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Global Emergency Medicine Journal Club: Social Media Responses to the March 2014 *Annals of Emergency Medicine* Journal Club on Targeted Temperature Management*

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In March 2014, *Annals of Emergency Medicine* continued a successful collaboration with an academic Web site, Academic Life in Emergency Medicine (ALiEM), to host another Global Emergency Medicine Journal Club session featuring the 2013 *New England Journal of Medicine* article “Targeted Temperature Management at 33°C (91.4°F) Versus 36°C (96.8°F) After Cardiac Arrest” by Nielsen et al. This online journal club used Twitter conversations, a live videocast with the authors, and detailed discussions on the ALiEM Web site’s comment section. This summary article details the community discussion, shared insights, and analytic data generated using this novel, multiplatform approach. [Ann Emerg Med. 2014;64:207-212.]

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INTRODUCTION

As described in previous publications, *Annals of Emergency Medicine* and Academic Life in Emergency Medicine (ALiEM) launched a shared initiative to increase awareness of key emergency medicine literature, increase the speed of knowledge translation, and provide an educational resource to teach critical appraisal to emergency physicians.^{1,2} The Global Emergency Medicine Journal Club combines an academic blog’s experience in educational discussions on social media with *Annals’* experience with critical appraisal and evidence-based medicine. In this third Global Emergency Medicine Journal Club, we featured the 2013 article by Nielsen et al.³

Before the launch of the Global Emergency Medicine Journal Club, the online discussion of the Nielsen et al³ targeted temperature management article was extensive.³ Its Altmetric score⁴ of 470 on January 20, 2014, placed it within the top 50 highest-rated articles ever published in the *New England Journal of Medicine* and the 99th percentile of all articles rated by the service.⁵ Multiple prominent clinician-educators declared that the article was practice-changing because of its relatively large study population and robust methodology.

MATERIALS AND METHODS

The *Annals* editors selected the article for the third edition of the Global Emergency Medicine Journal Club collaboration with ALiEM.⁶ Three facilitators were chosen for their expertise in critical appraisal (D.R.) and medical education (B.T., M.L.). Two were experienced bloggers (BoringEM and ALiEM, B.T.; ALiEM, M.L.) and have a broad, international reach on Twitter,

*The #ALiEMJC Twitter and Google Hangout videocast participants and supporters are listed in the [Appendix](#).

with more than 1,600 (B.T.; @Brent_Thoma) and 5,000 (M.L.; @M_Lin) followers at the discussion.

Before selection of the Global Emergency Medicine Journal Club questions, an inventory of the previous social media discussions on the targeted temperature management trial was taken. The Boolean search term “targeted temperature management” was entered into Google and FOAMSearch⁷ on March 10, 2014. The first 100 results of each engine and any blog posts or podcasts linked to within them were reviewed. All blog posts and podcasts discussing the trial were compiled. Consensus was developed on the 4 questions between the *Annals* editors and authors according to the results of this review and the questions posed in the March 2014 edition of the *Annals* journal club.⁶

The facilitators’ goal during the Global Emergency Medicine Journal Club was to encourage discussion and reflection on 4 preselected discussion questions and 1 poll question about current clinical practices. On March 25, 2014, a live Google Hangout videocast was used to host a discussion between Dr. Niklas Nielsen (Lund University, Sweden), the lead author of the targeted temperature management article, and representatives from ALiEM and *Annals*. The questions for the videocast were developed collaboratively by the participants according to the Twitter and blog discussions.

The Global Emergency Medicine Journal Club was hosted on the ALiEM Web site, with comments moderated on the blog and Twitter. The format of the discussion was similar to that of the November 2013¹ and January 2014² Global Emergency Medicine Journal Club. Promotion for the Journal Club included notices on the ALiEM and *Annals* Web sites, Facebook pages, and Google+ pages. Ongoing promotion occurred throughout the week, with tweets including the #ALiEMJC hashtag from the *Annals’* and facilitators’ Twitter accounts. Google Analytics, the ALiEM Social Media Widget, YouTube Analytics, and Symplur were used to

Table 1. Online blog posts and podcasts discussing the targeted temperature management article.

