires life-sustaining machines to keep me alive. (-)	2.57 (1.23)	0.0002	Agrees
9. Every patient should make an advance decision for himself/herself whether to continue life-support treatment (life-sustaining machines) when treatment is futile and he/she is expected to die. (+)	3.62 (1.09)	0.0001	Agrees
10. Someone (doctors, patients, or relatives) should make the decision whether to continue the life-support treatment for the patient when all the medical therapy is no longer effective. (+)	3.34 (1.22)	0.0003	Agrees

Lee JCY, Chen PP, Yeo JKS, So HY. HKMJ 2003; 9:186-91

Barriers to Excluding CPR

- **Hospital/Health system (Institutional)**
  - Failure to retrieve advance directive documents archived in hospital records
  - Fidelity in which the patient's code status is communicated to all clinicians caring for patient
  - Availability of clinical ethics consultation and palliative care services
  - Assistance for manage emotionally overwhelmed patients/families

Berger JT. JAMA Internal Medicine 2013; 173: 1859-60

Management of IHCA

Timely

Effective

Appropriate

Adverse Signs Before Cardiac Arrest

Adverse Sign	%	Adverse Sign	%
RR>30/min	48.6%	Heart rate <40/min	4.1%
SpO_2 <90%	45.9%	RR <10/min	2.7%
HR >140/min	23.0%	GCS <11	1.4%
SBP <90mmHg	21.6%	Coma	1.4%
Arterial pH<7.25	10.8%	Serum pH >7.55	Nil
Serum Na <140mmol/L	8.1%	Serum K <2.5	Nil
Serum K >5.5mmol/L	6.8%	Serum Na >150mmol/L	Nil
Oliguria	5.4%	Convulsion	Nil

So HY. Crit Care & Shock 2001; 4: 182-7

ACADEMIA

638 Primary Events											
308 Deaths				141 Cardiac Arrests				189 ICU admissions			
168 With antecedents		140 Without antecedents		112 With antecedents		29 Without antecedents		103 With antecedents		86 Without antecedents	
148 With DNAR	20 Without DNAR	12 With DNAR	16 Without DNAR	16 With DNAR	96 Without DNAR	7 With DNAR	22 Without DNAR	10 With DNAR	93 Without DNAR	3 With DNAR	83 Without DNAR

Kause J, et.al. Resuscitation 2004; 62:275-82

Causes of Suboptimal Care

- Failure of organization
- Lack of knowledge
- Failure to appreciate urgency
- Lack of experience
- Failure to seek advice
- Lack of supervision
- Medical staff not available
- Failure of equipment
- Fatigue
- Non-medical staff not available

McQuillan P, et.al. BMJ 1998; 316:1853-8

Medical Emergency Team (MET)

The concept of Cardiac Arrest Team is changed to a Medical Emergency Team in our institution.

Instead of waiting until the patient all but dies, the MET is called according to physiological abnormalities such as hypotension and tachypnoea…

	Before MET	After MET	Difference (95% CI)	Relative risk ratio (95% CI)
No. of cardiac arrests	63	22	41 (23–59)	0.35 (0.22–0.57)
Deaths from cardiac arrest	37	16	21 (7–35)	0.43 (0.26–0.70)
No. of days in ICU after cardiac arrest	163	33	130 (110–150)	0.20 (0.13–0.33)
No. of days in hospital after cardiac arrest	1353	159	1194 (1119–1269)	0.11 (0.09–0.13)
Inpatient deaths	302	222	80 (37–123)	0.74 (0.70–0.79)

Lee A, et.al. Anaesth Intensive Care 1995; 23:183-6

MERIT

	Control	MET	p	Difference (95% CI)*	Adjusted p	Adjusted odds ratio (95% CI)	ICC (95% CI)	DEFT
Primary outcome	5·86	5·31	0·804	−0·264 (−2·449 to 1·921)	0·640	0·98 (0·83 to 1·16)	0·0666 (0·0525 to 0·0841)	4·018
Cardiac arrest†	1·64	1·31	0·306	−0·208 (−0·620 to 0·204)	0·736	0·94 (0·79 to 1·13)	0·0196 (0·0065 to 0·0707)	1·511
Unplanned ICU admission	4·68	4·19	0·899	−0·135 (−2·330 to 2·060)	0·599	1·04 (0·89 to 1·21)	0·0951 (0·0757 to 0·1191)	4·258
Unexpected death†	1·18	1·06	0·564	−0·093 (−0·423 to 0·237)	0·752	1·03 (0·84 to 1·28)	0·0205 (0·0061 to 0·0663)	1·457

