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Does 'Renal Dose' Dopamine Work?

ABSTRACT & COMMENTARY

In this randomized, double-blind, placebo-controlled clinical study from the Australia and New Zealand Intensive Care Study (ANZICS) clinical trial group, they questioned the use of the widely practiced, but never proven, role of low-dose dopamine therapy "to protect renal function" or "to improve renal blood flow." Over a period of three years, more than 300 patients in New Zealand and Australia were randomized to receive either a placebo infusion or a dopamine infusion at 2 mg kg-1 min-1. Inclusion criteria were the presence of a central venous catheter, two or more features of the systemic inflammatory response syndrome (SIRS) during a 24-hour period, and at least one indicator of early renal dysfunction. The latter included a urine output averaging less than 0.5 mL/kg/h for four hours or more, a serum creatinine concentration more than 150 mmol/L (1.69 mg/dL) in the absence of premorbid renal dysfunction, or a rise in serum creatinine concentration of more than 80 mmol/L (0.9mg/dL) in less than 24 hours in the absence of creatinine kinase more than 5000 IU/L or myoglobin in the urine.

Patients who were younger than 18 years, who had a recent episode of acute renal failure in the previous three months, and those with renal transplants were excluded. After randomization, patients were given an infusion of either dopamine or placebo, and all care providers including physicians and nurses were blinded. There were two interim safety analyses, and the study had a 90% power to detect a 25% difference in creatinine rise between the two groups. There were 161 patients in the low-dose dopamine group and 163 in the placebo group. The groups were comparable in terms of age, disease severity, mean arterial pressure, creatinine levels at baseline, and use of nephrotoxic agents or diuretics during their stay. Both groups received the study drug or placebo infusion for about five days.

There was no difference in the urine output, the rise in serum creatinine, or the use of renal replacement therapy. There were equal numbers of arrhythmias in both groups. Dopamine infusion had to be stopped due to arrhythmia in seven patients. (*Lancet* 2000;356:2139-2143.)

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INSIDE

COMMENT BY UDAY NANAVATY, MD

Having had a chance to review the literature on this topic not long ago, I have to admit that this article provides what is perhaps the only evidence-based information we have in the field of dopamine therapy. The disease spectrum in this study was similar to what is encountered in most ICUs. The indications for starting dopamine therapy in the study are similar to those that most proponents of this therapy would agree. One can only hope that the proponents of this unproven therapy would also agree to the findings. Dopamine was no better than placebo in terms of "renal protection." Of more interest, it did not even have much natriuresis effect.

Hopefully, the results of this large, randomized, controlled study will have an effect on the widespread use of an unproven therapy so widely prevalent in ICUs around the world. The use of dopamine, especially "renal dose" dopamine, has been controversial for a long time. This therapy was based on observations in healthy volunteers in which some increases in renal blood flow and urine output were noted. However, what happens in healthy volunteers is not necessarily the same as is observed in disease states, as the physiology likely changes. The only subgroup of patients in whom dopamine has been shown to be somewhat effective is following cardiac surgery in the presence of decreased renal function. That particular group was not represented in the present study. Overall, it seems safe to conclude that, for most patients in ICU, "there is nothing like renal dose dopamine." ❖

Relevance of Length-of-Stay Reductions

ABSTRACT & COMMENTARY

Synopsis: *For all surviving patients, costs related to the last day of hospitalization were consistently minute, both as a percentage of overall costs (2.4%) and in absolute numbers ($420/d). Cost for specific subgroups followed the same trend.*

Source: Taheri PA, et al. *J Am Coll Surg* 2000; 191(2):123-130.

Hospital length of stay (los) is used as a primary benchmark for judging the success of efforts to reduce health care expenditures. The purpose of this study was to assess precisely how much is saved by shortening hospital LOS. Subjects were all surviving patients (n = 12,365) with LOS more than four days who were discharged from an academic medical center during fiscal year 1998. Patient costs were analyzed using three categories: 1) variable direct costs (expenditures identified from the care of individual patients on a particular day, e.g. lab test, radiographs); 2) fixed direct costs (expenditures identified with a specific hospital department, but not with a particular patient, such as equipment and medical devices used to care for patients); and 3) indirect costs (expenditures outside individual departments, e.g., admissions, administrative salaries).

For all patients, mean LOS was 10.5 days (median, 7 days). The mean total cost per case was $17,734 ± $229, and the mean variable direct cost of the last full day before discharge was $420 ± $7. The last full day before discharge represented 9.5% of the mean LOS, but only 2.4% of the total cost of care. Costs for several subgroups were also examined. When comparisons were made between patients who had major surgery and those who did not, there was only a $36 difference in the last-day variable direct costs ($396 vs $432). Therefore, variable direct costs incurred on the last full day before discharge constituted only 1.5% of the average $26,547

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VICE PRESIDENT/GROUP PUBLISHER: Donald R. Johnston.

EDITORIAL GROUP HEAD: Glen Harris.

MANAGING EDITOR: Robin Mason.

ASSISTANT MANAGING EDITOR: Neill Larmore.

COPY EDITOR: Melissa Lafferty.

MARKETING PRODUCT MANAGER: Schandale Kornegay.

