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The impact of a palliative care unit on mortality rate and length of stay for medical intensive care unit patients

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ABSTRACT

Objective: This study evaluates the impact of a 10-bed inpatient palliative care unit (PCU) on medical intensive care unit (MICU) mortality and length of stay (LOS) for terminally ill patients following the opening of an inpatient PCU. We hypothesized that MICU mortality and LOS would be reduced through the creation of a more appropriate location of care for critically ill MICU patients who were dying.

Method: We performed a retrospective electronic database review of all MICU discharges from January 1, 2006 through December 31, 2009 (5,035 cases). Data collected included MICU mortality, MICU LOS, and mean age. The PCU opened on January 1, 2008. We compared location of death for MICU patients during the 2-year period before and the 2-year period after the opening of the PCU.

Results: Our data showed that the mean MICU mortality and MICU LOS both significantly decreased following the opening of the PCU, from 21 to 15.8% ($p = 0.003$), and from 4.6 to 4.0 days ($p = 0.014$), respectively.

Significance of results: The creation of an inpatient PCU resulted in a statistically significant reduction in both MICU mortality rate and MICU LOS, as terminally ill patients were transitioned out of the MICU to the PCU for end-of-life care. Our data support the hypothesis that a dedicated inpatient PCU, capable of providing care to patients requiring mechanical ventilation or vasoactive agents, can protect terminally ill patients from an ICU death, while providing more appropriate care to dying patients and their loved ones.

KEYWORDS: Palliative care unit, Length of stay, Mortality rate

INTRODUCTION

The benefits of inpatient palliative care consultation have become increasingly documented. The impact of palliative consultations, as well as targeted palliative care units (PCU) on intensive care unit (ICU) decompression and modification of site of death for critically ill patients has not been as extensively reported. The importance of appropriate palliative care consultation is highlighted by the fact that ~50% of all hospital deaths occur after failed ICU care and approximately one-third of all patients who die in the hospital, do so after spending a minimum of 10 days in the ICU during their final days of life (The SUPPORT Principal Investigators, 1995). Data from Dartmouth Atlas confirm that nearly 50% of cancer patients die in the hospital, and, in addition, state that ~25% are in the ICU in their final month of life (Goodman, et al., 2010).

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Although public perception views palliative medicine and critical care at opposite ends of the medical spectrum, it may be that merging these extremes is vital to optimizing patient care. In the United States, about 20% of patients who die do so in an intensive care unit (ICU) or following ICU discharge. This translates into 540,000 ICU deaths annually; comparable to the number of patients dying from cancer each year. Nearly one third of Medicare patients with advanced cancer die in hospitals, often in ICUs (Goodman, 2011). For most hospitalized patients, death occurs following the withdrawal or withholding of life-sustaining treatment (Prendergast, 1997). For these critically ill patients, integration of palliative care practices and principles is essential for high-quality critical care.

Transferring dying patients from the ICU to a PCU may improve the treatment of pain and suffering associated with critical illness. Undertreatment of pain remains a problem in ICUs, with 77% of patients reporting moderate-to-severe pain (Gelinas, 2007). The creation of aggressive inpatient PCUs capable of caring for chronically critically ill patients allows for decompression of ICUs while ensuring delivery of treatments consistent with patient or family preferences in an environment conducive to comprehensive treatment and palliative care.

METHOD

A retrospective electronic database review of all MICU discharges (5,035 cases) from January 1, 2006 through December 31, 2009, in a 873-bed university hospital operating in the New York metropolitan area, was performed to evaluate the impact of opening a new dedicated 10-bed PCU on January 1, 2008. This PCU was created with the goal of decompressing overly crowded ICUs and providing care to patients likely to die despite aggressive treatments. The 10-bed PCU was developed to accommodate all patients in need of palliative care including those receiving mechanical ventilation, renal replacement therapy, vasoactive medications, and other life-sustaining treatments. The 10-bed unmonitored unit was created within a newly renovated space formerly used as an ICU. The admission criteria for the PCU (see Table 1) were inclusive. Patients could be receiving mechanical ventilation, intravenous infusion of vasoactive medications, dialysis, or antibiotics, and did not have to have a Do Not Resuscitate (DNR) designation upon transfer. Ventilator patients were deemed unlikely to wean from mechanical ventilation by their ICU physician. The goal of the PCU was to provide care to all patients who could benefit from palliative care regardless of treatment preferences.