Outcome data are crude rate per 1000 admissions. ICC= intraclass correlation coefficient. *Difference weighted by number of hospital admissions during study period. †Excludes events with pre-existing NFR orders.

Table 3: Primary and secondary outcomes during study period

The MET system greatly increased the frequency of emergency team calling but did not decrease cardiac arrests, unplanned ICU admissions or unexpected death.

Hillman J, et.al. Lancet 2005; 365:2091-7

MERIT?

…a cluster randomized design leads to a loss of statistical power when compared with a patient-randomized study.

Even though over 70 000 patients and 15 000 adverse events were recorded in the 23 hospitals, Hillman (2006) suggests the study was underpowered and would have needed the participation of over 100 hospitals to show any difference.

MERIT?

Implementation of any acute resuscitation team is complex, and arguably requires a change in culture and communication patterns. Culture change rarely occurs rapidly and needs more than just didactic education.

As such, 4 months may be an insufficient preparatory time, and 6 months an insufficient study period.

Chain of Prevention

Smith GB. Resuscitation 2010; 81:1209-11

Resuscitation (2008) **77**, 170–179

available at www.sciencedirect.com

ScienceDirect

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

REVIEW PAPER

Review and performance evaluation of aggregate weighted 'track and trigger' systems☆

Gary B. Smith[a,*], David R. Prytherch[b], Paul E. Schmidt[b], Peter I. Featherstone[b]

Resuscitation (2008) **79**, 11–21

available at www.sciencedirect.com

ScienceDirect

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

CLINICAL PAPER

A review, and performance evaluation, of single-parameter ''track and trigger'' systems☆

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Modified **E**arly **W**arning **S**igns (MEWS)

Score	3	2	1	0	1	2	3
RR		≤8		9-14	15-20	21-29	>29
HR		≤40	41-50	51-100	101-110	111-129	>129
SBP	≤70	71-80	81-100	101-199		≥200	
UO	Nil	<0.5					
Temp		≤35	35.1-36	36.1-38	38.1-38.5	≥38.6	
Neurol				Alert	Voice	Pain	Unresp

Gardner-Thorpe J, et.al. Ann R Coll Surg Engl 2006; 88:571-75

HONG KONG EAST CLUSTER

港 島 東 醫 院 聯 網

Effect of Implementation of Modified Early Warning Score (MEWS) in PYNEH on Outcome of *Adult Septic Patients* Compared with Regional Hospitals Not Implementing MEWS