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Customer Service E-Mail Address: customerservice@ahcpub.com

Editorial E-Mail Address: melissa.lafferty@ahcpub.com

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average total cost for patients having major surgery. For trauma patients who spent at least three days in the ICU and at least seven days in the hospital, variable direct costs also fell below $500 per day, as was the case for all other subgroups analyzed. Mean end-of-stay costs represented only a slightly higher percentage of total costs when LOS was short (6.8% for patients with LOS of 4 days). Approximately 40% of variable costs were incurred during the first three days of admission.

COMMENT BY LESLIE A. HOFFMAN, PhD, RN

To control escalating costs of health care, administrators have strived to reduce hospital LOS. Much of the focus on reducing hospital LOS is based on the assumption that "lopping one day off" at the end of a hospital stay substantially reduces expenditures. However, hospital days are not all "economically equivalent." If a patient remains in the hospital for four days, the last full day represents 25% of the total LOS. However, study findings indicated that this last day represented only 6.8% of the total cost of hospitalization.

Consequently, does LOS matter? The answer varies depending on several factors. If the hospital has excess capacity, keeping a patient in the hospital longer would not preclude other individuals from being admitted. In this situation, there would be little financial incentive to further shorten LOS. If the hospital has capacity constraints, the situation would be different because it would not be possible to admit new "high-revenue" admissions if patients were kept longer prior to discharge. An additional consideration relates to how nursing care is managed in regard to staffing ratios. The study hospital used substantial amounts of nursing overtime, which allowed staffing to be adjusted quickly depending on need. Because nursing represents the majority of end-of-stay costs, the inability to quickly adjust staffing could have a profound effect on costs.

The main finding of this study was that, in a general population and in more specific subgroups, the costs related to the last day of hospitalization were consistently minute, both as a percentage of overall cost and in absolute numbers. If targeting LOS is not a means to reduce health care costs, what options are there? First, cost reduction efforts should be shifted to the first days of hospitalization when most costs are incurred. Second, more focus should be placed on health status, clinical outcomes, and patient readmission rates, not simply on LOS. Third, all hospital facilities should be examined in order to determine whether they could be more fully used in off-peak hours when they are historically idle. ❖

Rocking Bed May be as Effective as Prone Positioning

ABSTRACT & COMMENTARY

Synopsis: *In a small study of patients with acute respiratory distress syndrome, prone positioning was compared with continuous rotation treatment, and a similar improvement in oxygenation was seen.*

Source: Staudinger T, et al. *Crit Care Med* 2001; 29(1):51-56.

Prone positioning has been shown to be effective at improving oxygenation in some patients with severe acute respiratory distress syndrome (ARDS). The technical difficulties of this maneuver and difficulties with other interventions make a less complicated positional alternative attractive. Staudinger and colleagues used a specially designed kinetic bed to provide continuous rotation, and examined the effect of this therapy in a group of 26 patients with recently diagnosed (< 72 hours) ARDS. Patients were randomly assigned to receive prone positioning or the kinetic bed treatment. Exclusion criteria were pregnancy, malignant cardiac arrhythmias, recent (< 72 hours) thoracic or abdominal surgery, death during the first 24 hours following randomization, or severe hemodynamic instability requiring initiation of vasoactive therapy or increases in current infusion rates during rotation. The bed was designed to rotate continuously from one lateral position to the other, reaching a 124 degree angle, every 4 minutes, with a 15 second pause at the maximum rotation. Supine positioning was performed daily in such a fashion as to perform routine care procedures as briefly as possible (2-4 hours).

Patients were entered into the study based on the usual criteria for ARDS: diffuse pulmonary infiltrates, an oxygenation ratio (PaO_2/FIO_2) of less than 200, low wedge pressure, and the right clinical setting. All patients were monitored with pulmonary artery catheters and arterial lines. They were sedated and ventilated in the pressure control mode, using small tidal volumes (6-8 mL/kg), FIO_2 0.6 or less, and PEEP up to 20 cm H_2O in order to keep arterial saturation greater than 91%. Inhaled nitric oxide (iNO) was used in all patients prior to entry into the study, beginning at 1 ppm. If the patient was a responder to iNO, the dose was increased until the maximum effect on oxygen saturation was obtained. All patients were on iNO initially, but this

therapy was weaned as oxygenation improved. Hemodynamic and gas exchange variables were obtained hourly.

Twenty-six patients were entered into the study, with 12 assigned to the prone treatment group and 14 to the rotation treatment group. There were no differences between the groups in age (52 vs 54), the proportion of iNO responders (75% vs 79%), initial APACHE II or Murray Lung Injury Scores, or the average iNO dose (20 ppm). Initial ventilatory parameters and blood gases on entry along with intrapulmonary shunt and oxygenation ratio over the first 72 hours were not different in the two groups. There was no difference in the number of patients who improved, or in the area under the curve for the above oxygenation measures, between the groups. No patients were excluded from the prone group for hemodynamic instability, while maximal rotation was temporarily reduced in two patients in the rotation group. There were no complications related to the therapy (such as lines or tubes lost) in either group. There was no difference in mortality (59% vs 64%), or in time to resolution of ARDS in survivors (5 days).

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

This is a preliminary study demonstrating equal efficacy of continuous rotation and prone positioning in improving measures of oxygenation in patients with severe ARDS. The convenience of such therapy would certainly justify adding it to the armamentarium against ARDS if it also improved survival.