Table 1. *The palliative care unit*

Admission Criteria for Ventilator Patients
1. Patient may transfer from MICU, SICU, CTU, NSICU, CCU, RCU.
2. Patient may be admitted directly from the Emergency Department.
3. Palliative medicine consultation is required for PCU admission.
4. Patient may remain under the care of the attending physician of record or be transferred to the palliative care team.
5. Patient has a tracheostomy or is orally/nasally intubated.
6. Patient is awaiting a nursing home bed or is expected to die prior to hospital discharge.
7. If inpatient hospice care is appropriate, the patient may be admitted to the Hospice Care Network in the PCU on a ventilator. The patient is discharged from NSUH and readmitted to the Hospice Care Network in the PCU.
8. A DNR order is *not* required for PCU admission but the goals of care are palliative or discussions are in progress toward palliation.

MICU, medical intensive care unit; SICU, CTU, NSICU, CCU, RCU. PCU, palliative care unit; NSUH, DNR, do not resuscitate.

The newly created PCU was staffed with one nurse for each five patients. A board-certified hospice and palliative medicine medical director was in charge of the unit. A nurse manager, social worker, chaplain, hospice and palliative medicine fellow, and attending physician visited all patients daily. Ventilator patients were managed by respiratory therapy in conjunction with the hospice and palliative medicine attending physician. As the unit was not monitored, vital signs were recorded as ordered, usually only once daily, or were discontinued altogether. Standardized palliative care orders were used to facilitate care in this unit (Appendix A).

Data from a 17-bed medical intensive care unit (MICU) was reviewed with the hypothesis that the opening of the PCU would have beneficial impact on overall MICU mortality and MICU length of stay (LOS). The Wilcoxon two-sample test was used to determine whether quarterly ICU mortality rates and LOS significantly decreased over time (across quarters) (Zar, 1984). The working (two-tailed) hypothesis was that mortality rates, as well as LOS, would decrease after the introduction of the PCU. A two-tailed exact test with $\alpha = 0.05$ was used.

RESULTS

Table 2 shows the results of our retrospective electronic database review of the 5,035 MICU discharges from January 1, 2006 through December 31, 2009.

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Table 2. *Key Characteristics Before and After the Opening of the Palliative Care Unit*

	2006				2007				2008				2009			
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Discharges	285	268	280	283	287	258	308	350	341	321	327	385	243	392	365	342
MICU[1] Mortality(%)	29.8%	18.2%	18.9%	20.9%	22.0%	22.1%	18.2%	18.0%	15.0%	14.6%	13.2%	14.8%	16.3%	15.6%	15.7%	21.1%
Mean MICU LOS[2] (days)	4.98	4.61	4.56	4	5.28	5.25	4.21	4.08	4.36	4.31	4.1	4.05	3.89	3.75	3.75	3.6
Mean APACHE[3] 111 Score	82.03	76.86	72.89	64.62	75.54	75.79	74.57	73.65	72.32	70.48	70.47	67.35	71.54	71.86	n/a	n/a
Mean Age (years)	68.35	68.79	69.89	66.68	69.55	68.57	66.59	68.68	68.03	67.87	68.44	67.7	70.09	67.31	69.26	66.85

[1] = Medical Intensive Care Unit, [2] = Length of Stay, [3] = Acute Physiology Age and Chronic Health Evaluation

Our results indicate that since the opening of the PCU on January 1, 2008, MICU crude mortality significantly decreased (21% to 16%, Wilcoxon two-sided exact test, $p = 0.003$). During this time, 155 MICU patients died in the PCU after it opened. There was also a significant reduction in MICU LOS (4.6 to 4.0 days, Wilcoxon two-sided exact test, $p = 0.014$). During the study period, the mean patient age remained unchanged, holding consistent at 68 years (Wilcoxon two-sided exact test, n.s.).

As seen in Figure 1, most of the mortality rates after the opening of the PCU in 2008 were significantly lower than the mortality rates in 2006 and 2007. Additionally, after the opening of the PCU, the highest mortality rate was in the fourth quarter of 2009, which was still significantly lower than the combined average of the rates prior to 2008. The same can be said for LOS, as LOS was significantly lower after opening the PCU. Furthermore, as seen in Figure 2, LOS has continued and remained on a downward trend after the opening of the PCU.