Web site	Author	Title	Type	Country	Date
Ambo FOAM	Robert Simpson	Therapeutic hypothermia after cardiac arrest: just not cool anymore?	Blog	Australia	November 19, 2013
Crit-IQ	Christopher Poynter	TTM: game changer or just another piece of the jigsaw?	Blog	New Zealand	November 22, 2013
EM Nerd	Rory Spiegel	The adventure of the empty house	Blog	United States	November 19, 2013
EMCrit	Scott Weingart	EMCrit Wee: the targeted temperature trial changes everything	Podcast	United States	November 18, 2013
EMCrit	Scott Weingart	Five minutes with Jon Rittenberger on the TTM trial	Podcast	United States	November 18, 2013
EMCrit	Scott Weingart	Post cardiac arrest care in 2013 with Stephen Bernard (part 1)	Podcast	United States	December 10, 2013
EMCrit	Scott Weingart	Post cardiac arrest care in 2013 with Stephen Bernard (part 2)	Podcast	United States	December 17, 2013
Emergence Phenomena	Ang Shiang-Hu	Is this the end of therapeutic hypothermia?	Blog	Singapore	November 19, 2013
EM Lit of Note	Ryan Radecki	Giving hypothermia the cold shoulder	Blog	United States	November 20, 2013
Intensive Care Network	Mathew Mac Partlin	Niklas Nielsen interview, 1 week post TTM publication	Podcast	Australia	November 25, 2013
Intensive Care Network	Oliver Flower	Cooling post OOHCA: the world has just changed	Blog	Australia	November 18, 2013
KI Docs	Tim Leeuwenberg	Should I cool the cardiac arrest patient?	Blog	Australia	November 19, 2013
Life in the Fast Lane	Chris Nickson	TTM after cardiac arrest	Blog	Australia	December 2, 2013
Life in the Fast Lane	Mike Cadogan	All in a lather over TTM	Blog	Australia	November 20, 2013
Life in the Fast Lane	Chris Nickson	Reports of therapeutic hypothermia's death are greatly exaggerated	Blog	Australia	December 1, 2013
Life in the Fast Lane	David Denman	We need to talk about TTM...again	Blog	Australia	March 8, 2014
Medical Evidence Blog	Scott Aberegg	Chill out: homeopathic hypothermia after cardiac arrest	Blog	United States	November 20, 2013
MERITUS	Kasia Hampton	Not-so-therapeutic hypothermia?	Blog	United States	November 19, 2013
PulmCCM	Anonymous	Hypothermia did not help in OOHCA in largest study yet	Blog	United States	November 23, 2013
Resus Review	Charles Bruen	Therapeutic hypothermia: the history of general refrigeration	Podcast	United States	November 28, 2013
Resus.Me	Cliff Reid	Therapeutic hypothermia does not improve arrest outcome	Blog	Australia	November 18, 2013
ScanCrit	Anonymous	Therapeutic hypothermia: Not so cool	Blog	Anonymous	November 18, 2013
SOCMOB	Chris Bond	Calgary EM Journal Club: therapeutic hypothermia—TTM Trial	Blog	Canada	February 28, 2014
St. Emlyn's Blog	Simon Carley	What's the target temperature for OOHA cooling?	Blog	United Kingdom	November 18, 2013
The RAGE Podcast	Chris Nickson et al	The post-TTM era: homeopathic hypothermia or aggressive normothermia?	Podcast	International	December 26, 2013

TTM, Targeted temperature management; OOHCA, out-of-hospital cardiac arrest.

track metrics for viewership, social media, the videocast, and Twitter, respectively. The number of comments and words per comment in the blog discussion were calculated, excluding the initial comments by the facilitators and all references. All analytics were recorded during a 14-day period. The Twitter and blog discussions on each question were analyzed with a qualitative thematic analysis by one author (B.T.) and member checked by a second (D.R.).

RESULTS

The inventory of blog posts and podcasts previously discussing the targeted temperature management trial³ is presented in Table 1. There were 18 blog posts and 7 podcasts, of which 17 were published within 1 week of the online publication of the targeted temperature management trial.³ The analytics data for the Global Emergency Medicine Journal Club, which occurred between March 20 and April 2, 2014, are summarized

in Table 2. The geographic distribution of participants is outlined in Figure 1.

