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Post Cardiac Arrest Syndrome: Knowledge and attitudes of Emergency, Cardiology and ICU staff in two tertiary centres in Ireland (a pilot study)

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Background / Aim

Aims:

- ▶ We aimed to survey knowledge, management and attitudes towards post-cardiac arrest care including prognostication amongst medical and nursing staff from Emergency Medicine, Cardiology and Intensive Care services.

Background:

- ▶ In recent years significant advances have occurred in the management of post cardiac arrest syndrome, including the use of therapeutic hypothermia and early PCI. ILCOR have published guidelines for optimal post ROSC ¹. We were interested in exploring the knowledge and management priorities of post cardiac arrest patients amongst different medical specialties who are involved in this aspect of care on a regular basis.
- ▶ Following literature review, it became evident that data assessing underlying knowledge and opinions of physicians and nursing staff in the management and prognostication of post arrest patients was limited.
- ▶ Also following the recent publication of Nielsen et al, Targeted Temperature Management Trial in November 2013 ², we wished to assess if underlying knowledge or local guidelines had changed
 - ¹Neumar RW, Nolan JP, Adrie C, et al. Post-cardiac arrest syndrome: epidemiology, pathophysiology, treatment, and prognostication: a consensus statement from the International Liaison Committee on Resuscitation. *Circulation*. 2008;118:2452-2483
 - ²(Nielsen N, et al for the TTM Trial Investigators. Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest. November 17, 2013 DOI: 10.1056/NEJMoa1310519)

Methods / Demographics

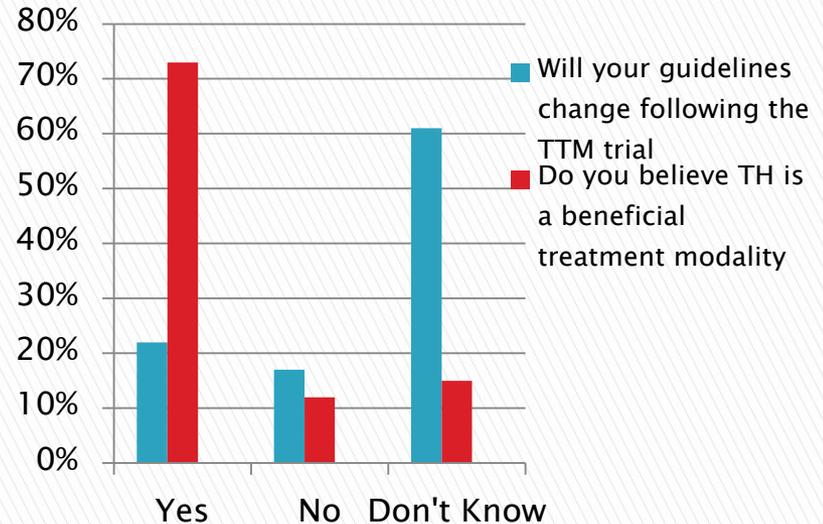
- ▶ A survey of registrars, consultants and senior nursing staff involved in the care of post arrest patients in the disciplines of Emergency Medicine, Cardiology and Intensive Care was undertaken electronically using “Survey Gizmo” and paper based questionnaires and analysed using the R Commander statistics program. The sample included participants from two Dublin based tertiary hospitals. As both hospitals are tertiary training centres and would follow similar management practices this sample is assumed to be representative.
- ▶ Inclusion criteria included any doctor working in the above specialties at registrar level or above and senior nursing staff. There were no direct intervention or change to patient care.
- ▶ We received 69 replies, 60 completed surveys and 9 partially complete.
- ▶ Of those 36 (52%) respondents were female, 33 (48%) respondents were male.
- ▶ 51 (74%) were of a medical background and 18 (26%) were of a nursing background.
- ▶ Of the subspecialties 12(17%) worked in Cardiology, 22 (32%) worked in Emergency Medicine and 35 (50%) worked in Intensive Care or Anaesthesia.
- ▶ 50 (72%) of respondents were between the ages of 31–50.
- ▶ All figures have been rounded to the nearest whole percentage or 0.5% as appropriate.

