



# The Impact of a Dedicated Palliative Care Unit on a Busy Medical Intensive Care Unit in an Academic Setting; a Retrospective Review

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## Abstract

**Introduction:** Palliative care aims to maximize quality of life for those patients facing serious illness. There is growing evidence to demonstrate that palliative care (PC) consultation teams have been associated with improvement in quality markers such as reduction in intensive care unit length of stay (LOS) and mortality. Palliative care units (PCUs) are geographically designated units where patients are cared for by specially trained staff. PCUs are less prevalent nationally and so there are fewer studies exist examining the impact of PCUs in institutions that already have a PC consultation team. The aim of this study was to examine the impact of establishing a PCU on a medical intensive care unit (MICU) that often runs at maximum capacity specifically focusing on MICU LOS, and mortality and indirectly capacity.

**Methods:** Retrospective chart review was performed on patients receiving a PC consultation in the MICU one year before and after the establishment of a PCU in an academic university hospital. The primary outcome variables include time to MICU discharge, MICU length of stay, and mortality at MICU discharge. Clinical factors were compared between two time periods using wilcoxon rank sum test or Pearson chi-square test where appropriate.

**Results:** MICU LOS was shorter in the group after the establishment of a PCU compared to that before establishment of PCU (median 4.2 vs. 5.1 days,  $p=0.015$ ). The MICU mortality rate was 11% after the PCU and 34% before the PCU ( $p<0.001$ ).

**Conclusion:** The addition of a PCU can significantly reduce MICU LOS and mortality, thereby adding needed capacity for patients who need intensive care.

## Introduction

Palliative care (PC) is relatively a new specialty in medicine that has rapidly grown over the last decade that aims to relieve the suffering of patients facing serious illness utilizing a patient and family centered approach [1]. Integration of PC into various medical specialties has demonstrated important benefits to patients, clinicians and health care institutions [2,3]. As a result, there has been a national trend among hospitals to develop PC programs [4].

The mainstay of PC is delivered in hospitals through consultation teams. There are however a growing number of dedicated inpatient palliative care units (PCUs) being developed across institutions. PCUs are geographically designated units where patients and families are cared for by staff trained in the principals of PC. Although the approach to care is much like that of hospice, PCUs can accommodate a much greater scope of patients.

The current evidence describing the many benefits of PC supports the consultative model of care [5-7]. In the MICU, there is considerable published data that demonstrates the integration of PC improves multiple quality markers including length of stay, better alignment of treatment goals with patient care plans and more appropriate utilization of health care resources [8-12]. The evidence documenting benefits of PCUs, though less robust, seems to indicate a benefit to PCUs within institutions that have PC consultation teams [13,14]. Still there remains insufficient guidance for institutions to determine if investment in a PCU is worthwhile. This decision may be further challenged by the fact that dedicated PCUs require considerable more financial, spatial

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**Table 1:** Patient Demographics.

	Pre-PCU N=185	After PCU N=227	Test statistics
Age (years)	62 +/- 15 <sup>1</sup>	61 +/- 16 <sup>1</sup>	0.78 <sup>1</sup>
Gender			0.57 <sup>2</sup>
Female	46%	43%	
Male	54%	57%	
Race			0.19 <sup>2</sup>
White	74%	75%	
African American	16%	19%	
Other	10%	6%	
UHC expected LOS (days)	9.6 +/- 5.8 <sup>1</sup>	10.3 +/- 6.6 <sup>1</sup>	0.26 <sup>1</sup>
UHC expected mortality (percentage)	0.32 +/- 0.27 <sup>1</sup>	0.34 +/- 0.28 <sup>1</sup>	0.77 <sup>1</sup>
UHC expected cost (dollars)	6.8 +/- 6.3 <sup>1</sup>	5.6 +/- 5.1 <sup>1</sup>	0.36 <sup>1</sup>

UHC- University Health System Consortium

<sup>1</sup>Represents X +/- 1 SD. Tests used: <sup>1</sup>Wilcoxon test; <sup>2</sup>Pearson test

and personnel resources than that required by PC consultation teams [15].

Our institution developed a PCU five years after establishing a PC consultative team with the goal of improving end of life care within our institution. Specifically, leadership hoped to improve the quality of death for our dying patients unable to be discharged to hospice. We hypothesized that the creation of a PCU would facilitate patient flow throughout the institution, allowing patients to receive appropriate care in the appropriate place. This was especially important given that our institution frequently runs at or beyond capacity, and ICU beds are often in high demand. The aim of this study was to examine the impact of the establishment of the PCU on quality markers in the MICU, specifically LOS and MICU mortality.

## Methods

A retrospective review was performed on both patient charts and through an already existing database of MICU patients. We studied patients one year before and one year after the PCU opened in September 2012. Using the palliative care consult service records, patients who received a palliative care consult from the MICU between September 2011- August 2012 and January 2013-December 2013 were identified. We did not include patients from September to December 2012 in order to allow time for the PCU to become fully functional. After the two patient groups were identified, desired data were obtained from an existing MICU database. Chart review was also performed for any information missing from database.

MICU length of stay was defined as the total amount of time spent in the MICU during a hospitalization. Therefore, if a patient was transferred from the MICU to the floor but “bounced back” to the MICU, then both MICU admissions were added together to create a cumulative length of stay in the MICU.

