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Effects of Flow Triggering on Breathing Effort

ABSTRACT & COMMENTARY

Aslanian and associates compared pressure and flow triggering of the mechanical ventilator during pressure support (PS) and volume assist/control (A/C) both in a lung model and in eight patients. In the lung model evaluation, the Puritan-Bennett 7200ae, Siemens 900C and 300, Bird 8400ST, Taema Cesar, Hamilton Veolar, Newport Wave, Draeger Evita 2, and Engstrom Erica ventilators were compared at pressure triggering sensitivities of –0.5, –1.0, and –2 cm H_2O, and at flow sensitivities of 1, 2, 3, 4, and 5 L/min. In the clinical evaluation, the PB 7200ae was used to compare pressure triggering sensitivity –2 cm H_2O and flow triggering sensitivity 2 L/min.

During both pressure triggering and flow triggering, there were significant differences observed among the different ventilators. The Newport Wave performed best during pressure triggering, followed by the Siemens 300, and the Siemens 300 and Draeger Evita 2 performed best during flow triggering. With the most sensitive settings, there were no differences between pressure and flow triggering in any ventilator. Pressure triggering was unavailable on the Draeger Evita 2 and Engstrom Erica, and flow triggering is unavailable on the Siemens 900C, Taema Cesar, Hamilton Veolar, and Newport Wave.

In the clinical arm of the study, flow triggering outperformed pressure triggering during pressure support, but during volume A/C there were no differences in patient effort. With PS, the esophageal pressure-time product per minute (193 ± 77 vs 168 ± 67 cm H_2O s/min), the diaphragm pressure-time product/min (191 ± 80 vs 161 ± 68 cm H_2O s/min), and the inspiratory work of breathing, both per min (12.2 ± 6.8 vs 10.5 ± 5.9 joules/min) and per liter (1.16 ± 0.53 vs 1.00 ± 0.49 joules/L) were all significantly lower with flow triggering. (Aslanian P, et al. *Am J Respir Crit Care Med* 1998;157:135-143.)

COMMENT BY ROBERT M. KACMAREK, PhD, RRT

This study clearly demonstrates that the triggering capabilities of today's mechanical ventilators have improved dramatically compared to those of the previous generation of ventilators. In addition, based on the lung model data when set at consistent sensitivity set-

INSIDE

tings, there were no differences in triggering effort between flow (FT) and pressure (PT) triggering during PS and A/C. This is contrary to the data on the 7200ae published by Sassoon et al (*Crit Care Med* 1987;17:1108 and *ARRD* 1992;145:1219) during CPAP. However, this difference is expected based on the way PT and FT function during CPAP. With PT and CPAP, the sensitivity setting is normally targeted (e.g., 1 cm H_2O below baseline), whereas FT manufacturers have targeted actual baseline pressure or higher. With assisted modes of ventilation, once the ventilator senses patient effort, gas delivery is determined by the assisted breath algorithm rather than by the triggering algorithm.

The results of the clinical aspect of this study must be questioned for Aslanian et al to choose sensitivity settings that were not comparable in the laboratory analysis (-2 cm H_2O PT; 2 L/min FT). If a more sensitive PT were selected (-0.5 or –1.0 cm H_2O), it is unlikely that any differences would have been observed between the two types of triggers. Goulet et al (*Chest* 1997;111:164) observed no differences in triggering effort between PT and FT when PT of –0.5 and –1.0 cm H_2O were compared to flow triggers of 2 and 3 L/min.

I would recommend the use of a flow trigger in preference to a pressure trigger whenever it is available. Since FT is clearly superior to pressure triggering during CPAP and pressure triggers tend to be set with less sensitivity than flow triggers, and also because the accumulation of condensate in the ventilator tubing results in auto-cycling with PT set at -1.0 cm or less H_2O, the new flow triggering systems should always be used. ❖

Based on the actual algorithms for flow and pressure triggering, patient effort differences can be expected to exist during:

a. CPAP.
b. SIMV.
c. pressure support.
d. assist control.
e. none of the above

Calcium Antagonists Improve Outcomes After Subarachnoid Hemorrhage

ABSTRACT & COMMENTARY

Synopsis: *This meta-analysis of 10 studies in 2756 patients found that calcium antagonists reduce the risk for death and dependence, for secondary ischemia-related deficits, and for cerebral vasospasm in acute subarachnoid hemorrhage.*

Source: Feigin VL, et al. *Neurology* 1998;50:876-883.

