Beyond technology:
Intensive care in the 1980s

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The 3rd World Congress of Intensive and Critical Care Medicine should serve as a festive occasion for intensive care. It marks the 10th anniversary of the Society of Critical Care Medicine, the 1st Assembly of the World Federation of Societies of Intensive and Critical Care Medicine, a concomitant meeting of the Iberio Pan American Federation—and the emergence of intensive care into young adulthood. From the beginnings in the 1950s, the infant specialty has grown into a multidisciplinary, multiprofessional, and multinational discipline. Truly this is an impressive coming of age. It is ironic, therefore, that I believe that intensive care faces a serious crisis—one which threatens its very existence. The costs are increasing while the dollars available are not and perhaps will never be sufficient to meet the demand. The number of patients considered suitable for intensive care grows daily while the number of personnel available to provide this care is not even keeping pace: actually, the total numbers are diminishing. This combination suggests to me a true crisis. However, I believe that we can meet this challenge and, more importantly, can provide true satisfaction and a sense of accomplishment for the individuals working in this specialty and for society, in general, if we examine the goals of intensive care from a human standpoint and the means that can be discovered to attain these goals. Beyond technology, then, implies looking beyond the limitations imposed by technology based intensive care to frontiers to be explored in human development. I will try to delineate the problems, propose this new perspective and, finally, to project the results that I believe are possible.

We are faced with certain societal factors which impinge upon our ability to deliver highly technological and specialized intensive care. Throughout the world, inflation continues to raise the costs of every product

and every service. It does not seem likely that an early or easy solution can be predicted. We are all aware of the tremendous increase in energy costs which are quickly translated into other products and services as well. The prospect of cheap and unlimited energy seems difficult to obtain and certainly distant if possible. Worker productivity continues to fall whether due to the desire for the "good life", the diminution of job satisfaction, or loss of the work ethic. Taken together these tend to decrease the value of monies presently allocated to provide intensive care. Further, society no longer seems to consider unlimited spending to save a single life as a workable or desirable goal. It is reasonable to predict that there will be some limitation of further allocations which would further limit the ability to deliver adequate intensive care. Not only do the costs for presently available equipment continue to increase, but each technological advance seems more expensive than the last. Computerized tomography certainly has increased our diagnostic ability but at a vastly increased cost. In cardiac transplantation, the technical problems have been solved and there are reasonable expectations for survival. Yet recently, Massachusetts General Hospital chose not to begin a program because of the overwhelming cost per patient. In a world of multimillion dollar salaries for professional athletes, those who provide care for human beings receive salaries that are considerably less than most blue collar workers. A professional baseball player may earn as much for a single game as a nurse earns in an entire year. As an hourly wage, over $4000 seems excessive— especially since half the time is spent sitting on the bench. While it does not seem likely that society will resolve this inequity, it is clear that the nursing profession will continue to battle for deserved salary increases and that, because of the crisis in nursing personnel, hospital administrations are forced to become sympathetic and will provide some relief. These factors combine to diminish the total medical care which can be provided by a given allocation. Thus, less medical care can be purchased because the efficiency has diminished and the total dollars are fewer.

There are also specific medical factors which tend to intensify the crisis. We are faced with a necessity to provide intensive care to a greater number of patients each year. This reflects the increasing age of the population in general. Older patients are more subject to critical illness and even lesser illnesses may become critical because of the diminished physiological reserve in the older population. Our own success has also contributed to the problem. Because we can successfully care for patients with overwhelming illness and especially after major surgery, an increasing number of patients are referred by their individual physicians for intensive care. This increased desire to admit patients is exemplified by coronary artery bypass surgery. Mortality rates approximate 1–2% at the present time. All patients undergoing coronary artery surgery spend at least 24–48 h in an ICU. It is not clear whether the low mortality rate reflects intensive care or increased surgical ability, but it is a fact of life that cardiac surgeons insist that these patients be cared for in ICUs.

