

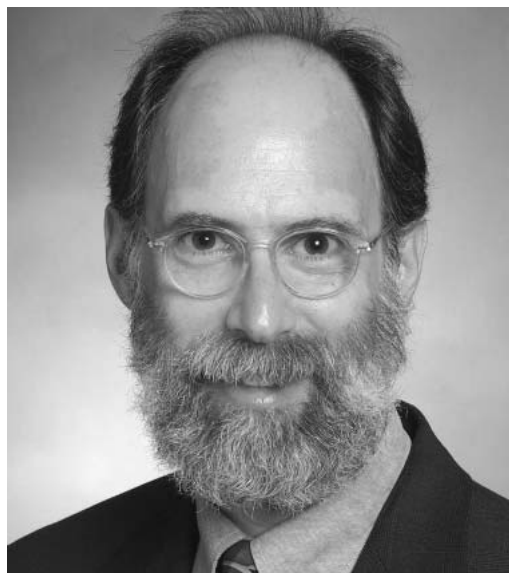
Moral Experience and Technicians of the Heart: Reflections on the Practice of Perfusionists

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The increasing reliance upon technology within the health care context clearly sets up possible conflict between traditional humanistic norms in medicine and values inherent to a technological imperative. In this light, it is suggested that the technologic role perfusionists play obscures a degree of moral recognition. Specifically, despite shouldering significant responsibility for patients' lives, and routinely confronting value-laden dimensions of patient care, perfusionists are not typically recognized as having moral accountability (in the same manner as are physicians and nurses). This is in large part due to perfusionists being closely identified with the technology for which their role is primarily defined. And yet, reflection upon perfusion technology and perfusion practice serves to bring into sharp focus the centrality of perfusionists' moral accountability.

In the last section of chapter 2 of her book, *For the Time Being* (1), Annie Dillard skillfully notes how individuals from across the ages and from many different cultures—for instance, 1st century Hindus, 4th century Romans, 12th century Korean Buddhists, 18th century Hasidic Jews—all have lamented the decline of the moral fiber of their own times. Each alludes to the past—that is, the past of their own cultures and their own people—when such decline not only was *not present*, but also was far from the collective imagination; and yet, in their own present times, they find decline. A similar kind of lament, with its vision of a simpler and more virtuous past, is one we have seen in our own culture in responses to the social changes of the past 40 years, a response that continues to be felt as we move fully into the 21st century.

This is not, however, limited to popular culture; in the context of medicine and health care, a similar theme is present, particularly in the context of real (or potential) problems brought about by the use and influence of technology. At its most general, there is concern that medical technology, and its implicit “technological imperative” (2), introduces new and distinctive values into the realm of



health care (3). As a result, conflict necessarily arises between traditional norms of humanistic medicine and these “technological” values (4). Physicians, having embraced medical technology and having become deeply reliant upon it, are now losing many of the basic humanistic skills that not only have traditionally defined medical practice, but more importantly, have traditionally served as the root of medical ethics (5). Technology in medicine, therefore, is to be viewed with suspect.

This kind of trepidation regarding medical technology is more often articulated in terms of particular technologies, which are taken to be the harbinger of corruption of heretofore stable and well-accepted values and norms. For instance, such a perspective has been articulated most recently (and most veraciously) in relation to the prospect of human cloning, which is seen as leading to a debasing of the sanctity of parenthood and the final commodification of human beings (6). Similar questioning (focused more on the sanctity of human life itself) has swirled around solid organ transplantation, especially in light of the prospect of an artificial heart (7) or the use of nonhuman organs in humans (8). Nanotechnology in medicine is

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yet another locus beginning to generate concern of this type (9).

It is interesting to note that the worry regarding the role and influence of technology in medicine is often presented as something new and particular to our age. But like the lament Dillard addresses, the concern over technology in the medical context has been around for quite a long time. As Jonsen notes, the entire history of medicine is full of this worry (10). Moreover, as he and others also point out, critical consideration of the implications of changing technology in medicine is one of the core issues dating to the beginning of modern bioethics some thirty-odd years ago (11), which suggests that the fears and apprehensions associated with technology and medicine are not mere Luddite views of a small group of fanatics.