Feigin and colleagues at the university of Utrecht performed a systematic review of randomized controlled trials comparing treatment with a calcium antagonist drug to control therapy in patients with acute subarachnoid hemorrhage (SAH). They used the Cochrane Stroke Review Group's trial register as well as an electronic database from 1966-1995 and several other sources, and used only those studies that met rigorous inclusion and exclusion criteria. In addition to information on study design and patient characteristics, Feigin et al examined death, poor neurologic outcome, secondary ischemia, cerebral vasospasm, recurrent hemorrhage, and adverse effects of therapy in each study, as well as in the aggregate.

Ten studies involving 2756 patients were included in Feigin et al's meta-analysis. In all 10 studies, the administration of calcium antagonists within 10 days of the initial SAH reduced the risk for secondary ischemia-related neurologic deficit or for cerebral infarction as shown by computed tomography. Trends toward reduced mortality (9 studies) and fewer incidents of rebleeding (6 studies) with the use of calcium antagonists were found. A poor overall neurologic outcome (death or dependence) was significantly less like-

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ly if patients with acute SAH were given calcium antagonists. Although a variety of agents were used in the studies included in this meta-analysis, Feigin et al recommend oral nimodipine and intravenous nicardipine as the calcium antagonists of choice, depending upon the patient's severity of acute illness.

COMMENT BY DAVID J. PIERSON, MD, FACP, FCCP

Acute SAH is a common and serious problem in the ICU. In the acute management of patients with SAH, whether calcium antagonists such as nimodipine and nicardipine should be administered to reduce the likelihood of cerebral vasospasm or delayed ischemia remains controversial. Cerebral vasodilation is desirable, but the controversy relates to the risk of concomitant hypotension with the use of these agents. In patients with acute brain injury and derangement of normal cerebral autoregulation, systemic hypotension with a drop in cerebral perfusion pressure can lead to severe worsening of neurologic status, even when it is transient. This carefully performed systematic review of previously reported studies provides strong support for the use of calcium antagonists in SAH. Clearly, however, every effort should be made to prevent even brief episodes of hypotension when these agents are used in this setting. ❖

Meta-analysis of randomized control trials of the use of calcium antagonists in subarachnoid hemorrhage found:

a. trends toward reduced mortality.
b. fewer incidents of rebleeding.
c. a decreased likelihood of a poor neurologic outcome.
d. all of the above
e. none of the above

Early Extubation After Cardiac Surgery: No Increase in Ischemia

ABSTRACT & COMMENTARY

Synopsis: *In a randomized study of patients undergoing coronary artery bypass surgery (CABG), those extubated between one and two hours after surgery had no more evidence of ischemia than those extubated after 10-12 hours.*

Source: Berry PD, et al. *Brit J Anaesth* 1998;80:20-25.

In an attempt to shorten hospital and icu stay, patients undergoing CABG are being extubated sooner following surgery. They are often hypothermic, marginally compensated hemodynamically, and still experiencing the effects of anesthesia. Adverse effects of early extubation include the need for re-intubation, hemodynamic deterioration, and cardiac stress. Berry and associates studied the incidence of electrocardiographic (ECG) ischemia in a prospective, randomized study of 98 patients with good ventricular function and no lung disease undergoing elective CABG surgery. Three ECG leads were recorded for 24 hours following surgery in all patients. The time-weighted sum of all ST-segment changes was calculated. Acute ischemia was defined as ST-segment changes of more than 2 mm in any lead. An acute myocardial infarction (MI) was diagnosed by characteristic elevations of blood MB-CPK levels or the appearance of new Q waves on ECG.

Thirteen patients were excluded due to bundle branch blocks, poor arterial blood gases, excessive bleeding, death in the early postoperative period,[1] and failed early extubation (3 patients), which left 85 patients for analysis. The early extubation group, E (43 patients) differed from the late group L (42 patients) only in that more E were being treated for hypertension and more were receiving beta blocker therapy (P = 0.030). There was no difference in preoperative ischemia, surgical success, operative length, or complications.

