IS DOWN-SIZING AND DISBANDING SPECIALTY CARE TEAMS A COUNTERPRODUCTIVE STRATEGY FOR COST REDUCTION IN HEALTHCARE?

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Cost reduction is a major focus of healthcare in the United States (US) and throughout the world. US hospitals are merging and downsizing staff as a major effort in cost containment. Specialty care teams such as nutrition support, IV therapy, and infection control, have been early prey to down-sizing or elimination by administrators who perceive these programs as dispensible amenities. This will most likely prove to be counterproductive and excessively costly.

In 1994, the US Agency for Healthcare Policy and Research published *The National Bill for Diseases Treated in the U. S. Hospitals*, which listed medical complications from the use of a device or procedure for diagnosis or treatment among the top ten most costly health-related problems in the US, at an annual cost of $3.1 billion.[1,2] An extraordinary number of medical devices are used in the delivery of parenteral and enteral nutrition. Both modalities carry significant risk for costly complications related to the associated medical device. The incidence of central venous catheter (CVC) complications alone is estimated at well over 10%.[3]

The consequences of adverse events with vascular catheters and enteral feeding devices can be life-threatening. Patients may survive elaborate, high-tech surgical procedures after trauma or life-threatening illnesses only to later suffer or die as a result of insufficient knowledge of prevention or treatment of medical device-related complications, or failure of the device itself. Patients surviving such adverse events may be left with profound abnormalities such as neurological impairment, disfigurement, loss of limb, or permanent loss of venous access sites; all negative outcomes which result in extended length of hospital stay and inordinate costs.

Another costly and unfortunate outcome of device-related adverse events is malpractice litigation, not typically a line-item in a hospital's or agency's budget. Following are examples of recent legal cases where large sums were awarded for patients who suffered or died from such events.

> CASE 1: A 73 yr. old man had a feeding tube inserted upon hospital admission. Following the administration of enteral feedings he went into respiratory distress, a nine day coma, and subsequently died. The plaintiffs argued that unknown employees of the defendant manually inserted the feeding tube into the lung rather than the stomach, and that these employees fed the decedent without checking the tube placement with a chest x-ray. The defendant initially argued that the decedent was confused and manipulated the tube from his stomach to his lung after the tube was initially placed. The defendant admitted liability at trial. The parties stipulated to the $6286 in funeral expenses. The jury returned a $210,000 verdict for the plaintiff, who also received $14,227 for expert costs.[4]

> CASE 2: A 25 yr. old laborer and father of five children was admitted to the hospital with a stab wound to the back. The defendant surgeon performed a ligation of an actively bleeding inter-costal artery. The patient subsequently developed sepsis and adult respiratory distress syndrome requiring mechanical ventilation and a laparoscopy to rule out an intra-abdominal cause of sepsis. The patient's condition improved and the defendant decided to perform a tracheostomy and a percutaneous endoscopic gastrostomy (PEG) tube placement to facilitate ventilation and alimentation during the long hospital stay. During the PEG tube placement, the defendant inserted an angiocath through the abdominal wall three times without first seeing the endoscopic light shining from the

stomach through the abdominal wall, in- dicating that the angiocath would be placed into the stomach. Pulsatile blood was returned with each attempted angiocath placement. During the third stick, the patient's blood pressure dropped to zero. The defendant performed an emergency laparotomy. There were three puncture wounds in the patient's liver from the unsuccessful attempts. The patient died on the table after unsuccessful resuscitation efforts. According to published accounts, the Indiana medical review panel unanimously agreed that the defendant had violated the standard of care, but could not determine whether the violation was a factor in the decedent's death. The parties reached a settlement with a total present value of $675,000.[5]

CASE 3 A 65 year old man did very well after aorta-bifemoral bypass surgery. However, 24 hours after surgery the cap on the internal jugular vein catheter sheath became disconnected. The catheter connection had been secured with tape instead of a luer-lok connection. The intensive care nurses and a physician noticed blood gushing from the catheter and immediately applied pressure. The ICU personnel, however, failed to suspect that a massive air embolism had occurred. He died one hour later after cardiac arrest. A $394,900 settlement was reached.[6]