In this light, it is interesting to consider how these kinds of worries and fears fit within the context of perfusion technology, and in particular, what such a view might reflect about the purveyors of this technology, namely, perfusionists. After all, perfusionists are, by discipline, by practice, and by name, primarily and avowedly technicians. Accordingly, if there is something ill advised or problematic associated with this technology, by implication, perfusionists, as the ones who run and manage this technology cannot be immune from such a problem. This article is concerned with such an influence of technology on medicine in the context of perfusion practice. Specifically, it considers whether the technologic role perfusionists play might actually reinforce an obscuring of a certain kind of moral recognition concerning medicine and health care.

PRELIMINARY NOTE

Clearly, the alliance between medicine and technology has made profound and positive differences—in medicine and for human kind—not only in terms of expanding the number and scope of medical interventions, but in terms of how we understand health, well-being, illness, and injury, and where we draw the bounds regarding the legitimate role of medicine and health care in the lives of individuals and for society as a whole. Without a doubt, our lives have been transformed by medical technology not only socially and culturally, but also even biologically; think here, as a simple example, of the increase in average life span.

In the same manner, technology in relation to medicine and health care has altered what we do, as well as how we do what we do, when taking care of the ill and injured. In so doing, it has similarly altered the ways in which to conceptualize those things we do (12). As part of its conceptual implications, medical technology has also raised questions, which entail inherently ethical considerations. This is in large part due to the fact that medical technology

leads us into realms where we must make choices concerning matters either previously unimagined, or in some cases, previously unimaginable—for instance, repairing physical anomalies before a child is even born (as occurs with fetal surgery for spinal bifida [13]), or, extending life when the living body cannot do so itself (via ventilators, dialysis machines, pacemakers, and so on), and, still striking our fancy after nearly fifty years, replacing parts of one's body with parts from another (where that other may be either dead or alive). Having to face both the expansion of our choices and the need to choose, the question of our ability to choose *responsibly* becomes difficult to answer (14).

Facing what was previously unimagined or even unimaginable, and then having to make a decision, and act upon that decision, brings to the forefront core values and commitments of those who must choose and then act. However, those directly involved in decision making, as well as those acting on those decisions, are not the only ones who face such moral challenge. For instance, in hospitals, nursing facilities, and other institutions in which health care is provided, ancillary health care workers—lab technicians, physical therapists, nurse assistants, and, noteworthy for this article, perfusionists—are often *not* involved in the decision-making process *per se*—and sometimes not even *primarily involved in the care* of the patients for whom decisions are made. Nonetheless, their tasks directly bring them into the context of the decisions being made and the subsequent aftermath of those decisions. Thus, even if unnoticed, they too run up against, or are confronted by, values and commitments—their own, those of others, those of the institutions in which they work, and so on. It is this confronting of values and commitments that gives rise to the issue of moral recognition about which this article is concerned.

POWER AND AUTHORITY IN PERFUSION PRACTICE: AN OVERVIEW

Clearly, the service provided by perfusion technology is widely recognized within the health care system to be extremely valuable—open-heart surgery, as we know it, for instance, could not be performed without it. And yet, there can be little argument that perfusionists, as the technicians who run the machines, are not typically seen as meriting a similarly high degree of status within the health care system, and hence they are not given the same kind of institutional and professional status as the other health care personnel beside whom they typically work—surgeons, anesthesiologists, and critical care physicians.

One likely reason, it may be suggested, is that perfusionists' education and training lack the demands and rigors associated with medical education and training. For instance, only slightly more than half of the training pro-

grams require undergraduate degrees prior to admission and less than one in four offer Master degrees at program completion; moreover, even the most strenuous programs for perfusionists take only 24 months to complete (15). Compare these with the requirements associated with medical education (which includes two years of basic science training and two years of clinical training, followed by at least three years of residency training—except in the case of surgical disciplines, which require at least five years of additional training, and more often closer to ten years of postgraduate clinical training).

But it is not merely that perfusionists' education and training is less demanding. It is also the fact that perfusionists undergo their education and training for a much more practical reason: namely, to become proficient in running perfusion machinery. In fact, in a certain practical sense, without the machines, there is no real need for perfusionists at all (the same kind of dependence upon technology as a *raison d'être*, cannot be said for either physicians or nurses). In this sense, the value of perfusionists within the health care system is based solely on their role, and that role is itself dependent upon, and thus subordinate to, the role of the perfusion technology.

