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Global Emergency Medicine Journal Club: Social Media Responses to the January 2014 Online Emergency Medicine Journal Club on Subarachnoid Hemorrhage*

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From January 20 to 24, 2014, *Annals* 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 *Journal of the American Medical Association* article “Clinical Decision Rules to Rule Out Subarachnoid Hemorrhage for Acute Headache” by Perry et al. This online journal club used the power of rapid Twitter conversations, a live videocast with the authors, and more detailed discussions hosted on the ALiEM Web site’s comment section. There were more than 1,431 individuals from 501 cities in 59 countries who viewed the blog post. During this 5-day event, 28 comments (average word count 153 words) and 206 tweets were made. This summary article details the community discussion, shared insights, and analytic data generated during this novel, multiplatform approach. [Ann Emerg Med. 2014;64:88-94.]

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INTRODUCTION

Social media have emerged as a possible new method for closing the knowledge translation window. Online Twitter-based journal clubs have increasingly been reported as a possible vehicle for knowledge translation^{1,2} because these technologies allow us to expand our communities of practice.

In 2013, we launched a shared initiative to increase global awareness of new key emergency medicine literature: the Global Emergency Medicine Journal Club. This venture joined a social media-based educational platform committed to academic blogging and online publishing (Academic Life in Emergency Medicine [ALiEM]), with an established and successful traditional peer-reviewed print journal (*Annals of Emergency Medicine*).³ The ALiEM-*Annals* partnership pairs the power, flexibility, and timeliness of an academic blog’s ability to foster social media discussions with the *Annals* editorial team’s experience guiding others through critical appraisal and evidence-based medicine. It is hoped that this will combine the blog’s topicality and breadth with the strengths of traditional peer review, resulting in a new mode of communication better suited to contemporary continuous professional development.

In this second Global Emergency Medicine Journal Club, we featured the 2013 article by Perry et al⁴ in *JAMA*: “Clinical Decision Rules to Rule Out Subarachnoid Hemorrhage for Acute Headache.”⁴

*The official responses by the *Annals* Journal Club editors are published in the June 2014 issue. Please refer to this separate document for more thorough insights into the *Annals* Journal Club answers.

MATERIALS AND METHODS

The *Annals* editorial board selected a Global Emergency Medicine Journal Club article and their Journal Club questions. Three discussion facilitators were selected by ALiEM because of their expertise in medical education and social media. All were experienced bloggers with ALiEM. At the time, their respective numbers of Twitter followers were greater than 5,000 (M.L. [@M_Lin]), greater than 900 (T.M.C. [@TChanMD]), and greater than 400 (H.R. [through @emergmedottawa account]).

The ALiEM Web site hosted the Global Emergency Medicine Journal Club during January 20 to 24, 2014. A single blog post featured a clinical vignette (Figure 1) and then 4 discussion questions (Figure 2). The discussion questions were taken from the free *Annals* Journal Club Guides.⁵ The blog post was enabled for comments to allow the global audience of ALiEM to respond to the questions. The ALiEM questions focused more outside of the boundaries of the featured study. These questions were meant to enhance and integrate networked learning that occurs to enhance knowledge translation by linking the new content to previously acquired knowledge.⁶ Additionally, on January 22, 2014, the *Annals* and ALiEM editors hosted a live multiperson videoconference interview of 2 of the article’s authors, using Google Hangouts On Air (which allows direct Web publishing of a video teleconferencing session straight to YouTube).⁷ This unique event brought together the 2 authors from their Canadian institution and experts from across the United States and Canada to create a continuous professional development opportunity that was immediately available to an international audience.