Presently, we suffer from a critical shortage of nursing personnel. Over 90% of the hospitals in the United States report nursing vacancies in ICUs. On an overall hospital level, approximately 100,000 jobs are available at this time. This figure is even more striking when one realizes that of the 1.3 million nurses in this country, only 900,000 are presently practicing nursing as a profession. If only one-fourth of the nurses not practicing returned to work, there would be no nursing shortage. Nevertheless, the crisis continues to grow. Of those who chose nursing as a profession, progressively fewer select hospital-based ICU nursing as a career. University trained nurses tend to select primary care or practitioner roles, and I see ICU nursing perceived as technical nursing and not as desirable as those roles which permit the nurse to exercise assessment and care functions. Nursing turnover rates continue to rise and, most disturbingly to me, nurses who leave often select nonnursing careers which further diminishes the number of available nurses. It is common to discuss "burn out" among ICU personnel. Yet we have not solved or even delineated the problem clearly. Why is the environment perceived as stressful and why do capable, well-trained and experienced nurses fail to find job satisfaction in this once highly desirable role? Why do nurses leave nursing? There is even a national study group grappling with the problem yet there appears to be no solution in the offing.

It is also evident that fewer physicians select careers as full-time "intensivists." Though there are fewer than 100 critical care fellowships available in the United States, not all positions are filled. It is also disheartening to note that in contrast to other medical specialties, intensivists tend to practice full-time intensive care for relatively few years. A surgeon usually practices surgery from the completion of his residency until his retirement. There are few physicians still practicing full-time bedside—not administrative—intensive care after 10 years in the field. Perhaps "burn out" should be applied to physicians as well. At the present rate, we will never fill all available positions in intensive care because it is likely that the graduating class will barely replenish the positions vacated each year. It is ironic that this trend has developed at the same time that the intensive care has been recognized by the American Board of Medical Specialities. The net result and our major problem in the 1980s is how to survive in the ICU with increased demands and decreased resources. Is there any solution to this dismal picture that I have painted? I sincerely hope so and suggest that we must change our goal from considerations of what *should* be done in an *ideal* world to what *can* be done today. We must provide more job satisfaction. We must develop the ICU until it becomes an attractive environment to work. In this fashion, we may enhance recruitment and increase retention. I believe that this can be done if we change our focus from technology, physiology, and pharmacology as the expression of our professional lives to an emphasis upon human resources—the impact of caring *as* a person *for* a person. This change can be based upon considerations based upon societal values and the goals of medicine.

In 1979 I was privileged to attend a lecture by Chaplain Ernle Young in which he discussed the goals of medicine as coordinated with societal values. His discussion had a profound effect upon me and I have obtained his permission to share his approach. There are two fundamental principles of medicine: preservation of life and the alleviation of suffering. At times these may become incompatible in which case we must select either one or the other. A simple example can demonstrate the dilemma. A young trauma patient may develop a life-threatening pneumothorax. We may not have an opportunity to provide adequate local anesthesia during the insertion of chest tube. In this situation, we have chosen to preserve life while being unable at that instant to alleviate suffering.

Let us examine this more rigorously (Fig. 1). Especially in intensive care, we can easily lose the perspective that life is a continuum beginning with birth and ending with death. In the words of Herman Feifel, "Our birth right is death, the common thread that binds all mankind." In this context, death is not an enemy to be feared but appropriate in the natural order of things. However, at the beginning of life, we in medicine chose to emphasize the preservation of life because this is associated with society's value of the sanctity of life. We will, in certain cases, choose to consider the alleviation of suffering as a less important goal, because the quality of life in early life is not viewed as equal priority. However, as the end of life approaches, we may often reverse these principles (Fig. 2). At this time, the alleviation of suffering is most important because the quality of life to an individual patient seems to represent societal values. The preser-
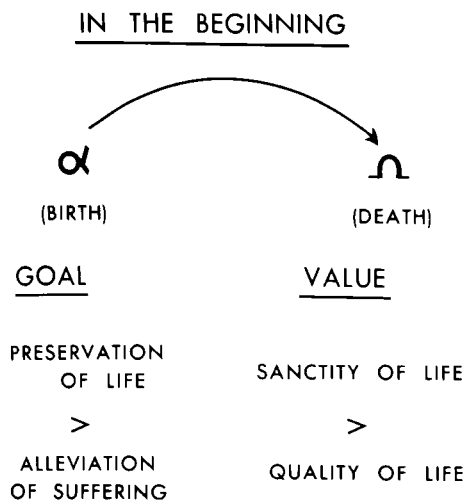
IN THE BEGINNING

α   Ω
(BIRTH)   (DEATH)

GOAL   VALUE

PRESERVATION   SANCTITY OF LIFE
OF LIFE
   >   >
ALLEVIATION   QUALITY OF LIFE
OF SUFFERING

FIG. 1.