This subordinate status may be, to some degree, seen as being metaphorically displayed by perfusionists' physical location within the OR during open-heart procedures. Literally, the perfusionist sits on a low stool, often no more than a foot or two off the ground, at the end and to the side of the patient, behind (and hence obscured by) the enormous system of pumps, tubes, and filters that is the perfusion machine. Moreover, unlike the anesthesiologist who similarly resides near a massive stack of machinery in the OR (and may even be obscured from direct view), the perfusionist has no direct contact with the patient; any sense of "patient contact" is, rather, mediated through the machine. This subordinate status of perfusionist to the perfusion machine has an even greater, and quite practical, indication: in terms of the power-and-authority chain of command—within the OR, the intensive care unit, or other locations where perfusion technology is used and hence perfusionists practice—perfusionists are on the lower end whereby they, for the most part, follow orders, not give orders.

PERFUSIONISTS' RESPONSIBILITY: TECHNOLOGICAL ASPECTS

And yet, despite having little formally recognized power and authority, perfusionists actually carry a fairly significant weight of responsibility. Perfusionists' responsibility may be conceptualized as entailing at least three distinct aspects. First, they are responsible for ensuring that the machinery functions properly and without mechanical error whenever it is used as part of patient care. Practically,

this means that perfusionists are responsible for setting up the machines prior to their usage, correctly operating them at the time of their usage, responding to and appropriately correcting any mechanical glitches that may occur during their usage, cleaning the machines after they have been used, and maintaining the working order of the machines after successive uses, which itself entails assessing whether parts must be replaced, ordering replacement parts when necessary (16), and then installing those new parts when they arrive. This first aspect of responsibility is clearly technologically oriented insofar as the central emphasis is on the proper mechanical functioning of the machine.

Second, by running the machine "properly" (which means ensuring that no mechanical errors or difficulties occur or go without correction), perfusionists are responsible for regulating and maintaining patients' bodies according to pre-established physiologic criteria. Here, the emphasis is on the hemodynamic stability that ensues from the proper functioning of perfusion technology, and effort is directed towards establishing and then sustaining what Stefan Hirschauer has called the "surgical body" (17), which is, essentially, the status whereby human bodies and bodily functions are completely controlled so as to undergo (in the context of perfusion technology) either the rigors of surgery (as in the case of bypass), or treatment (as in the case of ECMO), or support (as in the case of LVADs). In this effort to manage and maintain patients' bodily functions, perfusionists' responsibility is still technological in nature, only the "machine" upon which their focus is fixed is not the perfusion machinery *per se* but the human body as understood mechanistically, that is, understood, again using Hirschauer's term, as a "surgical body." At this point, I want again to point out that, regarding both the machinery and the surgical body, perfusionists follow directions—that is, they follow orders given them from surgeons and anesthesiologists.

PERFUSIONISTS' RESPONSIBILITY: A 3RD, NOT-MERELY TECHNOLOGICAL, ASPECT

As for the third aspect of responsibility, it is one that is not similarly simply technological. This third notion of responsibility may be readily seen in the case of bypass when considering the management of the interface between a patient's body and the perfusion machinery, and, specifically, the management of the transition onto, and then later off of, perfusion equipment. These transitions are critical since during them, patients' hemodynamic stability—and by implication their very lives—are controlled neither by their bodies nor the perfusion machinery; rather, control resides "in the balance" between body and machine. The machine, however, is the access to exerting control over what is between body and machine, thus

making the machine crucial for managing the interface *between* body and machine.

In the OR, there is a palpable sense of intensity, even more than usual, during the transition onto, and later off of, bypass. The reason: during such transition, control over the patient's life resides in the balance between machine and body. Since the perfusionist is the operator of the machine, and hence, during these moments, is the individual having the greatest ability to control the preservation of the patient's life, during these moments of transitions—which last no longer than 90 seconds or so—the perfusionist becomes the center of attention. What's striking is that in contrast to the typical dynamics of the surgical team, at just these most critical moments, the usual hierarchy of authority is turned upside down and the perfusionist gives directions to the surgeon and the anesthesiologist in their efforts to accommodate the body as the machinery is turned on or turned off.

