

PROGRAM BRIEF

Child Health Research: Identifying Quality Problems and Improving Care

The mission of AHRQ is to improve the quality, safety, efficiency, and effectiveness of health care by:

- Using evidence to improve health care.
- Improving health care outcomes through research.
- Transforming research into practice.

The mission of the Agency for Healthcare Research and Quality is to improve the safety, quality, efficiency, and effectiveness of health care for all Americans, including children. Finding ways to measure and improve care for the Nation's 73 million children and adolescents is a continuing priority for AHRQ.

This program brief summarizes recent findings (2009 through mid 2013) from selected AHRQ-supported projects focused on improving health care for children and adolescents.

An asterisk (*) following a summary indicates that reprints of an intramural study or copies of other publications are available from AHRQ. Ordering information appears on the last page of this program brief, as well as contacts for more information about AHRQ's research programs and funding opportunities. Visit AHRQ's Web site at www.ahrq.gov and click on "Children" to find updates on child health initiatives at AHRQ and information about current projects.

Look inside for:

Identifying Health Care Quality Problems

| | |
|--|----|
| Measuring Quality of Care | 2 |
| Infectious Disease | 2 |
| Mental and Behavioral Health | 3 |
| Emergency Care | 5 |
| Chronic Illness | 5 |
| Inpatient Care | 6 |
| Patient Safety | 8 |
| Access to Care | 10 |

Improving Health Care Quality for Children and Adolescents

| | |
|---|----|
| Preventive Care | 11 |
| Clinical Guidelines/ Recommendations | 11 |
| Interventions | 13 |
| Care Management | 15 |
| Practice Organization | 15 |
| Health IT | 16 |
| Tools/Models | 17 |





Identifying Health Care Quality Problems

Measuring Quality of Care

- *Some modifications would improve national pediatric quality of care measures.*

Applying clinically relevant changes to national pediatric quality measures and gathering data from electronic medical records (EMRs) would improve the accuracy of estimates of services provided to children, according to this study. The researchers identified selected pediatric quality measures developed to meet the mandate of the Children's Health Insurance Program Reauthorization Act of 2009 (CHIPRA), including measures of well-child visits, early childhood and adolescent immunizations, and recording of body mass index (BMI). They found that extending the time period and/or age specified in a recommendation increased compliance for most of the measures. Casciato, Angier, Milano, et al., *J Am Board Fam Med* 25(5):686-693, 2012 (AHRQ grant HS18569).

- *Commentary discusses improving care quality and outcomes for children.*

The authors discuss the role and impact of the Children's Health Insurance Program Reauthorization Act (CHIPRA) on overcoming what they call the "translational block," which is the disconnect between sufficient knowledge of clinical effectiveness and delivery of effective services at the patient's bedside. They describe CHIPRA's contributions to improving health care quality and stress the need for more emphasis on expanding clinical research on children's health topics. Dougherty and Clancy, *Acad Pediatr* 11(3S):S91-S93, 2011 (AHRQ Publication No. 11-R047).^{*} See also Mangione-Smith, Schiff, and

Dougherty, *Acad Pediatr* 11(3S):S11-S21, 2011 (AHRQ Publication No. 11-R046)^{*} (Intramural).

- *Measuring quality of care for middle ear infection can be problematic.*

Using data from multiple pediatric practices to measure the quality of care for painful inner ear infections (otitis media with effusion [OME]) reveals a number of problems that may require changes in the quality measures themselves or in how they are calculated, according to this study. Data from 19 practices in 10 States revealed suboptimal average percentages for proper diagnosis of youngsters seen for possible OME, as well as high average percentages of inappropriate use of three classes of medications to treat OME: antihistamines/decongestants, antibiotics, and systemic corticosteroids. Lannon, Peterson, and Goudie, *Pediatrics* 127(6):e1490-e1497, 2011 (AHRQ HS16957).

Infectious Disease

- *Recommendations are needed to simplify management of young, febrile infants.*

The risk of serious bacterial infection (SBI) in the immediate neonatal period and during the first few months of life is increased in preterm infants. Infants less than 60 days of age continue to have the highest risk of SBI and pose a challenge to practitioners about how extensive their evaluation should be in a non-toxic-appearing child. Jhaveri, Byington, Klein, and Shapiro, *J Pediatr* 159(2):181-186, 2011 (AHRQ HS18034).

- *Study documents rise in Clostridium difficile infection rate among hospitalized children.*

The number of cases of *Clostridium difficile* infection (CDI) among hospitalized U.S. children more than doubled over the 10-year period 1997 to 2006, according to this study. CDI can

cause severe diarrhea, inflammation of the colon, bowel perforation, and even death. Children with CDI had a 20 percent greater risk of death and a 36 percent higher risk of surgery to remove all or part of the colon, and they were twice as likely to have higher hospital costs and four times as likely to have an extended hospital stay as children without CDI. Nylund, Goudie, Garza, et al., *Arch Pediatr Adolesc Med* 165(5):451-457, 2011 (AHRQ HS16957).

- *Researchers examine MRSA screening in pediatric intensive care units.*

Although the nostrils have been considered the primary site of *Staphylococcus aureus* colonization, recent studies indicate that pharyngeal carriage may be equally or more common. The researchers examined the prevalence of pharyngeal carriage for methicillin-susceptible and methicillin-resistant *S. aureus* (MSSA and MRSA, respectively) and compared the sensitivities of pharyngeal and nasal screening among children admitted to a hospital intensive unit. Of 122 children who were carriers of MSSA and/or MRSA, 113 were pharyngeal carriers, and 45 were colonized in the pharynx alone. The sensitivity of pharyngeal screening for MSSA and MRSA was 92.6 percent, compared to 63.1 percent for nasal screening. Makamura, McAdam, Sandora, et al., *J Clin Microbiol* 48(8):2957-2959, 2010 (AHRQ T32 HS00063).

- *Use of rotavirus vaccine led to a substantial reduction in acute gastroenteritis hospitalizations among U.S. children.*

Researchers compared hospitalizations for acute gastroenteritis before (2000-2006) and after (2007-2008) introduction of the rotavirus vaccine, which was recommended in 2006 for the routine vaccination of all infants in

the United States. In 2007, there was a 16 percent decrease in hospitalizations for acute gastroenteritis and, in 2008, a 45 percent decrease, compared with the prevaccine period. Curns, Steiner, Barrett, et al., *J Infect Dis* 201(11):1617-1624, 2010 (Intramural).

- *Prior to 2006, rotavirus was implicated in one-fourth of diarrhea-related ER visits for young children.*

Researchers examined the number of emergency department (ED) and clinic visits for diarrhea-related illness in children younger than age 5 and found that the rate of outpatient visits and ED visits remained essentially stable over 1995-1996 and 2003-2004. Black children with diarrhea-related illnesses were more likely than white children to be seen in the ER, even when both groups had insurance. These data will help determine the impact of the rotavirus vaccine introduced in 2006 on reducing diarrhea-related clinic and ED visits, note the researchers. Pont, Grijalva, Griffin, et al., *J Pediatr* 155(1):56-61, 2009 (AHRQ grant HS13833).

- *Blood cultures taken from children show drug resistance to a class of antibiotics usually used for adults.*

Children usually are not given the broad-spectrum antibiotics called fluoroquinolones because they cause joint toxicity. Nevertheless, two common bacteria—*Escherichia coli* and *Klebsiella*—showed fluoroquinolone resistance in 217 blood cultures taken from children at the Children's Hospital of Philadelphia. Eight of the cultures (2.9 percent) were resistant to two common fluoroquinolones, ciprofloxacin and levofloxacin. These drugs are commonly used in adults, and ciprofloxacin was recently approved for children to treat inhalation anthrax and problematic urinary tract infections. Kim, Lautenbach, Chu, et al., *Am J*

Infect Control 36(1):70-73, 2008 (AHRQ grant HS10399).

