

---

# Perfusion Error Cause Removal: The Perfusion Case Conference

---

**Charles M. Tyndal Jr. and Richard G. Berryessa**

Department of Surgery  
School of Medicine  
University of Colorado Health Sciences Center  
Denver, Colorado  
and PSICOR Inc.  
San Diego, California

## Abstract

---

**Prevention of accidents is one of the fundamental elements of perfusion quality. Unfortunately, errors and accidents frequently occur during cardiopulmonary bypass. A recent retrospective survey of perfusionists identified some common accidents. We have previously reported a method of developing protocols to prevent and treat the ten most common perfusion related problems.**

**Until we reach the day when perfusion accidents no longer occur, we need to be able to systematically evaluate failures and prevent their recurrence.**

**We have developed a non-judgmental forum to discuss, analyze, and prevent variances or unusual circumstances that occur during cardiopulmonary bypass. We hold a monthly case conference where we discuss all cases from which we can learn something—interesting cases and cases during which there was a departure from protocol.**

**The purpose of this paper is to discuss the development of a case conference and to outline the format and benefits of such an Error Cause Removal program.**

## Introduction

---

Perfusion Technology is a specialty in which accidents occur with alarming frequency. Recently a retrospective survey of perfusionists revealed that a perfusion accident occurred at least once in every three hundred procedures.<sup>1</sup> Further, one of every one thousand cases involves an accident which results in permanent injury or death. While these statistics may seem to imply a relatively low risk of death or injury

associated with cardiopulmonary bypass (CPB), even one death as a result of an accident is unacceptable. To accept less would be a disservice to the patient.

Webster defines an accident as “chance or what happens by chance; an event that happens when quite *unlooked for*; an unforeseen and undesigned injury to a person.” We suggest that after thirty-five years of experience with CPB, and a worldwide experience that approaches 400,000 cases per year, that there should be few, if any accidents or events that happen which are “unlooked for.” In our view, the problem is philosophical: the mindset of health care providers has never been one of prevention. In fact, we seldom look into the future far enough to anticipate a problem, let alone prevent it. This “range-of-the-moment,” short sighted viewpoint has to change. The place to begin is in our own practice starting with the source/cause of most accidents.

Most perfusion accidents are a result of operator error.<sup>2,3,4</sup> These errors usually are associated with a lack of training, knowledge, or communication rather than lack of “caring” for the patient. It is, however, difficult for the perfusionist to develop concern for the patient because he/she has little personal contact with the patient. This lack of human interaction makes it difficult to develop a sense of compassion for the patient, and makes the job mechanical.<sup>5</sup>

Statistically, the larger your experience, the greater the chance that you will be forced to recognize the magnitude of the perfusion accident problem. We have seen the need in our practice to relentlessly improve the level of safety we provide our patients. Although the probability of catastrophic accident appears low, it is our goal to eliminate error completely and perform “Zero Defect”<sup>6</sup> CPB.

The first step towards achieving error free perfusion is developing a standard for “the way things should be done.” This standard we call a protocol. The protocol outlines the requirements the team (surgeons,

---

Direct communications to: Charles M. Tyndal Jr., 16818 Via del Campo Court, San Diego, CA 92127.

perfusionists, anesthesiologists) has for the conduct of CPB. Once the protocol is established by consensus, there must be a process to evaluate both the protocol and conformance to the protocol. The protocol needs to be evaluated with regard to how realistic/achievable it is and performance needs to be evaluated against the protocol. In time, the protocol will evolve into a document that defines the "ideal." The measurement of conformance will define how close practice comes to the "ideal."

The initial step in defining conformance is to establish a variance policy (a variance is a departure from the standard). We suggest you make this as simple as possible. The first category should be Serious or Major variance: any occurrence which caused or could have caused harm to a patient or member of the team. Second, a Minor variance: one that did not, or could not, cause harm, but was outside the protocol. With standards and a way of tracking conformance to standards, the next step is to develop a method of analyzing and eliminating failures. To this end we have developed what we call the Perfusion Case Conference (PCC).

#### *Perfusion Case Conference*

We hold a monthly perfusion case conference (PCC), attendance at which is compulsory for members of our group. At this meeting we discuss any case which was associated with a variance, morbidity, or mortality. We also review all cases which might be interesting to the group, or from which we might learn something. If a case or treatment is unique, a literature search is done and a case report generated, if warranted.

The PCC is structured as a non-judgmental forum to encourage full disclosure of events surrounding a case. Human errors are difficult to discuss objectively, but the purpose of the PCC is not to punish or humiliate the participants. The purpose is to ensure that an error never recurs—that our system comes another step closer to being fail-safe.

Our practice is based on protocols which are revised regularly. Changes in protocol frequently originate from the consideration of a problem at PCC. Protocols are meant to be constantly upgraded to reflect the narrowing of the tolerances around the "ideal."