Clinical application of the results of this study are hindered by the fact that even prone positioning has not been shown to improve patient survival, despite its ability to improve oxygenation. Nitric oxide, also used in this study, is another therapy that does not improve survival despite having a salutary effect on measures of oxygenation. Despite the recognition that few therapies have been shown to improve the outcome of ARDS (probably, limiting the tidal volume does improve survival), it is difficult not to believe that a therapy which improves oxygenation and allows reduction in inspired oxygen concentration isn't valuable.

This is a dilemma of clinical medicine: improvements in short-term or surrogate measures of "improvement" are attractive when things appear desperate despite the lack of support of long-term improvement. We must resist embracing new expensive or dangerous therapies that do not have the scientific underpinnings of proven efficacy. While this study's results are an interesting observation, this therapy is unlikely to improve patient survival. ❖

Does Ranitidine Increase the Incidence of Nosocomial Pneumonia?

ABSTRACT & COMMENTARY

Synopsis: *Meta-analysis of randomized controlled trials of the use of ranitidine and sucralfate to prevent stress ulcer bleeding in ICU patients failed to show conclusive efficacy of either drug in preventing bleeding and suggested that ranitidine might increase the incidence of nosocomial pneumonia.*

Source: Messori A, et al. *BMJ* 2000;321:1-7.

Messori and colleagues in florence, italy, performed a series of meta-analyses of available randomized controlled trials of the use of ranitidine and sucralfate for the prevention of stress ulcer bleeding in ICU patients. They searched Medline and other databases for English-language studies with placebo controls.

Five separate meta-analyses were performed. The first of these examined the effectiveness of ranitidine vs. placebo in five trials including a total of 398 patients, and found that ranitidine had the same effectiveness as placebo (odds ratio of bleeding, 0.72, 95% CI 0.30-1.70, $P = 0.46$). The planned second meta-analysis of sucralfate vs. placebo could not be performed, as only one clinical trial met Messori et al's entry criteria. Three studies comprised 311 patients in the third meta-analysis of ranitidine vs. placebo with respect to nosocomial pneumonia. In this and the fourth meta-analysis, of sucralfate vs. placebo in two studies totalling 226 patients, no difference in the incidence of pneumonia with respect to placebo vs. either drug could be found. However, in the fifth meta-analysis, directly comparing ranitidine to sucralfate in a total of 1825 patients in eight studies, there was a significantly higher incidence of nosocomial pneumonia in patients receiving ranitidine (odds ratio, 1.35; 95% CI, 1.07-1.70; $P = 0.012$).

The mean quality score in the four meta-analyses that could be completed ranged from 5.6-6.6 on a 10-point scale. Messori et al conclude that ranitidine is ineffective in preventing gastrointestinal bleeding in ICU patients and may increase the risk of pneumonia. Because of small numbers of published studies and total reported patients, Messori et al were unable to make any definitive statements about the clinical effects of sucralfate. They recommend that current recommendations on prophylaxis of stress ulcers be revised.

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

Most published studies of drugs for prophylaxis against stress ulcer bleeding in the ICU compare one supposedly active agent with another. According to Messori et al, this is the first ever meta-analysis of the effects of ranitidine vs. placebo on the incidence of gastrointestinal bleeding in ICU patients. A previous meta-analysis on H2 blockers and gastrointestinal bleeding[1] included five trials using cimetidine, the use of which in the ICU has now largely been abandoned, which generally favored the therapy, plus three trials with negative results using ranitidine. As Messori et al point out, there is only a single placebo-controlled, randomized clinical trial using sucralfate[2]; they believe that no conclusions as to the efficacy of that drug can be made from that study.

Both ranitidine and sucralfate are widely used to prevent gastrointestinal bleeding in ICU patients. According to the British Medical Journal, although a number of groups have recommended the prophylactic use of these agents, the Food and Drug Administration has not approved either drug for this purpose. This study casts considerable doubt on the clinical use of our current practice, and Messori et al emphasize that presently "there are insufficient data on effectiveness to conclude anything one way or another." Once again, further trials are needed. ❖

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Which Ventilation Mode Feels Best?

ABSTRACT & COMMENTARY

Synopsis: *This study of the level of comfort of three modes of assisted ventilation used during weaning used healthy volunteers who found that assisted spontaneous breathing (pressure support) was the most comfortable and synchronized IMV was the least comfortable of the three.*

Source: Russell WC, et al. *Crit Care Med* 2000;28: 3645-3648.

Russell and colleagues at the leicester royal Infirmary recruited 24 healthy adult volunteers and had them breathe spontaneously through a mouthpiece on 5 cm H_2O of continuous positive airway pressure (CPAP) from a Drager Evita II ventilator, until they were at ease with the environment and the apparatus. Then, in random order, Russell et al had the subjects breathe for three minutes on three different modes available for use during weaning, and subsequently to assess the relative comfort of each mode using a visual analog scale. The modes tested were all used with 5 cm H_2O positive end-expiratory pressure (PEEP). The first was synchronized intermittent mandatory ventilation (SIMV), with tidal volume 5 mL/kg, inspiratory flow 60 L/min, and mandatory rate 8 breaths/min. Second was assisted spontaneous breathing (equivalent to pressure support), with an inspiratory pressure of 10 cm H_2O above PEEP, flow cycled at 25% peak flow. Third was biphasic positive airway pressure, a mode available on the Evita II which is essentially the same as airway pressure release ventilation without inversed inspiration:expiration ratio, with set inspiratory pressures of 5 and 10 cm H_2O, a rate of 8 breaths/min, and an inspiration:expiration ratio of 1:2.