Mental and Behavioral Health

- *Review compares safety and effectiveness of antipsychotic medications for children and young adults.*

This is the first comprehensive review comparing effectiveness and safety across the range of antipsychotics for children and young adults. The researchers found that evidence on the comparative benefits and harms of antipsychotics within and across classes is limited, and that some second-generation antipsychotics have a better profile than others. *First- and Second-Generation Antipsychotics for Children and Young Adults*, Comparative Effectiveness Review No. 39 (AHRQ Publication No. 11(12)-EHC077-1); 2012. Available at <http://go.usa.gov/j5ZB>. See also Seida, Schouten, Boylan, et al., *Pediatrics* 129(3):e771-e784, 2012 (AHRQ contract 290-07-10021).

- *Researchers call for a reevaluation of clinical practice patterns related to antipsychotic use in children and adolescents.*

This study found that antipsychotic prescriptions for children aged 13 or younger grew more than seven-fold and more than quadrupled among adolescents aged 14-20 over the two study periods (1993-1998 and 2005-2009). Only a small proportion of these prescriptions were for a Food and Drug Administration (FDA) clinical indication; the most common diagnosis was disruptive behavior disorder. Olfson, Blanco, Liu, et al., *Arch Gen Psychiatry* 69:1247-1256, 2012 (AHRQ HS21112). See also Olfson, Crystal, Huang, et al., *J Am Acad Child Adolesc Psychiatry* 49(1):13-23, 2010 (AHRQ HS16097).

- *Use of antipsychotic medications may contribute to diabetes in children.*

This study found that children using second-generation antipsychotics (SGAs) had a higher incidence of diabetes than children who were not using any psychotropic medications, but there was no significant difference in the incidence of diabetes between children using SGAs and those using antidepressants. The researchers analyzed data on 700,000 youths aged 5-18; over 9,000 of these youths began therapy with SGAs between 2001 and 2008. There was a four-fold increase in the rate of diabetes among children within the first year of SGA therapy compared with children who were not using any psychotropic medications. Andrade, Lo, Roblin, et al, *Pediatrics* 128:1135-1141, 2011 (AHRQ grant HS16955).

- *Prescribing of antidepressants for pediatric patients is often done off-label.*

This analysis of data from the National Ambulatory Medical Care Survey from 2000 to 2006 found that visits to pediatricians were 2.4 times as likely to be associated with off-label antidepressant orders as visits to pediatric psychiatrists. The researchers suggest that the lack of available FDA-approved antidepressant drugs for the pediatric population may account for much of this off-label prescribing. Lee, Teschemaker, Johann-Liang, et al., *Pharmacoepidemiol Drug Saf* 21(2):137-144, 2012 (AHRQ HS11673). See also Chen and Toh, *Psychiatr Serv* 62(7):727-733, 2011 (AHRQ HS19024).

- *Clinician and patient resources describe ADHD treatment options.*

Patient and clinician summaries evaluating the effectiveness of drug and behavioral treatments for attention

deficit/hyperactivity disorder (ADHD) are now available from AHRQ's Effective Health Care Program. The patient summary and clinician summary are accompanied by a continuing medical education/continuing education activity and faculty slide set to further assist clinicians, researchers, and other health professionals in decisionmaking. To access the summaries and other materials that explore the effectiveness and risks of treatment options for ADHD and other conditions, visit AHRQ's Effective Health Care Program Web site at

www.effectivehealthcare.ahrq.gov (AHRQ contract 290-02-0020).

- *ADHD medications don't increase serious heart risks in children or young adults.*

According to a study from AHRQ's Effective Health Care Program, medications used to treat attention-deficit/hyperactivity disorder (ADHD) are not linked to increased risk of heart attack or other serious cardiovascular problems in children. The study used data from more than 1.2 million children and young adults aged 2 to 24. Cooper, Habel, Sox, et al., *N Engl J Med* 365(20):1896-1904, 2011 (AHRQ contracts 290-2005-0033 and 290-2005-0042). See also Zuvekas and Vitiello, *Am J Psychiatry* 169(2):160-166, 2012 (AHRQ Publication No. 12-R015)* (Intramural).

- *Repeated exposure to general anesthesia before age 2 increases risk for developing ADHD.*

Researchers examined the effects of exposure to general anesthesia before age 2 and found that children who are repeatedly exposed to general anesthesia before their second birthday are at increased risk for later development of attention deficit/hyperactivity disorder (ADHD). Sprung, Flick, Katusic, et al.,

Mayo Clin Proc 87(2):120-129, 2012 (AHRQ HS19745).

- *Evidence is lacking on the best approaches to treat autism in teens and young adults.*

A recent research review focused on the comparative effectiveness of behavioral, educational, vocational, adaptive/life skill, and medical interventions for individuals with autism spectrum disorders (ASD) found that despite the growing numbers of young people affected by ASD, there is insufficient evidence available to help caregivers choose the best therapies for this group. Most of the available studies had low strength of evidence, addressed different interventions and outcomes, and lacked replication, making it challenging to draw comparisons across therapies. See *Interventions for Adolescents and Young Adults with Autism Spectrum Disorders*, Comparative Effectiveness Review No. 65 (AHRQ Publication No. 12-EHC063-1); 2012. Available at <http://go.usa.gov/j5ZQ>.

- *More emphasis is needed on screening and counseling of overweight adolescents.*

Researchers studied obesity counseling among 6,911 adolescent girls and 6,970 boys aged 11 to 17 years; 17 percent of the boys were overweight, and 17 percent were obese. Among girls, 14 percent were overweight, and 11 percent were obese. All adolescents reported having at least one visit with a health care provider during the preceding year. Obese boys and girls were much more likely than those who were overweight to receive counseling on diet and exercise from pediatric health professionals. Liang, Meyerhoefer, and Wang, *Pediatrics* 139(1):67-77, 2012 (AHRQ Publication No. 12-R096)* (Intramural).

- *Only one-third of adolescents are screened for emotional health during routine physicals.*

Even though most mental health problems begin in adolescence, only about one-third of youths aged 13 to 17 represented in this study reported discussing their emotional health during well-care visits with their primary care providers. The researchers assessed providers' rates of screening for emotional distress among a clinic-based sample (1,089) and a population-based sample (899) of adolescents. In both groups, significantly higher screening rates were reported by females. Ozer, Zahnd, Adams, et al., *J Adolesc Health* 44:520-527, 2009 (AHRQ grant HS11095).

Emergency Care

- *Evidence lacking on the risks and benefits of anticoagulant use in young trauma patients.*

Children and adolescents who are hospitalized for major trauma are often treated with low-molecular-weight heparin (LMWH), an anticoagulant, to prevent blood clots in veins, yet scientific evidence supporting the use of LMWH is lacking for children and adolescents. The researchers used trauma registry data to describe the number and characteristics of pediatric trauma patients treated at two pediatric and two adult trauma centers during 2007. Among 706 youngsters treated with LMWH, the most common injuries were lower extremity fractures and head injuries. A total of 2.1 percent of patients (all at least 15 years of age) developed blood clots despite LMWH treatment. O'Brien, Klima, Gaines, et al., *J Trauma Nurs* 19(2):117-121, 2012 (AHRQ grant HS17344).

- *ED crowding affects quality of care for pediatric patients.*

For the first time, researchers examined the association between emergency

department (ED) crowding measures with quality of emergency care for children. They found that ED crowding is associated with decreased quality of care for children, key crowding factors are global, and crowding is multifactorial and cannot be mitigated simply by ED providers working harder. Sills, Fairclough, Ranade, et al., *Pediatr Emerg Care* 27(9):837-845, 2011. See also Sills, Fairclough, Ranade, and Kahn, *Ann Emerg Med* 57(3):191-200, 2011 (AHRQ grant HS16418).