AT THE END

α   Ω
(BIRTH)   (DEATH)

GOAL   VALUE

ALLEVIATION   QUALITY OF LIFE
OF SUFFERING
   >   >
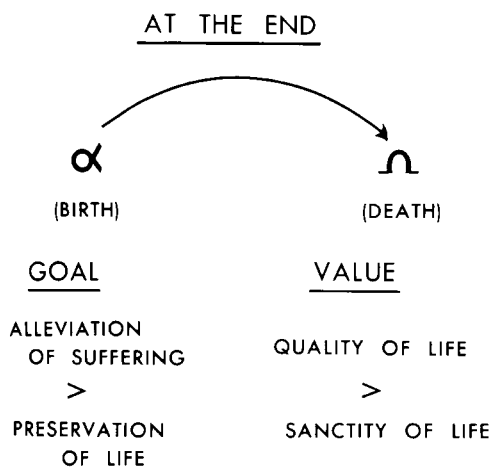PRESERVATION   SANCTITY OF LIFE
OF LIFE

FIG. 2.

vation of life at this time is no longer as dominant if we remember that death is part of the natural order of our living process (Fig. 3).

We could more clearly delineate the choice of priorities if we could define a certain point in time beyond which life cannot be extended with value, dignity, and meaning. After this point, we can no longer "save the patient" but, in fact, continued therapy will only prolong the dying process. The problem, of course, is to define this 'X' point. It must include objective medical data that, indeed, our therapy is no longer effective. It must also include a subjective definition of the quality of life for this particular patient at this particular time. This philosophical approach is complicated by the judicial and media intrusions as exemplified by the phrase "pulling the plug." In fact, this problem has been magnified out of proportion if we simply recall the strict definition of treatment which states that it is the application of remedies with the object of affecting a cure; i.e., therapy. If we can, indeed, define a situation in which our remedies cannot effect a cure, termination of these efforts does not represent discontin-

uing therapy or treatment but rather a decision to avoid prolonging the dying process. Instead of needlessly and fruitlessly continuing heroic although unproductive efforts, we must change our priorities and our goals (Fig. 4). Thus, at the beginning of life, before the 'X' point has been reached, care is appropriately directed to achieve cure of the disease state. This is in accordance with societal values and the principles of medicine. At this time, because of the sanctity of life, we attempt to preserve it. However, after the 'X' point has been passed, our efforts in providing care must be directed towards caring for the patient because society emphasizes, at this point, the quality of life and our major efforts are directed to the alleviation of suffering. This type of caring includes numerous opportunities for productive human intervention.

Our skills as medical professionals may be unable to

Ⓧ = POINT BEYOND WHICH LIFE
    CANNOT BE EXTENDED WITH

• VALUE
• DIGNITY
• MEANING
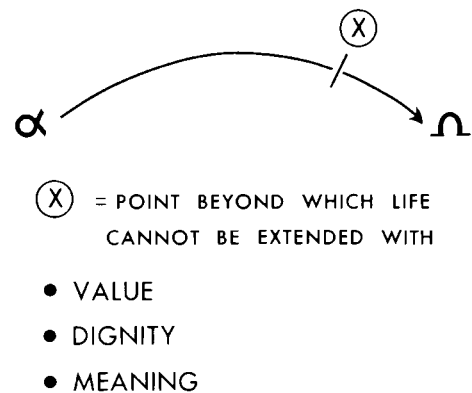
DYING CAN ONLY BE PROLONGED

Ⓧ INCLUDES OBJECTIVE MEDICAL DATA
   AND SUBJECTIVE DEFINITION OF
   "QUALITY"

FIG. 3.

