

Nicholas E. Davies Enterprise Award of Excellence

Applicant Organization: Mercy

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Menu Item: Improving Quality and Reducing Costs through Pathways: Heart Failure Pathway

Executive Summary

It's important for a health organization of Mercy's size to have standardization of pathways across facilities in order to improve quality of care and patient outcomes, along with reducing costs and improving reimbursement. In 2013, Mercy began to look for new opportunities to improve quality of care and offer the most cost effective approach to care through the use of evidence-based protocols, or pathways, configured in the Epic electronic health record (EHR).

Through continual monitoring of pathway utilization within target patient populations on a pathway (total inpatients excluding Skilled Nursing, Rehab, Swing Bed, Behavioral Health, Comfort Care Only and Organ Donor), our rates have improved from a range of 48%-53% pathway utilization in FY15 to a range of 53%-70% pathway utilization in FY16. This improvement aligns with the goal to cover 60-80% of the inpatient population with evidence-based standardized pathways. In addition to aligning to the pathway utilization goal, Mercy's mortality rate for target condition populations has primarily stayed the same or decreased compared to baseline patients and national average. The majority of conditions in which Mercy has produced pathways demonstrate reduction in mortality ranging from 30% to 100%. Mercy also achieved approximately a \$10 million reduction in direct variable costs overall for pathway conditions in FY15 and a \$17 million reduction in direct variable costs overall for pathway conditions in the first three quarters of FY16 (July 2014- March 2016).

The information used to create clinical pathways is now available for physicians to implement or adjust based on patient needs. As a result, Mercy is seeing patients with reduced risk of mortality and lower cost, which raises the bar on quality and cost effectiveness. The clinical pathways project has earned Mercy the 2015 *Computerworld* Data+Editor's Choice Award.

Background knowledge

It often takes 10-20 years for new medical evidence to go from research and development to widespread adoption in practice. A RAND study found that in the U.S. the chance of receiving care that meets generally accepted standards is about 55%. Mercy desired to be proactive in improving patient outcomes and gaining efficiencies in care.

Review of the literature supported the benefit of implementing tools to embed national guidelines into care. These guidelines are evidence-based and consensus-derived statements of optimum care for patients. The challenge for health care organizations is how to transform the evidence from paper to practice. Protocol or pathway development was proven to be effective in reducing process variation and improving patient outcomes and there was a growing body of

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literature that demonstrated that this strategy helps hospitals improve the quality and cost effectiveness of care. The literature supported that standardized protocols and pathways for care based upon national guidelines decrease mortality, improve the likelihood of receiving appropriate therapy and decrease the cost of care.

Mercy recognized that when there isn't a clear standard of care there's variation in the type and quality of services provided. That variation impacts the patients' outcomes.

In reviewing successful health care organizations, Mercy recognized a trend in accountability. These organizations recognized that the complexity and volume of knowledge can exceed an individual provider's ability to properly incorporate it into evidenced-based care consistently, correctly and safely. Successful organizations put structures in place to support standardized, patient-centered, collaborative and cost-effective care. A collective responsibility for improving patient care and producing better outcomes must exist.

Mercy incorporated these principles into an approach that stated:

- Care would be managed by focusing on applying evidence-based practice to the everyday care of common conditions.
- Standardized pathways would be developed based upon robust scientific evidence and expert consensus.
- Processes would be put into place to support data analysis of the common pathway conditions.
- Variability would be corralled by developing methods of controlling and allowing change. The principle of "80% of patients can be managed on a standardized protocol" was employed. Inherently, the principle recognized that 20% of patients are more complex and will require a more individualized approach to management of their care.

Organizations that have been successful at redesigning care and achieving better clinical outcomes have conducted thorough analysis of available resources. Resource reorganization would include establishing teams with the expertise to review literature for protocol development and review. Resources were needed to develop methods for measuring performance and tracking outcomes.

Mercy considered who needs to do what and the level of experience or skill that is required for every task. Enhancement of the EHR and information systems to help make appropriate treatment decisions was vital. Key care providers would work as a team to provide well-coordinated and timely care. A process would be developed to provide ongoing education on protocol use. The question changed from "What care can we provide with the resources we have?" to "What resources are required and how should they be configured for the care we need to provide?"

The approach to learning from everyday care included using daily practice to gain new knowledge about patient management and outcomes from clinician experiences, in addition to knowledge flowing from research to practice. Valuable new knowledge about the nature of disease, how to treat it, and how to organize the delivery of care was generated from daily experience. Medical and clinical staffs at all levels have insights and innovative ideas about how

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care is delivered. Physicians may consistently over-ride an order or an element of care may be consistently delayed. The goal was to capture these everyday learning opportunities, analyze and learn from them, and incorporate them into future generations of a pathway that guides care.

Mercy currently has approximately 40 evidence-based and standardized clinical pathways representing care of patients in an inpatient setting for 29 different procedures or conditions.

This project is one example of how Mercy's hospitals and clinics have been working together to leverage resources and improve care. In March 2016, their work was recognized by Truven as one of the top five large health systems in the U.S., as part of the 2016 Truven Health Analytics 15 Top Systems study. This study annually ranks the top 15 health systems – five large, five medium and five small – based on independent research and publicly reported data of system-wide performance in health care quality, patient satisfaction, coordination of care, cost of care and operational efficiency. The hospitals chosen represent the highest national standards in hospital care and management reducing overall expense year over year while improving patient outcomes. These are exactly the results that the entire industry hopes to attain.

Local Problem being Addressed and Intended Improvement

Mercy recognized the opportunity to improve the quality of care and costs by employing standardization as the initial step, noting that a large portion of the waste in health care can be contributed to failures in care delivery, care coordination, and overtreatment. Mercy was not achieving a healthy contribution margin in several communities on the top 15 diagnosis related groups (DRG) for patients in which reimbursement was received based upon bundled payment, namely Medicare and Medicaid patients. Heart failure was one of the conditions. The actual mortality rate for heart failure patients was at the national rate of 6% prior to implementation of the pathway.

Intended Improvement Goals-Heart Failure:

- Implement evidence-based clinical pathways for the majority of high volume conditions, including heart failure, representing 60-80% of Mercy's inpatient population, with utilization of pathway at 60-80%
- Improve quality of care for pathway patient populations, measurable by mortality as a proxy and other key clinical metrics such as:
 - Reduction of actual mortality rate for heart failure below the national rate
 - Reduce average time to diuretics in heart failure patients
- Reduce direct variable costs per case for heart failure in all payer groups where possible and allow for increase in costs where necessary to achieve quality improvement.

Design and Implementation

Decision to Develop a Pathway. Originally, the decision to develop a pathway was based upon the analysis of the top 15 loss DRGs with bundled payment providers, based upon contribution margin. The goal was to improve quality of care through standardization for selected patient populations and achieve a savings in direct variable cost per case through the process of standardizing and improving care. The pathway development process began with use of adhoc pathway development teams made up of physicians and interdisciplinary team members from various Mercy locations. The process for deciding to develop a pathway has evolved in to a more formal process that includes submission and consideration by Mercy’s Physician Specialty Councils. The decision includes consideration of number of lives touched, resources available to support development and cost benefit among other factors.