Chronic Illness

- *Consensus is lacking on the efficacy and safety of feeding and nutrition interventions for adolescents with cerebral palsy.*

Cerebral palsy (CP) is the most common cause of motor disability in children, and those with the condition often have feeding and swallowing problems that can lead to a variety of complications. According to a recent AHRQ review, consensus is lacking on the efficacy, safety, and applicability of feeding interventions for children with CP. Multiple interventions are often used in combination—such as tube feeding, oral stimulation, caregiver training, and surgical intervention—making it difficult to know the individual effects of each intervention. *Interventions for Feeding and Nutrition in Cerebral Palsy*, Comparative Effectiveness Review No. 94; March 2013 (AHRQ Publication 13-EHC015-EF); available at <http://go.usa.gov/TKqk> (AHRQ contract 290-2007-10065-1).

- *Study documents difficulties in moving adolescents with sickle cell disease from pediatric to adult care providers.*

Researchers surveyed 30 large pediatric sickle cell disease (SCD) clinics to examine issues around transition of adolescents with SCD to adult care. Discussion of transition with the patient began at an average age of 15.7 years,

with transition taking place at a mean age of 19.6 years. One pediatric center continues to see adult patients because the area lacks an adult-care provider able to care for SCD patients. A third of the centers allow patients to stay in pediatric care past the deadline for certain reasons, such as cognitive/developmental delay, time to complete a transition program or attain high school graduation, or while an adult provider is located. Only 60 percent of the pediatric clinics transferred their patients to an adult-care hematologist specializing in SCD. Sobota, Neufeld, Sprinz, et al., *Am J Hematol* 86(6):512-515, 2011 (AHRQ T32 HS00063).

- *Primary care doctors often don't know that a child has received ER care for asthma.*

Researchers reviewed medical records of 350 children who regularly received care at community health centers but ended up in an emergency department (ED) after experiencing an asthma flareup. Nearly 63 percent of patient records at the community health center contained faxed discharge summaries or a note from the ED provider, but the remaining 37 percent had no mention of the child's ED visit. Also, almost two-thirds of patients did not follow up with their usual provider after an asthma-related ED visit. Hsiao and Shiffman, *Jt Comm J Qual Patient Saf* 35(9):467-474, 2009 (AHRQ grant HS15420).

- *Poor asthma control is linked to family and insurance factors.*

Researchers surveyed parents of 362 children about asthma-related impairment and the number of asthma exacerbations in a 1-year period. Based on parental reports, 76 percent of children took daily controller medications, yet asthma was well controlled for only 24 percent of children, partially controlled for 20 percent, and poorly controlled for 56

percent. Medicaid insurance, presence of another family member with asthma, and maternal employment outside the home were associated with poor asthma control. Bloomberg, Banister, Sterkel, et al., *Pediatrics* 123(3):829-835, 2009 (AHRQ HS15378).

- *Study finds link between differences in health care coverage and higher readmission rates for pediatric asthma.*

This study used Rhode Island hospital discharge data from 2001 to 2005 to identify 2,919 children at the time of their first asthma hospitalization. During the study period, 15 percent of those children were readmitted to the hospital for asthma. Factors such as crowded housing conditions, proportion of minority residents in a neighborhood, and poverty did not affect rehospitalization rates. However, children insured by Medicaid at the time of their initial admission had readmission rates that were 33 percent higher than those of children with private insurance. Liu, *Public Health Rep* 124:65-78, 2009 (AHRQ cooperative agreement with CDC).

- *Hospitals vary widely in use of corticosteroids to treat acute chest syndrome in children with sickle cell disease.*

Researchers reviewed records on more than 5,200 hospital admissions for acute chest syndrome (ACS) at 32 pediatric hospitals in the United States. ACS is a frequent cause of sickness and death in patients with sickle cell disease, and corticosteroids are used to fight inflammation in children with ACS and sickle cell disease. The researchers found that use of these drugs varied dramatically between hospitals, ranging from 10 to 86 percent for all patients with ACS and 18 to 92 percent for those who had both ACS and asthma. Sobota, Graham, Heeney, et al., *Am J Hematol* 85(1):24-28, 2010 (AHRQ grant T32 HS00063).

Inpatient Care

- *Heart block in children after cardiac surgery increases hospital stay and total costs.*

Using data from the Kids' Inpatient Database, which was developed by AHRQ to analyze inpatient stays by children up to age 20, researchers identified children aged 24 months of age or younger who underwent surgery to repair congenital heart defects and experienced a postoperative complete heart block, as well as those who required placement of a pacemaker. Over the 10-year period studied, 16,105 children underwent heart surgery, and up to 7.7 percent developed heart block. Pacemakers were required for up to 2.3 percent of patients before discharge. The researchers found that development of heart block increases a child's length of hospital stay and total costs, and that there has been little change over time in the frequency of heart block following surgery. Anderson, Czossek, Knilians, et al., *J Cardiovasc Electrophysiol* 23(12):1349-1354, 2012 (AHRQ HS16957).

- *Pediatric cardiology centers vary in treatment of infants with single-ventricle congenital heart disease.*

Pediatric cardiology centers vary greatly in their initial treatment of infants and newborns with single-ventricle congenital heart defects (CHD), such as hypoplastic left heart syndrome, according to three AHRQ-supported studies. This variability makes the initial treatment of these congenital heart problems—in which the infant is missing the left ventricle—a clear target for quality improvement efforts, note the researchers. They drew on data for the first 100 infants enrolled in a registry through 21 participating centers. Three-quarters of the infants had received a prenatal diagnosis of their heart condition. The three studies are

reported in the March 2011 issue of *Congenital Heart Disease*. See Brown, Connor, Pigula, et al., 6(2):108-115; Baker-Smith, Neish, Klitzner, et al., 6(2):116-127; and Schidlow, Anderson, Klitzner, et al., 6(2):98-107 (AHRQ HS16957).

- *Certain factors increase risk of medication errors in the neonatal ICU.*

According to this study, medication errors are significantly more likely to take place in a neonatal intensive care unit (NICU) than in an adult care setting in the hospital, and human factors are behind most of these mistakes. Indeed, half of the medication errors in the NICU were the result of mistakes during drug administration. They examined more than 6,700 reports of medication errors in the NICU from 163 health care facilities. Overall, 72 percent of errors that reached the patient did not result in harm, while 4 percent of actual errors resulted in permanent harm or death. Stavroudis, Shore, Morlock, et al., *J Perinatol* 30:459-468, 2010 (AHRQ HS16774).

- *Transitions from neonatal ICUs to ambulatory care can be risky.*

Over 20,000 newborn babies make the risky transition from the neonatal intensive care unit (NICU) to home each year in the United States, often to the care of never-before-seen primary care physicians. These researchers examined the use of health care failure mode and effects analysis (HFMEA) to assess the risks associated with this care transition and prepared a qualitative evaluation of the HFMEA process. They identified the main processes and possible errors involved in the discharge of high-risk infants and found 40 high-risk failure modes and 75 associated high-risk causes. They concluded that while HFMEA holds promise for improving patient safety during care

transitions, the value of applying this tool to transitions from the NICU needs further study. Moyer, Singh, Finkel, et al., *Qual Saf Health Care* 19:i26-i30, 2010 (AHRQ HS17122).

- *Safety warnings did not reduce use of propofol for conscious sedation in children.*

Despite an early 2001 cautionary change in the drug's label and a letter to physicians from the manufacturer, the use of the anesthetic propofol for moderate conscious sedation (MCS) increased three-fold from 2001 to 2007 in hospitalized pediatric patients. In 2001, the label for propofol was changed to describe increased mortality with its use in a clinical trial involving pediatric intensive care unit patients. Soon after, the manufacturer sent a warning letter to physicians noting that propofol is currently not approved for sedation in pediatric ICU patients in the United States. Even after these warnings, propofol use for MCS dropped from 12 percent in 2001 to 9 percent in 2003 but then rose to 33 percent by the end of 2007. Heaton, Schuchter, Lannon, et al., *Clin Ther* 33(7):886-895, 2011 (AHRQ grant HS16957).