The link to the blog post was promoted on various social media platforms by ALiEM’s standard promotion system,

It is 8 PM on a Wednesday. Your shift ends in 2 hours, and you are just beginning the latter half of your shift in the quick-care area. Your next patient is a 24-year-old woman with a headache. She discloses that she had the worst headache of her life about 3 hours ago. Her husband explains that she is not a “complainer” and that he is quite worried because the headache occurred quickly, peaking within a hour of its onset. She does not usually have headaches. In the ED, she has vomited once. She is afebrile and nontoxic in appearance, and although she complains of mild neck pain, you do not note any frank nuchal rigidity. She has mild photophobia and phonophobia, but there are no focal neurologic deficits when you examine her. She is relieved to see that you are empathetic to her concerns, and you quickly arrange a CT scan to rule out an SAH. In the meantime, you also provide her with analgesics and an antiemetic. The 64-slice CT scan is read by the second-year radiology resident on call as negative for SAH. Just as you are about to consent the patient for a LP, a senior resident in the department asks you, “Wasn’t there a study by Perry et al that suggested you don’t need to do an LP anymore? Can’t you just rule out SAH with the clinical decision rule that they proposed?”

Figure 1. Clinical vignette for the Global Emergency Medicine Journal Club. SAH, subarachnoid hemorrhage; LP, lumbar puncture.

Annals of Emergency Medicine Questions: In this article, 26% of patients arrived by ambulance, and “arrival by ambulance” was one of the 4 variables in rule 2. The inclusion of this variable suggests that patients arriving by ambulance are at greater risk for SAH. In some settings, patients arriving by ambulance are automatically triaged to higher-acuity beds.

Q1: How might the patient’s location in the ED when treated by the clinician affect the evaluation that he or she receives?

Q2: Why might this be especially important for EDs that employ midlevel providers or resident moonlighters to staff the low-acuity areas?

ALiEM Questions

Q3: In your clinical practice, what information do you provide when counseling patients about the role of LPs for ruling out SAH?

Q4: In a teaching center, how do you integrate learning with patient care? Is the reading of a second-year radiology resident sufficient for ruling out SAH in this patient? Does this article answer this question?

Figure 2. Featured questions for the journal club audience.

archived at <http://academiclifeinem.com/journal-club-clinical-decision-rule-subarachnoid-hemorrhage/>.⁹

including a single social media posting on Twitter, Facebook, and Google+. For Twitter, we encouraged participants to use the hashtag #ALiEMJC to identify Global Emergency Medicine Journal Club questions and discussion comments.

At the end of the Global Emergency Medicine Journal Club week, we evaluated Google analytics data to determine the aggregate online reach of the blog post. Furthermore, aggregate #ALiEMJC hashtag analytic data were assessed with Symplur.com,⁸ and video viewership analytics were assessed with YouTube Analytics.

RESULTS

Analytic data for this Global Emergency Medicine Journal Club event during the first 14 days (January 20 to February 2, 2014) are summarized in the [Table](#), with a visual representation of blog readership reach in [Figure 3](#).

CURATED SUMMARY OF THE ONLINE DISCUSSION

A vigorous discussion of this article occurred during the week through both Twitter and the blog Web site. A full transcript of the Global Emergency Medicine Journal Club proceedings is

OVERALL INSIGHTS

The discussion revolved around the Ottawa Subarachnoid Hemorrhage Rule. This rule describes a new clinical decision tool for alert patients older than 15 years with a new, severe, nontraumatic headache, reaching peak intensity within 1 hour. The exclusion criteria for this rule are patients with new neurologic defects; history of aneurysms, subarachnoid hemorrhage, or brain tumors; and history of recurrent headaches (ie, ≥ 3 episodes during the course of >6 months). This rule consists of 6 variables, which in combination resulted in a rule with 100% sensitivity within the study cohort. These variables are deemed high risk and warranted evaluation if 1 or more features existed. These 6 features are as follows:

- aged 40 years or older
- limited neck flexion on examination
- neck pain or stiffness
- onset during exertion
- thunderclap headache (instantly peaking pain)
- witnessed loss of consciousness

These features conveniently can be organized into a mnemonic, as suggested by Dr. Brent Thoma ([Figure 4](#)).