SUMMARY OF THE GLOBAL EMERGENCY MEDICINE JOURNAL CLUB DISCUSSION

A vigorous discussion surrounding the 4 Global Emergency Medicine Journal Club questions occurred on Twitter and the ALiEM blog (Figure 2). It is summarized below, and a full transcript is archived at <http://academiclifeinem.com/aliem-annals-em-journal-club-targeted-temperature-management/>.

Q1: If you were creating a cardiac arrest protocol in your hospital, what would you set for the target temperature? Do you think the temperature or the protocol is more important for survival?

The difference in the results between the targeted temperature management trial and the previous hypothermia trials was attributed to hyperthermia and unbalanced care between the control and treatment groups in the trials by Bernard et al⁸ and

Table 2. Aggregate analytic data on the journal club discussion for the first 14 days of the event.

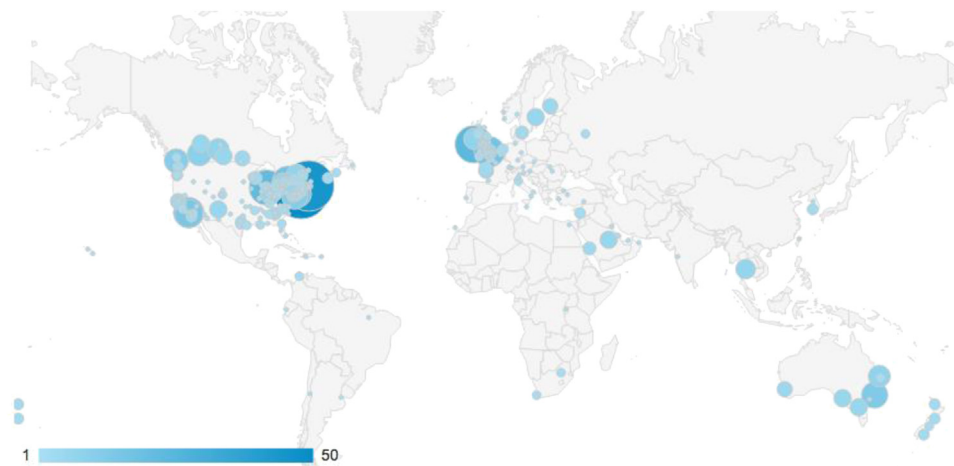
Social Media Analytic Aggregator	Metric	Metric Definition	Count
Google Analytics	Page views	Number of times the Web page containing the post was viewed	1,401
	Users	Number of times individuals from different IP addresses viewed the site (previously termed “unique visitors” by Google)	1,189
	Number of cities	Number of unique jurisdictions by city as registered by Google Analytics	433
	Number of countries	Number of unique jurisdictions by country as registered by Google Analytics	60
	Average time on page	Average amount of time spent by a viewer on the page	4:23 min (site average: 2:02 min)
ALiEM Blog	Number of tweets from page	Number of unique 140-character notifications sent directly from the blog post by Twitter to raise awareness of the post	118
	Number of Facebook likes	Number of times viewers “liked” the post through Facebook	28
	Number of Google+ shares	Number of times viewers shared the post by Google+	7
	Number of site comments	Comments made directly on the Web site in the blog comments section	31
Symplur Analytics for Twitter hashtag #ALiEMJC ¹⁶	Average word count per blog comment (excluding citations)	Number of tweets containing the hashtag #ALiEMJC	205
	Number of tweets	Number of unique Twitter participants using the hashtag #ALiEMJC	195
	Number of Twitter participants	How many impressions or potential views of #ALiEMJC tweets appear in users’ Twitter streams, as calculated by number of tweets per participant and multiplying it with the number of followers of that participant has	58
	Twitter impressions		313,229
YouTube Analytics	Length of videocast	Total duration of recorded Google Hangout videoconference session	26:46 min
	Number of views	Number of times the YouTube video was viewed	124
	Average duration of viewing		8:37 min

Hypothermia After Cardiac Arrest⁹ trials. As illustrated by the results of our poll (Table 3), the majority of the readers believed that the weight of the evidence supports a target of 36°C (96.8°F). The discussion participants echoed the sentiments expressed in the poll, with some caveats. A notable proponent against changing current practices to 36°C (96.8°F) was Dr. Hangyul Chung-Esaki (University of California, San Francisco, by blog comment), who noted that the 33°C (91.4°F) group may have been sicker, active cooling was needed in both groups, and there is still uncertainty surrounding optimal timing and length for cooling.