- *Hospitalized children often receive multiple medications, raising potential safety concerns.*

Researchers examined pediatric drug use at 411 general hospitals and 52 children's hospitals, representing one-fifth of all pediatric hospitalizations across the United States. The most common generic drugs and therapeutic agents being prescribed to children included IV fluids, pain relievers, anti-infective agents, and anesthetic agents. On the first inpatient day in a children's hospital, patients younger than 1 year at the 90th percentile of daily exposure to distinct medications received 11 drugs, and patients aged 1 or older received 13 drugs (8 and 12 drugs, respectively, at

general hospitals). By the 7th hospital day, the numbers had risen to 29 drugs for those younger than age 1 and 35 for those aged 1 or older in pediatric hospitals (22 and 28, respectively, in general hospitals). Feudtner, Dai, Hexem, et al., *Arch Pediatr* 166(10):9-16, 2012 (AHRQ HS17991). See also Lasky, Ernst, Greenspan, et al., *Pharmacoepidemiol Drug Saf* 20(1):76-82, 2011 (AHRQ grant HS17998) and Long, Horvath, Cozart, et al., *Qual Saf Health Care* 19(5):e40, 2010 (AHRQ HS14882).

- *Using tacrolimus and nicardipine may result in significant drug-drug interactions for some pediatric transplant patients.*

Patients who receive a kidney transplant usually receive the drug tacrolimus to reduce immune system activity and lower rejection risk. Children who receive a kidney transplant may experience acute high blood pressure, and physicians may prescribe intravenous nicardipine, an antihypertensive medication, to control it. According to this analysis of data from 42 pediatric hospitals, children receiving both tacrolimus and nicardipine had a rate of adverse events of immunosuppression of just over 7 percent, compared with 3 percent for those not receiving intravenous nicardipine. Hooper, Carle, Schuchter, and Goebel *Pediatr Transplant* 15:88-95, 2011 (AHRQ HS16957).

- *Study finds underuse of pain medication in children undergoing surgery for bladder reflux.*

Ketorolac, a pain medication given to children following surgery for vesicoureteral reflux (VUR), is underused, according to this study. Only 52 percent of 12,239 children operated on for VUR received ketorolac during their hospital stay between 2003 and 2008. Compared with children who did not receive ketorolac, those

receiving the drug had a shorter length of stay (2 vs. 3 days), decreased median hospital costs (\$14,223 vs. \$16,382), and similar complication rates (4 percent vs. 3 percent). Routh, Graham, and Nelson, *Urology* 76(1):9-13, 2010 (AHRQ T32 HS00063).

- *Hospital readmission rates may not be a useful quality of care marker for children with sickle cell disease.*

This study found that 17 percent of hospitalizations for children with sickle cell crisis result in readmission within 30 days, as well as substantial variation in pediatric sickle cell readmissions among the 33 hospitals included in the study. Older children, those treated with corticosteroids, and children hospitalized for pain were more likely to be readmitted within 30 days, while patients with a red blood cell transfusion were less likely to be readmitted. After adjusting for case mix and patient clustering, almost all hospitals had a significant drop in sickle cell readmission rates. This means that a small number of patients accounted for a disproportionate number of admissions, and that crude readmission rates do not account for those patients who need a substantial amount of inpatient and outpatient services. Sobota, Graham, Neufeld, and Heeney, *Pediatr Blood Cancer* 58:61-65, 2012 (AHRQ T32 HS00063).

- *Certain signals may predict neurological impairment in newborns.*

Researchers compared 36 malpractice cases in which infants were born with birth-related neurological injuries after exhibiting certain fetal heart rate (FHR) patterns, such as very rapid or very slow heart rates, with the medical records of infants who also had these FHR patterns during labor but were not born with neurological problems. They found an increased risk for neurological problems among infants exhibiting non-reassuring FHR patterns if their

mothers experienced vaginal bleeding in the antenatal period, there was a longer first stage of labor, or there was minimal heart rate variation during the first stage of labor. Kesselheim, November, Lifford, et al., *J Eval Clin Pract* 16(3):476-483, 2010 (AHRQ HS11886).

- *Study shows room for improvement in use of surfactant therapy to prevent respiratory distress syndrome in premature infants.*

Surfactant therapy prevents the development of respiratory distress syndrome (RDS) in many premature infants and shortens the course of RDS in others. This retrospective study sought to assess concordance with a locally developed (New York City) standard of care for premature infants with RDS; the standard recommends treatment within 2 hours of birth. The subjects were 773 infants weighing less than 3 pounds 13 ounces born in one of three New York City hospitals between 1999 and 2002; 227 of the infants showed signs of RDS. At the 2-hour time point, 37 percent of infants had received surfactant; at 4 hours, 70 percent of infants showing signs of RDS had received treatment. Overall, 85 percent of white infants, 67 percent of Latino infants, and 61 percent of black infants received surfactant, indicating a large opportunity to reduce infant mortality from RDS and also to reduce racial/ethnic disparities in birth outcomes. Howell, Holzman, Kleinman, et al., *J Perinatol* 30(9):590-595, 2010 (AHRQ HS10859).

- *Drugs to reduce complications of prematurity are not given as often as they should be.*

When given to women during preterm labor, antenatal corticosteroids have been shown to reduce the incidence of respiratory distress syndrome and other complications associated with prematurity. This study included 515 women eligible for antenatal corticosteroids; 70 percent of the women were black or Hispanic, and most had Medicaid coverage. One-fifth of the women studied did not receive the drugs. The researchers cite problems with language in the NIH consensus statement for much of the disparity in use of these drugs, particularly some ambiguity over who should and should not receive the drugs and when during labor they should be administered.

Howell, Stone, Kleinman, et al., *Matern Child Health J* 14:430-436, 2010 (AHRQ HS10859).

- *Study identifies problems with pediatric quality indicators.*

Low event rates and inadequate numbers of relevant pediatric inpatients at many hospitals limit the usefulness of AHRQ's inpatient pediatric quality indicators (PDIs), according to this study. Researchers used 2005-2007 data on pediatric hospital discharges in California to calculate statewide rates for nine PDIs and found that none of the 401 hospitals had sufficient patient volume to detect a doubling of the statewide average event rate for one of the measures, and only one-quarter of the hospitals doing pediatric heart surgery had sufficient volume to detect doubling of the statewide measure for mortality related to heart surgery. Bardach, Chien, and Dudley, *Acad Pediatr* 10(4):266-273, 2010 (AHRQ grant HS17146).

- *Most pediatric hospitals do not respond appropriately to overcrowding.*

Researchers used midnight census data during 2006 from 39 children's hospitals to examine occupancy levels and overcrowding. They found that overall, the hospitals reported 70 percent of midnights with at least 85 percent occupancy, including 42 percent with at least 95 percent occupancy. Only a few of the hospitals took active steps to reduce crowding through admissions cutoff or transfers out. The researchers note that crowding has been shown to be associated with increases in patient safety events, including medical errors. Fieldston, Hall, Sills, et al., *Pediatrics* 125(5):974-981, 2010 (AHRQ grant HS16418).

Patient Safety

- *Use of simulation-based training in pediatric anesthesiology remains problematic.*

Child and infant simulators have lagged behind their adult mannequin counterparts because of the technical difficulties in translating the mechanical features of an adult mannequin to the scale of a neonate or infant. Simulation is being used to train providers in pediatric anesthesiology, including emergency airway management, central line placement, and regional anesthesia techniques. According to this review, the future of simulation in pediatric anesthesiology will depend on improved educational and patient outcomes and clinical care delivery. At present, the costs of simulation are high, and there is no direct evidence that it improves patient outcomes. Fehr, Honkanen, and Murray, *Paediatr Anaesth* 22:988-994, 2012 (AHRQ grant HS18734).

