The Health Care Improvement Foundation
2014 Delaware Valley Patient Safety and Quality Award
Entry Form

1. **Hospital Name**

    Main Line Health System

2. **Title Of Initiative**

    Improving Mortality through Strategies that Drive Change in Culture and Behavior

3. **Abstract (Please limit this description to 250 words)**

    Our organization's priority performance improvement (PI) mandate for 2013 was reducing preventable mortality, as well as the observed to expected mortality ratio. Because performance was at or below average when compared to national benchmarks, we made a commitment to conduct deeper cause analysis on each death and trends over time to identify clinical drivers, individual and/or system failures. We evaluated mortality measurement and risk adjustment for accuracy. Most importantly, we conducted e-record review and observations to identify gaps in best practice that could prevent mortality.

    Our target audience were patients with severe sepsis and other illness with high risk for mortality, especially if they were in the "unexpected death" category, patients with low risk for mortality who were found in "expected death" numerators, and patients close to end of life who would benefit from timely palliative care and hospice services. In order to effectively address mortality reduction, a multi-campus/multi-disciplinary team was formed. Cause and gap analyses helped us identify a four pronged approach to reducing mortality ratios: 1) Standardize the mortality review process; 2) Improve documentation to drive coding that more accurately reflects severity of illness and risk of mortality; 3) Understand the importance of palliative and hospice services at end of life and the impact on mortality; 4) Standardize timely, evidence-based care for patients with severe sepsis.

    Results were a 39% reduction in overall mortality and a 55% reduction in sepsis-related deaths across 4 hospitals.

4. **What were the goals of your initiative?**

    The goal was mortality prevention and a significant decrease in observed to expected mortality ratios at all acute care hospitals. Our aim was to address: surviving sepsis, the #1 clinical reason for preventable mortality; need for timely, appropriate palliative care and hospice services; and improvement in clincial documentation to more accurately reflect severity of illness and risk for mortality.

5. **What were your initiative's baseline data and the results of your initiative?**

    At the start of the intervention, December 2012, data demonstrated an overall mortality ratio of 0.88 (worse than COTH 60th %tile) and a ratio of 1.17 (worse than our threshold of 1.09 - 7.5% reduction from baseline) for sepsis-related mortality. These ratios did not

reflect our mission. Survey and observation informed us that mortality review processes varied across sites, that understanding of data definitions and documentation sometimes differed from CMS criteria, there was little standardization of sepsis protocols and palliative care/hospice services were misunderstood and under-utilized.The metric was achievement of the Council of Teaching Hospitals' (COTH) top decile results for overall mortality, a ratio of 0.67. For sepsis-related mortality the benchmark was a ratio of 0.94, a 20% reduction from the 2012 baseline. The intervention period began in December 2012. Graphics display an 8 quarter trend with regression line and p-values (Figures 4 and 5). Comparing pre (January 2012 – December 2012) and post (January 2013 – December 2013) intervention periods, there has been an overall 39% reduction (p = < .05) in hospital mortality (observed/expected) and a 55% reduction (p = < .001) in sepsis-related mortality. In the 12 month period 2013, there were 44% decrease in overall mortality and a 40% decrease in sepsis deaths. (See FIgures 4 adn 5 for trend graphs)

6. **Describe the interventions that were instrumental in achieving the results for your initiative.**

In late 2012 and early 2013, the foundational work began to identify strategies to reduce mortality. While addressing issues related to clinical care, measurement and documentation, we also assessed the cultural aspects of improving mortality ratios. We found lack of commitment to a unified, system-wide approach to sepsis care. Leaders were not addressing a lack of standardized evidence-based practices and were not holding clinicians accountable for variation. Unspoken beliefs and behaviors about the use of palliative care and hospice services, especially among ICU staff, had to be confronted with a new commitment to offer patients and their clinicians the best options at end of life.

To succeed in reducing mortality, a leadership infrastructure needed to be in place with the executive team and medical staff leading the charge. Their mission was to drive improvement and to implement and monitor the mortality reduction tactics, starting with sepsis protocols (See Figure 1). We reinforced the message that high reliability started with accountability for the safety of the patient. An accountability model was created setting new expectations for nurse managers and their physician leader partners (medical directors, campus chiefs, etc.). See "Transforming Systems of Care Quality Framework" in the appendix (Figure 2).

