To the Editor:

The purpose of this letter is to address what I believe are gross misstatements and specific concerns pertaining to “AANA Journal Course: Update for Nurse Anesthetists—Thermoregulation: Anesthetic and perioperative concerns,” published in December 2001. I believe the author, Michael A. Fiedler, CRNA, MS, used a continuing education course to publish personal opinion and prejudice rather than deliver even-handed education. When the author turns his attention to the use of specific products, he leaves the realm of academia and enters the world of product promotion. My specific concerns are with the author’s comments regarding liquid crystal thermometry.

In one short paragraph he draws different conclusions than the authors of his cited sources and chooses to ignore other pertinent research in order to discredit a device that has been used successfully and safely on millions of patients by thousands of practitioners. The author writes:

“Liquid crystal skin surface thermometers, although not indicative of core temperature, have been suggested to be adequate to observe temperature trends. The relationship between skin temperature and core temperature during anesthesia, although consistent under some circumstances, varies with ambient temperature, the presence of air movement at the sensor site, local vasoconstriction, and other factors.”

Mr. Fiedler concludes that “Skin surface temperature strips are not accurate enough even for trending purposes.”

To support these suppositions Mr. Fiedler cites 4 sources. Reference 32 is an article that appeared in the Canadian Journal of Anaesthesia in 1993, which discusses a 2-part study done by Brull et al. The authors state:

“The present two-part study sought to compare liquid crystal (CR) skin temperature with other temperature monitors which are used routinely during surgery. The first part compared CR with oesophageal (OS) temperature during general inhalational anaesthesia. The second part compared CR with OS, pulmonary artery (PA), and bladder (BL) temperatures during the periods of rapid temperature change associated with cardiopulmonary bypass (CPB). During the first part, the mean difference between OS and CR was –0.14 ± 0.85 degrees C; this difference remained consistent over time (P<0.05 by repeated measures analysis of variance). During the second part, the difference in temperature readings between CR and each of the other monitors remained consistent except for CR vs PA and CR vs OS during the cooling period of CPB, when the iced cardioplegic slush directly affected the PA and OS temperatures. This study suggests that CR, an inexpensive and noninvasive means of temperature monitoring, reflects trends in temperature changes in the clinical setting.”

Reference 33 is an anecdotal report published in 1996 wherein a liquid crystal strip registered a high temperature postinduction and caused the practitioner to cancel the surgical procedure. Naturally, what appears to be a false high reading is of concern. The product used is one that is not of proven accuracy. Here I agree with Mr. Fiedler that practitioners should take care to use products of known quality. I don’t believe it is responsible to determine that all liquid crystal indicators should be discarded based on the performance of 1 strip of 1 brand in 1 case.

Reference 34 evaluated 3 conditions long thought to adversely affect core-to-skin temperature correlation: the core-to-peripheral redistribution of body heat that accompanies induction, thermoregulatory vasomotion and ambient temperature. This article, when read thoroughly, found no clinically important changes in correlation. This study does, however, raise an important point: the best correlation between core temperature and liquid crystal temperature exists when the strip is used on the forehead. The use of forehead skin temperature should not be dismissed based on poor correlation of core-to-extremity-skin temperatures.

Reference 35 dates back to 1982. This 20-year-old study was done using liquid crystal strips that were available at that time. The most obvious problem with this study is the fact that the clinicians did not follow manufacturer’s instructions on how to read the temperature strip. They claim to have read the brightest illuminated block, which is not correct. By doing so, the person reading the strip could be off by as much as 1°F. The directions for reading that product are as follows:

- **Tan:** Read 1°F below.
- **Pale Green:** Read 1/2°F below.
- **Bright Green:** Read as it appears.
- **Blue Green:** Read 1/2°F above.
- **Deep Blue:** Read 1°F above

In summary, I do not believe the data cited, or other existing data, support Mr. Fiedler’s dismissal of liquid crystal temperature trend indicators. I believe he inappropriately used a continuing education course as a place for publishing personal prejudice. Liquid crystal indicators remain a cost-effective, reliable means of monitoring patient temperature trends. They are noninvasive, can be used easily with a laryngeal mask airway, and can migrate with the patient to provide continuity in monitoring.

Thank you for your open-minded consideration.

**Bruce A. Tomlinson**
President and CEO
Sharn, Inc.
Tampa, Florida

**REFERENCES**

Response:
This is in response to the letter written by Mr. Bruce A. Tomlinson regarding the December 2001 “AANA Journal Course: Update for Nurse Anesthetists—Thermoregulation: Anesthetic and perioperative concerns” (2001;69:485-491). I’m not certain how one could label as “personal opinion” and “prejudice” an article so replete with physiology and clinical science. What little content does emanate from me consists of synthesis, summation, and personal experience—each appropriate for this type of article. I disagree that “when the author turns his attention to the use of specific products, he leaves the realm of academia and enters the world of product promotion.” If this were so, studies evaluating the safety and efficacy of pharmaceuticals and equipment would never be published and the only people who would know anything about them would be those who conducted the research.

Anesthetists use many products and require information about the abilities and limitations of said products to make appropriate decisions about if, how, and when to use them. No brand names were promoted, nor even mentioned with the exception of 2 forced air warming blankets. They were legitimately identified as the most efficient at heat transfer to distinguish them from clinically less effective devices. The 2 companies named are fierce competitors, and their products were identified as relatively equal in heat transfer efficiency. Other references were to types of products, not brand names. It is difficult to imagine how one could discuss perioperative warming methods without mentioning products available to warm.

It is easy to understand why the chief executive officer of a company that makes liquid crystal temperature strips would take issue with the paragraph discussing these devices. And to a certain extent, rightly so. Published literature reporting on the utility of liquid crystal temperature strips for accuracy and trending purposes is split. There is information on both sides of the issues. There are times when I have reached an informed conclusion but credible information exists that takes the opposite position. In these circumstances my normal practice is to state my conclusion followed by information from the other side as well. When writing the manuscript I began this process by citing 2 references that did not support the accuracy and trending utility of liquid crystal thermometers and 2 that did. Unfortunately, I inadvertently neglected to write the sentence that was to cite the articles supporting liquid crystal thermometers and did not discover this mistake during proofreading. This was my error, and I regret the distress it has obviously caused you. With that said, keep several things in mind:

1. The article in question was neither a review of liquid crystal temperature strips nor was the text specific to your brand of thermometer.
2. Anesthesia clinicians do not always place liquid crystal temperature strips on the forehead, clearly the location likely to yield the most accurate result. The fact that they are, in reality, placed in so many other locations reduces their accuracy and usefulness. This is true regardless of whether or not the strips are placed contrary to manufacturers’ recommendations.
3. Clinically, I find temperature strips often difficult to read. This is especially true given the unambiguous digital readouts we otherwise use. The instructions that you included to adjust the temperature read on the strip based on the color of the bar that is visible is one example of just such difficulty.

To summarize, I had intended to include a statement with information supporting the accuracy and trending utility of liquid crystal temperature strips in addition to the statement that does not support them. I failed to do so. I regret my error. I hope that you and others can look past an omission in 1 paragraph to an article with information anesthetists and perioperative nurses can use to understand and prevent hypothermia. The focus of the article was the improvement of clinical care.

Michael A. Fiedler, CRNA, MS
PhD Candidate (G-3)
NIH/NINR Individual NRSA Fellow
College of Nursing
University of Tennessee Health Science Center
Memphis, Tennessee