Regarding Therapeutic Hypothermia

TH (n=69)	Yes	No	Don't Know		
TH is indicated in <u>ALL</u> cardiac arrests with COMA	39%	54%	7%		
Prevention of hyperthermia is more important	67%	20%	13%		
Rhythms TH is indicated in -	VF/VT	PEA	Asystole	All	None
	49%	1%	3%	46%	1%
Time to achieve TH	1-6 hr	6-12 hr	12-24hr		
	48%	42%	10%		
Target Temperature (°C)	32-34	34-36	>36		
	74%	23%	3%		
TH Duration	<24hr	24hr	48hr	72hr	
	4%	72%	21%	3%	
Methods (/69)	Blankets	Ice Packs	Chilled IV fluids	Other Method	
	93%	49%	39%	16%	
Monitoring	Continuous	Intermittent	Core	Periph	
	99%	1%	94%	6%	

It was felt that the following were contraindications to cooling - recent surgery (41%), coagulopathy (67%), sepsis (42%), refractory shock despite pressors (55%), major trauma (45%) and toxicological causes of cardiac arrest (33%)

TTM



As one can see on the table to the left, despite ILCOR guidelines suggesting cooling for all post arrest cases with coma, opinions were divided on whether this was indicated. It was also noted that there was divided opinion on what arrest rhythms should be cooled. A majority (67%) agreed that prevention of hyperpyrexia was very important in post arrest management. 90% felt cooling should be achieved within 6 hours of ROSC. And following current guidelines 74% felt the target temperature was 32-34°C. The majority of respondents felt cooling should be continued for 24 hours (72%). Most stated they achieved cooling using cooling blankets, ice packs and chilled intravenous fluids. All agreed monitoring should be continuous with a preference for core monitoring. Despite the publication of the TTM trial the majority did not know if their local guidelines would change - it was commented on that it would be difficult without an amendment in ILCOR guidelines. Interestingly despite the above trial 3 months prior to our survey, over 70% of respondents still felt that TH was a beneficial treatment modality.

Cardiac Intervention

	Yes	No	Don't Know
Angiography is indicated in all ECGs demonstrating STEMI.	98%	2%	0%
Angiography is indicated in all ECGs demonstrating new LBBB	70%	20.5%	9.5%
Angiography is indicated in all ECGs demonstrating diffuse ischaemia	37%	44%	19%
ECHO should be preformed prior to angiography	28.5%	67%	4.5%
CT brain should be performed prior to angiography	16%	78%	6%
Refractory arrests should go to the cardiac catheterisation laboratory on ECMO or LUCAS II	26%	35%	39%
Is there a role for Level 1 Post Cardiac Arrest Centres	75%	19%	6%

It was felt one should consider angiography in the following cases - VF (49%), VT (43%), cardiogenic shock (39%), rising troponin (52%).

We can see from the data above, as expected, the vast majority of respondents felt angiography was indicated in all ECGs demonstrating STEMI (98%). Regarding new LBBB 70% felt angiography was warranted. However, with an ECG demonstrating diffuse ischaemia opinion was divided on need for angiography. CT Brain and ECHO are often performed in post cardiac arrest cases although the majority of respondents indicated they believed these to be unnecessary. Opinion was divided regarding refractory cardiac arrest being brought to the cardiac catheterisation laboratory on ECMO or external compression. It was commented several times that this should be considered in certain select cases (eg young patients, local capabilities). The vast majority felt there was a role for national level 1 Post arrest care centres.