We use Lean Six Sigma performance improvement tools on a DMAIC foundation (Define, Measure, Analyze, Improve and Control). Senior leaders chartered a system-wide mortality improvement team to address four key areas: 1) Standardized mortality review process; 2) Clinical drivers for unexpected death; 3) Improved and timely palliative care and hospice services and 4) Improved clinical documentation and coding. The interventions are summarized in Table 1.

1) A standardized mortality review process was developed along with the revision of an existing mortality database to provide the ability to aggregate and summarize our

findings. Trigger events already captured in the database were reviewed and updated. A key component of the new mortality review process was the addition of physician review, which was especially important with the longer, more complex cases. Summary reports were also developed to provide the ability to identify general areas for improvement, such as failure to plan or communicate. The mortality review process now includes 100% review of all deaths, all sites, any cause. Campus mortality committees were also created to discuss opportunities and align work with existing or new PI strategies. Focused reviews uncovered the fact that many patients categorized as an expected death were not always transferred to the appropriate care setting (e.g., hospice and comfort care). Additionally, documentation did not always reflect the severity of the patient's condition which resulted in lower risk of mortality and severity of illness scores.

2) Another finding from the revised mortality review process was the identification of key clinical drivers of mortality with sepsis as the primary driver. A multi-disciplinary team was formed to specifically focus on mortality reduction through standardization and early goal-directed therapy for patients diagnosed with severe sepsis. Teams adopted evidence-based protocols for sepsis care modeled after The Institute for Healthcare Improvement's (IHI) "Surviving Sepsis" campaign. We created a nurse driven protocol for use with patients screened in the ED having symptoms of sepsis (See Figure 3). Protocols included a resuscitation bundle and a maintenance bundle with a sepsis alert to inform the ICU and support staff that a severe sepsis patient was being resuscitated. As we began to see positive outcomes in patients admitted through the ED transferred to ICU, the focus turned to all inpatient settings. The inpatient sepsis team identified strategies to screen for hospital acquired sepsis. A simple evidence-based screening tool used every 12 hours to assess for potential changing patient condition was implemented. In summer 2013, we began a partnership with Siemens to continue to build an integrated early warning system into the electronic medical record to enhance rapid communication and collaboration among caregivers. Interventions continue to demonstrate sustainability through first quarter 2014.

3) Palliative care opportunities were also identified through the revised mortality review process. As palliative and hospice services became operational, we developed a strategy to expand education and began a palliative care internship program for nursing. This placed knowledgeable caregivers who were focused on the patient's end of life needs at the bedside. Working in partnership with our home care network, palliative care and hospice nurses were placed at each campus to assist with managing transitions from palliative care to hospice. They engaged physicians and staff to make better decisions with patients and families to achieve individualized appropriate end of life plans. Extensive communication and education was conducted for ICU and hospital medicine physicians covering CMS criteria and documentation requirements for inpatient hospice admissions and outpatient hospice care.

4) The revised mortality review process further enabled us to recognize documentation and coding issues specific to inaccurate mortality ratios. The documentation did not

accurately reflect the severity of illness and risk of mortality for patients with significant life threatening illness. This finding was supported by an external 3M audit. In response to this finding, a clinical documentation improvement initiative was implemented and 6 new CDI Specialists were deployed to the campuses. These specialists review medical records and provide support to physicians to accurately and appropriately document in the medical record. Language that presented a barrier to patients being properly categorized for hospice (by criteria) is also reviewed by the CDI team and by the palliative care and hospice liaisons.

7. How can this initiative be replicated through the region? (Please limit this description to 100 words.)

Effective improvement in the area of reducing mortality can be replicated at other organizations that provide the same service and/or serve a similar type of population. It is our belief that the most important component needed for replication is about culture: leadership commitment and engagement of physicians and staff. Additionally, a culture of safety and reliability that stresses accountability at all levels of the organization should be firmly in place to ensure consistent application of tools and processes implemented. Organizations looking to replicate success in reducing mortality should also have robust performance measurement and analytics support.