Although almost all discussants agreed that this article needed further validation before its decision rule could be widely applied, various individuals expressed differing views on the effect of this

Table. Aggregate analytic data on the journal club discussion on various social media platforms 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	1,717
	Users	Number of times individuals from different IP addresses viewed the site	1,431
	Number of participating cities	Number of unique jurisdictions by city as registered by Google Analytics	501
	Number of participating countries	Number of unique jurisdictions by country as registered by Google Analytics	59
	Average time on page	Average amount of time spent by a viewer on the page	4:36 min (site average=2:02 min)
Blog statistics	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	127
	Number of Facebook likes	Number of times viewers "liked" the post through Facebook	19
	Number of Google+ shares	Number of times viewers shared the post through Google+	14
	Number of site comments	Comments made directly on the Web site in the blog comments section	28
	Average word count per blog comment (excluding citations)		153 words per blog comment
Symplur Analytics for Twitter hashtag #ALiEMJC ⁸	Number of tweets	Number of tweets containing the hashtag #ALiEMJC	206
	Number of Twitter participants	Number of unique Twitter users that participated with Tweeting during the 2 weeks around the event	62
	Twitter impressions	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	267,894
YouTube Analytics	Length of video	Total duration of recorded Google Hangout videoconference session	33 min
	Number of views	Number of times the YouTube video was viewed	154
	Average duration of viewing per person		11:22 min

study on their practice. Dr. Salim Rezaie stated, "This could truly be a game changer if the Ottawa SAH Rule and the Perry et al article [from *BMJ*, 2011] get used in conjunction with each other. This could decrease the number of LPs [lumbar punctures] and head CTs [computed tomography scans] needed to work up

this diagnosis."¹⁰ Drs. Justin Hensley and Anand Swaminathan reminded us that the use of the rule from this study may actually increase the number of CTs performed, which will not likely reduce costs or evaluation rates. Moreover, another participant (Dr. Rory Spiegel) expressed some hesitation about interpreting

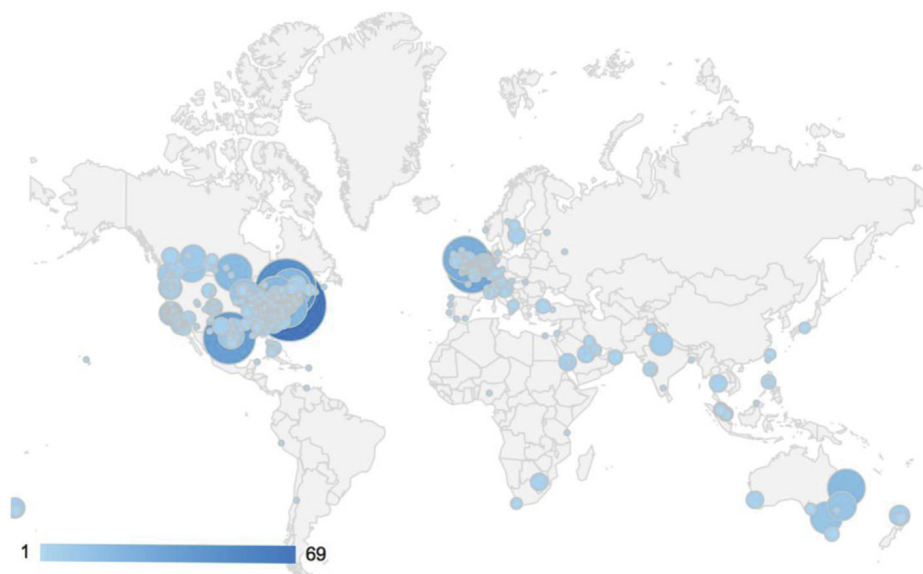


Figure 3. The geographic distribution of readers who viewed the Global Emergency Medicine Journal Club during the first 14 days.

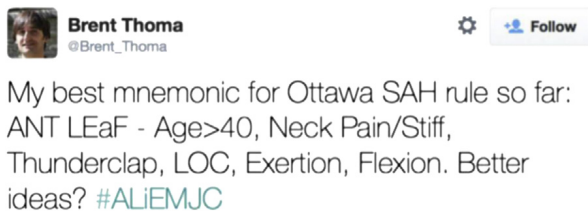


Figure 4. Tweet by Dr. Brent Thoma with a proposed mnemonic for the Ottawa SAH rule.

this single study as the “truth,” questioning the generalizability of the results of a single, albeit multisite, study.