Figure #1- Process for design and optimization of pathways

Experts Identified. Mercy’s Physician Specialty Councils identified a lead physician to participate in directing the development and implementation of the pathway after the decision was made to develop one. In addition, the Physician Specialty Councils identified a team of physician experts to participate in review of the evidence, drafting the pathway and revising the draft pathway to a usable state. They gave consideration to clinical expertise and location of practice in appointing the pathway development experts in order to be representative of the entire health ministry. They assigned a coordinator from the Mercy Clinical Performance Acceleration department to coordinate the development process. Then they identified interdisciplinary experts from across Mercy to participate in pathway development. The overall goal was to create a concentrated interdisciplinary team to develop the pathway. Mercy uses an iterative process to design and optimize pathways (See Figure #1).

The governance structure and interdisciplinary approach to pathway development and review is noted in Figure #2 below. It includes leaders and representatives from the Specialty Councils that would most often manage heart failure patients (hospitalists and cardiologists) along with interdisciplinary support from nursing, pharmacy, cardiac rehab, respiratory therapy, etc. The expectation was to implement standard order sets and pathway workflow that would decrease mortality associated with heart failure while improving the workflow process. The results would include better outcomes for the patient, decreased cost, and improved process measures such as decreased door to diuretic time.

Figure #2: Cycle and Governance of Pathway Development or Review

Cycle of Pathway Production/Review

All workflows (ambulatory, inpatient, post acute etc.) of the pathway go through each stage of the development or review process but potentially at different times.

Phase 1 <i>Research</i>	Phase 2 <i>Complete First Draft</i>	Phase 3 <i>Review and Revise First Draft</i>	Phase 4 <i>Epic Build Education Development</i>	Phase 5 <i>Review/Testing</i>	Final Phase <i>Final Build Change Control</i>
Introductory Paragraph PICOT Questions/Search Strategy Identify Opportunities: Quality, Service & Cost Ayasdi Data Analysis Baseline Metrics Articles/RCA's Evaluation Table Schedule Phase 3 Physician Meetings Send Physician Letters	Initial Drafts: Pathway Order Sets Process Map CTP/CTQ Identified	Final Drafts: Order Sets Pathway Process Map CTP/CTQ SC Approval	Handoff and Content Build in Epic Draft Education	Physician, Pharmacy, and Collaborative Meetings Revisions	Submitted for Change Management Process - 4 weeks'
Pathway Coordinator	Pathway Coordinator	Pathway Coordinator	Pathway Coordinator	Pathway Coordinator	
Lead RN	Lead RN	Lead RN	Lead RN	Lead RN	
Librarian	Librarian	Librarian			
Lead Physician	Lead Physician	Lead Physician	Lead Physician	Lead Physician	
Pharmacist	Pharmacist	Pharmacist	Pharmacist	Pharmacist	
Implementation Lead	Implementation Lead	Implementation Lead	Implementation Lead	Implementation Lead	
SC Physician Team		SC Physician Team		SC Physician Team	
Interdisciplinary Members as needed	Interdisciplinary Members as needed	Interdisciplinary Members as needed		Interdisciplinary Members as needed	

Design Phase

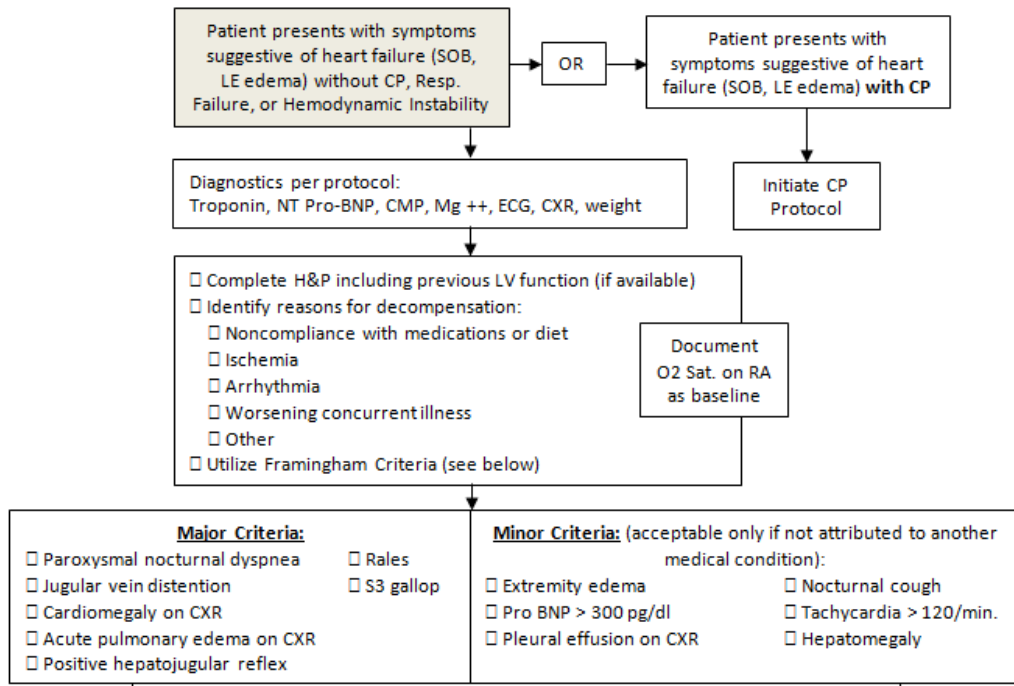
Literature Review. A masters-prepared nurse coordinator began the process by completing a literature review guided by the physician pathway lead. The literature review process was evidenced-based and employed strategies and tools such as development of Population/Patient standard Problem, Intervention, Comparison, Outcome, Time (PICOT) questions, Rapid Critical Appraisal and leveling of evidence, and development of evaluation tables of the literature reviewed. The Mercy Evidence Based Practice (EBP) Tool is used to execute the literature review.

Pathway Draft. The coordinator and the lead physician reviewed the evidence and designed the pathway based upon the evidence, with consideration to including the elements of care needed for 80% of the patients in the chosen patient population. A draft including a workflow algorithm, orders, pathway patient outcomes, pathway documentation and tasks, patient education, clinical and financial metrics (See Figure #3).

Figure #3– Example of the Heart Failure Emergency Department Workflow Algorithm to drive patient care on the pathway within Epic