Many of the participants registered concerns about patients inadvertently reaching higher temperatures when 36°C (96.8°F) is targeted. Dr. Joe Bednarczyk (University of Manitoba, Canada, by

blog comment) noted that “in the targeted temperature management trial caregivers were in a rigid protocol under the microscope of a study setting. Real world temperature control may be different.” Several participants echoed Dr. Chris Bond’s (University of Calgary, Canada, by blog comment) sentiments when he said that this trial cannot allow “us to become lackadaisical about preventing hyperthermia” because maintaining 36°C (96.8°F) is still likely to require active cooling and as much vigilance as 33°C (91.4°F). Drs. Teresa Chan (McMaster University, Canada, by blog comment) and Bednarczyk suggested targeting a range of temperatures (eg, 33°C [91.4°F] to 36°C [96.8°F]).

The question of the relative contribution of the protocol versus the temperature was even more nuanced. Drs. Nelson

**Figure 1.** Geographic distribution of readers who viewed the Global Emergency Medicine Journal Club during the first 14 days.

Q1: If you were creating a cardiac arrest protocol in your hospital, what would you set for the target temperature? Do you think the temperature or the protocol is more important for survival?

Q2: The authors note the inability to blind the critical care practitioners; however, they were able to blind the assessors providing follow-up neurologic examination. Were the methods used to eliminate the risk of critical care provider bias sufficient?

Q3: Do you think there is a subgroup of patients who will benefit from cooling to lower temperatures (ie, 32°C [89.6°F] to 34°C [93.2°F])?

Q4: The authors examined the primary outcome of survival time and followed patients to the end of the trial (ie, 180 days after the enrollment of the last patient) and powered the study to this outcome. The trial was designed as a superiority trial to detect a 20% reduction in the hazard ratio for death with hypothermia at 33°C (91.4°F) versus a control group at 36°C (96.8°F). Was the study appropriately powered for this outcome? How would the power calculations change if the study design were a noninferiority trial of relative normothermia at 36°C (96.8°F) versus hypothermia at 33°C (91.4°F)?

Figure 2. Featured questions for journal club audience.

Wong (Massachusetts General Hospital, by blog comment) and Salim Rezaie (University of Texas, San Antonio, by blog comment) referenced the similarities between this trial and the recent ProCESS trial on sepsis care.¹⁰ In both, the intervention was a multifactorial protocol, making it difficult to distinguish which factors resulted in the benefit or whether it was solely the result of the increased attention that patients under methodical care received. Dr. Ryan Radecki (University of Texas, Houston, by blog comment) called for further research in this area, noting that the effect of sedation duration, sedation medication, and simple hyperthermia management has yet to be examined in this population.

Q2: The authors noted the inability to blind the critical care practitioners; however, they were able to blind the assessors providing follow-up neurologic examination. Were the methods used to eliminate the risk of critical care provider bias sufficient?

Insufficient blinding can bias results. However, it is not possible to blind care providers to an essential vital sign, particularly when they will need to change care to reach a particular target value. The general sentiment was that the blinding had been as rigorous as possible. Ms. Eve Purdy (Queen's University, Canada, by blog comment) noted that any biases of the practitioners would have likely favored the 33°C (91.4°F) group. The fact that no difference was found implies that there was minimal bias or that the 33°C (91.4°F) group should have had worse outcomes.

Table 3. Poll responses by Journal Club participants to the question, which of the following statements is true for you and your institution's protocol on patients presenting with out-of-hospital cardiac arrest?