- *Outpatient advice on pediatric medication safety is often inadequate.*

Researchers examined data from charts and prescription reviews on 1,685 children from six medical practices in Boston. They also interviewed parents at 10 days after their child's first visit and again 2 months later to find out what kind of information, if any, they received on medication safety and whether there had been any medication errors or "near misses." Although 91 percent of providers had given information on why a medication was being prescribed, they only mentioned side effects 28 percent of the time, and they provided written information on medication safety just 14 percent of the time. Lemer, Bates, Yoon, et al., *J Patient Saf* 5(3):168-175, 2009 (AHRQ grant HS11534).

- *Most vaccination errors involve vaccines with similar names.*

After studying 607 vaccine error reports, these researchers found that the wrong vaccines, incorrect times, and wrong doses were at the heart of most vaccine-related errors, but wrong route of administration and wrong patient errors were rare. Vaccine names were implicated in many of the wrong vaccine errors. Wrong time errors most often occurred with scheduled vaccines being given earlier or later than recommended for a child's age. Bundy, Shore, Morlock, and Miller, *Vaccine* 27(29):3890-3896, 2009 (AHRQ grant HS16774).

- *Children are often harmed by adverse events in pediatric ICUs.*

Researchers analyzed data on safety incidents that took place in pediatric intensive care units (ICUs) around the country over a 2-year period. During that time, 23 of the ICUs reported 464 incidents. Physical injuries harmed children in 35 percent of the incidents, and three incident-related patient deaths

were reported. To improve safety in pediatric ICUs, the researchers recommend developing protocols for high-risk procedures, improved monitoring, and staffing, training, and communication initiatives. Skapik, Pronovost, Miller, et al., *J Patient Saf* 5(2):95-101, 2009 (AHRQ grant HS11902).

- *Incidence of pediatric medication errors is significant for treatment of ADHD.*

According to this study of reports involving medications used in the treatment of attention-deficit/hyperactivity disorder (ADHD) in children, the incidence of medication errors between 2003 and 2005 was significant. Of 361 error reports, 329 involved medications used only in the treatment of ADHD, and 32 involved medications used for ADHD and other conditions. Improper dose, wrong dosage form, and prescribing errors were the three most common errors. Bundy, Rinke, Shore, et al., *Jt Comm J Qual Patient Saf* 34(9):552-560, 2008. See also Winterstein, Gerhard, Shuster, and Saidi, *Pediatrics* 124(1):e75-e80, 2009 (AHRQ grant HS16774).

- *Medication error rates are high in children receiving outpatient chemotherapy for cancer.*

Researchers reviewed the medical records of patients receiving treatment from one pediatric and three adult oncology clinics involving 117 pediatric visits (913 medications) and 1,262 adult visits (10,995 medications). They identified 112 medication errors for an overall rate of 8.1 errors per 100 clinic visits. More than half of the errors had the potential to cause patient injury, and only 4 percent of the errors were stopped before they reached the patient. Most involved medication administration and prescribing. The medication error rate was much higher



in children than in adults: 18.8 errors per 100 visits compared with 7.1 errors per 100 visits. More than half of the pediatric errors that had the potential for patient harm occurred when medications were given in the home. Walsh, Dodd, Seetharaman, et al., *J Clin Oncol* 27(6):891-896, 2009 (AHRQ grant HS10391).

Access to Care

- *Disparities found in access to care for children with tic disorder.*

Medicaid-insured children diagnosed with Tourette disorder tend to have more psychiatric and behavioral problems than similar children with private insurance, according to this study. They also appear to be diagnosed at a later stage and receive more antipsychotic medications and less psychotherapy and/or fewer mental health assessments than their privately insured counterparts. Olfson, Crystal, Gerhard, et al., *J Am Acad Child Adolesc Psychiatry* 50(2):119-131, 2011 (AHRQ HS16097).

- *Children from low- and middle-income families with either public or private insurance have similar unmet health care needs.*

Researchers compared data on children from low- and middle-income families who had full-year coverage by either public or private insurance. They looked at whether the child had a usual source of care, no doctor visits in the previous year, unmet medical or prescription needs, less-than-yearly dental visits, or unmet dental needs; results were comparable for both groups of children. The only difference was that children in low-income families with public insurance had a 21 percent lower likelihood of having a usual source of care than children with private insurance. Unmet needs were higher among children with coverage gaps or

no health insurance coverage during the year compared with children who had full-year private insurance, regardless of family income level. DeVoe, Tillotson, Wallace, et al., *Med Care* 49(9):818-827, 2011. See also DeVoe, Tillotson, Wallace, et al., *J Pediatr Health Care* 26(5):e25-e35, 2012 (AHRQ HS16181 and HS18569).

- *Many children from low-income families are eligible for public health insurance but are not enrolled.*

The researchers examined enrollment data from the food stamp program in Oregon (FSP) and the Oregon Health Plan (OHP), which is the State's Medicaid/CHIP plan. They also mailed surveys to more than 10,000 households participating in the FSP that had at least one child aged 1 year or older to determine whether parents enrolled in FSP had also enrolled their children in OHP. There were a surprising number of discrepancies between parental report and State records. For example, 171 parents reported that their child was not enrolled in the OHP, while State records indicated they were enrolled. Similarly, 252 parents reported that their child was enrolled, while State records did not show enrollment. DeVoe, Ray, and Graham, *Am J Pub Health* 101(5):891-898, 2011 (AHRQ HS6181).

- *Children with insurance may not receive needed services if their parents are uninsured.*

According to this study, insured children living with at least one parent in families where the children were insured but the parents were not were more than twice as likely as children with insured parents not to have a usual source of care. They also were 11 percent more likely to have unmet health needs and 20 percent more likely to have never received any preventive counseling services. The researchers examined 2002-2006 data from AHRQ's Medical Expenditure

Panel Survey (MEPS) on 43,509 individuals. These findings suggest that the long-term improvement of health care for children cannot be met by covering children alone, note the researchers. DeVoe, Tillotson, and Wallace, *Ann Fam Med* 7(5):406-413, 2009 (AHRQ grant HS16181).

- *Even modest increases in cost-sharing in Medicaid and CHIP are burdensome for poor families.*

These researchers examined the effects of increased cost-sharing arrangements in Medicaid and CHIP that were instituted by many States in 2007. They found that parents would struggle with high out-of-pocket costs and financial burdens if premiums or copayments were increased for their children covered by CHIP, forcing many families to choose between getting medical care for their children and financial hardship.

The researchers suggest that implementing caps on out-of-pocket spending could help address the burden for low-income families without reducing potential budgetary savings. Selden, Kenney, Pantell, and Ruhter, *Health Aff* 28(4):w607-w619, 2009 (AHRQ Publication No. 09-R072)* (Intramural).

- *Access to primary care is linked to fewer ER visits by Medicaid-insured children.*

Quality pediatric primary care can reduce both urgent and nonurgent emergency department (ED) visits, according to this study involving visits by 5,468 children insured by the Wisconsin Medicaid program. Researchers linked the visits to parents' scores in three domains of their child's primary care: family centeredness, timeliness, and access to care. Overall, 28 percent of the children visited the ED during the followup year, and 59 percent of those ED visits were nonurgent. A high quality score on

family centeredness was associated with 27 percent fewer nonurgent ED visits, but no change in urgent visits. High-quality timeliness was associated with 18 percent fewer nonurgent and urgent visits, and high-quality access was associated with 27 percent fewer nonurgent visits and 33 percent fewer urgent visits. Brousseau, Gorelick, Hoffman, et al., *Acad Pediatr* 9:33-39, 2009 (AHRQ grant HS15482).