The ability to apply the results broadly may also be hindered by the nature of contextual features such as one’s medicolegal system. Dr. Rezaie suggested that in litigious societies such as the United States, physicians may find it more difficult to apply data from studies conducted internationally, or even in Canada. Avoidance of medicolegal repercussions may change the palatability for *any* missed diagnoses, and such cultural nuances may drastically influence practice patterns. Dr. Swaminathan noted that aside from medicolegal ramifications, a missed subarachnoid hemorrhage has disastrous implications for the patient. He also reminded us that subarachnoid hemorrhage is not the only diagnosis of concern when one considers severe headaches; physicians must remember to consider other critical headache diagnoses in the differential, including but not limited to meningitis, encephalitis, vertebral artery dissection, and temporal arteritis.

ANSWERS TO QUESTIONS

For our featured *Annals* Journal Club questions, we received quite a few comments that were useful to bear in mind when discussing this article, but also when thinking more broadly about the topic of diagnosing or ruling out subarachnoid hemorrhage.

Q1: How might the patient’s location in the emergency department (ED) when treated by the clinician affect the evaluation that he or she receives?

This question addresses the derivation process of the Ottawa subarachnoid hemorrhage rule. During the derivation of this rule, ambulance arrival was a factor (“rule 2”). In the study, 26% of patients arrived by ambulance, and often those who arrive with paramedics are triaged to higher-acuity zones of the ED (ie, beds instead ambulatory zones), as succinctly tweeted by Dr. Chris Doty (Figure 5).

Dr. Rezaie explained further that this may also be in part to anchoring:

“Ofentimes in lower-acuity areas, it is easy to anchor a physician, resident, physician assistant to a lower acuity diagnosis. This can be very dangerous, and lead to more missed diagnosis. Every one of us has been guilty of this anchoring bias, and important to remember (ie, massive PE or STEMI in the fast track area).”

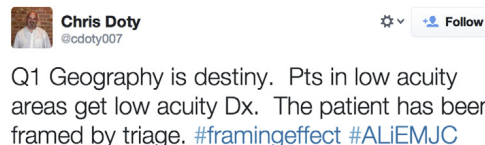


Figure 5. Tweet by Dr. Chris Doty in response to our first Global Emergency Medicine Journal Club question.

The concept of “anchoring” is a concept that has been championed by Dr. Pat Croskerry, which he defines as the following:

“... the tendency to fixate on specific features of a presentation too early in the diagnostic process, and to base the likelihood of a particular event on the information available at the outset (ie, the first impression gained on first exposure, the initial approximate judgment).”¹¹

The geographic location of the patient in the lower-acuity area of the ED may strongly affect these first impressions and may lead clinicians to anchor on the less dangerous aspects of a potential deadly headache.

Q2: Why might this be especially important for EDs that employ midlevel providers or resident moonlighters to staff the low-acuity areas?

As Dr. Teresa Chan noted in her Google Hangouts discussion with the authors of the Global Emergency Medicine Journal Club article (Drs. Perry and Stiell), there is a new generation of physicians who have been trained in the era of clinical decision rules.⁷ This Ottawa SAH Rule can be used as a clinical decision rule to help both less experienced and expert providers minimize anchoring and framing biases. Dr. Rezaie added that clinical decision rules may help to justify the physician’s own clinical gestalt and decisionmaking (ie, a low history, electrocardiogram, age, risk factors, and troponin score¹² in the evaluation of acute coronary syndrome).

Q3: In your clinical practice, what information do you provide when counseling patients about the role of lumbar punctures for ruling out subarachnoid hemorrhage?

Many providers noted that the lumbar puncture is a relatively benign procedure, at least when compared with the critical diagnosis of a sentinel bleeding event. Although patient concerns about discomfort must be considered, the important nature of the question must be communicated to the patient. Dr. Swaminathan noted that patients with low to moderate risk features have a pretest probability of approximately 7%, according to Dr. Perry’s previous work.¹⁰ Then with a negative CT result and using Bayesian reasoning by applying the Fagan nomogram, he is able to approximate the posttest risk of subarachnoid hemorrhage at 0.5% to 1%. He invites his patients to engage in shared decisionmaking by explaining that although a lumbar puncture will virtually rule out a subarachnoid hemorrhage, there may be false-positive results during this process. Dr. Perry provided an excellent overview of his approach to patient counseling during the Google Hangouts as well. He

emphasized that he provides a patient-centered view of the accuracy of CT and the risk of missing a subarachnoid hemorrhage (“essentially less than 1%”), and then he offers patients the option for the lumbar puncture.⁷ (For more details, read his discussion found on the Google Hangouts On Air video <http://academiclifeinem.com/journal-club-clinical-decision-rule-subarachnoid-hemorrhage/>.)