Heart Failure EMERGENCY DEPARTMENT ALGORITHM AND INPATIENT PATHWAY

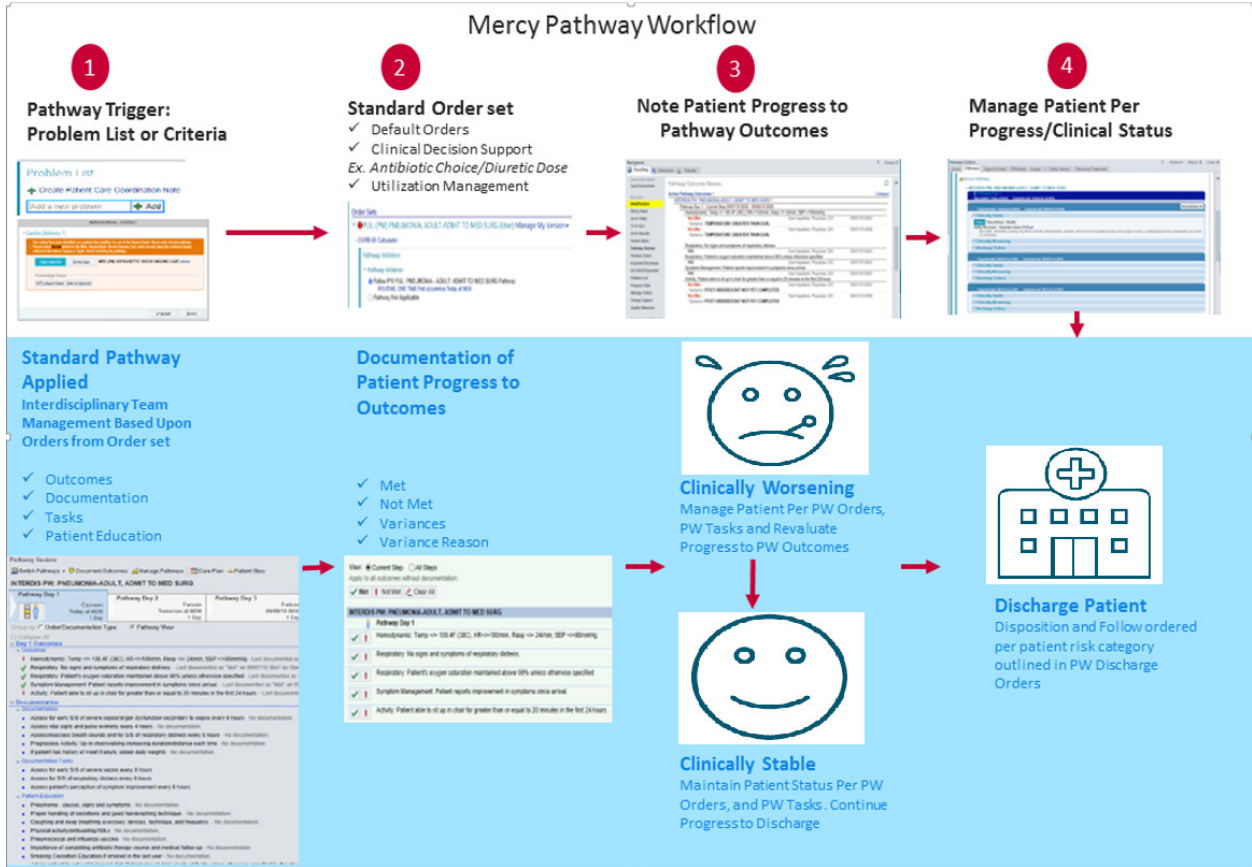


Review and Revise. The physician pathway lead conducted meetings with the expert interdisciplinary team to consider the literature review, patient care complexities, challenges and practices that must be accounted for beyond the evidence and guidelines. The draft pathway was reviewed and revised with consideration that 80% of patients can follow a predictive pathway and allowance for physician clinical judgment for the 20% that can't.

Approval. The final draft of the pathway approved by the expert team was reviewed and approved by the Physician Specialty Councils.

Workflow Process. The pathway development groups established the framework for the pathway workflow by first defining standard criteria to identify patients that the pathway should be used on. Standard treatment orders, outcomes, documentation, tasks and patient education are applied. Patient progress is evaluated against expected outcomes. Adjustments are made for patients who are clinically worsening. When the patient is clinically stable, progress is made toward discharge (See Figure #4).

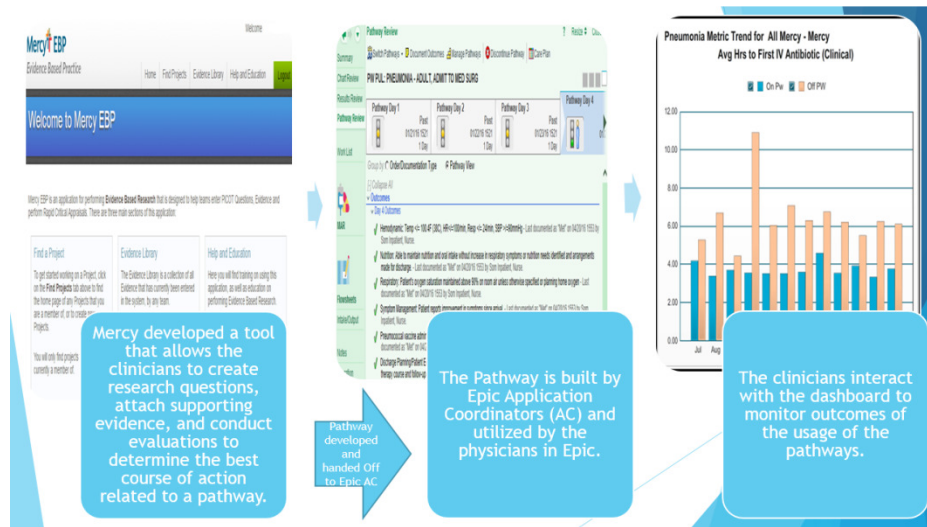
Figure #4- Mercy Pathway Workflow



How Health IT Was Utilized

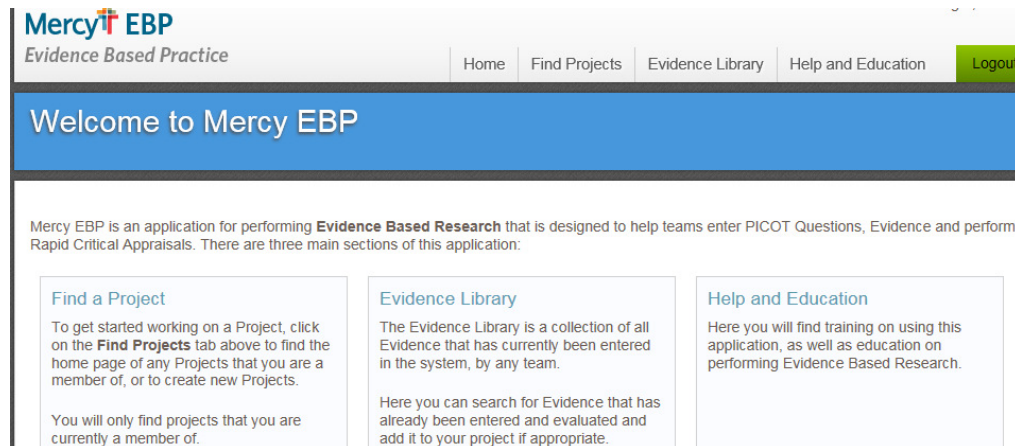
The diagram below represents a high-level view of the use of information technology for the pathway process that the clinicians and physicians interact with from beginning to end (See Figure # 5).

Figure #5- High level representation of the pathway process

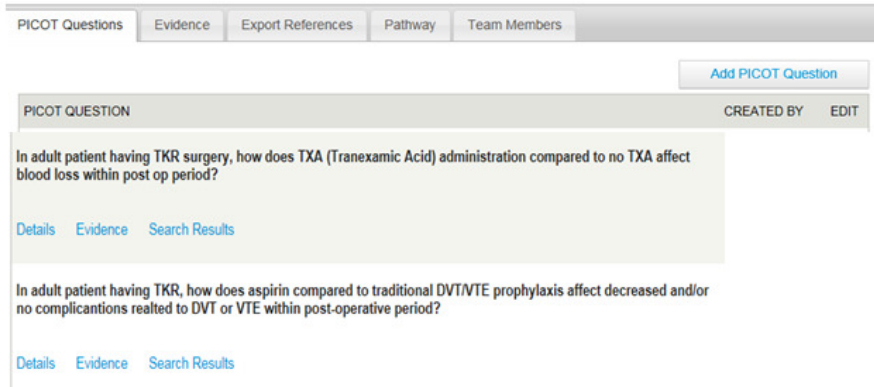


The clinician begins the process by accessing Mercy’s homegrown created tool named EBP by searching Find a Project (See Figure #6).