The number of patients experiencing postoperative ST-changes was similar in both groups (22 in E vs 17 in L; P = 323). ST depression was more frequent in the E group (20 vs 11; P = 0.029), although when the effect of preoperative hypertension was included in a multivariate analysis, no independent association with E or L extubation was found in the development of ST-changes or ischemia. Nitroglycerine was used more frequently in the E group and epinephrine more frequently in the L group. Four patients developed non-fatal MIs, two in each group, and two patients died, both in the L group. Ischemic burden (mm ST change times hours it was present, divided by the total hours of monitoring), CPK levels, hospital length of stay, and ICU length of stay were not different between the groups.

COMMENT BY CHARLES G. DURBIN, Jr., MD, FCCM

This is an interesting study demonstrating a lack of correlation between early extubation and development of ischemia following elective CABG surgery. Its conclusions must be viewed cautiously for several reasons. The initial randomization failed to control for beta blocker therapy use. Although multivariate analysis can help separate the issues, it essentially reduces the power of the experiment to show a difference when one actually exists (type I error). A second problem is that three patients failed early extubation and were dropped from analysis. The hazards of reintubation may adversely

affect patient outcome and should be recognized. This may not have affected the ischemia analysis but certainly should affect enthusiasm for early extubation.

Another issue is the surgical technique used. Many of these patients underwent normothermic bypass with electrical fibrillation with a short cross clamp time. This is an unusual technique in the United States. The effect of surgical technique was not analyzed in the study. Body temperature was not reported or compared. Anesthesia may have been different in the two groups as well, low-dose narcotic and propofol in E and higher dose narcotic with propofol in L. The increased use of nitrates in the E group and epinephrine in the L group is concerning. Were these patients being treated for identified problems? How did drug use correlate with outcomes?

It is difficult to do the "perfect" study looking for adverse outcomes. This paper suggests that ischemia is not a major concern when considering early extubation following elective CABG surgery, but more information is needed before this technique can be advocated universally. ❖

Early extubation following elective CABG surgery:

a. is not associated with an increased incidence of ischemia.
b. saves money by decreasing hospital length of stay.
c. means extubation within 12 hours following surgery.
d. results in an increase in cardiac deaths.
e. should only be considered if one or at most two vessels are grafted.

ICU Patients With Low Severity of Illness: How Many?

ABSTRACT & COMMENTARY

Synopsis: *In this regional sample, a large proportion of the patients admitted to ICUs had a low (< 0.3%) estimated probability of death and did not receive ICU-specific interventions.*

Source: Rosenthal GE, et al. *Arch Intern Med* 1998; 158:1144-1151.

To examine variations in severity of illness among patients admitted to ICUs, Rosenthal and colleagues collected data from 38 ICUs in 28 hospitals in one metropolitan region for four years (1991-1995). Patients with a predicted risk of death of 1% or less were classified as having low severity of illness. Predicted risk of death was determined using a statistical model that included APACHE III Acute Physiology Score, ICU admission source, and ICU admission diagnosis. Data were abstracted from ICU medical records on standardized forms. Patients were excluded if they were in the ICU for less than four hours following surgery, had burn injuries (only 1 hospital provided this care), were admitted only for hemodialysis, or died within the first hour after admission. Patients with diagnoses managed in coronary care or cardiovascular ICUs (acute myocardial infarction, unstable angina, cardiac arrhythmias, open heart surgery) were also omitted since they would require ICU care independent of acute physiologic abnormalities.

The total sample of 104,487 patients had a mean age (± SD) of 61.9 ± 18.1 years, 52% were male, and overall mortality was 11.8%. Low-severity patients accounted for 20,451 (19.6%) of all admissions, including 23.6% of postoperative and 16.9% of nonoperative admissions. Alcohol and other drug overdoses accounted for 40.2% of nonoperative low-severity admissions, while laminectomy and carotid endarterectomy accounted for 52.3% of postoperative low-severity admissions. Overall mortality among low-severity patients was 0.3%. The most commonly used ICU-specific intervention in postoperative and nonoperative patients was intra-arterial monitoring. Excluding intra-arterial pressure monitoring, only 12.1% of all postoperative and 11.4% of all nonoperative low-severity admissions received an ICU-specific intervention. Nonetheless, low-severity admissions accounted for 11.1% of total ICU bed days. Substantial variability was observed across hospitals. For nonoperative admissions, rates of low-severity illness ranged from 5.2-27.5% of all ICU admissions; for postoperative admissions, rates ranged from 9.4-68%. The mean rate of low-severity admissions was lower in the five major teaching hospitals than in the 23 minor teaching and nonteaching hospitals in the study sample.