Traumatic Lumbar Puncture

There was, however, some hesitancy in regard to how one might counsel a patient about the role of a lumbar puncture for ruling out subarachnoid hemorrhage because, as Dr. Matthew DeLaney noted, there is a relatively high rate of traumatic taps (10% to 15%). There is some debate about the role of lumbar puncture for ruling out subarachnoid hemorrhage before the 12-hour mark. Because there is no clear guidance about the “clearing” of RBCs across sequential sampling, it was noted that there is no extensive evidentiary support for this common practice.¹³ The “bloody tap” leads to the dilemma of how best to approach the next step. Several discussants noted that consultation with neurosurgery colleagues may be a next step. Many noted, however, that this might result in an ultimately negative evaluation result, which includes successive imaging with CT angiograms.

Xanthochromia

It was noted that waiting for greater than 12 hours (and up to 2 weeks) before performing the lumbar puncture may allow practitioners to rely more on xanthochromia, though there was some substantive debate about the role of this practice, given that many centers use visual inspection rather than spectrophotometry. Dr. Michael Schull noted, however, that some literature has shown that evaluation with the naked eye is equivalent to spectrophotometry.¹⁴

Q4: In a teaching center, how do you integrate learning with patient care? Is the reading of a second-year radiology resident sufficient for ruling out subarachnoid hemorrhage in this patient? Does this article answer this question?

Participants were quick to note that the featured Journal Club article did not directly address the implications of teaching centers and the integration of preliminary (“wet”) readings by radiology residents. Dr. Rezaie recalled the findings of the previous work conducted by Dr. Perry in 2011 on the 64-slice CT scan within 6 hours of the onset of the severe headache, whereby a negative CT result may obviate the need for a lumbar puncture altogether.¹⁰ This resulted in an avid discussion around the nature of the CT-scanning requirements from this study. There was some worry over the high standard set. Dr. Spiegel recalled that the standard used was the official neuroradiologist report.¹⁰ Many clinicians noted that wet readings are usually performed by either a junior radiologist or an emergency physician after hours, and as such, more studies looking at these preliminary readings may be of more interest to emergency physicians.

Discussants also raised the issue of the types of technology available for different types of centers. Teaching centers are often privy to the most advanced technologies, although there may be less experienced radiologists after hours performing the preliminary readings. Dr. Thoma noted the parallels between the trust in those “reading the scan” and the technological limitations we use in our various centers. That said, Dr. Hensley noted that in his rural academic site, they have only a 16-slice CT scanner. Caution must be used when generalizing results from studies with specific technological requirements. Dr. Paul Jones suggested that in today’s era of teleradiology, perhaps the human resource limitations of community or rural sites might be overcome by providing CT readings by neuroradiology specialists to minimize misreading. This, however, would solve issues of CT interpretation accuracy only and not gaps in technological resources.

Finally, when CT is used to risk stratify a patient for a subarachnoid hemorrhage, patient-specific criteria should also be factored in. Both Dr. Rezaie and Dr. Perry (on the blog comments⁹ and the Google Hangout,⁷ respectively) reminded discussants that patient-specific factors such as anemia may affect the accuracy of a noncontrast CT scan. As Dr. Perry explained on our Google Hangouts, “blood does not show up well when the patient is profoundly anemic...on any scan.” Anemic blood may be isodense to surrounding tissues and not easily differentiable by current CT technology from the surrounding brain tissue, leading to missed diagnoses of small bleeding events in anemic patients.⁷

ADDITIONAL QUESTIONS FROM THE CROWD

Dr. Andrew Webster asked a question of Drs. Perry and Stiell and the editorial teams of *Annals* and ALiEM on the Google Hangouts as follows:

“Do you see a role for CT angiogram in the work up of these headache patients, with the difficulties of knowing we may pick up asymptomatic cerebral aneurysms?”