Individual scores for the three ventilation modes among the 24 subjects ranged between extremes of 0.3 and 9.3 arbitrary units on the visual analog scale. There was a clear separation in mean scores for the three modes: assisted spontaneous breathing (pressure support) 2.03; biphasic positive airway pressure 4.12; and SIMV 5.38. These scores were significantly different with $P < 0.001$. In terms of subjective preference, 20 subjects ranked assisted spontaneous breathing first and only one ranked it third; in contrast, no subject ranked SIMV first and 19 ranked it third in preference. The preferences for biphasic positive airway pressure were intermediate between the other two, and individual comparisons between pairs of modes all showed statistically significant differences.

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

Under the conditions of this study, healthy volunteers without a previous history of being mechanically ventilated considered assisted spontaneous breathing most comfortable, and SIMV least comfortable, of the three modes examined. The differences in comfort level were considerable.

This study was designed to get some idea of what patients experience during the transition from full ventilatory support to completely spontaneous ventilation. It is hard to know what the experiences of these healthy volunteers, breathing for three minutes on each mode through a mouthpiece, has to do with the experience of mechanical ventilation by critically ill patients. However, it makes sense that completely spontaneous breathing, with each breath boosted by positive pressure at very high inspiratory flow, would be less distressing than having to accommodate to a fixed rate of pressure changes or of preset small tidal volumes at relatively low inspiratory flow. I have

always considered SIMV, when used to provide partial ventilatory support during weaning, to be an unnatural and most likely highly uncomfortable arrangement for an alert patient, particularly one who is dyspneic. Thus, the results of this study are in keeping with my long-held bias on the subject. I wish Russell et al had included a "T-piece" arm in their evaluation, and would be interested to know whether these normal volunteers would have liked completely unassisted breathing most of all. ❖

Special Feature

Respiratory Care in a Managed Care Environment

By Dean R. Hess, PhD, RRT

Three forces are driving health care as we move into the 21st century: access to care, quality of care, and cost of care. These were major issues facing the American voter in the recent Presidential campaigns, as topics such as prescription drug benefits and the Patient's Bill-of-Rights were debated by the candidates. Managed care has become an increasing force in the delivery of health care in the United States.[1] Simply defined, managed care is any system that manages the delivery of heath care in a way such that cost is controlled. First, with the implementation of the Medicare Diagnosis-Related Groups (DRG) prospective fixed-payment system, and now with the increasing penetration of managed care, the business of health care has shifted from revenue-generating to cost-control. Survival in this environment depends heavily on the ability to manage the costs of providing care.

In the United States, respiratory care makes up about 7% of total health care costs and about 10% of total prescription costs.[1] Respiratory care is the sixth largest disease category in terms of dollars spent. Because much of respiratory care is provided in acute and critical care environments, efforts to control its costs have direct effect on the provision of critical care services. Although the effect of this has been felt most acutely by respiratory therapists, it has nonetheless affected everyone whose work is related to critical care—physicians, nurses, patients, and families.

When the environment changes, survival requires adaptation and selection forces favor those who can adjust to fit the new climate. With increasing pressure to provide high quality at low cost, a careful examination of the necessity for some forms of respiratory care has occurred. This has happened at the same time that evidence-based medicine has become increasingly fashionable—in other words, providing health care is consistent with the high-level evidence that supports effective therapy.

Four methods can reduce the costs of respiratory care: elimination of unproven therapy, reduction of misallocation of therapy, transfer of patients to lower cost sites of care, and use of guidelines and protocols.

Elimination of Unproven Therapy

Overordering of respiratory therapy is nearly as old as the profession itself. Respiratory therapists have known for many years that many respiratory treatments are unnecessary or have unproven value. It is also known that much of this therapy can be eliminated without affecting patient outcomes. For example, Zibrak et al[2] implemented a program in which they were able to dramatically reduce the volume of respiratory treatments without any evidence of adverse patient outcomes (e.g., mortality or hospital stay). This program resulted in a reduction of aerosolized medication treatments and incentive spirometry of about 50%. In a revenue-generating business model, such as existed at the time of Zibrak et al's publication, there was no financial incentive to reduce the prescription of unnecessary or unproven therapy.

Incentive spirometry is commonly used in postoperative patients to facilitate deep breathing. The physiologic basis for this is sound. Postoperative patients have a monotonous shallow breathing pattern that promotes atelectasis, secretion retention, and pneumonia. Providing the patient with an incentive to deep breathe periodically should decrease these complications. Unfortunately, the evidence does not support this benefit. In fact, it might be argued that incentive spirometry simply moved into the niche vacated when the postoperative use of intermittent positive pressure breathing (IPPB) therapy became unfashionable. This was recently investigated by Gosslink et al[3] in a randomized controlled trial (RCT) of 67 patients following thoracic surgery. Incentive spirometry with deep-breathing and coughing was compared to deep-breathing and coughing alone. There was no difference in postoperative pulmonary complications, ICU stay, or hospital stay between the two groups. This RCT thus failed to demonstrate a benefit for use of routine incentive spirometry in this patient population.