COMMENT BY LESLIE A. HOFFMAN, PhD, RN

On-line availability of medical data offers new possibilities for assessing how health care, including care in the ICU, is delivered. While it is well known that ICU care is costly, few studies have examined how ICU beds are used or whether practice varies among hospitals. Important findings in the present study are that ICU beds were often used for patients in whom the risk of death was low and for patients who did not receive any ICU-specific intervention.

More than 62% of the patients with low-severity illness who received ICU-specific interventions received only intra-arterial monitoring—an intervention unlikely to provide important assessment data. No information was provided regarding staffing patterns in the study ICUs, so it was not possible to determine whether patients were

admitted to ICUs in order to permit more vigilant observation by nursing personnel or to compensate for the lack of housestaff. Rosenthal et al noted that there were large variations in numbers of low-severity patients admitted to teaching and nonteaching hospitals, but they did not note if there were variations among nonteaching facilities. This information would be helpful in eliciting factors that may have led to the observed differences.

As Rosenthal et al note, there are several methodological limitations in this study. Findings were based on medical record data rather than direct observation; low severity was defined using historical outcomes; and no information was recorded about organizational resources, such as the ability to provide intensive monitoring in non-ICU settings. Nevertheless, findings of this study suggest the need to carefully assess ICU admission criteria in order to elicit whether tradition, rather than need, determines who gets admitted. Given the high costs of ICU care, these findings provide strong support for ongoing analysis of ICU admission policies with the goal of determining how best to use these expensive resources. ❖

In a regional sample, the percentage of ICU admissions judged to be low severity was:

a. less than 2% of all admissions.
b. approximately 5% of all admissions.
c. approximately 10% of all admissions.
d. approximately 20% of all admissions.
e. higher in teaching hospitals.

Special Feature

Withdrawing Life Support: Decision-Making and Process

By Fred J. Tasota, RN, MSN, and Leslie A. Hoffman, PhD, RN

Today, 65-90% of deaths in intensive care units (ICUs) occur after a decision to withdraw or withhold life-sustaining therapy.[1-3] This high prevalence reflects a growing social and professional consensus that withdrawing or withholding treatment is ethically acceptable and clinically desirable if reversal of the disease process is no longer possible, restoration of an acceptable level of functioning is unlikely, and/or the patient is experiencing substantial pain and suffering.[4-6] Nevertheless, health team members continue to struggle with issues surrounding such decisions and their implementation.[4-6] This consequence is logical. Patients are transferred to an ICU so that they can receive aggressive, life-saving care. Yet mortality rates remain high for many conditions. Further, if the patient's condition deteriorates, guidance from the patient regarding what level of support is "unwanted" is typically not available.[6] In one study of 179 patients who received a recommendation to withdraw or withhold life-sustaining therapy, only 3% were able to participate in decision-making and only 4% had a written advance directive.[2] Consequently, patients continue to receive unwanted interventions after they, their families, and/or their care providers prefer to stop life-sustaining therapy.[4-6]

Withdrawal of mechanical ventilation, in particular, poses a difficult situation because it typically leads to the death of the patient within a short interval (24 hours or less), can be accomplished using different methods, and can be the source of patient discomfort if inappropriately managed. Consistent and compassionate communication among the health care team, family, and patient (if possible) is, thus, essential when undertaking this process.

Decision-Making Process

Two basic goals drive delivery of care in the ICU—to save patients who have a chance to live, and to help the dying do so with peace and dignity. When further care is incapable of producing a meaningful recovery—that is, futile—the latter goal moves to the forefront. The point at which goals change is difficult to determine because "futility" cannot be defined in narrow physiologic terms.[4,6] Futility embraces a combination of quantitative factors, such as the probability of survival, and qualitative factors, such as quality of life.[4] Therefore, each situation is unique.