Figure #6- Mercy EBP Tool



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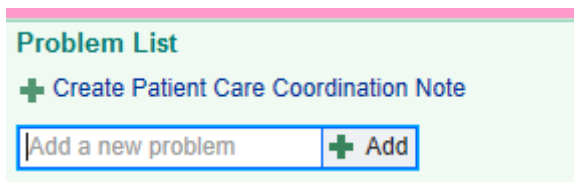


The EBP tool is designed to follow the evidence-based practice in health care processes defined by Bernadette Melnyk and Ellen Fineout Overholt. The tool is used in the everyday work processes of a care path coordinator conducting a literature review in preparation for development or optimization of a pathway. It is also available for use by others in the health system to support evidence based practice projects. Following the establishment of the project, the evidence library is investigated along with Ayasdi to obtain evidence based practices prior to the pathway and order set template design in the Clinical Decision tool.

Once the design is approved, it is exported and handed off to the Epic application coordinator to be built, tested, and validated in the Epic test environment. Following a successful validation, it is then promoted to Epic production, where the clinicians and physicians can begin to utilize following training.

The workflow in Epic starts with problem list documentation. The provider documents a problem on the patient's problem list that meets the criteria for utilizing the pathway (See Figure #7).

Figure #7- Add a problem to the Problem List in Epic



Based upon documentation of diagnosis and symptoms, the heart failure pathway is suggested (See Figure #8).

Figure #8 – Trigger suggestion for heart failure pathway

▼ Suggestions

CAR: (PW) HEART FAILURE-ADMIT TO TELEMETRY AND MED SURG

A standard order set and pathway were built into Epic. The order set contains a hard stop that requires the pathway to be ordered or a reason provided for why the pathway is not applicable to

the patient. The order set contains evidence-based orders and clinical decision support criteria to support a streamlined workflow (See Figure #9).

Figure #9- Pathway order set for heart failure



Key aspects of the heart failure pathway order set are the elements included to expedite the administration of diuretics. The order set is designed in a manner to prevent omissions and inaccuracies in the initial orders for diuretic medication. The focus on accurate initial orders reduces iterative communications, phone calls and care delays. The orders for diuresis are defaulted in the order set. The defaulted orders include intake and output, weigh patient and daily net diuresis goal to monitor the patient’s fluid status (See Figure #10).

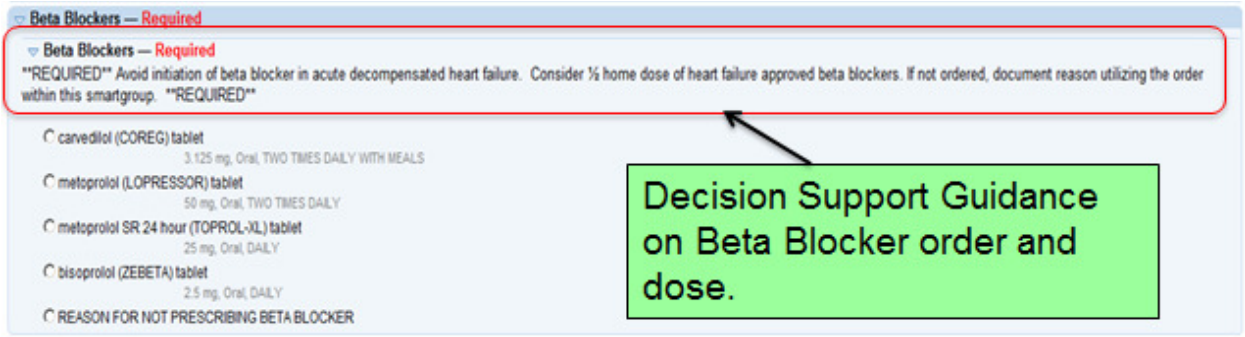
Figure #10- Default diuresis management orders



The order set also includes orders for respiratory treatment and a fluid controlled, low sodium diet. Angiotensin Converting Enzyme Inhibitor (ACE) and Angiotensin Receptor Blocker (ARB) medications are included in the order set with clinical decision support guidance related to prescribing these medications to patients with an ejection fraction of less than 40%. Standard first, second, and third line antiemetic medications are included. Beta blocker medications are

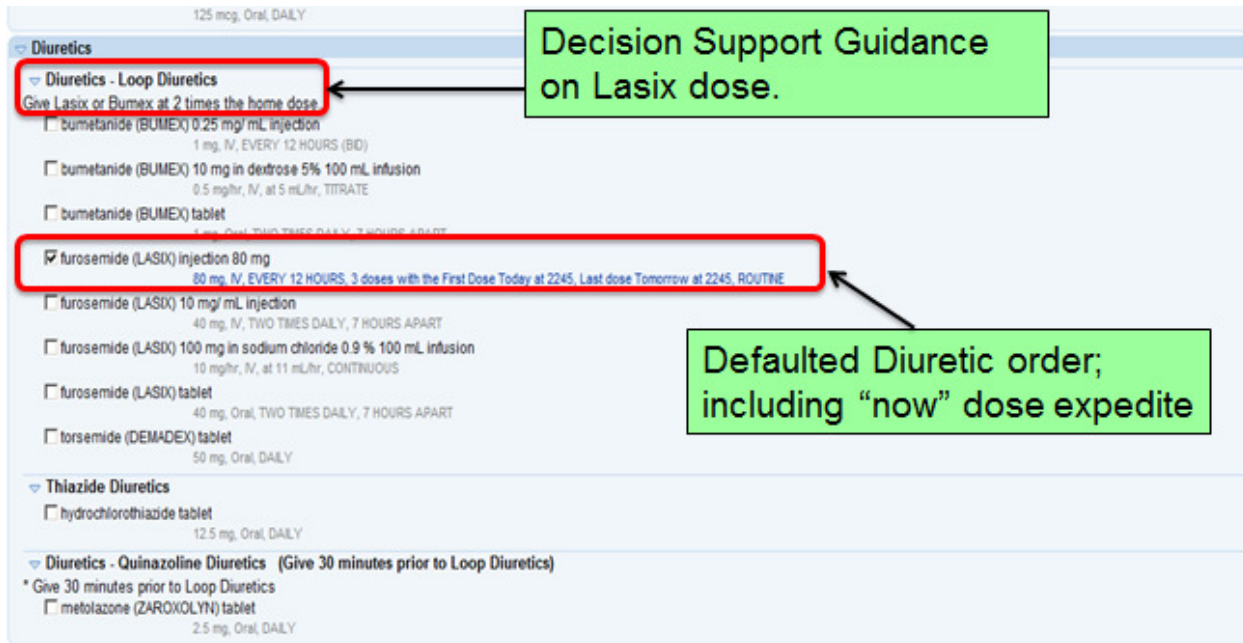
included in the order set. This medication section is a required section. Guidance is provided regarding the medication dose (See Figure #11).

Figure #11- Beta blocker medication included within the order set



Guidance is provided to the clinician regarding selection of diuretic dose. A defaulted order is included with the recommended diuretic dose. A “now” dose is included to expedite the administration of diuretics (See Figure #12). The order set also includes safety orders to protect the patient’s potassium level. The orders include when to notify the provider based upon potassium level and orders for supplemental potassium if needed.