Statement	No. (%)
We should target T=36°C (96.8°F). My institution's OOHCA protocol has not changed to 36°C (96.8°F).	38 (54.3)
We should target T=33°C (91.4°F). My institution's OOHCA protocol has not changed to 36°C (96.8°F).	14 (20.0)
We should target T=36°C (96.8°F). My institution's OOHCA protocol has changed to 36°C (96.8°F).	5 (7.1)
We should target T=36°C (96.8°F). My institution's OOHCA protocol is being changed to 36°C (96.8°F).	5 (7.1)
We should target T=36°C (96.8°F). My institution does not have an OOHCA protocol.	4 (5.7)
We should target T=33°C (91.4°F). My institution does not have an OOHCA protocol.	2 (2.9)
We should target T=33°C (91.4°F). My institution's OOHCA protocol is being changed to 36°C (96.8°F).	1 (1.4)
Other	1.4 (1)
We should target T=33°C (91.4°F). My institution's OOHCA protocol has changed to 36°C (96.8°F).	0
Total	70 (100)

Although the intensivists were not blinded to the target temperature, blinding was incorporated in several ways. Dr. Wong was impressed that the authors were blinded while writing the study, whereas Dr. Bednarczyk noted that blinded neurologists conducted the neurologic assessment before the withdrawal of care. Dr. David Easton (University of Manitoba, Canada, by Twitter) thought that these other blinding protocols are perhaps robust enough to compensate for the nonblinded critical care practitioners (Figure 3).

Q3: Do you think there is a subgroup of patients who will benefit from cooling to lower temperatures (ie, 32°C [89.6°F] to 34°C [93.2°F])?

The consensus was that with the information that we currently have available, we do not know, because this trial was not powered to find differences in the subgroups. Dr. Radecki noted that cardiac arrest is a heterogeneous disease. A single study to investigate subgroups according to cardiac arrest causes and out-of-hospital interventions would be too enormous and expensive to conduct.

Several participants, including Dr. Jean Baptiste Lascarrou (Centre Hospitalier Départemental, France, by blog comment), the study chair of the French Hypothermia After Cardiac Arrest in Non Shockable Rhythm trial¹¹ assessing therapeutic hyperthermia in nonshockable rhythms, thought that a sicker patient population (eg, those with asystole) may benefit more from lower temperatures. However, Dr. Daniel Runde (University of California, Los Angeles, by Twitter) pointed out that if there was a subgroup that fared better in this trial, there must be a subgroup that fared worse to balance the results. The supplementary appendix did separate into shockable (hazard ratio of 33°C [91.4°F]=1.06 [95% confidence interval 0.84 to 1.34]) and nonshockable (hazard ratio of 36°C [96.8°F]=1.08 [95% confidence interval 0.79 to 1.48]) subgroups and found no difference in mortality. However, these hazard ratios contained wide confidence intervals and the study was not powered to find a difference in these subgroups.



David
@dwe123



Follow

Q2 #aliemjc Are any studies perfect? The other robust qualities of study perhaps outweigh this.

Figure 3. Tweet by David Easton, an emergency physician from Winnipeg, about the nonblinding of critical care practitioners in the TTM trial on March 20, 2014.

Q4: The authors examined the primary outcome of survival time and followed patients up to the end of the trial (ie, 180 days after the enrollment of the last patient) and powered the study to this outcome. The trial was designed as a superiority trial to detect a 20% reduction in the hazard ratio for death with hypothermia at 33°C (91.4°F) versus a control group at 36°C (96.8°F). Was the study appropriately powered for this outcome? How would the power calculations change if the study design were a noninferiority trial of relative normothermia at 36°C (96.8°F) versus hypothermia at 33°C (91.4°F)?

This trial was a superiority trial powered to detect a difference in the primary outcome of mortality. Drs. Chan and Wong noted that neurologically intact survival would probably have been a more clinically relevant outcome. However, because finding a significant difference in neurologic outcome would require less power than finding a difference in overall mortality, the study had adequate power to accurately detect differences in this secondary outcome and did not.

The power calculations for the targeted temperature management trial were predicated on the results of the Hypothermia After Cardiac Arrest⁹ trial and that by Bernard et al.⁸ An absolute risk reduction of approximately 11% (which was exceeded by both of these 2002 studies^{8,9}) would have been needed to find a significant difference. The power needed for this comparison was met and no significant difference was found, allowing us to say with confidence that the 33°C (91.4°F) group did not have an 11% absolute risk reduction in mortality relative to the 36°C (96.8°F) group.