It is also pertinent to consider that different members of the health team have varying beliefs and that these beliefs influence decision-making. In a study of 456 university-affiliated internists, respondents were asked to rank their preferences for withdrawing eight forms of life support (blood products, hemodialysis, IV vasopressors, total parenteral nutrition, antibiotics, tube feedings, mechanical ventilation, and IV fluids).[7] Rankings were associated with gender ($P = 0.039$), age ($P < 0.0001$), and whether the physician was a general internist or specialist ($P < 0.0001$), but not with religion, rank, or degree of exposure to patients in an ICU. In a second study, physicians ($n = 225$) were asked to rank their preferences in withdrawing six life-sustaining technologies related to their special expertise: pulmonologists with mechanical ventilation, nephrologists with hemodialysis, gastroenterologists with tube feedings, hematologists with blood products, cardiologists with IV vasopressors, and infectious disease specialists with antibiotics.[8] With the excep-

tion of infectious disease, specialists indicated a preference for withdrawing their "own" form of life support. Few studies have investigated nurse perceptions during withdrawal of mechanical ventilation. In one study,[9] there was unanimous (100%) agreement with the decision to withdraw mechanical ventilation, but some nurses (15%) had concerns about the procedure with specific reference to patient comfort.

These studies support the statement that health team members confront this issue with their own sets of perceptions and biases. Consequently, it is essential that decisions about withdrawing or withholding life-sustaining therapy not be made unilaterally. Rather than avoiding the subject, health team members should maintain open discussions among themselves (and with the patient and/or family) regarding all medical matters, including the treatment plan, progress, and prognosis.[4-6] When the patient's condition or a request from patient or family raises doubt about the appropriateness of continuing treatment, the need for open, ongoing communication becomes paramount.

Changing the Direction of Care

The process of arriving at a decision to withdraw therapy can be arduous for all involved.[10] Some family members arrive at this decision earlier than others, and it is important to air opinions openly.[10] It is important that the family understand that allowing death to occur naturally is the anticipated outcome, and that the priority is relief of the patient's suffering with medications given as needed to promote comfort. Nurses and other team members, such as respiratory therapists and social workers who have direct roles in patient care, need to be actively involved in these discussions. They can provide valuable input, uncover disagreements, and assist with mediation of disputes. It is also important that withdrawal of support, like other medical procedures, be accompanied by proper informed consent and documentation in the medical record.[10] Attention to minority opinions can avoid distrust, inability to bring closure following death of a loved one, and lawsuits. Consensus is not a requirement, but it is important to try to reach agreement.[10] The following guidelines are important to successful communication during the decision-making process:

- Whenever possible, initiate discussions about preferences for life-sustaining therapies before an acute event occurs making death imminent.
- Hold regular meetings to discuss the patient's current condition, plan of treatment, and prognosis.
- Keep discussions frank, informative, and consistent
- Document discussions in the medical record.
- Once a decision is reached that further care is futile, communicate to the family that withdrawal of support is a recommendation, not merely an option.
- Allow time to accept the recommendation.
- Establish a time for withdrawal. Incorporate a short period of delay to provide opportunity for family members to reflect on the decision, make necessary arrangements, and plan to be present, if they wish. The delay should not be longer than a day, however, because further deferral tends to increase anxiety.

Ultimately, decisions about withdrawing and withholding life-sustaining therapy should be guided by two fundamental principles, autonomy (that is, one's duty to respect the rights of others to make decisions about treatment they wish to receive) and beneficence (that is, the duty of practitioners to do "good" for the patient). When it is not possible to reach agreement, it is advantageous to have institutional supports to facilitate decision-making. Educational programs and written policies defining acceptable circumstances for discontinuing therapies can be helpful. A multidisciplinary ethics committee may help to resolve conflicts when agreement cannot be reached.[5]

Implementing Withdrawal of Mechanical Ventilation

Limited research has examined how withdrawal of life support is best accomplished. In a recent study, a retrospective chart review was used to identify the process used for 419 patients admitted to three university-affiliated hospitals.[3] The issue of withdrawal was first raised by the attending physician (71.9%) or primary attending service (24.9%), and rarely by the family (2.4%) or patient (0.8%). Once the issue was raised, discussions primarily involved critical care physicians (69% to 98%) and the family (83% to 100%). Nursing (16%) and social workers (14% to 19%) were infrequently involved. Once the issue was raised, a decision to withdraw life support was made at the first meeting in most cases (63%), although a minority (5%) required four or more meetings. Slightly more than half (52%) of the patients had life support withdrawn within one hour of the decision and 77% within 10 hours. Once the process began, most patients died quickly (that is within one hour [55%], within 4 hours [75%], or within 24 hours [98%]).