Chest physiotherapy is a time-consuming, costly, and potentially dangerous (at least for some patients) therapy that is commonly used for hospitalized patients. Despite its popularity, there is little evidence to support its use in most hospitalized patients. Alexander et al[4] reported their

experience with a strategy to reduce use of chest physiotherapy without compromising patient care. They did a 30-year review of the literature to identify appropriate indications for chest physiotherapy: patients who produce copious amounts of sputum (> 30 mL/d), patients with segmental or lobar atelectasis, lung abscess, and a diagnosis of cystic fibrosis or bronchiectasis. Although commonly accepted, these indications are largely anecdotal due to the paucity of RCTs demonstrating benefit for chest physiotherapy. In a series of 177 patients who were ordered to receive chest physiotherapy, Alexander et al [4] identified 72 who fit the identified indications. The remaining 105 patients (i.e., those in whom chest physiotherapy was judged inappropriate) were randomized to receive the therapy as ordered or to not receive the ordered chest physiotherapy. Hospital length-of-stay and mortality were no different between the patients who were randomized to receive chest physiotherapy and those who were randomized not to receive it. This was associated with a reported cost savings of $319,000.

Reduce Misallocation of Therapy

Misallocation of respiratory therapy refers to over-ordering and under-ordering.[5] Overordering results in therapy for patients who do not require the therapy or are unlikely to benefit from the therapy. Underordering is failing to prescribe respiratory care for those likely to benefit from receiving the treatment. Misallocation of respiratory therapy occurs commonly, is associated with a number of therapies, and occurs in both academic and nonacademic hospitals. Stoller has suggested three possible factors that affect misallocation of respiratory therapy: 1) respiratory disorders are commonly misdiagnosed, resulting in prescription of inappropriate therapy, 2) respiratory treatments are prescribed in a more cavalier manner than drugs, and 3) physicians empowered to prescribe respiratory therapy sometimes lack sufficient training about respiratory therapy to order it appropriately.[5]

Kester and Stoller[6] studied misallocation of respiratory therapy at a large academic medical center. From an audit of 170 patients' charts, they reported that 25% of the prescribed respiratory therapy was not indicated. On the other hand, 10% of the patients were not ordered to receive therapy that was indicated. Similar patterns of misallocation have been reported by others, as reviewed by Stoller.[5] Use of guidelines and protocols has been suggested as a strategy to improve allocation of respiratory therapy. This approach empowers respiratory therapists to identify and provide the appropriate respiratory therapy. The available evidence suggests that respiratory therapists are indeed able to improve the allocation of respiratory therapy.

Guidelines and Protocols

Clinical practice guidelines (CPGs) are systematically developed statements to assist clinicians with appropriate care for specific clinical circumstances. CPGs came into vogue in the 1990s and have been promulgated by governmental agencies and professional societies. For example, about 50 CPGs have been published by the American Association for Respiratory Care (AARC) in the past 10 years and are readily available on the internet (web address http://www rcjournal.com/ online_ resources/cpgs/cpg_index.html). The principal motivations for CPGs have been to improve the quality of care, decrease the cost of care, and reduce regional variability in care. Guidelines describe the most appropriate care based upon the available evidence. Pathways, which have become popular in nursing practice, define the best practice along a specific timeline and provide a framework for data collection and documentation. Protocols dictate specific instructions for clinical care and have become popular in respiratory care practice. Therapist-driven protocols are medical staff-approved respiratory care plans in which the physician orders a protocol rather than a specific therapy, the respiratory therapist determines the care plan within the parameters of the protocol, the therapist implements the care plan and modifies it (including discontinuation) within the boundaries of the protocol.

In a RCT, Stoller et al[7] studied physician-directed vs. therapist protocol-directed respiratory therapy for adult non-ICU patients. The respiratory therapist protocols were consistent with the CPGs published by the AARC. They reported that respiratory therapist directed respiratory care was slightly less expensive than physician-directed respiratory care and without adverse events. Perhaps more important, misallocation was less with the therapist directed care. Based upon these results, therapist-driven protocols were made mandatory for prescribing respiratory care to most adult non-ICU inpatients at Stoller et als' hospital (Cleveland Clinic Foundation).

Kollef et al[8] reported the results of a quasi-randomized clinical study of the effect of therapist-driven protocols on patient outcomes and resource management for non-ICU inpatients. They also reported that respiratory care managed by therapist-driven protocols was safe and resulted in less misallocation of respiratory therapy than physician-directed respiratory care. They further reported that respiratory therapist directed care resulted in a significant reduction in the overall use of respiratory therapy, which resulted in a significant cost savings.

In the critical care setting, respiratory therapists are intimately involved in care of patients receiving mechanical ventilation. Several recent studies have reported an important role for respiratory therapist protocols in the assessment for extubation readiness and for weaning of patients from mechanical ventilation.[9] Ely et al[10] reported a study in which respiratory therapists screened mechanically ventilated patients for extubation readiness daily, performed a spontaneous breathing trial if indicated, and notified the physician if the patient successfully completed the spontaneous breathing trial. Patients were randomized to this intervention or to a daily screen only. They reported decreased ventilator days, decreased costs, and no adverse outcomes associated with the intervention. In a follow-up study, Ely et al[11] reported successful large-scale implementation of a therapist driven weaning protocol. Kollef et al[12] randomly assigned mechanically ventilated patients to receive physician-directed or protocol-directed weaning (protocol implemented by respiratory therapists and nurses), and reported that use of the protocol resulted in weaning patients safely and more quickly than traditional physician-directed weaning. Marelich et al[13] reported a RCT comparing physician-directed weaning and protocol-directed weaning by respiratory therapists and nurses. Similar to the findings of Ely and Kollef, they reported that protocol-directed weaning resulted in reduced duration of mechanical ventilation without any adverse effects.