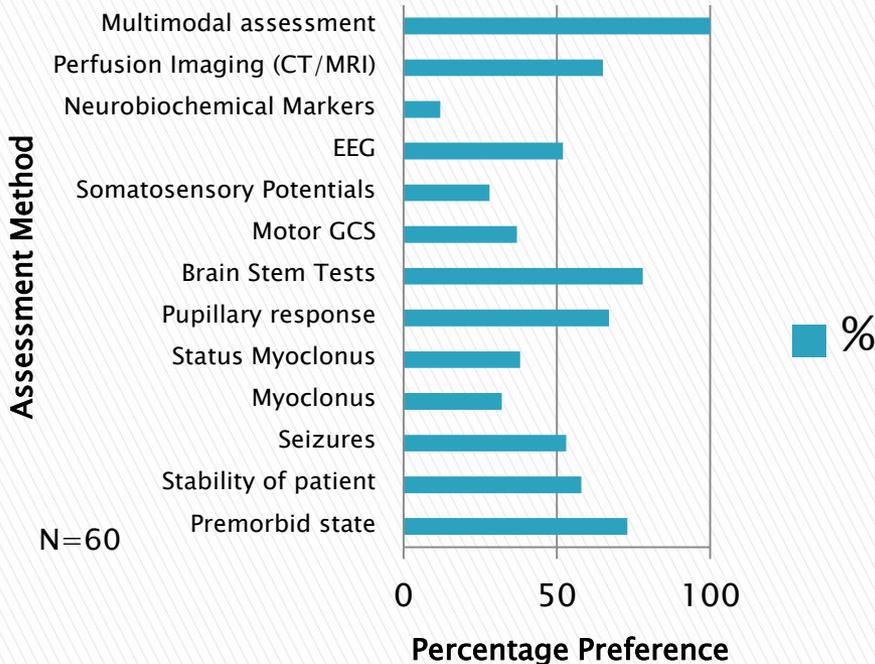
Physiological Goals

When questioned regarding preferred physiological targets responses were generally in line with ILCOR and American Heart association guidelines. The majority felt oxygen saturation should be maintained at >94% (85%). Regarding target Mean arterial pressure (MAP) most felt between 60-70mmHg was adequate. While most felt continual EEG monitoring was ideal it was noted it is not available in most settings. Target blood sugar demonstrated a preference for a range between 5-8mmol allowing for mild hyperglycaemia. It was commented that up to 10mmol was ideal. Most felt a urine output of >0.5ml/kg/hr was ideal in contrast to ILCOR who suggest >1ml/kg/hr, however, it was noted that the risk of pulmonary oedema increases with a large fluid load. Opinions differed regarding optimal haemoglobin with the majority indicating a preference for >10g/dL. Regarding vasopressors, 97% indicated a preference for Noradrenaline. 72% indicated a preference for Dobutamine as their first line Inotrope.

Oxygen Saturation (%)	90-93	94-96	>96	
	15%	47.5%	37.5%	
MAP target (mmHg)	60-70	70-80	>80	
	56%	36%	8%	
Continual EEG Monitoring	Yes	No	Don't Know	
	52%	33%	15%	
Target Blood sugar Level (mmol)	<5	5-8	>10	
	0%	97%	3%	
Target Urine Output (ml/kg/hr)	<0.5	>0.5	>1	
	0%	69%	31%	
Target Haemoglobin g/dl	>7	>8	>9	>10
	13%	16.5%	18%	52.5%

Prognostication

Regarding prognostication, 46% of respondents felt this should be performed 72 hours after the cessation of cooling. 45% felt that there was no accurate way to prognosticate outcome (32% yes, 23% don't know). 48% felt that the appropriate time to prognosticate differed depending on whether TH was performed or not (33% no, 18% don't know). As we can see on the table below, all respondents felt the most appropriate way to prognosticate involved multimodal assessments. Additional preferences included perfusion imaging, brain stem testing, pupillary response and overall patient assessment in terms of premorbid state and the patient's stability.



Attitudes

Do any of the following influence your attitude towards a case of a patient with post cardiac arrest syndrome?

Patient Age (/60)	20-50	50-60	60-70	70-80	80-90	>90
	100%	82%	70%	34%	17%	13%
Downtime prior to ROSC		Yes	No	Don't Know		
		77%	18%	5%		
Patient Comorbidities		Yes	No	Don't know		
		75%	18%	7%		
Precipitant of arrest		Yes	No	Don't know		
		53%	37%	10%		
Potential for organ donation		Yes	No	Don't know		
		41%	52%	7%		
Family / Next of kin views		Yes	No	Don't know		
		53%	35%	12%		

Attitudes to intervention across the age ranges of patients corresponded generally to expectation, with greater caution in regards to the likelihood of a positive outcome in higher age brackets. 77% of respondents reported that the downtime of the patient played a significant part in their assessment of a possible positive outcome. Findings for comorbidities were similar (75% of respondents). While a significantly higher percentage (53%) would consider the precipitant of the cardiac arrest would influence their expectation of favourable outcome, 37% considered that it would not, with 10% uncertain. Where a potential organ donor is concerned, 41% stated that this would influence their assessment of the case while 52% stated that it would not. Although the concerns of the next of kin do not constitute a medical evaluation, 53% of respondents felt that they were relevant in their assessment.