Figure #12- Decision support guidance on Lasix and default diuretic order



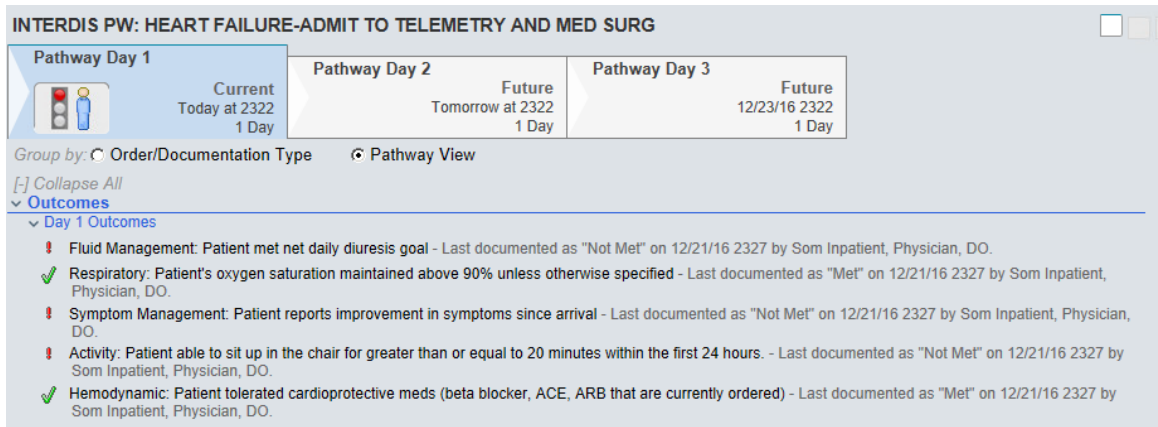
Bowel therapy orders are defaulted in the order set. Options for management of venous thrombosis/embolism and deep vein thrombosis are required within the order set. Pharmacological prophylaxis must be ordered or a reason noted for not ordering. Basic laboratory tests recommended for this patient population are defaulted in the order set. Additional lab and imaging tests are also available, including guidance on when to order. For

example, recommendations are included to consider an echocardiogram, if ejection fraction evaluation has not been performed in the last six months. Consult orders are defaulted for cardiac rehab and nutrition.

The patient is monitored against the established patient outcomes contained in the pathway for each day. Documentation to pathway outcomes is performed at a minimum of every 12 hours to establish if the patient is clinically stable and progressing toward discharge or clinically worsening.

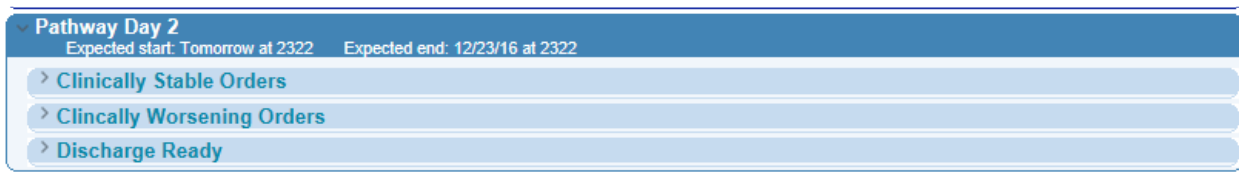
The stoplight functionality of the pathway outcome documentation alerts the care team that the patient is not meeting clinical outcomes as expected. A red light indicates that the patient is meeting less than 50% of expected goals and potentially clinically worsening (See Figure #13).

Figure #13- Pathway status alert functionality



Pathway orders are organized into sections to support management of the patient based upon clinical status: clinically stable, clinically worsening or discharge-ready (See Figure #14).

Figure #14- Pathway subsequent day orders



Authorization is built into the order to execute evidence-based adjustments within the scope of practice of the interdisciplinary team.

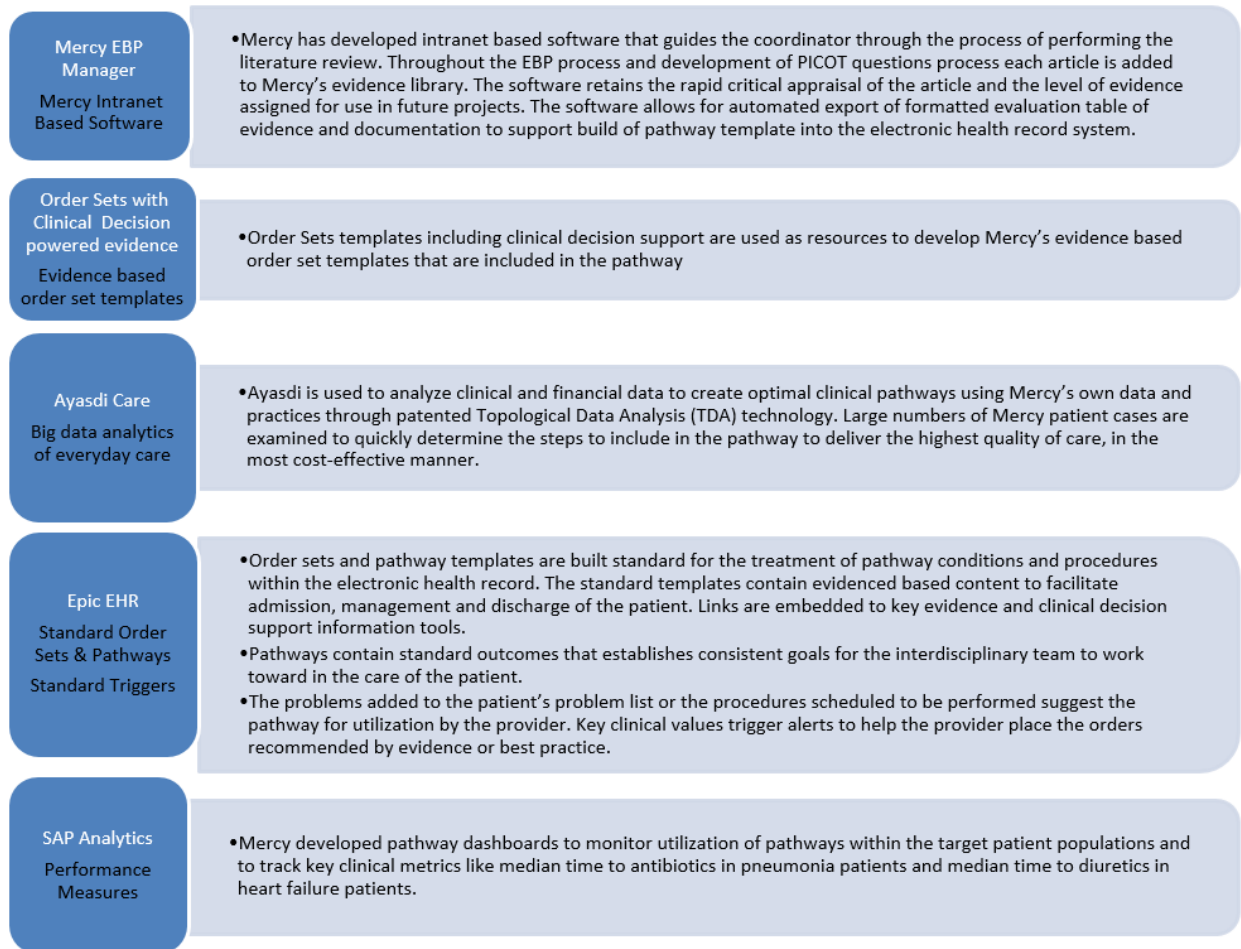
Clinicians and physicians assess and monitor pathway utilization and the outcomes of the whole population of patients on the pathway through the dashboard.

There is other technology utilized throughout the design and implementation process that is not depicted in the high level representation process (See Figure #15). The technology not

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mentioned in the high level process helps to drive the creation of the pathway and view of the dashboard.