Transfer to Lower Cost Sites of Care

Caring for patients in acute care hospitals is expensive. If the patient's severity of acute illness allows, it would seem cost-effective to transfer the patient to lower cost sites of care such as weaning centers, extended care facilities, and the home. Until recently, reimbursement strategies (DRG exemption) had favored transfer of long-term mechanically ventilated patients to weaning centers. However, favorable reimbursement strategies for such centers are disappearing. This produces a catch-22 scenario for cost-effective health care. On one hand, it is less costly to care for these patients in long-term care facilities. On the other hand, long-term care facilities cannot accept transfer of these patients if reimbursement is unfavorable.

Summary

Managed care has challenged the health care delivery system to identify and implement cost-effective strategies to reduce costs. For respiratory care, a number of strategies can be used to reduce costs. Some of these have been subjected to RCTs, which have reported high-level benefit for these strategies. ❖

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CME Questions

38. In a general ICU population, low dose dopamine infusion has been shown to:

a. decrease overall mortality.
b. improve urine output.
c. decrease the need for renal replacement therapy.
d. All of the above
e. None of the above

39. When comparisons were made of costs incurred on the first and last day of hospitalization, costs of care on the last full hospital day were:

a. 24% of the mean total cost of stay.
b. 2.4% of the mean total cost of stay.
c. $1045 per day for surgical patients.
d. $2450 per day for trauma patients.
e. nearly half the total hospital expenditure.

CE/CME Objectives

After reading each issue of *Critical Care Alert*, readers will be able to do the following:

- Identify the particular clinical, legal, or scientific issues related to critical care.
- Describe how those issues affect nurses, health care workers, hospitals, or the health care industry in general.
- Cite solutions to the problems associated with those issues.

In Future Issues: Unintended Adverse Effects of Lung-Protective Ventilation

CRITICAL CARE Plus

EXPANDING YOUR FOCUS IN INTENSIVE CARE

Quality of Life at the End of Life: A Sense of Meaning is Paramount

Palliative Medicine Must Address Psychosocial Ills to be Successful

By Julie Crawshaw

Researchers for a quality of life working group at the mayo clinic maintain that physicians can do more for terminally ill patients to make sure their quality of life doesn't deteriorate during their final days. Rummans and associates note that, overall, physicians may actually prolong end-of-life suffering by focusing on aggressive approaches for curing the patients' underlying disease.[1]

Teresa A. Rummans, MD, Professor of Psychiatry and Psychology at Mayo University and lead author for the study, says that many physicians fail to acknowledge when the time has come to provide the patient with palliative-only care services.

"Strategies that more deeply involve family and caregivers can greatly reduce patient suffering by creating a multidimensional approach that maintains the quality of life at life's end," Rummans says.

The study observes that despite the growth of the hospice movement in the United States during the past 30 years, nearly 85% of Americans die in hospitals and nursing homes, in sharp contrast to the period before the 1900s when most died at home surrounded by their loved ones. This change has resulted in a more prolonged but less personal death, the study says.

Rummans et al define quality of life as the physical, psychological, social, and spiritual domains of health that are influenced by a person's experiences, beliefs, expectations, and perceptions.

"When we looked at the quality of life aspect in 90- to 100-year old patients, most rated it as pretty good," Rummans says. "This is in sharp contrast to what our youth-oriented culture indicates. But as people get older they find meaning in their lives just as they did when they were younger."

Enhancing the Quality of Life

William Brietbart, MD, Chief of Psychiatry Service at Sloan Kettering Memorial Cancer Center in New York City, has researched the psychiatric aspects of symptom control and palliative care for the past 16 years. Breitbart says that one of his goals in teaching and writing has been expanding concepts of palliative care from a concentration on pain and physical symptom control to include psychiatric, psychosocial, existential, and spiritual aspects of care. His series of symptom prevalence studies in AIDS patients found that of the top 10 symptoms with a prevalence rate greater than 60%, most are psychological or psychiatric in nature. "Physical pain, by contrast, often turns out to be number three or four," Breitbart says. "At the top of the list are things like anxiety, distress, irritable or sad mood, insomnia, fatigue, lack of energy, and feeling hopeless."

Breitbart says that delirium is the most common symptom associated with cancer patients in the last stages of the disease. "Up to 85% develop delirium," Breitbart says. "I don't think the estimates of pain are that high." Whether caused by painkillers, organ failure, or other physical drivers, the delirium is a psychiatric manifestation. Patients can become confused, disturbed, or hallucinate.

Breitbart served on the panel that developed the American Psychiatric Association's guidelines for the treatment of delirium. He says that delirium is usually reversible and treatable. "You basically ensure the patient's safety, provide some structured environment, and discover and treat the underlying cause."