#### *Mechanics*

We hold our PCC on the first Monday of the month. Everyone knows that case conference will be held even if we have to make adjustments to the schedule. This meeting is important enough that it appears on the call schedule that each perfusionist receives before each new month. A perfusionist involved in a case to be discussed is responsible for presenting the case

concisely and with supporting records. We try to limit PCC to less than 90 minutes.

In order for PCC to work, someone must be responsible for organizing and leading the meeting. Without clear direction the goals of PCC will not be achieved. PCC must not become a power struggle or a forum to demonstrate the superiority of any person or group. The success of this program relies upon honesty, integrity, knowledge, effort, and the voluntary disclosure of mistakes. It is critical that a participant not fear for his/her self esteem or become intimidated by the group as a result of discussing errors in judgment or lack of knowledge. The preservation of this atmosphere is the responsibility of every member of the group, but it is one of the duties of the designated leader. It is an apparent paradox that we are intolerant of mistakes and tolerant of the person responsible for the mistake. We realize that errors are made and if we discuss them we are less likely to make them again.

The communication of problems is fundamental to keeping others from repeating the same mistakes or having the same problems. Sometimes problems are of such magnitude that it is not advisable to wait to address them. We use Phonemail™ (a voice message computer system accessible by phone) to alert the group to these problems.

PCC is similar to M&M conferences that we attend. There are important differences, however. PCC covers more ground and in greater depth. Interesting cases and cases not involving mortality or morbidity are discussed. PCC is a team effort to improve and not a group of competing practitioners.

The principles of PCC can be applied to small groups or in the practice of a solo perfusionist. The development of standards (protocols) and a variance policy followed up with discussion amongst the perfusionist/surgeon, or perfusionist/anesthesiologist is a practical approach. It is not unreasonable for the solo perfusionist who has developed standards to keep a personal journal of variances and action taken to prevent recurrence. A formal and concerted effort to review and resolve quality failures is the essence of PCC.

#### *Summary*

PCC is part of the effort to improve perfusion quality. The educated, well trained, interested perfusionist is less likely to make mistakes. The primary emphasis of quality is prevention of accidents and achieving the standards outlined in the protocol.

Quality perfusion makes fiscal sense. The cost of doing things over again and the cost of accidents contribute to the unacceptable cost of health care. Health care costs are rising at a rate much higher than the cost of living. It is an inescapable conclusion that the lack of standards and quality improvement efforts in

health care contribute in a significant way to this dilemma.

PCC, properly conducted, will accomplish valuable goals. Communication is improved, protocols are refined, areas for further training are defined, participants stimulated, and perfusion quality reinforced. Financial resources, patient lives, and perfusionists careers may be saved by preventing accidents.

## References

1. Kurusz M, Conti V, Arens J, et al.: Perfusion Accident Survey. *Proceedings of the American Academy of Cardiovascular Perfusion*, Volume 7, 1986.
2. Mortensen JD, Yates WG, Shoenberg AA, et al.: *Final Report: Cardiopulmonary Bypass Systems: A Study of Safety and Performance*. Salt Lake City, Utah: University of Utah Research Institute, FDA Contract No. 223-80-5081, 1981.
3. Stoney WS, Alford Jr, WC, Burrus GR, et al.: Air Embolism and Other Accidents Using Pump Oxygenators. *Ann. Thorac. Surg.* 29:336-340, 1980.
4. Schabel RK, Berryessa RG, Justison GA, Tyndal, Jr, CM, and Schuman J: Ten Common Perfusion Problems: Prevention and Treatment Protocols. *J Extra-Corpor Technol* 19:392-398, 1987.
5. Berryessa RG, Tyndal CM: Perfusion techniques which may decrease brain injury during cardiopulmonary bypass. *Brain Injury and Protection During Heart Surgery*. Hilberman M. (Ed.), Norwell M.A.: Martinus Nijhoff, 1988, pp. 137-156.
6. Crosby PB: *Quality is free*. New York: Mentor Books, New American Library, 1979, p. 145-147.

## Questions from the Audience

*Unknown: Question:* What do you use as precedence for establishing your protocols?

*Answer:* Good question. We are delving into a new area. We tried to, from the literature, define some basis for precedence. If there is no precedence then we try to develop some protocol on the side, what we want to try, what we want to show. Then we systematically try to do a study, for example, to make sure that what we are trying is the right thing, doing what we expect it to do and not to abandon it for the right reasons, for documentable reasons.

*Frank Hurley, Chicago, Illinois: Question:* I would like to compliment you on your presentation. One area I would like to define is the presentation of the case. I think it might be more helpful in the learning process if the situation is presented as an open-ended event, simply because a 70-year-old man developed XYZ after cardiopulmonary bypass, and then the discussion will generate possibilities as opposed to an individual coming up to you and saying this is what happened on bypass.

*Answer:* We present a case, just the facts, we don't speculate, we don't make any judgements about what could have happened and why something happened, we just say what did happen. And then we talk about what to do to improve that and it causes more open-ended, free-for-all type of conversation. I think that is what you are getting at.