8. Explain how the initiative demonstrates innovation (Please limit this description to 100 words.)

To succeed in reducing mortality, a leadership infrastructure needed to be in place with the executive team and medical staff leading the charge. Their mission was to drive improvement and to implement and monitor the mortality reduction tactics, starting with sepsis protocols (See Figure 1). We reinforced the message that high reliability started with accountability for the safety of the patient. An accountability model was created setting new expectations for nurse managers and their physician leader partners (medical directors, campus chiefs, etc.). See "Transforming Systems of Care Quality Framework" in the appendix (Figure 2).

9. How does this initiative demonstrate collaboration with other providers within the continuum of care? (Please limit this description to 100 words.)

As new or improved palliative and hospice services became operational, we developed a strategy to expand education and began a palliative care internship program for nursing. This placed knowledgeable caregivers who were focused on the patient's end of life needs at the bedside. Working in partnership with our home care network, palliative care and hospice nurses were placed at each campus to assist with managing transitions from palliative care to hospice. They engaged physicians and staff to make better decisions with patients and families to achieve individualized appropriate end of life care plans.

10. Explain ways in which senior leadership exhibited commitment to the initiative (Please limit this description to 100 words.)

Senior leaders made mortality reduction the #1 priority. They committed resources, tied mortality reduction to the executive incentive program, hired new palliative care and

hospice resources and most importantly, developed the new "Transforming Systems of Care" quality framework with a specified "accountability model" that outlined new roles for physician and nursing leaders. Leaders continued to tie the work of mortality reduction to the culture of safety and high reliability. We used high reliability and lean six sigma principles throughout this huge initiative that spanned 4 acute care settings and home health.

11. Appendices (i.e., tables and graphs)

Appendix

Figure 1. Strategies for reducing sepsis-related mortalities
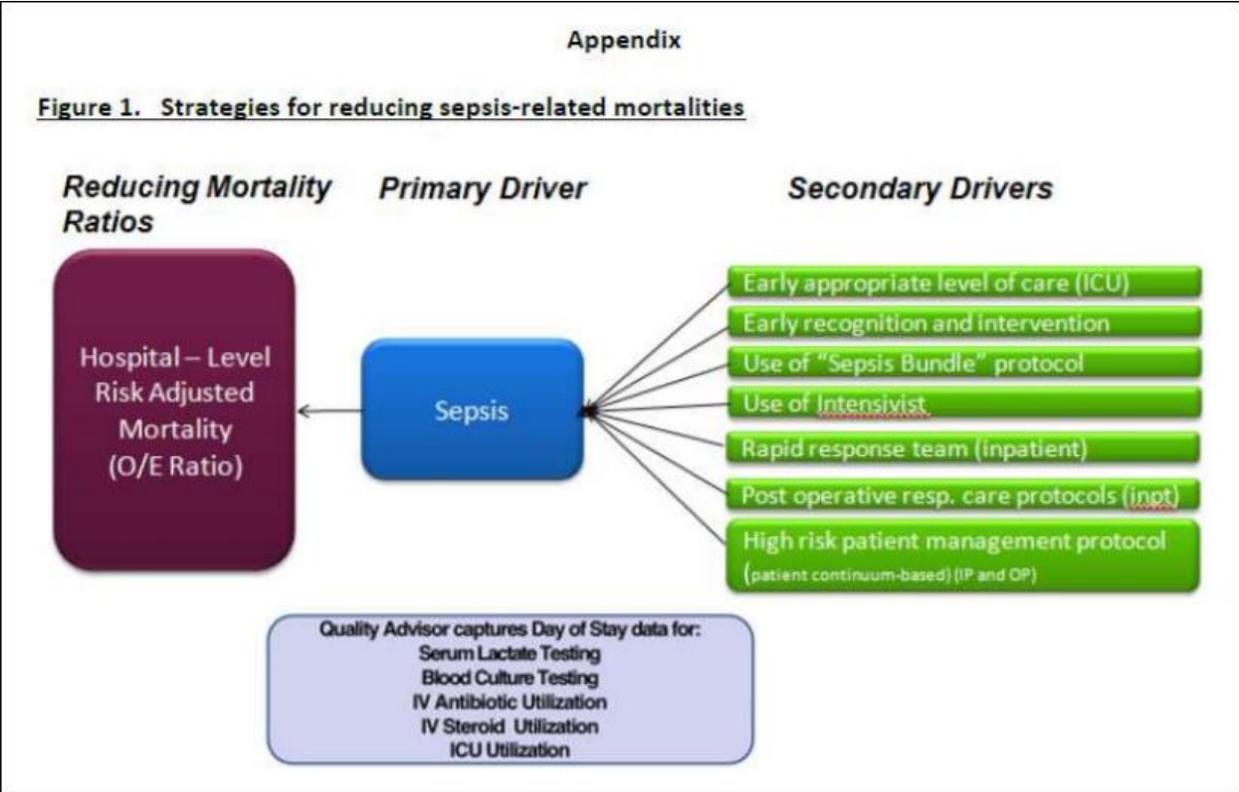
Figure 2. Quality, Patient Safety and Accountability Framework – Developed 2013