Breitbart says that depression is as treatable in cancer patients as it is in the physically healthy population, with response rates in the 60-70% range.

"Recent studies show that patients who have insight into their illness—who understand their prognosis and impending death—are four times less likely to experience depression than those who deny their disease. Patients dealing with impending death are much less likely to experience depression."

One of Breitbart's most recent studies focused on the depression, hopelessness, and desire for hastened death among terminally ill AIDS and cancer patients. He found that only 17% of terminally ill AIDS and cancer patients met the criteria for clinical depression, the same number who reported a high desire for hastened death.

Patients who were clinically depressed were four times more likely to have a high desire for death. "Every patient we studied who wanted hastened death was either clinically depressed or scored high on feelings of hopelessness," Breitbart says, "and the two act independently and synergistically."

Another finding Breitbart considers highly significant is that the less spiritual well being the patient had, the greater the desire for hastened death became. Patients with low levels of spiritual well being were about 10 times more likely to have depression than those with high levels. "You might consider spirituality as a construct made up of faith and meaning," Breitbart says. It's not the faith element that protects patients from depression. It's having a sense of meaning."

Adopting Hospice Principles Relieves Suffering

"Physical, psychological, and spiritual comfort: Those are the dimensions of quality of life," Rummans says. "The principles that have improved the quality of life for hospice patients must be adopted in hospitals and other [settings] so that suffering can be relieved where the vast majority of Americans continue to die."

Rummans et al's research shows that involving the patient's caregivers from the outset of the health problem is essential to improving quality of life. She observes that there isn't much that can be done to improve the quality of life for a patient who is admitted and dies within a few hours. "But for someone who comes into critical care and lingers for a number of days, we can take the palliative measures that sometimes get ignored when we're trying to save the patient."

Rummans et al found that pain control is high among these measures. Another study referenced in their paper followed more than 4000 patients at five academic medical institutions from hospital admission until death. When Rummans et al surveyed family members of the patients, they found that more than half the patients experienced inadequate pain control. Helping patients deal with feelings and spiritual concerns were also prominent: One-quarter of these patients suffered from emotional distress and nearly one-quarter experienced social abandonment and feelings of isolation.

Rummans says that critical care patients are often not given the same opportunity to make choices about their care as are patients with cancer or other long-term illnesses. "Critical care patients often find themselves in the midst of their situations very quickly," Rummans says. "Many times they don't have time to really reflect on a lot of the issues that go into quality of life."

Rummans et al's points out that dying patients most fear prolonged dying experiences. However, when appropriate palliative care is provided, the dying patient may well experience a sense of freedom and personal fulfillment from being able to complete life goals. ❖

Reference

1. Rummans T, et al. Maintaining quality of life at the end of life. *Mayo Clin Proc* 2000;75:1305-1310.

Talking it Through is a Lot Easier Than it Used to Be

Improved Abilities Widen Voice Recognition Acceptance, Use

By Julie Crawshaw

Richard p. o'brien md, an emergency room physician at Moses Taylor Hospital in Scranton, Pa, started using voice recognition software in 1996, when the user was required to speak slowly and pause slightly between words. The current generation of that software, though, allows users to speak continuously, and O'Brien says that anybody who is willing to work with the system can get good recognition.

"It's no different than a video game," he says. "You learn how to play it, when it's likely to mess up and how to edit things quickly." He estimates that most people can function with a voice recognition system in six weeks, and become really good at using it within six months.

"When I first started, I was using it to do two charts a day and handwriting the remainder," O'Brien says. "Now, I can do complicated charts in five to eight minutes."

Nearly one-third of the information systems professionals at a recent Healthcare Information and Management Systems Society conference in Orlando, Fla, said they would likely invest in voice recognition technology during the next 12 months. O'Brien, who started with the very first Windows-based system, now uses Clinical Reporter from Lernout & Hauspie (L&H) of Belgium, which recently bought out Dragon Systems, another VR software company popular with physicians. L&H offers voice recognition systems customized for 13 medical specialties, including emergency room and neonatology medicine. Their systems recognize a medical vocabulary of approximately 250,000 terms that include medication names, medical procedures, diagnoses, and diseases.

Users can also create or import multiple custom vocabularies for different specialties or fields of interest. Though a system specifically targeted for critical care physicians is not yet available, O'Brien believes the emergency room vocabulary comes close.

O'Brien now considers his voice recognition system as useful to him as his prescription pad or stethoscope. "You have accurate, legible documents available immediately. If you're integrated with the hospital information system you could have a paperless chart. And you can get information from previous records because they're all digital," he says.

He also sees economic benefits in transcription cost savings and medical-legal benefits in better documentation because it's more explicit. "Plus," O'Brien says, "I don't consider it a particularly expensive solution."

In his prevoice recognition days, O'Brien dictated his procedures and findings into a cassette recorder. The tape was then transcribed, which took about three hours to turn each hour of tape into a transcribed report. Now, O'Brien's reports are available instantly. He speaks into a headset plugged into a Pentium 133 computer with 32 megabytes of ram. Templates keyed to American Medical Association standards guide his creation of appropriate medical documentation. He uses a 1440 modem to fax the typed reports anywhere in the hospital, or to the offices of his patients' primary care physicians.