- *Uncertainty about insurance coverage may put children at risk for unmet medical needs.*

When parents are uncertain whether or not their child is insured, the child's risk of having unmet health care needs is increased, according to this study. Researchers identified children whose parents were uncertain about their coverage from data on nearly 2,700 low income families in Oregon. In 13.2 percent of the families, parents were uncertain about their child's public health insurance coverage. Their children were at increased risk for having unmet medical needs compared with children whose parents were sure of their child's coverage. DeVoe, Ray, Krois, and Carlson, *Fam Med* 42(2):121-132, 2010 (AHRQ grant HS16181).

Improving Health Care Quality for Children and Adolescents

Preventive Care

- *Authors discuss Preventive Services Task Force perspective on recommendations for children.*

In this article, several members of the AHRQ-supported U.S. Preventive Services Task Force Child Health Workgroup discuss evidence-based primary care preventive services as a strategy for addressing important pediatric conditions and illnesses, the

process used by the Task Force in making evidence-based recommendations, the current library of Task Force recommendations for children and adolescents, and factors that influence the use of these recommendations and other guidelines by clinicians. Melnyk, Grossman, Chou, et al., *Pediatrics* 130(2):e399-e407, 2012 (AHRQ Publication No. 13-R003)*

- *Task Force updates vision screening recommendation for young children.*

In an update to its 2004 recommendation, the U.S. Preventive Services Task Force now recommends vision screening for all children at least once between the ages of 3 and 5 years to detect amblyopia or its risk factors. The Task Force found insufficient evidence to assess the balance of benefits and harms of vision screening in children younger than age 3. Access the recommendation at <http://www.uspreventiveservicestaskforce.org/uspstf/uspvsch.htm>.

- *Having a usual source of care promotes preventive health counseling for children.*

The researchers analyzed 2002-2006 data from AHRQ's Medical Expenditure Panel Survey (MEPS) and found that more than 75 percent of children had both a usual source of care (USC) and continuous insurance coverage in a given year. Another 14 percent had a USC but were uninsured, while 5 percent of children had insurance but no USC; 4.2 percent of children had neither continuous insurance nor a USC. Children with both health insurance and a USC were most likely to receive preventive health counseling (PHC), and those without both insurance and a USC had the highest rates of missed PHC. Surprisingly, children with insurance but no USC were more likely than uninsured children with a USC to have

never received PHC. DeVoe, Tillotson, Wallace, et al., *Matern Child Health J* 16:306-315, 2012. See also DeVoe, Tillotson, Wallace, et al., *Ann Fam Med* 9:504-513, 2011; and DeVoe, Tillotson, Wallace, et al., *Med Care* 39(9):818-827, 2011 (AHRQ HS 16181 and HS18569).

- *Routine screening is the best way to detect the majority of Chlamydia infections in adolescent girls.*

Untreated *Chlamydia trachomatis* (CT) infections can lead to pelvic inflammatory disease, ectopic pregnancy, and infertility. Despite recommendations for annual screening, screening rates remain low among all sexually active adolescents and young adults under age 26. These researchers describe an intervention in a California HMO that improved CT screening during urgent care. As a result of the intervention, the change in the proportion of adolescent girls screened for CT increased by almost 16 percent in the five intervention clinics compared with a decrease of 2 percent in the comparison clinics. Tebb, Wibbelsman, Neuhaus, and Shafer, *Arch Pediatr Adolesc Med* 163(6):559-564, 2009 (AHRQ grant HS10537).

Clinical Guidelines/Recommendations

- *Quality measure compliance for children's asthma care reduces hospital readmissions.*

Researchers analyzed data on more than 1,800 children hospitalized for asthma at a large academic children's hospital over a 6-year period. They found that 6-month asthma readmission rates dropped following implementation of a standardized care process model to increase provider compliance with the Joint Commission's three quality measures for children's inpatient asthma care. Fassl, Nkoy, Srivastava, et al.,

Pediatrics 130(3):482-491, 2012 (AHRQ grants HS18166, HS18678). See also Newman, Hedican, Herigon, et al., *Pediatrics* 129(3):e597-e604, 2012 (AHRQ HS10399).

- *Use of standardized feeding evaluation improves growth in newborns after surgery for congenital heart defects.*

Treatment of a congenital heart defect in the left ventricle (hypoplastic left heart syndrome or HLHS) of newborns involves a series of surgeries to improve the heart's pumping capacity during an infant's first 4-6 months of life. Some pediatric cardiology centers use a "bundle" of practices to closely monitor weight gain or loss in newborns with HLHS following stage 1 surgery. Newborns treated in these centers have significantly better growth during the multistage repair process than newborns treated in centers that use fewer interventions, according to this study. Results showed that optimal growth of infants was associated with centers that used a combination of standard postoperative feeding evaluation before discharge, close weight monitoring after discharge with home scales, and specific gain/loss "red flags." Anderson, Iyer, Schidlow, et al., *J Pediatr* 161(1):16-21, 2012 (AHRQHS16957).

- *Consolidating blood draws may help reduce blood loss in critically ill children.*

This study identified several ways that blood loss can be minimized in critically ill children being treated in a pediatric intensive care unit (PICU). The researchers analyzed chart data on 63 children who spent more than 2 days in the PICU at one institution. The number of blood draws for each child averaged 2.7 per day, and the blood volume drawn in excess of lab requirements was 1.4 mL per draw, resulting in an excess of 3.6 mL per day and 23.0 mL for the child's total stay in

the PICU. Recommendations for minimizing blood loss in these children include using small-volume tubes and a closed system, consolidating tests, and taking advantage of adjunct monitoring to measure end-tidal CO₂ and cerebral-mixed venous saturation. Valentine, and Bateman, *Pediatr Crit Care Med* 13(1):22-27, 2012 (AHRQ T32 HS00063).

- *Guidelines help clinicians assess and treat maladaptive aggression in youth.*

A team of national experts reviewed the available scientific literature and developed a set of evidence-based consensus treatment recommendations for youth with maladaptive aggression. The first of two reports describes the literature review process and establishes nine recommendations to help health care providers engage families, assess youth, and effectively evaluate and manage maladaptive aggression. The second report offers 11 recommendations to help primary care and specialty providers select appropriate psychosocial interventions and medications to treat maladaptive aggression. See Knapp, Chait, Pappadopulos, et al., *Pediatrics* 129(6):e1562-e1576, 2012; and Rosato, Correll, Pappadopulos, et al., *Pediatrics* 129(6):e1577-e1586, 2012 (AHRQ grant HS16097).

- *Treatment guideline reduces hypoglycemic events in critically ill children.*

A team of physicians in critical care medicine and endocrinology at a major children's hospital developed and implemented a guideline for the initiation and maintenance of insulin infusions for stress hyperglycemia in the pediatric intensive care unit. Hypoglycemic events declined significantly after implementation of the guideline, dropping from 36 percent before the guideline to 12 percent after

its implementation. In addition, the average number of days between hypoglycemic events lengthened from 21 to 186 days. Chima, Schoettker, Varadarajan, et al., *Qual Manag Health Care* 21(1):20-28, 2012 (AHRQ HS16957).

- *Adherence to discharge guidelines for late-preterm newborns remains variable.*

The American Academy of Pediatrics advises against early discharge (less than 48 hours after birth) of late-preterm (LP) newborns because they are at increased risk of neonatal complications. This study found that more than 50 percent of the 282,601 LP newborns in the study were discharged early. Researchers studied LP births from 611 hospitals in California, Pennsylvania, and Missouri and found that from 1995 to 2000, early discharge decreased from 71 percent of the sample to 40 percent. However, by 2005, 39 percent were still discharged early. Hispanic ethnicity, lack of insurance, and California residence were associated with early discharge. LP newborns whose mothers were younger than 20, had previous children, and/or lived in rural areas were more likely than other LP newborns to be discharged early. Goyal, Fager, and Lorch, *Pediatrics* 128(1):62-71, 2011 (AHRQ HS15696).