Hence, for 90 seconds or so, during each period of transition, it is the perfusionist who tells the others what to do. Miscalculation by the perfusionist is not only potentially fatal, but the time between occurrence and recognition of error, and the occurrence of fatal outcome, is relatively short. At these moments, perfusionists are responsible not merely for the proper technological functioning of the machine but also for interpreting its function and directing the others taking care of the patient so that they may respond appropriately to best ensure not only that the body as surgical body is maintained, but that the body as human being survives. And such responsibility, with its requirements for interpretation—and hence judgment—directed towards the body as human being (and not merely surgical entity) is more than technological in scope.

This sense of responsibility associated with perfusion practice is even more pronounced and extended in the context of LVADs, and in particular, in the setting in which the decision is made to withdraw the device as part of the withdrawal of life-sustaining interventions. Perfusionists, as the technicians who “take care of the device,” have no role in the decision to withdraw; this is the responsibility of patients, families, and physicians. However, given their responsibilities for maintaining and managing these devices, perfusionists are the individuals who must, so to speak, “do the deed” and actually disconnect and remove the equipment. While such disconnection is, in one sense, merely a technological undertaking, in another sense it is not; the removal of the LVAD is directly connected to the death of the patient—and the perfusionist thus shares (to some degree) in the responsibility for that death.

This point must not be over read. It is not suggesting that perfusionists, in their acts of disconnecting LVADs, are culpable or blamable for patients' deaths or even that they bear the brunt of the various kinds and degrees of

responsibility associated with such situations. After all, as stated above, perfusionists play no role in making decisions to withdraw, they merely fulfill the decision by carrying out the technological activities associated with their role as technicians, namely, taking care of the machine (which in this case means, removing the machine since it is no longer going to be used). However, in actually “doing” the disconnection and removing LVADs, perfusionists are confronted with patients' deaths—and not merely the loss of the surgical body or the disruption of hemodynamic stability or any other characterization that articulates human life in mechanistic or reductive terms.

ACCOUNTABILITY: IS THEIR ROOM FOR MORAL RECOGNITION?

This seems to be pointing towards an important point regarding accountability. Having to interpret technological data, make judgments, and direct others regarding what to do, or walking into a room and turning off a machine without which the patient connected to it cannot survive, brings perfusionists face-to-face with considerations that are not merely technological; in fact, they are imbued with highly-charged values and commitments. For instance, in the OR, in the midst of managing the transitions onto and off of bypass, perfusionists no longer reside near the bottom of the power-and-authority chain of command. Rather, in those moments, because they are so technologically mediated, the perfusionists are at the top of the power-and-authority pyramid, whereby the power and authority to tell others what to do, and have those others act as told, is theirs. Hence, unlike at other times, in these brief moments, the surgeons and anesthesiologists with whom perfusionists work are no longer “superior.” And, practically, in these moments, and available for reflection at other times, the bases for the usual balance of power and authority—such as education, institutional status and recognition, monetary compensation, and so on—are, so to speak, up for grabs, and available for questioning.

Similarly, when LVADs are disconnected, the usual conception of patients as (albeit complex but still essentially) bodies to be manipulated and controlled is difficult to maintain, for, with the disconnection of the tubing and pumps and the other facets of the machinery, death occurs—is occurring, right there and right then—prompting a variety of other rituals and activities to be undertaken even before the perfusionists have completed their work. Again, either in that moment or at some point later, the fact of one's participation in another human being's death is evident and available for inspection, consideration, and questioning.

These considerations are not, however, as part of routine and day-to-day practice, topics pertinent for the ful-

fillment of perfusionists' primary responsibilities, which are primarily and almost exclusively technological. In fact, explicit discussion of these kinds of considerations does not fit into the formal routine of perfusion practice at all. Compare this to medical or nursing practice in which discussion of such issues not only frequently occur within the context of specific patients' care, but are found in popular and prestigious journals, have become standard topics in medical and nursing education, and, as mentioned at the beginning, have a rich tradition within the histories of these health care disciplines.