A subsequent study compared these findings with data obtained from six community hospitals.[11] The incidence of withdrawal of life support was similar to that found in teaching hospitals, but more patients died in community hospitals as a result of withholding as opposed to discontinuing treatment. Families were more likely than physicians to be the first to raise the issue, and the time from beginning withdrawal of support to death of the patient was longer. If all discussions were in fact documented in these studies, the findings suggest that families are not

actively involved in decision-making early in the process. Nevertheless, findings suggest that families are supportive of the decision, since little time ensued between making the decision and initiating treatment withdrawal.

Two distinct methods of withdrawing mechanical ventilation have been described: the endotracheal tube may be removed, or it may be left in place while ventilator rate, positive end-expiratory pressure, supplemental oxygen, and tidal volume are reduced.[9,12,13] The directness of extubation represents one merit.[13] However, this approach fails to protect the patient's airway, and, thus, there is risk of stridor, air hunger, and the consequent requirement for large doses of morphine and other sedatives. The latter point can be of consequence. Although administration of morphine is accepted to relieve distress, even if it depresses respiration (principle of double effect), it is possible under these circumstances for the dosage to become so large as to call into question the issue of euthanasia.[13] The best approach seems to be a combination of the two: leave the endotracheal tube in place but decrease the FIO_2 and ventilatory support over a brief interval (after suctioning and medicating the patient).[13] There is no reason to prolong the process of dying by prolonging reduction in support.

Regardless of the method chosen, health team members must frequently assess and aggressively manage patient discomfort with rapid titration of appropriate medications. Morphine is the most useful choice for analgesia due to its potency, its ability to relieve dyspnea, and its wide therapeutic range. In patients prone to bronchospasm, fentanyl may be substituted. Dose requirements vary significantly based on level of pain, tolerance, and factors affecting systemic distribution. More important than specific dosages are the principles that discomfort should be anticipated and medication should be immediately available. Intravenous infusions facilitate a consistent effect and should be combined with intermittent boluses, administered when ventilator support is decreased or when patient discomfort is increased. In order to optimally reduce discomfort, the physician must either be at the bedside at all times or provide nurses with wide-dosing latitude. Benzodiazapines are indicated for sedation, anxiety, restlessness, and delirium. Optimal management is best achieved using a combination of opiates and benzodiazapines with lower doses of both drugs. Depending on the situation, opiates and/or benzodiazapines may not be indicated or necessary. Likewise, circumstances may warrant the use of other agents (e.g., anticholinergics to decrease secretions, bronchodilators to ease breathing, and antiemetics for nausea).

In the previously cited study with findings from university hospitals, morphine was used in all instances in which medication was considered appropriate, and sedation was used in 61% of cases.[3] Morphine was most often (44%) given by bolus injections, supported by a background infusion. However, in 36% of cases, a morphine infusion alone was used. The median hourly dose was 14.4 mg, with a range of 0.7-350 mg/h (mean 21 ± 33 [SD]). Benzodiazepines were most commonly given as boluses alone (80%). In 20% of cases, a background infusion was used either with (10%) or without (10%) bolus injections. The median hourly dose was 5.1 mg, with a range of 0.2-80 mg/h (mean 8.6 ± 11).

Neuromuscular blocking agents are contraindicated, since they mask signs and symptoms that alert the health team members of the need to provide additional analgesia and/or sedation. If necessary, reversal agents (neostigmine) may be used. If paralysis cannot be reversed in 2-3 hours, most authors recommend proceeding while administering high doses of opiates and sedatives.[9,12]

While maintaining the patient as the primary focus of the process, family support remains vital throughout in order to allay anxiety experienced by loved ones. Comfort measures directed toward the patient in an unhurried, compassionate manner demonstrate continued caring by the health team. In addition, the following are important to promote patient and family well-being:

- Maintain interaction with the patient and family (not talking is equated with not caring).
- Explain that death is the anticipated outcome, the priority is relief of suffering.
- Explain the dying process and what to expect during withdrawal.
- Reinforce that the use of medications is not to hasten death, but to promote comfort.