α → Ⓧ CARE = CURE

Ⓧ → Ω CARE = CARING

• VALUES ASSOCIATED WITH PRINCIPLES
• SANCTITY OF LIFE WITH PRESERVATION
           OF LIFE
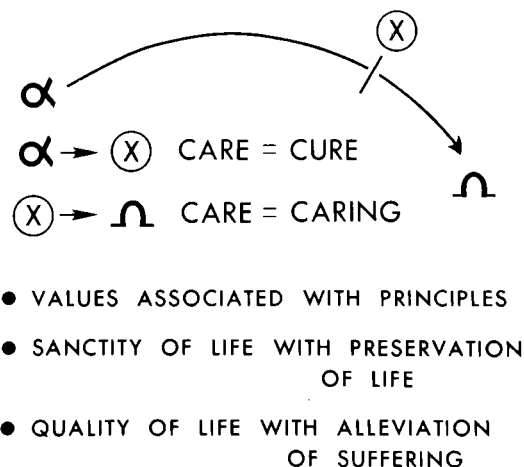• QUALITY OF LIFE WITH ALLEVIATION
           OF SUFFERING

FIG. 4.

deal with the devastating critical illness, but we must not view this with a sense of failure. Rather, it is an opportunity for the expression of those unique human resources that can, in fact, aid the patient and family to cope with the dying process. This provides us with a greater opportunity for productive interventions, because we don't cure every patient, but it is clear that each of us eventually will die. Investigations into the dying process have revealed that most patients proceed through varying stages. The final stage is one of acceptance. The patient fully comprehends and accepts the reality of his own death. It is at this time that we can provide much needed human support. Acceptance may be lonely; but our human presence is both desirable and necessary to provide support. It is certainly clear that we can alleviate suffering during this time not only with pharmacological interventions but by providing an appropriate environment for the patient and his family. Perhaps in the heat of the all out battle against illness, we may tend to overlook the physical comfort of the patient. It is important at this stage to devote our attention to providing the maximal comfort possible. This can take many forms including the elimination of venipuncutres to obtain specimens for unnecessary laboratory testing, other diagnostic procedures and especially painful and no-longer-therapeutic interventions. Finally, we must become cognizant of the reality that many patients are poorly prepared for dying in an ICU. This illness may have been abrupt in onset and unexpected. We often find that the patients may be psychologically, financially, legally, and socially unprepared for impending death. We have forgotten the ancient wisdom recorded in the Talmud: from the moment of birth, we are old enough to die. This is often true for families. Providing an environment in which they can learn to cope with this unpleasant reality should, indeed, be one of our most important goals.

There are many important actions that may occur during the dying process. Ethically speaking, there are even certain situations in which mercy killing and suicide may be morally justified. However, we, in intensive care, must focus upon the incorporation of the hospice concept into our daily environment. This growing movement is most often applied to patients with terminal cancer. Their course may be protracted and the modern, acute hospital has little to offer them in terms of cure and, unfortunately, less in terms of providing an appropriate environment to die. It is for this reason that "hospices" are often built in separate physical locations. However, this concept, which embodies the alleviation of suffering because of the importance of the quality of life, *can*, if our efforts are so directed, be expressed in an ICU. Not nly is this fundamentally good for the patient's family and society but, I believe, can have an extremely salutary effec upon the personnel who choose to work in intensive care. No longer is death regarded as failure but the dying process becomes an opportunity to help and, thus, every patient can benefit from his ICU stay. Some may get better while others may die better. In this light, the controversies over "pulling the plug", seem to vanish. Withdrawing and withholding aggressive treatment can be viewed more accurately as an appropriate change of focus. No longer do we fruitlessly and expensively prolong the dying process but rather, freed from the burden of supplying technologically demanding but ineffective treatments, we can devote our efforts to caring for the dying patient and his family.