Figure #15 - Represents all technology utilized

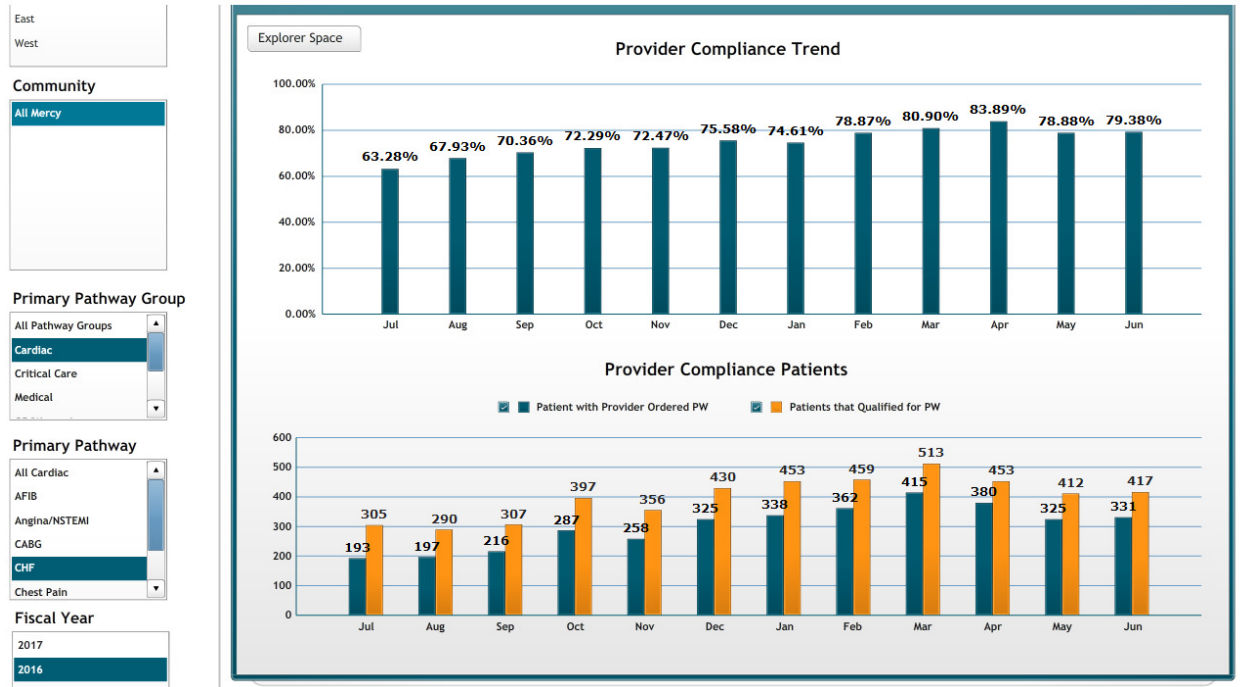


Mercy partnered with Ayasdi and used Topological Data Analysis (TDA) and machine intelligence to develop surgical pathways by inferring the steps needed to produce the best patient outcomes based upon Mercy's own data and practice within a given patient population. In addition, pathways previously developed could be immediately optimized through this process. For example, analysis of Mercy's data revealed that use of Pregabalin (trade name Lyrica), pre- and post-operatively decreased the use of opiates post-operatively, resulting in fewer complications from opiate medication, quicker recovery, and reduced length of stay.

Mercy developed dashboards to monitor utilization of pathways within the target patient populations, including heart failure and to track key clinical metrics for each pathway condition. The utilization reflects that the heart failure pathway was utilized on between 63%-83% of patients with heart failure during fiscal year 2016. This is consistent with the goal of use 60%-80%. (See Figure #16).

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Figure #16 – Representation of dashboard reflecting utilization of heart failure pathway



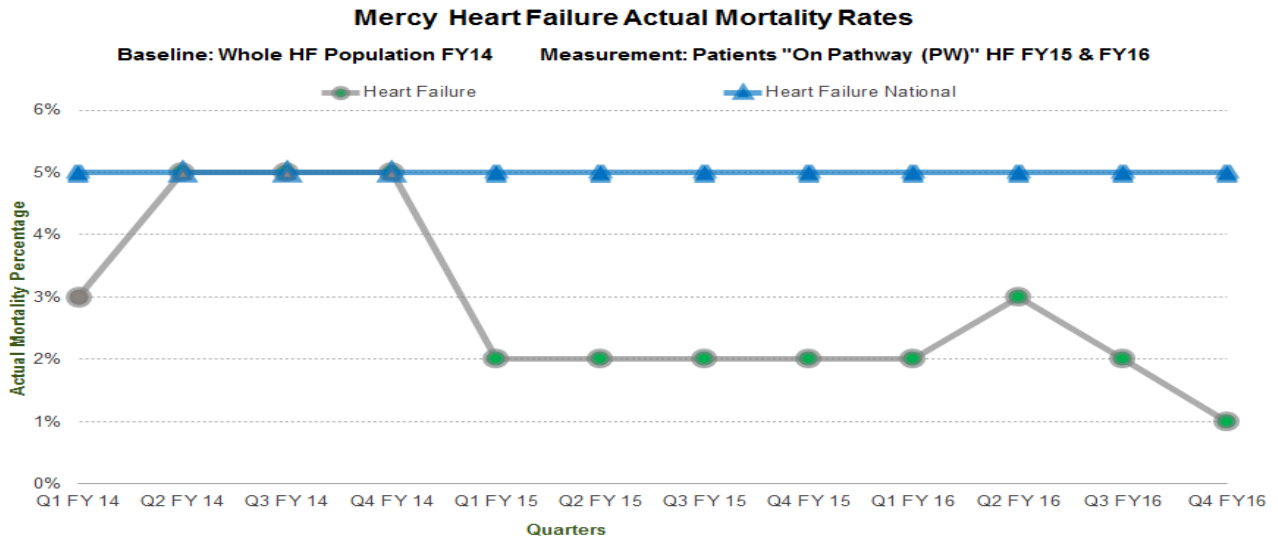
Compensation for administrative leaders and physicians is based upon utilization of pathways at the target rate of 60-80%. Pathway availability, utilization, and outcomes are considered in negotiation of payer contracts. Pathways are designed to help achieve quality and financial targets associated with bundled payment and Accountable Care Organization (ACO) programs.

Value Derived/Outcomes: Improved Mortality, Cost Reduction and Decreased Door-to-Antibiotic Time

The chart below illustrates the actual mortality rate of all patients treated for heart failure during the baseline period Fiscal Year 2014 (July 2013 through June 2014) and the actual mortality rate of the patients on the heart failure pathway after the full implementation of the pathway in July 2014, the beginning of Fiscal Year 2015. The heart failure pathway was piloted or trialed at local facilities prior to the full implementation in July 2014 but the full Mercy-wide implementation occurred in July 2014. The actual mortality rate is compared to the national average for heart failure per Healthgrades (See Figure #17).

