

Reserved Bed Pilot Program Increases Transfer Volume and Improves Capacity Strain in a Large Neurosciences Intensive Care Unit

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Introduction

Dedicated Neurosciences ICUs provide an institutional center for specialized care. Despite a demonstrable reduction in morbidity and mortality, dedicated Neurosciences ICUs still experience significant capacity strain with resulting supra-optimal utilization and diseconomies of scale. We present a case study in the recognition and management of capacity strain within a large Neurosciences ICU.

Methods

Excessive demand for services in a Neurosciences ICU creates significant operational issues. A Reserved Bed Pilot Program (RBPP) was implemented to maximize specialty-specific economies of scale, reduce declines due to capacity, and increase transfer volume for the neurosciences service line. Strategic key performance indicators (KPIs) were created to evaluate the efficacy of the RBPP with respect to those primary objectives. Service-line specific operational KPIs were established to evaluate changes in operational throughput for the neurosciences service-line. Hospital operations impact KPIs were created to evaluate changes in operational throughput of other service-lines.

Strategic Key Performance Indicators

Service-line Operational Key Performance Indicators

Key Performance Indicator	Definition	Pre-pilot monthly average/benchmark	Pilot period monthly average	p value
Census of intensive care unit	Average percent occupancy of NICU] (measured daily at midnight)	91.9% (3 open beds)	87.9% (4 open beds)	0.03*
Volume by portal of entry (internal referral)	Average monthly internal referrals, including emergency department admissions and consults	141	154	0.01*
Volume by portal of entry (elective clinical practice)	Average monthly elective clinical volume, including direct admissions from clinic and elective operative volume	228	236	0.64
Volume by portal of entry (outside hospital transfer)	Average monthly accepted and completed transfers	51	65	0.01*
Off-service placement	Percentage of total unit patient days occupied by patients who are deemed "off-service"	7.0%	2.7%	0.01*

*p <0.05 considered statistically significant

Results

The implementation of the RBPP allowed a significant increase in accepted transfer volume to the neurosciences service-line compared to pre-pilot values (p=.02). Declines due to capacity decreased significantly (p=.01). Unit utilization significantly improved across all service-line units relative to theoretical optima (p<.03). Care regionalization was achieved, as evidenced by a significant reduction in "off service" patient placement (p=.01). Negative externalities were minimized, as evidenced by a non-significant impact on the operational KPIs of the emergency department and post-anesthesia care unit (p=.54).

Conclusions

Capacity strain is a significant issue for hospital units. Reducing capacity strain can increase unit efficiency, improve resource utilization, and augment service line throughput. Implementation of a reserved bed pilot program in our Neurosciences ICU resulted in a significant improvement in service-line operations with minimal externalities at the institutional level. Its implementation has improved access to care throughout a large geographical area, while improving resource utilization and care efficiency at the institutional and service-line levels.

Learning Objectives

By the conclusion of this session, participants should be able to 1) Understand the impact of capacity strain on a Neurosciences ICU, 2) Recognize the causes of capacity strain, and 3) understand the impact of a reserved resource paradigm on unit/service-line/hospital operations.

Hospital Operations Key Performance Indicators

Key Performance Indicator	Definition	Pre-pilot monthly average/benchmark	Pilot period monthly average	p value
ED leave without being seen	Percent of patients who leave the ED without being seen by a provider	7.3%	4.9%	0.01*
ED LOS (admitted patients)	Average length of stay for all ED patients with an admission request	8.2 hours	7.7 hours	0.003*
ED LOS (overall)	Average length of stay for all ED patients (from check-in to check-out)	5.9 hours	5.6 hours	0.01*
ED boarded patient count	Number of ED patients per month with an admission request and waiting on bed > 4 hours	845 patients	820 patients	0.54
ED boarding hours	Total number of hours boarded per month for ED boarded patients	6,246 hours	7,353 hours	0.11

*p <0.05 considered statistically significant

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