Thus, we must look beyond technology for two reasons. First, unlimited technological expansion will not be possible as determined by the major limitations faced in our society. Second, we must, as medical professionals, go beyond technology to provide human resources for our patients. Both aspects are important because I believe that the limitations of dollars and people are real and that they will not improve. For us to continue in intensive care, then, we must move in these different directions. I do not view this in a negative fashion but rather, an emphasis to accentuate the positive, for we will be providing the best treatment that we can, despite the limitations of resources. We will continue to strive to return as many patients as possible to health, but most importantly we will be capable of extending ourselves to aid the dying patient. Whatever resources are available will be used to help and limitations just provide an opportunity to exercise our human qualities. No longer will death be a victorious enemy because we will know that every interaction can have a beneficial effect. Should these concepts reach fruition, then we can predict that the ICU will become a more desirable work environment and perhaps this may ease the personnel limitations we now face. Further, should this environment be professionally and personally rewarding, we might also anticipate that the turnover rate and burn out phenomenon may also diminish. Within this conceptual framework, we can now examine the role of technology more carefully. We must define technological efficiency and provide the most care for the available monies. Our ideals should not emphasize the most elegant, sophisticated and expensive equipment, rather, the widest possible application for the lowest cost.

Can society adjust to these changes? I believe so. Consider the dramatic reversal in our image of an ideal car; no longer is it advertised as bigger and faster but rather, "properly sized" and economical. We must initiate a similar change of emphasis in intensive care. We must also insist that the thrust of technology be aimed at easing personnel problems: to support our limited personnel and not create more complicated solutions to existing problems. Technology can often seem to be a step beyond our human capabilities since a computer can solve mathematical problems that we cannot. We must remember that technology is of our creation *and*

we choose its goals *and* we must choose these new directions. Technology must not be viewed with awe. Rather, we must be in awe of our human capabilities. Technology is not the master but the servant.

We must accentuate the positive qualities of human capabilities that are beyond technological achievement. We cannot yet computerize those special qualities of the doctor/patient and nurse/patient interactions. A smile, a touch, confidence, and security are still beyond our programming capabilities. Numerical data are clearly crucial to intensive care; so, too, are the human elements. We can and do look at patients and receive important information. The ability to recognize that patients, families, and staff may be encountering difficulties in coping with the emotional and psychological effects of the devastating illness again are beyond the computer's capability but are among our best attributes. In fact, these deserve our concerted efforts towards fostering human development in the ICU.

On the other hand, we can program computers and utilize technology to offset some of our inherent human weaknesses. Computers can always observe, do not tire, record information correctly, perform repetitive, simple calculations and, of course, even more complex ones, and finally, they never call in sick or require coffee breaks. Thus, technology properly designed and utilized expands but does not replace human resources. A runner could train for a lifetime and obviously never "beat" a commercial jet airliner. We certainly produce more numbers than we can handle and have properly relegated data management to large scale computers. These do not represent defeat but point out that our *ingenuity* created a technology to help us expand beyond our physical limitations. In my view, in the 1980s, ICUs should become humanity biased.

Let us take full advantage of our human capabilities and use technology appropriately, not as an end but rather to serve the delivery of care to as many patients as possible. This care must be dedicated to cure whenever possible but must shift its emphasis to caring for those patients who are beyond our limited knowledge and abilities. In this way, we can enhance the quality of life for our patients surely but, of equal importance, for the staff who chooses to work in this stressful environment. Perhaps, we cannot always provide a cure but to strive always for a proper environment for the natural end of life is an equally important goal. The challenge today is to recognize the real limitations that society must face. These cannot be conquered by mere blind exploitation of technology. Rather, we must focus upon our distinct human qualities of insight and caring. In this way, the popular view that intensive care is a depersonalizing environment can be replaced by the recognition that human beings are caring for human beings. We seem to be able to assimilate data from a variety of sources using all of our senses. Calculation and data management alone will not provide a sophisticated level of total intensive care. We must not look *to* technology to solve all problems, rather, *beyond* technology to personal development. In the future, we must face reality. We will only be able to deliver the intensive care supported by resources allocated. It is more important to focus upon how much intensive care should be given in an individual case so that resources are allocated more appropriately. This allocation must be structured by careful qualitative judgments consonant with the principles of medicine and societal values. These must change as resources and knowledge evolve. It is only with a proper structure that future changes can be incorporated into the delivery of the best intensive care possible. Rather than view the crisis and obstacles as limits, we must think beyond—to develop the capabilities that can be found within us all. Intensive care beyond technology recognizes societal limitations and the potential for human development. It is with this perspective that I view the next decade with great excitement and confidence. The real limitations will not serve as shackles to limit future development but rather call for imagination and creativity, uniquely human qualities, to develop a form of intensive care that is truly beyond technology.