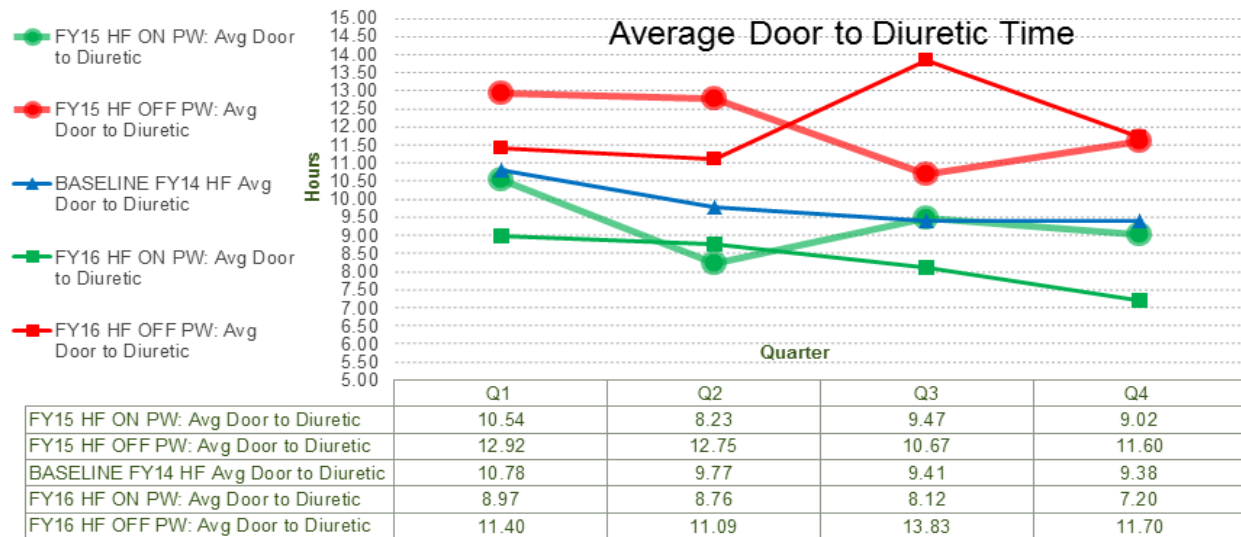
Mortality rate reflects inpatients discharged from Mercy acute care hospitals that meet DRG/ICD9/ICD10 criteria for heart failure, excluding SNF, Rehab, Residential Care, Swing, BH, Comfort Care and Organ Donor patients. Data was provided by Mercy Decision Support

Figure #17- Heart failure actual mortality rates



The door-to-diuretic time for patients on the pathway is approximately three hours less than patients that are not on the pathway. The door-to-diuretic time for patients on the pathway is approximately one hour less when compared to the baseline patient population (See Figure #18).

Figure #18- Average door to diuretic time



The cost reduction value associated with the heart failure pathway is discussed in the financial considerations section below.

Lessons Learned

- Establishing a primary focus of quality improvement in development and build of standard evidence-based pathways, combined with awareness of costs associated, aids in

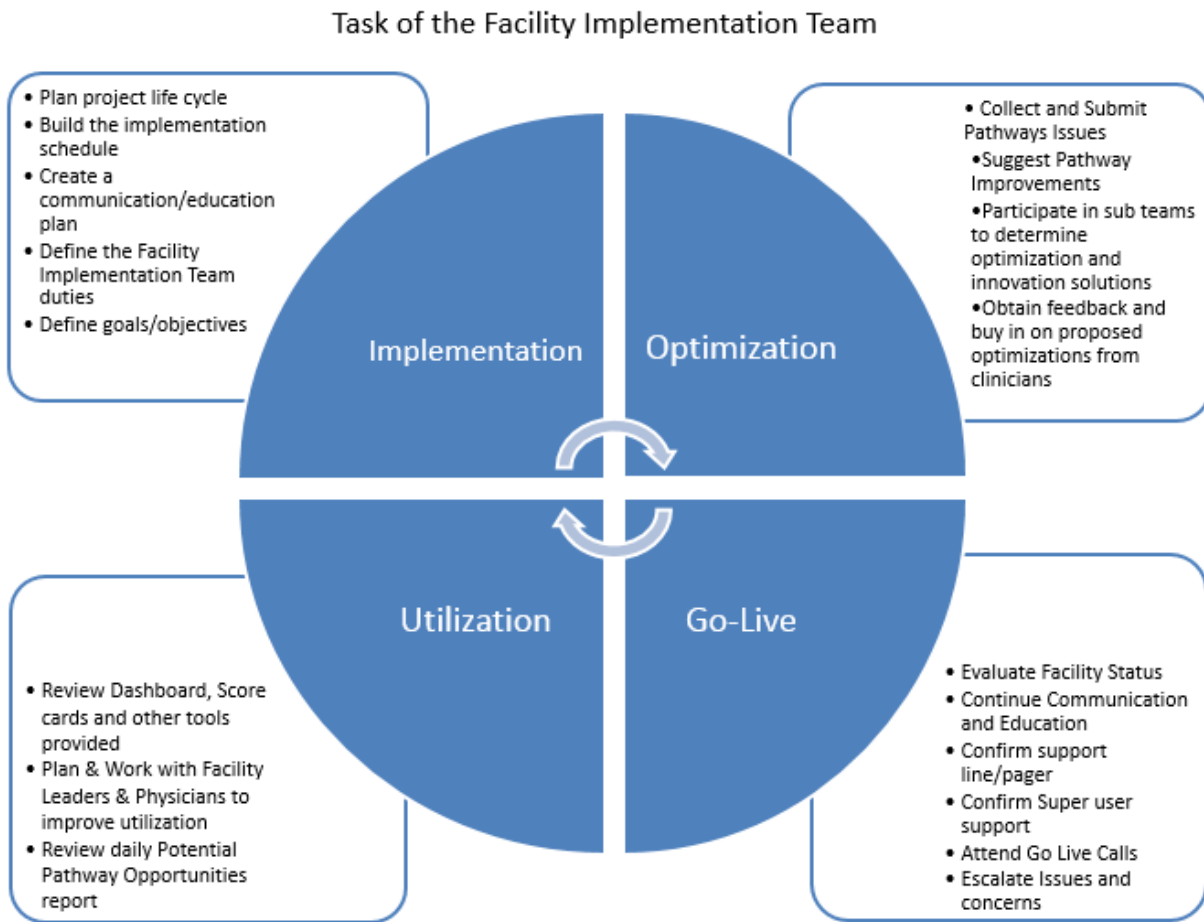
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- achieving the dual purpose of both improving quality of care and cost effectiveness.
- Beginning with the goal of developing a standard process provides a fertile environment to further optimize and improve upon the standard.
 - Objectives, reasons for pathway development or revision and the patient population criteria must be clearly identified.
 - It is important to assess baseline data and culture to determine “pain points” proactively.
 - Analysis of quality and cost data reporting using the dashboard helps direct attention to conditions and workflows that need additional attention for optimization.
 - Use of big data analytic tools, such as Ayasdi Care, allows for learning from everyday care by identifying current practices that are producing desired patient outcomes for incorporation into pathway development and assisting in evaluation of opportunities to optimize pathways in existence.
 - Establishing a governance structure that includes system-wide representation of physicians across specialties and the organization which provides the needed foundation to support design, build, implementation, maintenance and optimization of evidence based pathways.
 - The creditability of pathways developed and governed by formal physician specialty councils was much stronger than guidelines initially developed by adhoc pathway development teams.
 - Alignment of compensation and recognition with the desired behavior of using standard evidence-based pathways facilitates adoption of pathways. Utilization of pathways improved when physician compensation was tied to utilization compliance and outcomes.
 - The pathway development cycle must include maintenance and optimization. After a pathway has been implemented, the change control process allows for a two-week window to address any immediate maintenance issues. After the initial two-week window, we address issues as they are received. Requests are vetted, approved or rejected by the physician specialty council that is aligned to the pathway with consideration of recommendations from other clinical disciplines such as pharmacy, physical therapy or care management as appropriate. Pathways are reviewed every two years near the anniversary of their creation. The same disciplines are included in the review as the initial development. The timeframe for a review is typically less than a development. Reviews are also triggered when pathways are not meeting the desired quality or financial targets.
 - Developing a standardized implementation/support plan with the flexibility to account for facility-specific needs including change agents and champions is key to success (See Figure #19)
 - Developing formal communication and education plans/tools including a cascading structure and feedback loops is a very important step.
 - Pathway medication management
 - Previous versions of medication orders listed medications important in heart failure. The list of medication was by therapeutic class and in alphabetical order. Additionally, many choices were placed in alphabetical order within each section. This led to a workflow that did not follow clinical thought patterns. The lists were complete, yet not in logical clinical order for decision making.
 - Solutions:
 - Use the options within Epic to arrange medications in logical clinical decision making order; leading with the most important therapy while

