An Evidence-Based Care Process Model for Febrile Infants

Institution: University of Utah School of Medicine

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Description

We introduced a web-accessible evidence-based care process model (EB-CPM) for the care of the febrile infant in all Intermountain Healthcare facilities on January 1, 2008. The EB-CPM focused on six quality measures and was designed to decrease variation in the care of the febrile infant and to increase delivery of evidence-based care by pediatric and non-pediatric providers.

Goals & Objectives

The overall goal was to decrease variation in care and increase the evidence-based care delivered to febrile infants 1-90 days of age across all 22 Intermountain hospital facilities. The EB-CPM was designed by an interdisciplinary group representing all Intermountain facilities and included physicians, nurses, laboratory staff, and administrators. Evidence-based recommendations for care were provided. Provider performance of the six quality measures was captured during 2004-2009. Infant outcomes and costs were also analyzed.

- Objective 1: Perform complete blood count and urinalysis for all febrile infants.
- Objective 2: Document infant's risk for serious bacterial infection (SBI) based on history and laboratory testing.
- Objective 3: Perform viral diagnostic testing for all admitted febrile infants.
- Objective 4: Administer appropriate antibiotics to admitted febrile infants (four antibiotics were included).
- Objective 5: Discontinue antibiotics by 36 hours for infants who have negative bacterial cultures.
- Objective 6: Discharge admitted infants who do not have SBI by 42 hours.

Implementation

We accomplished this innovation using a quality team that included representatives from all facilities. We employed proven techniques like local champions and we addressed the unique needs of individual facilities. We made sure that the tools developed facilitated the process of caring for the febrile infant and that all facilities had the capacity to perform the high-quality care recommended. This involved teaching new skills to hospital personnel at some facilities, for example performance of catheterized urine collection in young infants.

We collaborated through the Pediatric Clinical Program at Intermountain Healthcare. We also worked with the Utah chapter of the American Academy of Pediatrics and the American Board of Pediatrics in order to allow physicians to use the EB-CPM for maintenance of certification.
The NIH supported this work through a K24 career development grant to Dr. Byington and the AHRQ supported this work. Our strategies to engage parents were based on previous work and addressed the major concerns parents had regarding the febrile infant evaluation. These concerns were related to excessive length of stay, which we were able to decrease with the EB-CPM and fears in 1/3 of parents that their infant would die during the hospital stay.

We developed parent education material in English and Spanish to better explain why the evaluation for fever was needed, what to expect, and the overall expectation that the infant would recover. We engaged clinicians by providing data at institution, practice, and individual level.

Practicing physicians contributed to the EB-CPM through their questions. We were able to write more explicit recommendations and were able to answer many physician questions with data from their own practice or from Intermountain as a whole.

**Evaluation & Measurement**

We used the electronic data warehouse to capture data for all quality measures. We collected baseline data from all facilities prior to implementation of the EB-CPM (2004-2007) and then captured data monthly following implementation. The measures of success included the 6 quality measures and a set of balancing measures to evaluate unintended consequences. In addition, we measured cost.

**Results**

The EB-CPM for the care of the febrile infant has transformed the care delivered in all Intermountain facilities and has improved the outcomes of these vulnerable infants. In addition, while providing better care and improving outcomes, the cost for caring for febrile infants has been substantially decreased. We made significant improvements (p < 0.001) in all of the quality indicators of evidence-based care. Further, the changes were seen across all facilities and resulted in the care delivered at all Intermountain facilities being exceptional and the care at community hospitals was identical to the care delivered by pediatric specialists at the children's hospital. Examples of improved infant outcomes included, increasing the proportion of infants identified with urinary tract infection from 7% to 9% (+29%) and increasing proportion of infants diagnosed with viral illness from 25% to 36% (+40%). Both of these resulted in more appropriate care for infants. Infants who were low risk for SBI were less likely to be treated with antibiotics following implementation of the EB-CPM (91% vs 85% for admitted infants and 43% vs 34% for infants managed as outpatients, p < 0.001 for both).

The mean hospital length of stay for admitted infants was reduced from 60 hours to 44 hours (-27%), saving over 1600 hospital days across the system. The cost for caring for febrile infants was reduced substantially across the system (p < 0.001) and it cost less to care for febrile infants in 2009 compared with 2004. The savings per year was estimated to be $1.9 million. Improvements have been sustained or increased through 2011.

We learned many lessons during the design and implementation of the EB-CPM. The composition of the team was critical and all aspects of the care process had to be evaluated in order to make these improvements. For example, Intermountain facilities are spread across a vast geographic area and all share a central laboratory located in Salt Lake City. Optimizing the transport of specimens via a courier system was one unexpected outcome of the process that proved vital for improving the provider's ability to make decisions regarding length of antibiotic administration and hospital stay. Another creative approach involved providing physicians the opportunity to use the EB-CPM to meet their requirements for part 4 of maintenance of certification (MOC) as outlined by the American Board of Pediatrics.

**Integration of research and education**

This program takes advantage of the collaborative relationship between the University of Utah Department of Pediatrics and Intermountain Healthcare. The Department contributes research expertise and an ability to obtain extramural funding for quality improvement. Intermountain is able to contribute large patient volumes, exceptional electronic records, and a diverse group of physicians who have an interest in quality improvement and an understanding of real life care delivery. The EB-CPM has been used to educate residents and fellows in pediatrics, family medicine, emergency medicine, infectious diseases, and hospital medicine through the University training programs, the community of general providers through CME, and pediatricians participating in MOC.