



# Making Sense of Inpatient Hospital Mortality Rates: The Added Value of a Detailed Clinical Case Review



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## Background

Inpatient mortality rates have been used as a quality measure in stroke, though the validity and value of this has been questioned.

## Objectives

At Dartmouth Hitchcock Medical Center (DHMC), we recently started to routinely review all inpatient deaths, including stroke, as well as mortality reports from UHC and GWTG-Stroke. We hoped to develop a better way to identify missed non-adjustable factors in healthcare that may account for higher or lower mortality according to risk-adjusted models and missed opportunities to prevent death on a regional level. Specifically, we wanted to explore the value of a detailed chart review by clinicians. We also wanted to explore if and how the care provided before transfer can be part of the mortality review process.

## Design/Methods

We initially reviewed our mortality reports from GWG-Stroke and UHC for 2014. We then identified a cohort of 20 patients from our UHC Stroke Mortality Index Report of all stroke deaths from January to June 2014 including ICD-9 codes 430-432.99, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, or 997.02 and a discharge status of "expired." Of note, UHC includes subdural hematomas and also provides Risk of Mortality (ROM) and Severity of Illness (SOI) levels. The Division of Quality, Safety, and Value at DHMC provided administrative data required for UHC risk-adjustment and their data abstractors formally reviewed each case. Fellowship-trained vascular neurologists from our stroke program independently performed a detailed chart review and made a independent determination of preventability.

## Results

**Table 1: UHC Mortality Rates (all of 2014)\***

	Observed	"Expected"
Ischemic (n=290)		5.52%
Non-ischemic (n=196)		16.84%
Total	10.09%	10.91%

"Opportunities" (deaths) for period of cohort: 6.36  
\* includes SDH and patients dying in ED

**Table 2: Overall characteristics 2014 cohort**

Outside transfer	70%
DHART Air	25%
ICH	45%
Isolated SAH	10%
SDH	20%
Ischemic stroke	25%
CMO status before death	100%
Palliative Care Consults	25%
Organ donation	0%
Early deaths (LOS 2 or less)	45%
LOS (median, days)	3.5(1-23)
Mechanical ventilation	65%
Extubation to death (median, hours)	3.8(0.3-65)

Cases that were determined to be possibly preventable on the clinicians' review included care provided in the days prior to presentation and at outside hospitals prior to transfer. This was not the case for the review by the Division of Quality, Safety, and Value which focused strictly on care provided after presentation to DHMC. We did not identify any cases where there seemed to be premature withdrawal of support due to overly pessimistic prognostication, nor any connection between preventability and UHC ROM and SOI.

**Table 3: Final determination of preventability of deaths**

Possibly preventable	
• Division of Quality, Safety, and Value	0
• Clinicians' Review	7(35%)
Death non-preventable	13(65%)
Possible iatrogenic death, possibly preventable	5(25%)
• Angiographic complications	
• IV t-PA before transfer followed by sICH	
• CEA complicated by brainstem infarction	
Non iatrogenic but possibly preventable	2(10%)
• ICH progression and inadequate anticoagulation reversal or no Rx of elevated SBP > 160 on > 1 reading prior to transfer or en route	

## Conclusions

A detailed case review by clinicians added to the information provided by mortality reports and the review by our quality division staff. This clinical review and including the pre-transfer and EMS phases of care in the review can uncover areas for improvement. Interestingly, the UHC predicted "opportunities" closely matched the number of possibly preventable deaths.

This work has implications as healthcare moves toward incentivized, outcome-based care. The mislabeling of a hospital as excellent or poor based on mortality scores has a number of inadvertent consequences including: compromising patient preference for reaching benchmarks, limiting treatment of sick patients, and decreased utilization of palliative measures. Further research is needed examining variables and the processes used to evaluate mortality that are valid at the individual, hospital, and regional levels.

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