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- patient is volume overloaded and using text to suggest optimal dosing strategies.
 - Collapse sections, yet leave them available for medications less likely to be needed during initial admission orders.
 - Within sections, organize medications using cost consideration and patient considerations for dosing (i.e. selecting therapy associated with high patient adherence, due to side effect profile, availability for coverage at low co-pay, and number of required doses per day).
- Sections within the initial admission order set were required to encourage use of medications that help reduce morbidity and mortality in heart failure patients. This is important to encourage, but not required on admission when the patient is likely suffering from instability and volume overload.
 - Solutions:
 - Move medications associated with morbidity and mortality reduction to the subsequent day orders of the pathway to allow the provider to select them when clinically appropriate. Organize the order of display by recommended order for initiation by the guidelines, and then further organize with cost and patient considerations in mind.
 - Eliminate requirement from the order to select something from each category of medication associated with morbidity and mortality reduction (i.e. beta blockers and ACEI/ARB). Move this to a best practice alert within the discharge navigator to remind the provider of important clinical recommendations for therapy. This limits the amount of times a provider has to respond to a hard stop or alert because, if the medication is clinically appropriate, in most cases the provider will have initiated therapy in house or before discharge when the provider can be reminded of the need to consider other treatment modalities.
- Having all medications repeated in alphabetical order on subsequent day pathway did not assist providers in easily ordering medications or keeping the focus on discharge planning. The list was cumbersome at best, and providers did not optimally use this set of orders.
 - Solutions:
 - Use technology to build categories such as clinically worsening, clinically stable, and ready for discharge helps get the needed medications for each phase of care and keeps the focus on preparing for a safe discharge in the most time efficient manner.
 - Use technology to have medication orders properly organized, which gets providers what they need at their fingertips for ease of order. The control we have of these lists ensures we are keeping the providers ordering cost-effective formulary agents.

Figure #19- Tasks of the Facility Implementation Team



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Financial Considerations

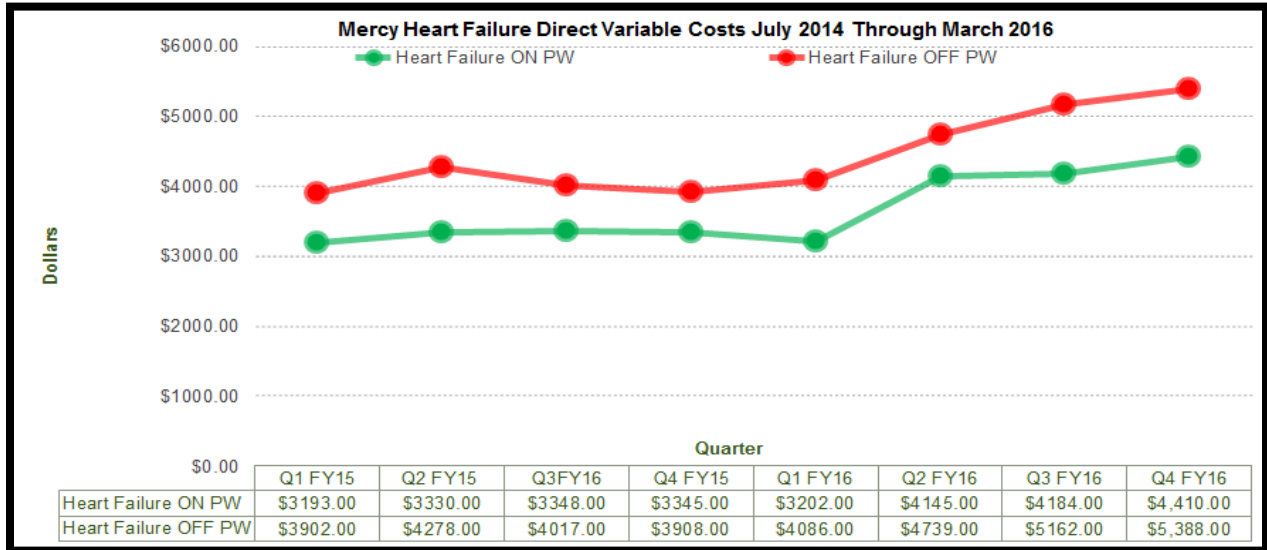
Financial Considerations include costs and savings for the entire Mercy pathways program consisting of approximately 40 pathways.

Cost-Benefits Analysis - Pathways Financial Consideration			
Costs			
	Year 2015	Year 2016	2 Year Total
Software (annual license) *Evidence Based Clinical Decision Support Tool - UpdateToDate (3rd Party Vendor) *Clinical Decision powered evidence -Order Sets *Epic EHR (Already in use by Mercy) *SAP Analytics (Already in use by Mercy)	\$ 550,000.00	\$ 550,000.00	\$ 1,100,000.00
Implementation *Software setup *Controls *Training fees	\$ -	\$ -	\$ -
On Going IT (support & maintenance) *IT support for initial server install *Monthly IT support *Consultants *Support & Updates - Software	\$ 42,416.00	\$ 21,890.00	\$ 64,306.00
Hardware *Computers *Network *Application integration *Database servers	\$ -	\$ -	\$ -
Human Resources *Consultants *Co-worker Salaries	\$ 1,000,000.00	\$ 988,439.00	\$ 1,988,439.00
Training (included in Operational Costs)			
Total Annual Costs	\$ 1,592,416.00	\$ 1,560,329.00	\$ 3,152,745.00
Benefits			
Direct Variable Cost Savings*	\$ 10,589,781.00	\$ 17,107,031.00	\$ 28,495,359.00
*Annualized Projections (Added estimate of the final quarter from above)			

Comparison of patients that were on the pathway to those that were not on the pathway for individual conditions reveal that direct variable cost per case is lower in most conditions and those with higher costs for patients on pathway reveal improvements in mortality reduction. The chart below illustrates the direct variable cost per case for patients with heart failure on pathway compared to patients off pathway starting with FY2015 when the pathways were fully implemented. Direct variable costs for patients treated on the heart failure pathway are on average approximately \$800 less per case than patients who are not treated on the heart failure pathway (See Figure #20).

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Figure #20- Heart failure direct variable costs July 2014 through March 2016



Direct variable cost data reflects inpatients discharged from Mercy acute care hospitals from July 1, 2014-June 30, 2015 for FY2015 and July 1, 2015- March 30, 2016 for FY2016 that meet DRG/ICD9/ICD10 criteria for the stated condition, excluding SNF, Rehab, Residential Care, Swing, BH, Comfort Care and Organ Donor patients. Data provided by Mercy Decision Support.

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