All of which brings into highlight the issue of whether technology in the context of medicine may serve to challenge, and even obscure, moral recognition. Perfusion technology, as a prototypical example of technology's impact on medicine and health care, has allowed us to do to the body what otherwise we could not. In particular, the body as surgical body is more fully mechanized than ever before. Such mechanization, moreover, entails a complex economy in which any individual body—be it patient, surgeon, anesthesiologist, nurse, or perfusionist—becomes part of a much more complex surgical enterprise and technological undertaking; in that light, the surgical body, like the dancing Shiva, has many arms indeed. But lest we immediately jump to conclusions of humanity lost, it must be pointed out that through this mechanization, and through this complex technological enterprise, a human body is not only made repairable, but individual human lives may be restored—and even improved upon. This technology that leads to revived and better lives is surely impressive and, with little surprise, garners our attention and focus.

As the caretakers of the machines, perfusionists become, by role, by function, by most daily activities, extensions of the machinery—and thus, it may be suggested, part of the technology itself. Accordingly, concern for moral experience and reflection not merely has no place, it has no sense; after all, in the usual way of speaking, machines and technology have no moral experience. Hence, circumscribed by both the language of their role and that of their activity, perfusionists *qua* technicians have no means for articulating and giving account of moral experience—their own or otherwise.

But lacking a formal means for attending to moral experience, it remains the case that perfusionists find themselves—at 90 second intervals during bypass procedures, and as part of the aftermath of the decision to withdraw an LVAD—undergoing significant moral experiences and coming face-to-face with actual instantiations of specific values and commitments. And this leads to the real crux associated with the alliance between medicine and technology: that alliance, for all intents and purposes, appears to create a perspective that inherently obscures the moral dimension of its own perspective due to its having no

means for articulating—and possibly even recognizing—such moral considerations.

FINAL THOUGHT: TECHNOLOGY BOTH OBSCURES AND CLARIFIES

Writing nearly thirty years ago on the topic of technology and responsibility, Hans Jonas noted that “we are constantly confronted with issues whose positive choice requires supreme wisdom—an impossible situation for man in general” because “he does not possess that wisdom,” the situation is made even worse in contemporary times because humanity “denies the very existence of [wisdom's] object: viz., objective value and truth.” Accordingly, Jonas concludes, “we need wisdom most when we believe in it least” (18). And here, returning to Dillard's observations noted at the beginning of this article, she writes in that last section of chapter 2 of her book the culminating sentiment faced by each society as it confronts itself: “The good times, and the heroic people, are all gone. Everyone knows this. Everyone always has” (19).

Is this true? Do we lack the requisite wisdom to adequately deal with what the alliance between technology and medicine brings forth? And is it already too late; have our fates already been sealed? These are fundamental ethical questions that face all of us who participate in the modern technologically driven health care arena. And yet, this much is certain: technology in the context of modern health care has surely made many lives easier and has allowed us to alter and even limit much of the physical suffering previously undergone by countless generations of the past. Still, so too has the alliance between technology and medicine raises up for our inspection, should we choose to look, one of the most basic and enduring of moral questions: how can I best be accountable for the choices I inevitably have to make?

Regardless of how technology alters our world and affects what we are capable of doing—in the world of medicine or the world more generally—what we must always contend with is being able to discover or create meaning for our choices, our actions, and indeed, ourselves. This is the human lot. For perfusionists, as for all whose roles place them squarely in the context—and confines—of technological activity, technological perspectives, and technological value, the challenge is to be able to balance the demands of that technological frame with the demands which arise out of being human, such as being legitimately recognized and enabled to articulate the moral dimensions of one's experiences. While technology may serve to obscure the moral dimensions of technology's own perspective as viewed from within, from without, it also serves to bring into sharp focus the centrality of moral experience and accountability to human endeavors.

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16. This is explicitly stated within the "'Essentials and Guidelines' for an Accredited Educational Program for the Perfusionist," which has been adopted by the American Academy of Cardiovascular Perfusion, American Association for Thoracic Surgery, American Board of Cardiovascular Perfusion, AMA, American Society of Extracorporeal Technology, Perfusion Program Directors' Council, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons. See AmSECT's web page (www.amsect.org).
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