Differences between the medical subspecialties

▶ Differences that were noted included

- When asked if cooling was indicated in all cardiac arrests with coma only 10/35 respondents from ICU agreed whereas 5/12 from Cardiology and 12/22 from Emergency agreed. A chi squared analysis was performed demonstrating a statistically significant difference. X-squared = 15.0147, df = 4, p-value = 0.004671
- When asked if prevention of hyperpyrexia was more important than therapeutic hypothermia 27/35 ICU staff agreed, 4/12 Cardiology and 15/22 Emergency Staff agreed. Again a chi square analysis was done which demonstrated this difference was statistically significant. X-squared = 13.0922, df = 4, p-value = 0.01083
- Its important to note with both of the above results, whereas there is a clear difference between the above disciplines our numbers were small in particular from Cardiology where we had 12 total respondents. Perhaps this also demonstrates early knowledge regarding the new TTM trial (regarding prevention of hyperpyrexia) or that while TH is recommended for VF arrest, it is suggested in the setting of other rhythms.
- Across other management opinions were reasonably consistent with no statistically significant differences noted.
- However, upon questioning regarding the optimal haemoglobin the results were as follows-

Target Haemoglobin g/dl	>7	>8	>9	>10
Cardiology	0%	16.5 %	16.5%	67%
Emergency Medicine	5%	9.5%	9.5%	76%
Intensive Care / Anaesthesia	25%	21%	25%	29%

- It is clear reviewing above that while Cardiology and Emergency Medicine considered a haemoglobin above 10g/dL important whereas ICU staff were divided on this question. The explanation for that is unclear and will need to be further evaluated. There is no optimal documented target level recommended formally by ILCOR in their most recent guideline. Again doing a chi square analysis demonstrated the above as being a statistically significant difference. X-squared = 68.0848, df = 6, p-value = <0.01

Conclusions

- ▶ Knowledge and attitudes towards the management of post cardiac arrest cases amongst medical staff generally conformed to international guidelines, however while the guidelines suggest TH in all arrest rhythms (and recommend it in VF), 49% of respondents to this survey consider it only indicated in VF / VT. This is consistent with the original evidence base for TH.
- ▶ Though in general aware of the recent trial (TTM, Nielsen et al), 72% of respondents consider that TH to be a beneficial treatment modality. Some commented that they would not expect local guidelines to change in advance of international guidelines.
- ▶ There was little difference noted amongst the subspecialties except that ICU staff in particular did not feel TH was warranted in all cardiac arrests with coma and Cardiology did not feel prevention of hyperpyrexia took precedence over TH. Also it was noted that there was a marked difference amongst ICU/ Anaesthesia regarding the optimal haemoglobin for these patients which at present we are unable to explain.
- ▶ Limitations included a small sample size including a small Cardiology response (12). Regrettably we did not obtain any responses from any cardiology nurses therefore were not able to analyse the differences amongst nurses.
- ▶ From this study we can see that international guidelines are generally well conformed to. However, we would propose consideration of a survey of all tertiary centres to further evaluate this. Also with the recent publication of Nielsen et al, Targeted Temperature Management Trial in November 2013 there will likely be a slow shift away from targeted temperature management at 33°C with a broader focus on maintenance of temperature of 36°C or less and prevention of hyperpyrexia. This slow shift and slower adoption of change of practice is in keeping with general adoption of other evidence based medicine interventions which often takes place long after trial publication. This is in stark contrast to the rapid and obvious discussion and debate around this trial and implementation that was described on social media.