The discussants noted that performing a CT angiogram looking for cerebral aneurysms may not be the best diagnostic approach to acute undifferentiated headaches. Dr. Swaminathan warned that incidental, asymptomatic cerebral aneurysms increase with age.¹⁵ Furthermore, Dr. Spiegel stated that there is no clear evidence that a CT angiogram will improve the diagnostic algorithm for a subarachnoid hemorrhage. The diagnostic accuracy of a CT angiogram has been previously assessed against the criterion standard of digital subtraction angiography in patients with a known subarachnoid hemorrhage on CT. He highlighted that in these populations, a CT angiogram still demonstrated a sensitivity of only 81% to 99%.¹⁶⁻¹⁹ In ED patients who have suspected but unconfirmed headaches, these numbers may be drastically different.

Dr. DeLaney reminded us that not all subarachnoid hemorrhages are caused by cerebral aneurysms. In at least 1 small study, 50% to 56% of patients with a negative CT result but

positive lumbar puncture result were found to have subarachnoid hemorrhages caused by nonaneurysms (eg, perimesencephalic subarachnoid hemorrhage).²⁰ Thus, if the posttest probability remains high despite a negative CT result, a lumbar puncture may still be required.

DISCUSSION ON THE PROCESS

There were several lessons learned during this second Global Emergency Medicine Journal Club initiative. This journal club session received a substantially increased number of page views (n=1,717 versus 1,171 in the first 2 weeks, which equates to a 47% relative increase in pageviews).

As opposed to our inaugural Global Emergency Medicine Journal Club, we used the Google Hangouts On Air videoconference platform to discuss our questions with the authors (Drs. Perry and Stiell) and editorial board members from both *Annals* and ALiEM. This presented a novel opportunity for knowledge translation and may have attracted more traffic and resulted in a more enriched experience for viewers. Our plan is to continue to use this medium as an avenue for knowledge translation and to bring scientists and educators together to discuss scientific findings. Participants on average viewed only about one third (11 of 33 minutes) of the recorded video, which may reflect their preferred video viewing length. More research and continued innovation will help to elucidate whether our participants will engage with the material like individuals with Massive Open Online Course videos. Previous literature about Massive Open Online Course videos suggests that optimal length would be 6 minutes.²¹

CONCLUSION

This second edition of the ALiEM-*Annals* Global Emergency Medicine Journal Club initiative shows ongoing and increased interest by a global audience. The additional live videoconference participation from the featured article's authors demonstrates the potential of this multimodal platform as a method for knowledge translation directly linking scientists to clinicians, and continues to accelerate the incorporation of leading-edge research in clinical care.

The authors acknowledge the #ALiEMJC Twitter contributors and supporters (listed alphabetically by Twitter handle: @Academicem, @Alsugairmd, @Andyneill, @Andywebster, @Anoukkoare, @ARJalali, @Beemgroup, @Brent_thoma, @Captainbasilem, @Cdoty007, @Dawninottawa, @Doc_abi, @Docnikko, @Docschull, @Doctor_vile, @Drjenwilliams, @Drjermy, @Dr_majed911, @Drtonysurfer, @EMCases, @Emconversations, @Emhighak, @Emlitofnote, @Er_kw, @Helenlaird, @Jlsamash, @Joegogol47, @Jvrbntz, @Katellington, @Lonerganco, @Maascalualty, @Maitiu78, @MDware, @M_Lin, @Mprizzleer, @Naveenprasad29, @Njoshi8, @N_ozgurdogan, @Nser22, @Nyedmd, @Nysuri, @ParmyDeol, @Petradmd, @PoppasPearls, @Reneam1, @Rfidsdoc, @Sanijohn, @Scishiffi, @Smotovmd, @Socraticem, @Srrezaie, @stella_yiu, @TChanMD,