Continuous variables were reported as mean and standard deviation or median with interquartile range. Categorical variables were reported as percentage and frequency. Clinical factors were compared between two time periods using Wilcoxon rank sum test or Pearson chi-square test where appropriate. The primary outcome variables include time to MICU discharge, MICU length of stay, and mortality at MICU discharge. We fit cox proportional hazard model to assess the association between palliative care and time to MICU discharge with adjustment of University Health System Consortium

**Table 2:** MICU LOS before and after PCU established.

	Pre-PCU N=185	After PCU N=227	P value
Died before MICU discharge	34%	11%	P<0.001
Median MICU LOS (days)	5.1	4.2	P=0.015

After adjusting for UHC LOS, mortality, cost, and patient age, patients admitted to the MICU before the PCU was established were more likely to stay in the ICU longer than patients who were admitted to the MICU after the PCU was established (OR 1.82, 95% CI 1.30-2.56, P<0.001).

(UHC) length of stay, UHC mortality, UHC cost, and age. We used proportional odds model to assess the difference in MICU length of stay before and after palliative care adjusting for same set of covariates. We used logistic regression to assess the difference in MICU mortality before and after palliative care adjusting for same set of covariates. All statistical analyses were performed using statistical software R version 3.2.5 ([www.r-project.org](http://www.r-project.org)).

## Results

Demographics are detailed in Table 1.

MICU LOS was shorter in the group after the PCU compared to that before the PCU (median 4.2 vs. 5.1 days, p=0.015). The MICU mortality rate was 11% after the PCU and 34% before the PCU (p<0.001). After adjusting for UHC LOS, mortality, cost, and patient age, the multivariable cox proportional hazard model indicated that that hazard of death in the MICU before the PCU was 2.49 times the hazard of death in the MIUC after the PCU (95% CI 1.57-3.94, P<0.001). The odds of death in the MICU before the PCU were 4.36 times the odds of death in the MICU after the PCU (95% CI 2.59-7.36, p<0.001).

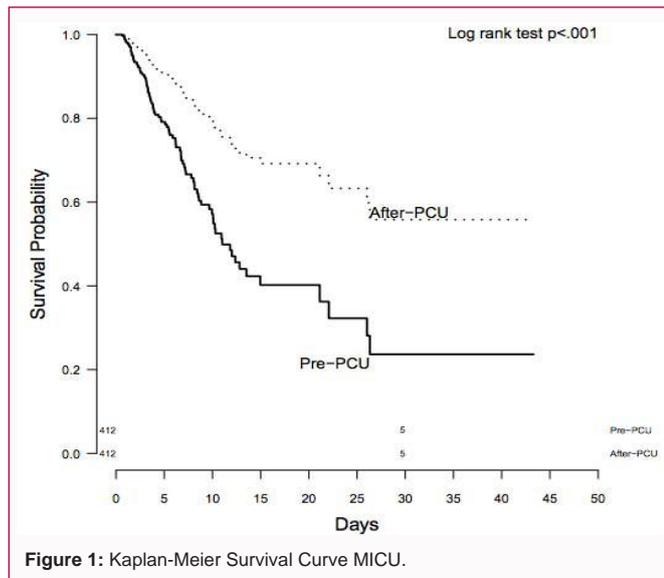
Table 2 describes LOS before and after establishment of a PCU.

Figure 1 displays the Kaplan-Meier curve for MICU LOS as survival from ICU admission to ICU discharge. The primary endpoint was either death in the ICU or discharge from the ICU.

## Discussion

The results of our study indicate that both LOS and mortality decreased for patients receiving PC consults in the MICU since the establishment of our PCU. The two groups studied were similar in terms of age and UHC predicted models for LOS, mortality, and cost.

Our results support the work published by Digwood and



colleagues describing the impact of a 12 bed dedicated PCU. Their work demonstrated that implementation of a PCU correlated with a significant decrease in MICU LOS and mortality, as it created a viable clinical care setting that could provide appropriate end of life care [16]. Most Americans state their preference is to die at home; however, the vast majority of Americans die in a facility [12]. Historically ICU patients at the end of life have limited discharge options. Hospices often lack the resources and expertise to manage some of the therapies most commonly used in the ICU including vasoactive drugs and ventilator support, but the PCUs developed in both this and the Digwood study had the capability of providing ICU level care. Thus, patients who were unable to go home could be transferred to the PCU, which was designed to be a quieter, more home-like setting than an ICU or medical-surgical floor.

Our study demonstrates that the establishment of the PCU provides an alternate location for end of life care for patients while at the same time creating needed capacity within our ICU. This benefit is particularly relevant to institutions like ours that are challenged with meeting an ever-growing demand for ICU beds that constantly surpasses supply. Mosenthal and colleagues noted a similar improvement in capacity following the integration of PC into the usual care of trauma patients documenting a reduction in both trauma ICU mortality and LOS [8]. Reduced mortality in Mosenthal's study was attributed to more appropriate utilization of resources. Transitioning comfort care patients out of the ICU facilitated admission of patients requiring specialty trauma services into their trauma ICU.

Although we did not study the perceptions of end of life care bereaved families whose loved ones were cared for in our PCU, based on previous studies we surmise that the PCU has improved family members' experience with their loved ones. Cassaret and colleagues surveyed bereaved family members to see if there was a perceived difference in care at the end of life for patients being cared for by a PC consult team vs. in a dedicated PCU. They concluded based on analyses of their surveys that "care received in a PCU may offer more improvements than that achieved with PC consultations [13]".

We note the following limitations to our study. The two cohorts comparing MICU patients before and after establishment of a PCU may have some disparities, as they were reviewed from two different

time periods. It is possible that the decreased LOS and mortality may be the reflection of a population with a lower severity of illness not captured by the UHC index. Also, since this study reviewed data one year immediately following the establishment of our PCU, it is possible that the differences noted in MICU LOS were the result of increased enthusiasm to transition patients to this novel unit.

## Conclusion

Our results indicate that the addition of a PCU in our institution can significantly reduce MICU LOS and mortality, thereby enhancing capacity for to our MICU.

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