Although families often ask questions about how long the process will take, it is best to refrain from providing specific estimates, as time may vary considerably from that expected. Although the majority of patients succumb within minutes to a few hours, there are instances when patients survive for longer periods and may be transferred to a ward.[5]

Conclusion

If these management strategies are understood and applied, the difficult process of withdrawal of life support can become more humane. Attention to patient comfort, to clear, open and ongoing communication, and to promoting death with dignity are vital for all concerned. *(Tasota is Project Director, Transtracheal Assist Grant, School of Nursing, University of Pittsburgh.)* ❖

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Morphine or other agents that may suppress respiration and precipitate death may be given to terminally ill patients for the purpose of alleviating distress. This is known as the ethical principle of:

a. beneficence.
b. autonomy.
c. double effect.
d. primum non nocere.
e. non-maleficience.

Correction

In the article "Music Therapy Reduces Anxiety in Mechanically Ventilated Patients" (*Crit Care Alert* 1998;6[7]:49-50), the source was incorrectly cited. The correct citation should read: Chlan L. Effectiveness of a music therapy intervention on relaxation and anxiety for patients receiving ventilatory assistance. *Heart Lung* 1998;27:169-176. We regret any confusion we may have caused. ❖

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Managing Editor *(Name and Complete Mailing Address)*: Miriam Timmerman, same as above

10. Owner *(If owned by a corporation, its name and address must be stated and also immediately thereafter the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.) (Do Not Leave Blank.)*

Full Name	Complete Mailing Address
American Health Consultants	3525 Piedmont Road, Bldg. 6, Ste. 400
	Atlanta, GA 30305

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check here. ☐ None

Full Name	Complete Mailing Address
Medical Economics, Inc.	Five Paragon Drive
	Montvale, NJ 07645

12. For completion by nonprofit organizations authorized to mail at special rates. The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes: *(Check one)* ☐ Has Not Changed During Preceding 12 Months ☐ Has Changed During Preceding 12 Months *(If changed, publisher must submit explanation of change with this statement)*

PS Form **3526**, July 1995 *(See instructions on Reverse)*

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13. Publication Name	14. Issue Date for Circulation Data Below
Critical Care Alert	September 1998

15. Extent and Nature of Circulation	Average No. of Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
a. Total No. Copies *(Net Press Run)*	1079	1175
b. Paid and/or Requested Circulation (1) Sales Through Dealers and Carriers, Street Vendors, and Counter Sales *(Not Mailed)*	7	7
(2) Paid or Requested Mail Subscriptions *(Include Advertisers' Proof Copies/Exchange Copies)*	911	975
c. Total Paid and/or Requested Circulation *(Sum of 15b(1) and 15b(2)*	918	982
d. Free Distribution by Mail *(Samples, Complimentary, and Other Free)*	28	28
e. Free Distribution Outside the Mail *(Carriers or Other Means)*	0	0
f. Total Free Distribution *(Sum of 15d and 15e)*	28	28
g. Total Distribution *(Sum of 15c and 15f)*	946	1010
h. Copies Not Distributed (1) Office Use, Leftovers, Spoiled	133	165
(2) Return from News Agents	0	0
i. Total *(Sum of 15g, 15h(1), and 15h(2)*	10799	1175
Percent Paid and/or Requested Circulation *(15c / 15g x 100)*	97	97

16. This Statement of Ownership will be printed in the November issue of this publication. ☐ Check box if not required to publish.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner: Donald R. Johnston, Publisher — Date: 9/25/98

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions *(including fines and imprisonment)* and/or civil sanctions *(including multiple damages and civil penalties)*.

Instructions to Publishers

1. Complete and file one copy of this form with your postmaster on or before October 1, annually. Keep a copy of the completed form for your records.
2. Include in items 10 and 11, in cases where the stockholder or security holder is a trustee, the name of the person or corporation for whom the trustee is acting. Also include the names and addresses of individuals who are stockholders who own or hold 1 percent or more of the total amount of bonds, mortgages, or other securities of the publishing corporation. In item 11, if none, check box. Use blank sheets if more space is required.
3. Be sure to furnish all information called for in item 15, regarding circulation. Fee circulation must be shown in items 15d, e, and f.
4. If the publication had second-class authorization as a general or requester publication, this Statement of Ownership, Management, and Circulation must be published; it must be printed in any issue in October or the first printed issue after October, if the publication is not published during October.
5. In item 16, indicate date of the issue in which this Statement of Ownership will be printed.
6. Item 17 must be signed.

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