Transforming Systems of Care : Quality and Patient Safety Framework

Performance Improvement Leadership Council

*PI, Project Management Competencies & Perpetual Readiness

Financial, Clinical & Operational Analytic Competencies

Population Workgroups

Joint Replacements Knee Hip	Cardiovascular Conditions	Respiratory Conditions	**High Risk Care Mangement

Cross-functional Workgroups

Safety Initiatives : Reliable Culture of Safety , Eliminating Harm and Reducing Mortality

Quality Initiatives : Improving Transitions of Care , Patient Experience and Delivery of Culturally Competent Care

Clinical Infrastructure work : (e.g. Smart Chart and Next Gen optimization , 3M Clinical Documentation and Ambulatory Quality /ACO)

Optimizing the Clinical Environment : Accountability Infrastructure

System Clinical Operations Council

Campus Clinical Operations Teams

Clinical Environment Workgroups and Microsystems

Inpatient Medicine and Critical Care CEW	Emergency Medicine CEW	Women and Infants CEW	Surgical CEW	Rehab Services	Ambulatory Services

Inpatient Medicine and Critical Care Microsystems

Emergency Medicine Microsystems

OB/Neonatal Microsystems

Surgical Microsystems

Revised: 4/29/2014
*Process Improvement
**Includes patients enrolled in Pay for Performance programs

Figure 3. RN Protocol:

Department of Emergency Medicine

Adult Severe Sepsis Screening Tool at Time of Triage
CRITERIA TO INITATE SEPSIS ORDERS:
Suspected or Confirmed Infection AND 2 of 3 of the following:
____ **Temperature > 100.3 F (38 C) or < 96.8 F**
____ **Pulse > 100 bpm**
____ **SYSTOLIC BP < 90mmHg**

NOTIFY PHYSICIAN TO INITIATE INITIAL SEPSIS TREATMENT ORDERS *If patient meets 2 or 3 of the above parameters initiate the specific orders below and transcribe orders on Physician Order Sheet.*
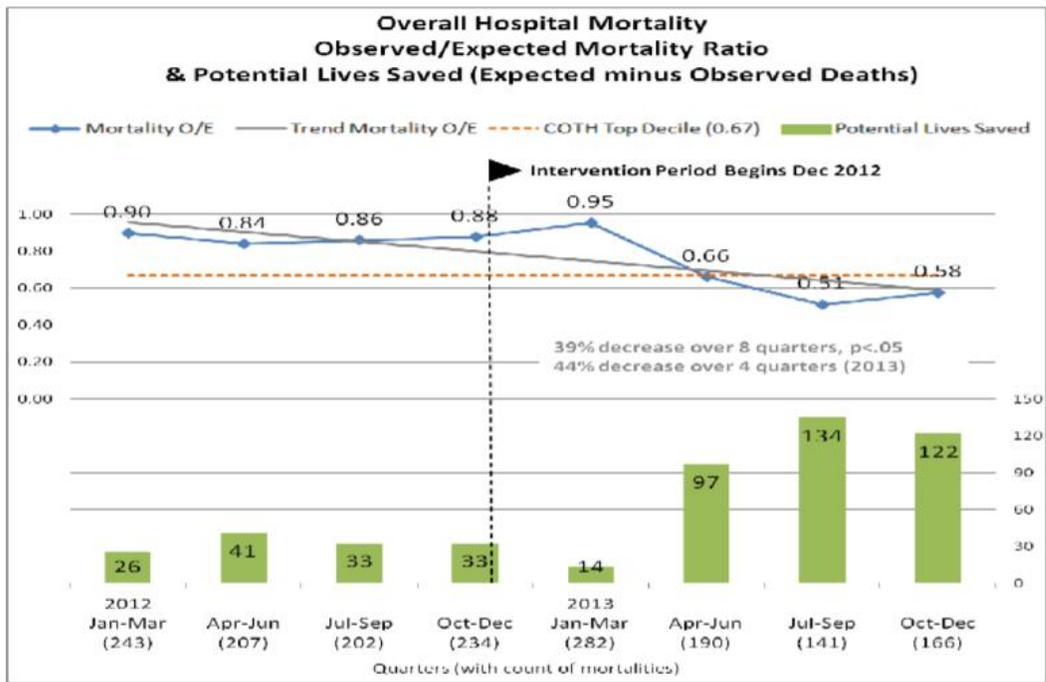
☐ Cardiac monitor with pulse oximeter