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ETHICS/CONCEPTS

Circulatory Death Determination in Uncontrolled Organ Donors: A Panel Viewpoint

James L. Bernat, MD; Thomas P. Bleck, MD; Sandralee A. Blosser, MD; Susan L. Bratton, MD, MPH; Alexander M. Capron, LLB; Danielle Corneli, BSN, CPTC; Michael A. DeVita, MD; Gerard J. Fulda, MD; Alexandra K. Glazier, JD, MPH; Cynthia J. Gries, MD; Mudit Mathur, MD; Thomas A. Nakagawa, MD; Sam D. Shemie, MD

One barrier for implementing programs of uncontrolled organ donation after the circulatory determination of death is the lack of consensus on the precise moment of death. Our panel was convened to study this question after we performed a similar analysis on the moment of death in controlled organ donation after the circulatory determination of death. We concluded that death could be determined by showing the permanent or irreversible cessation of circulation and respiration. Circulatory irreversibility may be presumed when optimal cardiopulmonary resuscitation efforts have failed to restore circulation and at least a 7-minute period has elapsed thereafter during which autoresuscitation to restored circulation could occur. We advise against the use of postmortem organ support technologies that reestablish circulation of warm oxygenated blood because of their risk of retroactively invalidating the required conditions on which death was declared. [Ann Emerg Med. 2014;63:384-390.]

A podcast for this article is available at www.annemergmed.com.
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SEE EDITORIAL, P. 401.

Programs of organ donation after the circulatory determination of death (DCDD) have increased in prevalence markedly during the past 2 decades.¹ In the United States and Canada, DCDD programs are restricted to the "controlled" circumstance in which the surrogate decisionmaker of a hopelessly ill, ventilator-dependent patient in an ICU decides to withdraw life-sustaining therapy to allow the patient to die but additionally requests that the patient donate organs after death or honors the recorded wishes of the patient.² A controlled donation after the circulatory determination of death (cDCDD) protocol coordinates the process of withdrawing life-sustaining therapy with the readiness of the surgical team to remove the transplantable organs as quickly as possible after the patient's death.³

Several European countries, particularly Spain and France, have implemented programs of "uncontrolled" donation after the circulatory determination of death (uDCDD) on "Maastricht 1" donors (brought in dead) and "Maastricht 2" donors (unsuccessfully resuscitated) to permit organ donation from patients who experienced spontaneous cardiac or respiratory arrest outside the hospital and for whom cardiopulmonary resuscitation (CPR) was unsuccessful.^{4,5} These programs generally have been well accepted and have supplemented the organs available for transplantation, particularly in countries that do not permit cDCDD.⁶ The Institute of Medicine, a strong proponent of expanding cDCDD programs, has advocated adding uDCDD protocols, once perfected, to existing cDCDD protocols in US hospitals.⁷

But only a few experimental uDCDD protocols have been tested in the United States, and these protocols have not been successful in recruiting patients.⁸

The one critical issue dogging all DCDD protocols is the validity of death determination in the donor patient. Since the earliest cDCDD protocol conducted at the University of Pittsburgh Medical Center more than 20 years ago, critics have questioned whether the donor is actually dead at the moment death is declared.⁹⁻¹¹ The University of Pittsburgh protocol permitted donor death declaration once asystole and apnea had been present for 2 minutes.¹² Criticism over the proper timing of donor death declaration has persisted because of the apparent arbitrariness of death determination: each cDCDD protocol stipulates its own criteria for determining death. For example, the Institute of Medicine recommended 5 minutes of asystole,¹³ some European countries require 10 minutes,¹⁴ and a DCDD heart transplantation protocol at Denver Children's Hospital permitted death declaration in some neonates after only 75 seconds of asystole.¹⁵

In 2008, the United States Department of Health and Human Services Health Resources and Services Administration—the agency that funds experimental DCDD protocols—recruited a panel of experts to formulate uniform guidelines for cDCDD death determination that were physiologically grounded and based on conceptual analysis. Our panel established several physiologic principles of circulatory death determination and then applied them to the cDCDD donor to create guidelines.¹⁶ The second phase of our work, funded through the Health Resources and Services

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Be sure not to miss the podcast of "Circulatory Death Determination in Uncontrolled Organ Donors: A Panel Viewpoint", in the April 2014 issue. The podcast features a discussion by *Annals* Podcast editors David H. Newman, MD, and Ashley E. Shreves, MD.

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