- *Recommendations on rounding pediatric doses may improve e-prescribing.*

When adjusting medication doses for pediatric patients, clinical decision support systems for e-prescribing need to calculate a dose that is appropriate for a child's age and weight, is safe and effective, and can be prepared readily. The percentage change by which the prescribed dose can be "rounded" for ease of preparation and administration, while maintaining effectiveness and safety, varies from drug to drug, which

has been problematic in designing e-prescribing systems for pediatric patients. In this study, the researchers drew on expert opinion and the scientific literature to classify 120 medications commonly prescribed to pediatric patients into three major categories related to dose rounding. After four rounds of discussion by an expert panel, consensus was reached on 99.3 percent of the medications. Johnson, Lee, Sponer, et al., *Pediatrics* 128(2):e422-e428, 2011 (AHRQ HS17216).

- *AHRQ evidence report focuses on inhaled nitric oxide therapy for preterm infants.*

According to this review, there is insufficient scientific evidence to support giving inhaled nitric oxide therapy to preterm infants requiring mechanical ventilation to improve survival or decrease pulmonary morbidity or neurological impairment. Researchers were unable to determine whether inhaled nitric oxide therapy impacts long-term health outcomes, such as respiratory symptoms, rehospitalization after intensive care unit discharge, and growth. There also was insufficient evidence that use of inhaled nitric oxide therapy influences the incidence of cognitive, motor, or sensory impairment or neurodevelopmental disability in preterm infants who require mechanical ventilation. See *Inhaled Nitric Oxide in Preterm Infants*, at <http://go.usa.gov/j5B5> (AHRQ contract 290-2007-10061-1).

- *Adherence to evidence-based guidelines for catheter management is key to reducing blood stream infections in pediatric patients.*

In a study that was conducted in 26 hospitals, these researchers found a 32 percent reduction in central venous

catheter (CVC)-associated blood stream infections when care providers followed evidence-based guidelines for inserting and maintaining CVCs in pediatric ICUs. After implementing the guidelines for 9 months, the hospitals saw a median reduction in CVC-associated blood stream infections from 6.3 to 4.3 per 1,000 CVC days. Also, the intervention prevented an estimated 69 CVC-associated blood stream infections for a cost savings of nearly \$3 million. Jeffries, Mason, Brewer, et al., *Infect Control Hosp Epidemiol* 30(7):645-651, 2009 (AHRQ grant HS13698)

Interventions

- *Multifaceted QI intervention leads to significant reductions in serious safety events among hospitalized children.*

Researchers at Cincinnati Children's Hospital implemented a quality improvement initiative focused on cultural and system changes that resulted in a significant and sustained reduction in serious safety events (SSEs) and an improvement in overall patient safety culture at the hospital. They created an SSE team to review current safety literature and recent SSEs at the hospital, instituted error prevention simulation training and the use of volunteer safety coaches, established a patient safety oversight group, and promoted sharing of lessons learned across the organization. Muething, Goudie, Schoettker, et al., *Pediatrics* 130(2):e423-e431, 2012 (AHRQ grant HS16957).

- *Bloodstream infections decline sharply in NICUs in nine States due to AHRQ's CUSP initiative.*

This study found that central line-associated bloodstream infections

(CLABSIs) in newborns were reduced by 58 percent in less than a year in hospital neonatal intensive care units (NICUs) participating in an AHRQ patient safety program. Frontline caregivers in 100 NICUs in nine States relied on the program's prevention practice checklists and better communication to prevent an estimated 131 infections and up to 41 deaths and to avoid more than \$2 million in health care costs. Health care teams in the project States used AHRQ's Comprehensive Unit-Based Safety Program (CUSP) to improve safety culture and consistently implement catheter insertion and maintenance guidelines. More information and resources, including the CUSP Toolkit, are available at <http://go.usa.gov/j5Bh>.

- *Technical brief covers surgeries for seven fetal conditions.*

This technical brief discusses fetal surgery for seven conditions, ranging from heart defects to spina bifida. It indicates that although fetal surgery research is advancing quickly, it has not progressed to the level of rigor required to optimally inform care. Key findings indicate that (1) work is needed to determine diagnostic approaches, determine which fetuses would benefit from surgery, and project long-term functioning for the targeted organ; (2) preliminary evidence is based in a few highly specialized centers; and (3) despite gaps in the literature, the field is moving toward more robust research and rigorous, more consistent documentation of outcomes over longer periods of time. See *Maternal-Fetal Surgical Procedures*, Technical Brief No. 5 (AHRQ Publication No. 10(11)-EHC059-EF); 2011. Available at <http://go.usa.gov/j5K4>.

- *Review finds two types of surgery equally effective for moving undescended testicles into normal position.*

A review of existing research on evaluation and treatment of undescended testicles (cryptorchidism) found that both laparoscopic and open surgical techniques are effective for moving undescended testicles into normal position in the scrotum. However, the review also found that no specific imaging technique can consistently determine the presence or absence of testicles or the location of undescended testicles. Also, evidence is lacking on the utility of hormonal stimulation testing to determine the absence of testicles. *Evaluation and Treatment of Cryptorchidism*, Comparative Effectiveness Review No. 88 (AHRQ Publication No. 13-EHC001-1); 2012.* Available at <http://to.usa.gov/j5Kk> (AHRQ contract 290-2007-10065-1).

- *Adjusting hospital admissions by day can reduce overcrowding in children's hospitals.*

Researchers examined the differences in weekday and weekend inpatient occupancy rates at children's hospitals to see if the practice of "smoothing" could assist with overcrowding. Smoothing is when a hospital proactively controls admissions to achieve more even occupancy levels over days of the week. The researchers collected daily inpatient census data for 1 year from 39 children's hospitals located in 23 States and found that occupancy rates varied from 70.9 percent to 108.1 percent during weekdays and 65.7 percent to 94.9 percent on weekends. Only 12.4 percent of scheduled admissions came in during weekends. They applied a hypothetical smoothing algorithm to

each week's census and found that its use would have prevented occupancy rates reaching higher than 95 percent. Fieldston, Hall, Shah, et al., *J Hosp Med* 6(8):462-468, 2011 (AHRQ HS16418).

- *Certain psychotherapeutic interventions may benefit children exposed to trauma.*

A recent study found that approximately two-thirds of children and adolescents will experience at least one traumatic event by their 18th birthday. Although many children exposed to trauma do not experience long-term difficulties, others go on to develop traumatic stress syndromes, including post-traumatic stress disorder (PTSD). The goal of this research was to identify effective, evidence-based therapies for children exposed to traumatic events, such as accidents, natural disasters, school shootings, and war. They found that school-based treatments with elements of cognitive behavior therapy appear promising, based on their impact on children's PTSD, anxiety, depression, or anger symptoms. *Child and Adolescent Exposure to Trauma: Comparative Effectiveness of Interventions Addressing Trauma Other than Maltreatment or Family Violence*, Comparative Effectiveness Review No. 107 (AHRQ Publication No. 13-EHC054-1); 2013. Available at <http://go.usa.gov/j5KP> (AHRQ contract 290-2007-10056-1).

- *Some minority youths benefit more than others from evidence-based mental health interventions.*

These researchers examined the impact of a quality improvement intervention designed to improve access to evidence-based depression care for minority youths and found a significant reduction in depression

symptoms among blacks, significant improvement in care satisfaction among Hispanics, and no intervention effects among white youths. They examined outcomes for 344 youths who completed a 6-month followup assessment. Ngo, Asarnow, Lange, et al., *Psychiatr Serv* 60(10):1357-1364, 2009 (AHRQ grant HS09908).

- *Telephone coaching to improve asthma management may lead to better quality of life for children and parents.*

Researchers compared usual asthma care practices with usual care plus a 12-month telephone coaching program for children with asthma being cared for by community pediatricians in St. Louis. Parents of children randomized to the coaching intervention received monthly (or more frequent) telephone calls from trained pediatric nurses to help them with day-to-day management of asthma care. A total of 190 children were randomized to the intervention group and 172 to the usual care control group. Quality-of-life scores improved significantly in the intervention group, and there was a significant reduction in the proportion of children with poorly controlled asthma. Garbutt, Banister, Highstein, et al., *Arch Pediatr Adolesc Med* 164(7):625-630, 2010 (AHRQ HS15378).