☐ VS & Temp check q15 min x1 hr, q30 min x1 hr

☐ POCT Glucose

☐ Oxygen at _____L/min **Maintain SpO2 > 93%**

☐ Initiate 2 large bore IV (18 g). *(If unable to obtain large bore IV access in 15 minutes, notify the IV Team and Physician).*

☐ 1000 mL 0.9% NSS bolus Wide Open
Notify physician if patient's SBP < 90 or MAP < 65 after 1000 mL 0.9% NSS

☐ EKG on admission; Repeat for pain or change in symptoms or status

LABS
☐ CBC with Differential – **Lavender Tube**

☐ Complete Metabolic Panel - **Mint Green Tube**

☐ Serum Lactate (venous or arterial) – **Mint Green Tube on Ice**

☐ PT/PTT – **Blue Tube**

☐ POCT HCG if not available, send **GOLD Tube**

☐ Blood Cultures x2 (draw and hold)

☐ Urinalysis

☐ Urine C&S

☐ Obtain and Hold Sputum Culture and Wound Culture

*Activate "Sepsis Alert" via 711 page and proceed to "Severe Sepsis Pathway" if Serum Lactate ≥4 or failure to resuscitate (MAP ≤ 65) after 20 – 40 mL/kg of fluid. **At Physician discretion Sepsis Alert may be activated prior to the above criteria and proceed to the "Severe Sepsis Pathway" (not yet implemented). *See Page 2 for "Adult Severe Sepsis Antibiotic Guideline"*

Figure 4. Overall Hospital Mortality

Overall Hospital Mortality
Observed/Expected Mortality Ratio
& Potential Lives Saved (Expected minus Observed Deaths)

Figure 5. Sepsis-related Mortality

Sepsis Mortality
Observed/Expected Mortality Ratio
& Potential Lives Saved (Expected minus Observed Deaths)

Legend: Mortality O/E — Trend Mortality O/E --- Benchmark (0.94) ■ Potential Lives Saved

Intervention Period Begins Dec 2012

1.25 1.13 1.17 1.17 0.87 0.88 0.57 0.57

55% decrease over 8 quarters, p<.001
40% decrease over 4 quarters (2013)