CASE 4: A 57 year old man underwent complex surgery for a giant cerebral aneurysm with a good prognosis. A central venous catheter with an introducer sheath was placed pre-operatively by the anesthesiologist. The patient was transferred from the intensive care unit to a neurosurgical ward three days post-op. The catheter had been removed and the introducer sheath left in place for the administration of fluids and antispasmodic drugs. In a confused state, the patient climbed out of bed to go to the bathroom. He inadvertently disconnected the administration tubing from the sheath which had not been adequately secured. The nurses found him on the toilet in a comatose state having suffered a massive air embolism through the disconnected catheter. He died later from complications related to the embolism. A large undisclosed settlement was reached.[7]

CASE 5: A 46 year old woman needed dialysis for treatment of a non-functioning kidney. The defendant's general surgeon inserted a peritoneal dialysis catheter (CAPD) which had two Dacron cuffs designed to anchor the tube in place. The manufacturer's instructions specifically stated that the distal cuff should be placed in the abdominal muscle, not in the peritoneal cavity, so that it would not adhere to the small intestine or other organs. The plaintiff subsequently underwent a kidney transplant, performed by a second defendant surgeon. Several weeks later, the plaintiff returned to the transplant surgeon to have the CAPD removed. When he removed the catheter, he observed some bowel tissue attached to the cuff and a tear in the bowel, which he repaired. He admitted the plaintiff for observation, since her immune system had been suppressed to prevent rejection of the new kidney. After admission she complained of abdominal pain, and the defendant ordered an increase in pain medication, but did not come to the hospital. When he was called again and informed that the plaintiff had a tender, distended abdomen, no bowel sounds, and a fever of 102.8 degrees, he ordered Tylenol. Subsequent complications included sixteen months hooked to a feeding tube twelve hours per day, an ileostomy bag, and five additional abdominal surgeries which resulted in removal of eleven feet of small intestine. The plaintiff claimed that the first surgeon was negligent in placing the catheter in her peritoneal cavity, and that the second surgeon was

negligent for failing to return immediately for emergency surgery in light of the plaintiff's symptoms. The jury returned a $2.3 million verdict for the plaintiffs. Sixty-five percent of the fault was attributed to the surgeon who implanted the catheter and 35% to the surgeon who removed it. The jury also rewarded the plaintiff's husband $200,000 for loss of consortium.[8]

A 1988 analysis of CVC complication reports from the US Food and Drug Administration (FDA), Device Experience Network (DEN), indicated that 52% of the reported complications have a cause-effect relationship associated with practitioner technique.[9] Further analysis of the FDA data determined the contribution of practitioner technique to CVC-related injury and death to be as high as 72%. These data represent complications associated primarily with catheter insertion. However, practitioner technique is also a critical factor in the prevention of catheter-related infection.

Infection is the most serious complication of CVCs throughout the world. If tabulated separately, nosocomial infections would be the fourth leading cause of death in the US after heart disease, cancer, and stroke.[10] The most common nosocomial infections in the US are urinary tract, surgical site, bloodstream, and ventilator-dependent pneumonia; three of which directly involve a medical device.[11] Of these, bloodstream infections (BSI) have the greatest impact on attributable mortality, increased length-of-stay, and cost.[10]

The increased use of CVCs has contributed to a 70% increase in reported primary BSIs over the past decade in the US.[11] It is frightening to consider recalculated values for CVC-related morbidity and mortality that would include infectious complications. It is even more frightening to consider the potential impact of so called "cost saving" measures such as elimination of nutrition support teams, IV therapy teams, and infection control programs. This is happening in US hospitals despite numerous studies demonstrating the efficacy of specialty teams in the reduction of CVC infection rates,[12-32] and despite recommendations published in the US Centers for Disease Control's (CDC) *Guidelines for Prevention of Intravasular-Device-Related Infections*.. These guidelines strongly recommend designation of IV therapy or trained personnel for insertion and maintenance of intravascular devices.[33]

The transfer of medical device insertion and management from specialists to general practitioners, and in some cases unlicensed personnel, will undoubtedly result in increased complication rates. Reductions in registered nurse staffing ratios further compound the risk. Understaffing was identified in the early 1970s as an important risk factor for epidemic staphylococcal infections in a neonatal unit.[34] A recent study was conducted to determine risk factors for CVC-BSIs during a protracted outbreak in a Surgical Intensive Care Unit (SICU).[35] When controlled for TPN use, assisted ventilation, and duration of hospitalization, the patient-to-nurse ratio was found to be an independent risk factor associated with CVC-BSI in these patients. Nursing staff reductions during a period of increased TPN use appeared to have contributed to the increase in BSIs due to the reduced ability to provide adequate care. Nursing staff changes were examined in a follow-up study to determine the relationship of staffing patterns and primary BSI rates.[36] The data suggest that merely evaluating overall nurse-to-patient ratios may be insufficient, particularly when the number of overall nursing staff is not decreased but more experienced personnel are replaced by more recently employed or pool personnel.