Dr. Rolston explained that for outcomes such as mortality, the acceptable noninferiority margin (the amount of difference

that would be considered clinically insignificant) should be very small, with an absolute risk reduction of less than 1% (corresponding with an number needed to treat of >100). Confidently demonstrating this much smaller risk reduction in a noninferiority trial would require a substantially larger population. In this case, Dr. Rolston calculated that a sufficiently powered noninferiority trial with a 1-sided α of .025, power of 90%, and noninferiority margin of 1% to 2% to be somewhere between 25,900 and 105,594 patients. Dr. Sandy Dong (University of Alberta, Canada, by Twitter) came to a similar conclusion without performing the calculation and added that there are no guarantees with regard to certainty (Figure 4).

This is an important distinction to understand because it means that the appropriate conclusion from this trial is not that targeting 33°C (91.4°F) and 36°C (96.8°F) are the same, but that they were not 11% different. Dr. Lascarrou criticized the design and discussions about the targeted temperature management trial for this reason, noting that the researchers “built a superiority trial with an equivalence way of thinking.” In general, the participants thought that this was a very difficult concept to understand comprehensively and suggested several excellent resources.¹²⁻¹⁵

GLOBAL EMERGENCY MEDICINE JOURNAL CLUB POLL

The participants were polled about their thoughts and their institution’s protocol on patients presenting with out-of-hospital cardiac arrest. Of 70 responses, a slight majority (54.3%) indicated that we should target 36°C (96.8°F) but that their protocol had not been changed. The full results are presented in Table 3.



Sandy Dong
@SandyDongMD



Follow

#ALiEMJC Q4: n would likely be impractical for a noninferiority study. 80% power is the norm = 20% of negative studies are wrong!

Figure 4. Tweet by Sandy Dong, the emergency medicine residency director at the University of Alberta, about the power required for a similar noninferiority study on March 21, 2014.

CONCLUSION

The Nielsen et al³ 2013 targeted temperature management article was analyzed online extensively within a week of its publication. This Global Emergency Medicine Journal Club discussion conducted a discussion approximately 4 months after the publication to continue the debate and determine whether these findings have changed clinical practices. Despite their personal support of the 36°C (96.8°F) target temperature, many ALiEM readers indicated that only a few centers have changed their targeted temperature policy from 33°C (91.4°F) to 36°C (96.8°F) for out-of-hospital cardiac arrest patients. Overall, the targeted temperature management trial was thought to be extremely well designed and made a substantial contribution to the literature. Further study of subgroups that may benefit from targeting lower temperatures for postarrest patients is warranted. From an educational perspective, this study provides an excellent basis for discussions about trial design, and particularly the importance of distinguishing between superiority and noninferiority study designs. It was able to attract 1,189 unique readers from 60 countries, using social media modalities that included a medical education blog and Twitter.

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APPENDIX

The #ALiEMJC Twitter and Google Hangout videocast participants and supporters: @aiz2007, @akaletmd, @amcunningham, @arco_icu, @arjalali, @bhanders, @caepresidents, @captainbasilem, @dr_jibbajabba, @drtrexford, @dwe123, @elbertchu, @emcurrents, @emlitofnote, @emmanchester, @emra_ccdivision, @emswami, @epmonthly, @foam_highlights, @gordontheccp, @grrambulance, @harboruclaem, @iceman_ex, @icu_management, @jeffrabrigh, @jkgas, @jkirschnermd, @johnboy237, @jojohaber, @jvrbntz, @maitiu78, @majthagafi, @mprizzleer, @nickjohnsonmd, @njoshi8, @paramedickiwi, @pharmertoxguy, @pippa_dolittle, @purdy_eve, @rfdsdoc, @runde_mc, @sandydongmd, @scienceofmed, @slrem, @smaccteam, @srrezaie, @stemlyns, @stephenlebowitz, @tchanmd, @thomas1973, @thelastanna, @tillyjake, @upennem, @wikem_org, and @wessexics.

The Google Hangout videocast participants: Niklas Nielsen, MD, PhD, Tyler Barrett, MD, MSCI, and Jarone Lee, MD, MPH.