Potential Lives Saved: -7, -4, -4, -5, 6, 6, 20, 25

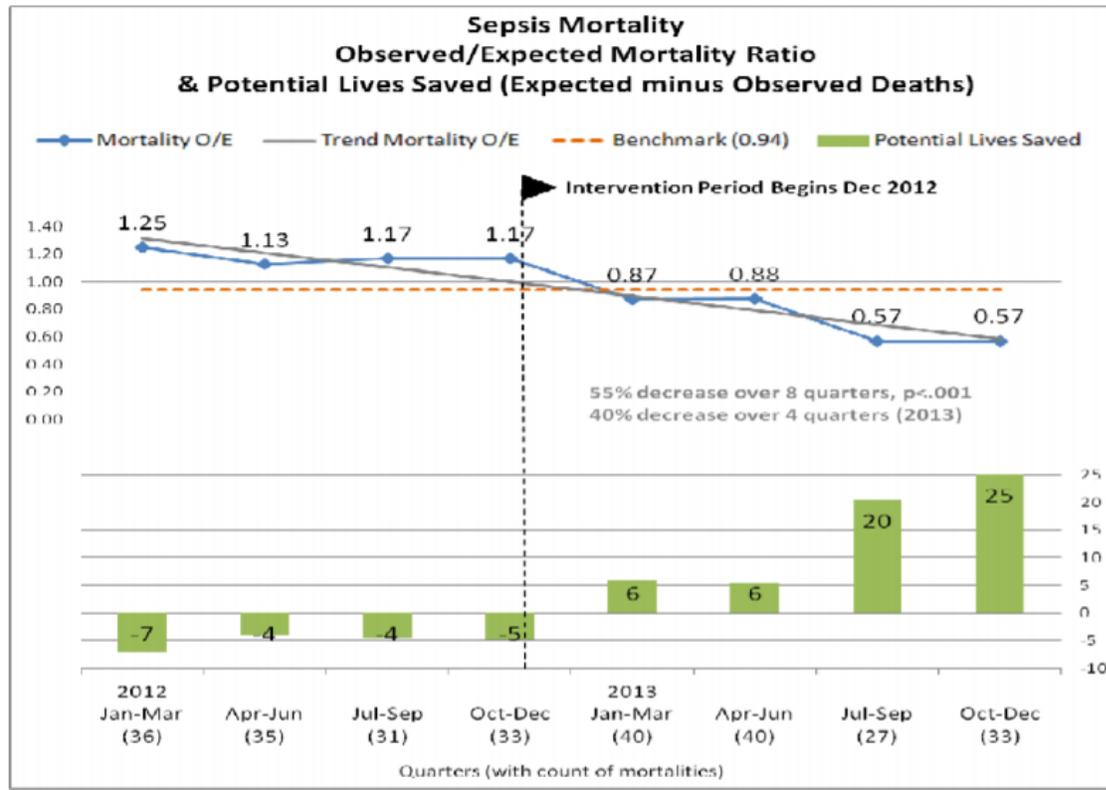| 2012 Jan-Mar (36) | Apr-Jun (35) | Jul-Sep (31) | Oct-Dec (33) | 2013 Jan-Mar (40) | Apr-Jun (40) | Jul-Sep (27) | Oct-Dec (33) |

Quarters (with count of mortalities)

Table 1. Summary of Reducing Mortality Interventions

Mortality Review Process	Clinical Drivers	Palliative/Hospice Care	Clinical Documentation/Coding
Standardization of review process. 100 % review of all deaths, all sites, any cause. A mortality research database was built to track and trend variables & review follow up action items.	Identified sepsis as the primary driver of mortality.	Developed strategy to expand education.	External reviewers conducted an assessment of coding practices. Risk of Mortality (ROM) and Severity of Illness (SOI) were inaccurately reflected in the data
Physician reviewers dedicated to identify system/ individual clinician failures and opportunities to improve process and outcomes.	Multi-disciplinary team formed to focus on mortality reduction through standardization and early goal-directed therapy for patients with *severe* sepsis.	Implemented a palliative care RN internship for nursing. Partnered with homecare network to place RN hospice liaisons in each hospital.	A clinical documentation improvement initiative was implemented. New CDI specialists hired to provide support to physicians to accurately document in the EMR.
Campus based mortality committees formed to discuss opportunities and align work with existing or new PI teams as well as peer review committees.	Adopted evidence based protocols (resuscitation and maintenance bundles). EDs implemented sepsis alert system to inform ICU and support staff that a sepsis patient was being resuscitated	Extensive communication and education was conducted for ICU and hospital medicine physicians which included CMS criteria for inpatient hospice admission and outpatient hospice care.	
	Evidence-based screening tool used q 12 hours to assess inpatients with signs of sepsis.		
	Developing an early warning system integrated into the EMR to enhance communication among caregivers.		