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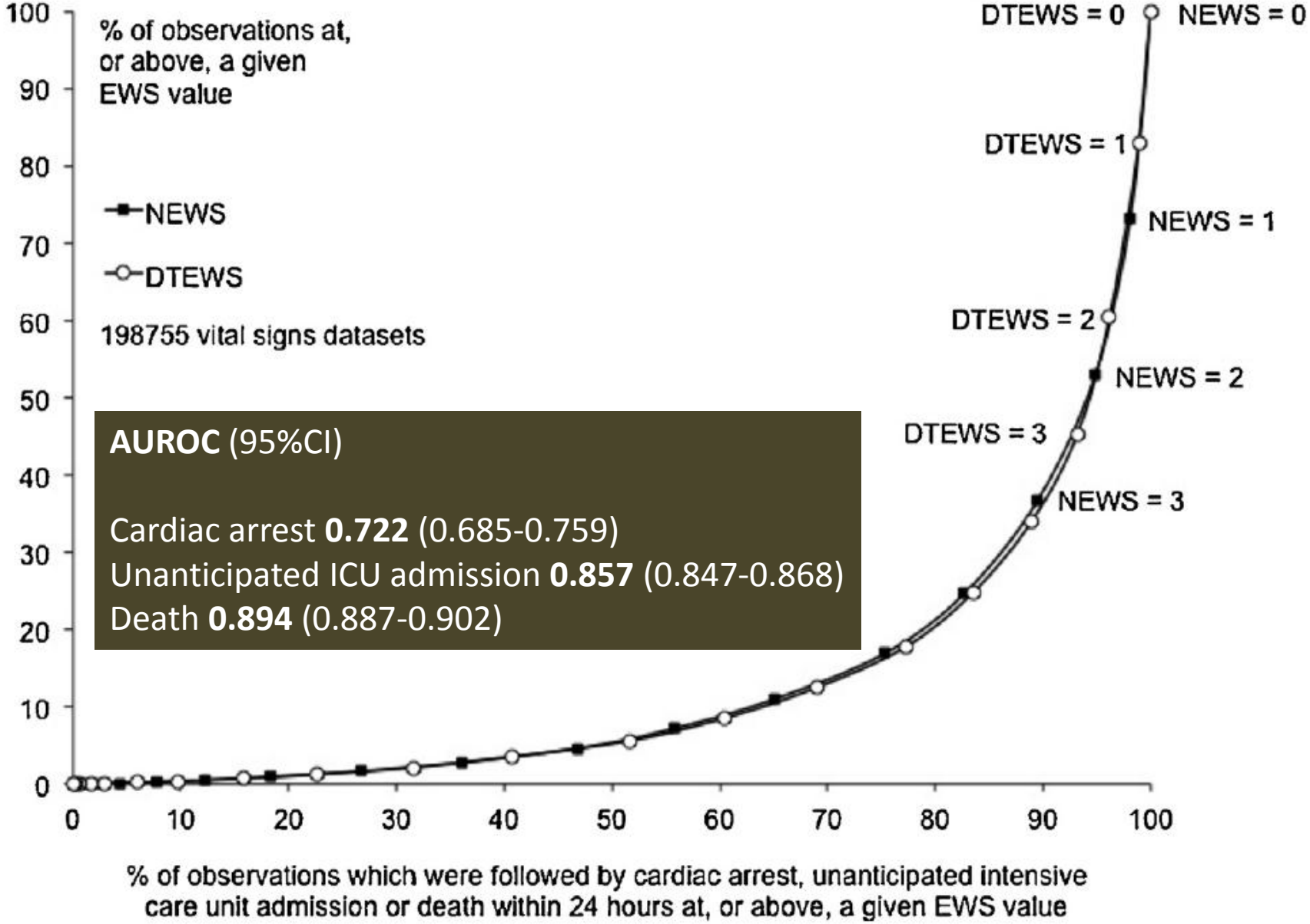
PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

*The NEWS initiative flowed from the Royal College of Physicians' NEWSDIG, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for Innovation.

Royal College of Physicians

NHS Training for Innovation

Royal College of Physicians. ***National Early Warning Score: Standardising the assessment of acute illness severity in the NHS***. RCP 2012



AUROC (95%CI)

Cardiac arrest **0.722** (0.685-0.759)
Unanticipated ICU admission **0.857** (0.847-0.868)
Death **0.894** (0.887-0.902)

Badriyah T, et.al. Resuscitation 2013 Dec 19 (Epub)

Cardiac Arrest Risk Triage (CART)

Vital Sign	Score
Respiratory rate, breaths/min	
<21	0
21-23	8
24-25	12
26-29	15
>29	22
Heart rate, beats/min	
<110	0
110-139	4
>139	13
Diastolic BP, mm Hg	
>49	0
40-49	4
35-39	6
<35	13
Age, y	
<55	0
55-69	4
>69	9

Best for predicting cardiac arrest (AUC 0.83), ICU transfer (0.77) and composite outcome (0.78)

Churpek MM, et.al. Chest 2013; 143:1758-65

Chain of Prevention

Smith GB. Resuscitation 2010; 81:1209-11

the effectiveness of a rapid response system (RRS) programme ". . .is dependent not only on the existence of an MET but mainly on the **periodic and continued education and training of the entire hospital staff** . . .".

Management of IHCA

Timely

Effective

Appropriate