The substitution of specialty teams with nurse educators and surveillance programs does not appear to be an effective strategy either. A study evaluating the effect of intravascular surveillance and educational programs on rates of nosocomial BSIs, reportedly resulted in neither a reduction in the total intravascular catheter-related BSIs, nor in a change in the proportion of potentially preventable CVC-BSIs.[37] It was concluded that a program where nurse educators perform surveillance, develop hospital procedures, and conduct educational offerings related to intravascular therapy, is unlikely to have a statistically significant impact on nosocomial BSIs, and that the cost benefits and patient

outcomes of intravascular therapy teams whose staff actually perform care, merit evaluation.

Each year, among the 35 million patients admitted to US hospitals, at least 2.5 million will develop a nosocomial infection,[38] adding a financial burden estimated by the CDC to be in excess of $4.5 billion (1992 dollars).[39] Approximately 250,000 nosocomial BSIs occur annually with an overall mortality rate of 15-71%, at a cost of $3,061 - $40,000 each.[10,38] Nosocomial intravascular device-related BSIs, 90 per cent of which originate from CVCs of various types, are estimated to occur in 50,000 to 100,000 patients in US hospitals.[40] TPN (total parenteral nutrition) catheter-related septicemia is about two times the incidence of TEN (total enteral nutrition) septic complications; additionally TPN complications are 4 to 15 times more expensive than TEN.[41] These figures represent a huge monetary loss under a prospective payment system. Haley, et al, analyzed 9,423 nosocomial infections (including 439 bacteremias) to determine the extent to which US hospitals could expect to receive additional payment for nosocomial infections under the DRG algorithm.[42] Extra payment, averaged over all nosocomial infections, would have been no more than $93 per infection (1985 rates), constituting only 5% of the hospitals cost for treating the infections. Thus, at least 95% of the cost savings obtained from preventing such infections represent financial gains to the hospital.

How can any healthcare system turn its back on such compelling data at the expense of morbidity, mortality, increased litigation, and health care costs, especially when financial incentives for hospitals to prevent nosocomial infections under a prospective payment system have been identified? Attempting to lower operating expenses with arbitrary staff reductions may result in increased costs relative to increased nosocomial infections,[36] device-related complications, and increased compensation to the victims. It is imperative to determine the efficacy of cost reduction strategies by analyzing healthcare outcomes and epidemiology studies that reflect these changes.

Surveillance and control of nosocomial infections and device-related complications must become a priority if we are to improve the quality of medical care while simultaneously controlling costs. Re-engineering of specialty teams with a multidisciplinary approach to vascular access and the delivery of enteral nutrition may be a more effective strategy to improve outcomes and reduce costs, and should be evaluated with a critical eye.

*The opinions expressed are solely the author's and do not necessarily represent those of the Public Healh Service or Federal Government.

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AQ2: Author's name is not to be included

AQ3: (personal communication) is correct

AQ4: Please replace "Tylenol" with "an antipyretic"

AQ5: Corrected citation:

Andrews, RM, Fox, S, Elixhauser, A., et al. The National Bill for diseases treated in U. S. hospitals: 1987. Rockville, MD: AHCPR, 1994

AQ6: Maricopa County

AQ7: Reference # 24: (QRB: Quality Review Bulletin)

"QRB/July 1987" is taken directly from the article…..no volume number

AQ8 and 9: Reference correction:

Goetz, A., Miller, J., Squier, C., et al. A comparison of nosocomial intravenous-related infections pre and post institution of an intravenous therapy team. (abstract) Am J Inf Control 1993;21: 82

AQ10: Publisher is Little, Brown

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Note: this is same citation as #29.