Although Acute Physiology Age and Chronic Health Evaluation (APACHE) III scores were available, they were not statistically analyzed, as data were not available for the last two quarters of 2009. Despite missing data, and as seen in Table 2, there was a general decline in the APACHE score as time progressed.

DISCUSSION

An ICU death is often associated with aggressive interventions, burdensome treatments, and emotional isolation. The value of the palliative care consultation has been well documented, and the ability to more effectively communicate prognosis and goals of care near the end of life can lead to a more

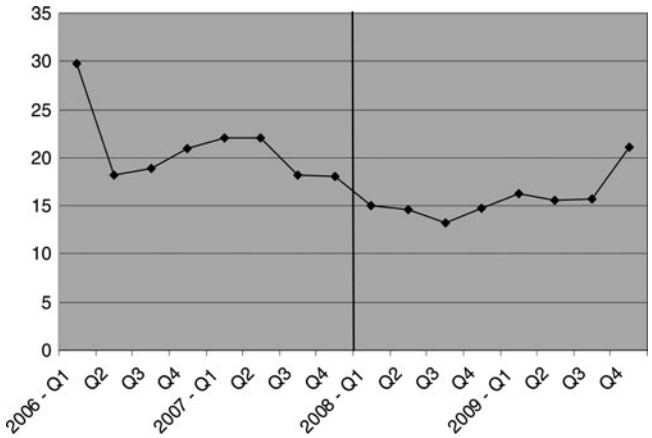

Fig. 1. Medical intensive care unit mortality rate across quarters. Black solid line on Q1 of 2008 denotes the opening of the palliative care unit.

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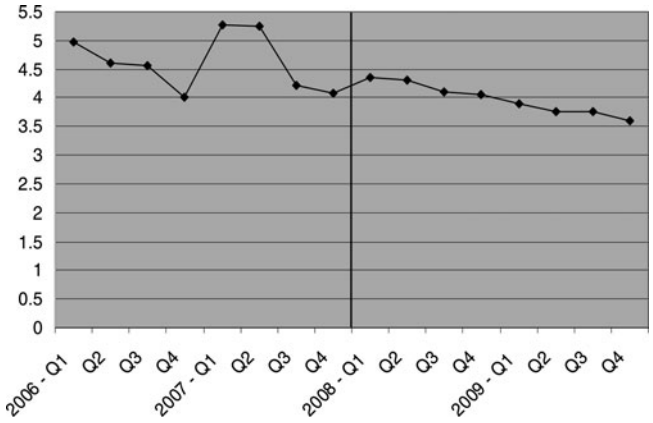

Fig. 2. Length of stay across quarters. Black solid line on Q1 of 2008 denotes the opening of the palliative care unit.

appropriate level of care, as proposed in this article. Protecting the patient from an ICU death allows more liberal visiting hours for family members, fewer burdensome procedures, less intense monitoring, and more effective pain and symptom management. Critically ill patients have been shown to have undertreated symptoms, high caregiver burden, and low patient and family satisfaction regarding their medical care (Teno et al., 2004). These data have also supported the hypothesis that hospital palliative care programs are linked to more effective symptom management and improved family satisfaction with care.

Our data show that the creation of a PCU had a significant impact on reducing MICU mortality. Our dedicated 10-bed PCU is located in close proximity to all 87 ICU beds, allowing for a seamless transition of ICU patients to the PCU. Unique to the few other units of its type, our PCU frequently accepts patients receiving mechanical ventilation, along with those on vasopressor support. This may appear to be contradictory to the traditional thinking of palliative care. However, transitioning patients from an ICU to a PCU must be done in concert with patient preferences and family's wishes. The PCU 24/7 open visiting hour access and nursing expertise in end-of-life clinical care promotes an environment aimed at improved family support and patient care.

The benefits of palliative care consultation in ICUs appear to extend beyond the decreased MICU mortality and MICU LOS documented in our chart review. The quality improvement in patient care in our retrospective data review appears to be manyfold. Helping patients and their families to obtain the most appropriate location of death can provide many clinical and non-clinical benefits. It has been previously documented that the ICU is one of the places in a hospital where family members suffer most (Pochard et al., 2001; Azoulay et al., 2005). The ICU is also the location where family members are most often asked to make critical decisions about their loved ones. Combine these stressful circumstances with tightly restricted ICU visiting hours, numerous subspecialty consultants, invasive procedures, and unclear prognosis, and the burden on families of terminally ill ICU patients can have lasting effects. One study reported that post-traumatic stress reactions were observed in one-third of family members 90 days after an ICU discharge or death of a relative (Azoulay et al., 2005). In addition, perceived incompleteness of the information received in the ICU was also independently associated with post-traumatic stress reactions. These findings reinforce previous data regarding the specific needs of family members of ICU patients. The availability of palliative care consultants who are experienced in communication and bereavement counseling coordination could serve as an instrumental component in improving patient and family satisfaction with the end-of-life decision-making process.