His reports now go to other physicians immediately and his billing is done faster because the chart is complete and signed when it comes out of the machine. Because nurses and other physicians have thorough, legible records as soon as they get the patient, they know exactly what O'Brien did and why.

Users Can "Teach" the Machine New Words

O'Brien says that when the system occasionally fails to recognize a word—such as the name of a new physician or drug—he "teaches" it to do so by typing in the word or spelling it verbally. "It only takes a couple of seconds to do that," O'Brien says, "and if you don't get it right the first time, you can delete the error from the system's vocabulary and redo it."

Teachable though it may be, O'Brien says that his voice recognition system is not without its quirks. When he wanted to say "new paragraph" to bump the cursor, what came back to him was "the car breath." So he taught the machine to bump the cursor by saying "Brittney Spears."

"I use rock stars' names a lot because the system won't confuse them with anything else I say," O'Brien says. "For example, I taught the system that the left side of a parentheses is called 'Crosby, Stills Nash and Young' and a semicolon is 'Arrowsmith.' I teach it something nonsensical that I'm not going to use otherwise."

L&H will soon bring out an update for automatically entering the correct ICD-9 and CPT codes, one for instructions in both English and Spanish, and one for a bit-mapped signature that will make hand-signing reports unnecessary. And for handling reports made by more than one physician because of a shift change, there will soon be a feature called "protected text" which will stop changes from being made by one physician to notes taken earlier by another. ❖

Reference

1. Lerner and Hauspie's Web site: http://www.lhsl.com/voicexpress/med.

Organ Donations Moving Online to Boost Security

By Julie Crawshaw

Colorado is the fourth state to offer online organ donor information to qualified health professionals. According to state health officials, Colorado's

list for people needing an organ transplant is growing twice as fast as the national average. The online registry should give physicians and other health care professionals direct access to donor lists and Colorado driver's license records to determine if brain-dead patients registered as organ donors. Potential donors can register online, by phone or by fax.

Federal law gives each person the right to donate his or her organs and tissues after death. Until recently, a driver's license provided the only means of determining whether an accident victim was also an organ donor. However, critically injured or ill patients frequently don't have their licenses with them and family members often don't know if their dying relative wanted to be an organ donor.

The Colorado Organ & Tissue Donor Registry ensures that donors' wishes will be known. Personal information in the registry is accessible only to a few medical professionals and by law cannot be shared with or sold to companies and government agencies. The nonprofit Donor Alliance, which facilitates organ and tissue donation in Colorado, maintains the computer system that houses the donor information. Only a few members of the Donor Alliance staff have access to the registry, and they have access only to information that confirms the identity and wishes of the donors. Colorado law prohibits the information from being sold for marketing purposes.

The Donor Alliance says that more than 71,000 Americans are now waiting for organ transplants and that a single organ and tissue donor can help as many as 50 people in need. In 1999, more than 6000 Americans died waiting for organs—an average of 16 per day. Colorado's registry is located at *www.coloradodonorregistry.org*. ❖

JCAHO Now Monitoring New Pain Initiative

Experts Applaud New Measures

The joint commission for the accreditation of Health Care Organizations (JCAHO), which accredits most of the nation's hospitals and thousands of other health care organizations, has begun monitoring how well these facilities assess and treat pain, marking another positive step toward the recognition for better pain management.

The new pain management standards are included in the 2000-2001 standards manuals, and JCAHO surveyors have begun assessing compliance since they took affect Jan. 1. JCAHO's new pain management standards were welcomed by clinicians, pain experts, patients, and their families who have seen pain gone untreated or undertreated for decades.

"These changes have the power to improve the quality of life for millions and millions of Americans," said June L. Dahl, PhD, Professor of Pharmacology at the University of Wisconsin Medical School and President of the American Alliance of Cancer Pain Initiatives (AACPI). "This is a great victory for cancer patients in particular whose pain is often undertreated. Many caregivers, particularly those involved in cancer treatment, have been challenging health care leaders for years about the need to assess and treat patients' pain better."

Under the new JCAHO standards, patients should be asked about pain and the intensity of the pain, including rating it on a simple "0 to 10" scale. Doctors and nurses will be expected to treat the patients' pain and continue to assess treatment during and after hospitalization.

Studies show that an estimated 70% of people with cancer experience significant pain, while fewer than half receive adequate pain treatment. Fifty million Americans suffer from chronic pain, and four out of 10 people with moderate to severe chronic pain do not receive adequate relief.

"The standards acknowledge that pain is a condition that needs explicit attention," said Carole Patterson, MN, RN, Director of the Standards Interpretation Unit of JCAHO. "Research shows that surgical pain and pain at the end of life, such as cancer pain, has not been managed well. Therefore, these standards should have a significant impact on pain management for patients."

The AACPI and the nearly 50 State Cancer Pain Initiatives headed by nurses, physicians, pharmacists, social workers, and researchers have long been advocates for better pain control in the nation's health care system, and see the new standards as a milestone in efforts to overcome barriers to effective pain relief.

Today's move will not affect all hospitals, nursing homes,and other facilities—only those accredited by the JCAHO. The JCAHO accredits 80% of the nation's hospitals that control 98% of the hospital beds.

"Undertreating pain has been and still is bad medicine, and is often based on unfounded fear, ignorance or miscommunication by health care professionals and patients," Dahl said. "Hopefully, the new standards will begin to change this." ❖