As previously reported, palliative care consultation has the opportunity to influence resource utilization and cost of clinical and non-clinical aspects of care (Morrison et al., 2008). It has also been previously shown, in a prospective matched-control study, that patients receiving palliative care had statistically significantly lower costs per day (Smith et al., 2003; Hanson et al., 2008). Although reviewing cost savings was not an initial goal of our review, the data were made available and were seemingly significant enough to include here. It is important to note that there is little literature currently available on specialized PCUs. There are very few operating in the United States, with only a few more having published data internationally. Our article hopes to underscore their potential in providing optimal patient care and to raise awareness of their potential niche in today's medical landscape.

Our results reflect a decrease in MICU mortality and MICU LOS during the creation and the implementation of a PCU. A study limitation is that APACHE III scores were not included in the analysis, even though a general decline in APACHE scores over time is evident in Table 2. The reason for excluding APACHE scores was simply lack of data: APACHE scores for the last two quarters of 2009 were not available. Given that higher scores imply a more severe disease and higher risk of death, it is indeed possible that severity of illness may partially explain the decrease in LOS, despite the fact that the age of our sample remained relatively consistent throughout the study period. It should be noted, however, that the APACHE III score ranges from 0–299. Since the score range is so wide, a change of at least five points is required to significantly impact hospital

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mortality rate. Our observed mean scores were within this range and therefore had no impact on observed mortality differences, which in our study were attributable to the opening of the PCU, creating a more appropriate location for terminal care of critically ill patients.

Previous data have reported shortened hospital and ICU LOS for patients with global cerebral ischemia after cardiopulmonary arrest and multiple organ system failure (Campbell & Guzman, 2003). This was demonstrated after implementing a proactive palliative care approach to patients with these admitting diagnoses (Campbell & Guzman, 2003). However, this type of data was not generalized across all MICU discharges as in our study. Barriers to palliative care in the ICU and criteria to identify those patients who would likely benefit from palliative interventions have both been identified in previously published literature (Nelson, 2006; Bradley & Brasel, 2009). Limitations to our study are inherent to it being a retrospective chart review. Physician turnover and management strategies may have varied in our MICU over the study period. Prospective, randomized trials are beginning to be published in the literature at present, and address both the clinical and non-clinical influences of palliative care consultation. Only with continued research will the true impact of these services be recognized.

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APPENDIX A

North Shore University Hospital

Palliative Care
Physician Orders

Date _____ Time _____ AM / PM

Addressograph

Primary Diagnosis:

Attending:

Allergies:

Discontinue all previous orders.

1. Diet: No restrictions (food may be provided by caregiver)
   Nothing by mouth (NPO)
   Tube feed _____ at _____ ml per hour via _____.
2. Activity: Out of bed as tolerated
   Out of bed with assistance
   Bed rest
3. Vital signs: Discontinue
   Every shift
   Daily
4. Pain and dyspnea assessment every:
   _____hours
   Every shift
5. Weight: None every _____ days
6. I & O: None every _____days
7. Visiting: Open visiting, nurse restrictions apply
   Per routine policy
8. DNR: Yes No
   Special Instructions:
9. Palliative care will include:
   Psychosocial Care – Social Work Referral
   Spiritual Care – Chaplaincy Referral
   Doula Referral – Call 562-8884
10. Oxygen therapy: None
    Other _____
    Pulse oxymetry : None Daily
11. Labs: None
    Other _____
12. IV: None D5W D5W 1/2NS NS
    Heparin lock
    Rate _____ ml per hour
13. Oral care every shift
14. Bowel Regimen
    Senekot 1 tab orally twice daily
    Colace 200mg orally twice daily

Assess patient for the following symptoms

Anxiety	Insomnia
Confusion/Agitation	Nausea
Constipation	Pain
Depression	Pruritis
Diarrhea	Stomatitis
Dyspnea	Terminal secretions
Hiccups	Vomiting

Additional New Orders

Signature:

Print Name:

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