- *Authors describe interventions to improve symptom control for terminally ill children.*

More than 50,000 children die each year, and many of these children do not receive optimum symptom-control near the end of life. This article provides a palliative care primer for the pediatric surgeon on interventions to improve quality of life for terminally ill children. The

interventions covered include gastrostomy, pain control, thoracotomy, and tracheostomy. Shelton and Jackson, *Surg Clin N Am* 91:419-428, 2011 (AHRQ grant HS13833).

Care Management

- *Use of a care process model to treat feverish infants with possible serious bacterial infections improves outcomes and lowers costs.*

According to this study, implementing an evidence-based care process model (EB-CPM) for treating feverish infants up to 3 months of age at pediatric and community hospitals could result in better diagnosis, shorter hospitalizations, shorter antibiotic treatment, and lower health care costs. The researchers developed an EB-CPM that includes a history, physical exam, complete blood count, and urinalysis for all febrile infants. Their study included 8,044 infants with 8,431 episodes of fever that resulted in evaluation at a tertiary children's hospital and four regional medical centers in Utah from 2004 through 2009. Byington, Reynolds, Korgenski, et al., *Pediatrics* 130(10):e16-e24, 2012 (AHRQ HS18034).

- *Report compares the effectiveness of treatments for juvenile arthritis.*

According to this report, medications known as disease-modifying anti-rheumatic drugs, or DMARDs, appear to be more effective than other treatments for children with arthritis, but there is not enough evidence to support one type of DMARD over another. The researchers compared DMARDs with conventional treatments, such as ibuprofen and steroids, and found that DMARDs work better than other treatments for alleviating the

symptoms of juvenile idiopathic arthritis, but the evidence was unclear about the long-term effectiveness and safety of these medications. There is no cure for juvenile idiopathic arthritis, which affects as many as 400 of every 100,000 children in the United States. *Disease-Modifying Antirheumatic Drugs (DMARDs) in Children with Juvenile Idiopathic Arthritis*, Comparative Effectiveness Review No. 28 (AHRQ Publication No. 11-EHC039-1); 2011. Available at <http://go.usa.gov/j5Kz> (AHRQ contract 290-2007-10066).

- *Antibiotics are modestly more effective than no treatment for middle ear infections in children.*

This review of 135 studies published from 1999 through 2010 found that antibiotic treatment for uncomplicated acute otitis media (AOM) in low-risk children may have a slightly better success rate compared with no antibiotic treatment. There was no evidence that any other antibiotic works better at treating AOM than amoxicillin, the currently recommended first-choice antibiotic for AOM. Coker, Chan, Newberry, et al., *JAMA* 304(19):2161-2169, 2010 (AHRQ contract 290-2007-10056).

- *Gait assessment before surgery may offset the need for repeat surgery in children with cerebral palsy.*

Children with cerebral palsy who have problems walking often undergo several rounds of surgery to correct their gait. According to this study of 313 children who received gait assessment prior to their initial surgery and 149 children who did not, only 11 percent of those who had gait assessment needed additional surgery, compared with 32 percent of the children who did not have gait assessment. Although the cost of the

initial surgical session was higher in the children who had gait assessment, the additional total cost per person-year was nonsignificant (\$20,448 vs. \$19,535 for those with and without gait assessment, respectively). Wren, Kalisvaart, Ghatan, et al., *J Pediatr Orthop* 29(6):558-563, 2009 (AHRQ grant HS14169).

Practice Organization

- *Medical home model improves delivery of preventive services to pediatric patients without raising costs.*

Researchers examined data for 26,000 children on their access to a medical home and found that children's care delivered in a medical home is associated with 11 percent more preventive visits, 9 percent more dental visits, and 13 percent fewer emergency department visits, compared with care delivered in another care environment. There was no appreciable difference in mean expenditures between children with and without a medical home.

Romaire, Bell, and Grossman, *Med Care* 50:262-269, 2012. See also, Romaire and Bell, *Acad Pediatr* 10(5):338-345, 2010 (AHRQ T32 HS13853).

- *QI collaborative improves outcomes in children with inflammatory bowel disease.*

Due to the lack of consensus on the best way to treat children with inflammatory bowel disease (IBD)—which includes Chron's disease and ulcerative colitis—variations in care delivery exist in both diagnosis and treatment of IBD. According to this study, organizing care into a quality improvement collaborative led to changes in care delivery, based on the Chronic Illness Care Model. Recommendations were developed



and implemented to standardize diagnosis, classify disease severity, and evaluate the patient's nutritional and growth status. Once care processes improved, other changes were made that centered on medications, managing nutrition and growth, and inducing and maintaining disease remission.

Crandall, Margolis, Kappelman, et al., *Pediatrics* 129(4):e1030-e1041, 2012. See also Heaton, Tundia, Schmidt, et al., *J Pediatr Gastroenterol Nutr* 54(4):477-485, 2012 (AHRQ HS16957).

- *Care setting affects the likelihood that children with persistent asthma will receive inhaled steroids.*

According to this study of 563 children with persistent asthma, those receiving care in community health centers or hospital clinics were significantly less likely than children seen in multispecialty practices to have received inhaled steroids for their asthma. Key components of quality care for children with asthma include prescribing inhaled steroids, vaccinating children against influenza, and discussing an asthma action plan with parents. Galbraith, Smith, Bokhour, et al., *Arch Pediatr Adolesc Med* 164(1):38-43, 2010 (AHRQ grant T32 HS00063).

Health IT

- *Children's electronic health record format is now available.*

Growing use of electronic health records (EHRs) continues to improve the quality and safety of health care in the United States, but many existing EHR systems are not tailored to capture or process health information about children. AHRQ and the Centers for Medicare & Medicaid Services recently announced the availability of a new

pediatric EHR format that includes recommendations for child-specific data elements, such as vaccines, as well as functionality that will enable EHR developers to broaden their products to include modules tailored to children's health. More information is available at <http://go.usa.gov/j5kC>.

- *Researchers examine how changing from paper records to EHRs affects pediatric behavioral health screening.*

These researchers investigated how changing over from paper health records to electronic health records (EHRs) affects behavioral health screening in children and adolescents. They found the transition period to be especially difficult, with declines in screening rates after the changeover. They note that the disruption lasted a long time before screening rates returned to pre-EHR implementation rates. Hacker, Penfold, Zhang, and Soumerai, *Psychiatr Serv* 65(3):256-261, 2012 (AHRQ grant HS10391).

- *Pediatric care providers identify desired attributes for computerized flu vaccination alerts.*

Influenza vaccination rates among children continue to be suboptimal, partly due to missed vaccination opportunities. One possible solution, computerized vaccination alerts, has met with only modest success, perhaps due to design problems. These researchers conducted focus groups and interviews with 21 pediatric health care providers to identify desired characteristics and concerns about immunization alerts. The respondents suggested that an alert should appear early in the visit, facilitate ordering, be based on the electronic health record and

immunization registry, and allow the provider to document reasons why the vaccine was not given by pasting back into the EHR note.

Birmingham, Catalozzi, Findley, et al., *Prev Med* 52:274-277, 2011 (AHRQ HS18158).

- *Computer system compares favorably with clinicians in assessing but not treating children with asthma.*

The researchers developed a computerized decision-support system (CDSS) for pediatric asthma, based on the 2007 guidelines issued by the National Education and Prevention Program. They applied the CDSS to all asthma-related visits to a pediatric pulmonology clinic and found that clinicians' agreement with the CDSS was 70.8 percent for control assessments but only 37 percent of severity assessments and 29 percent of treatment step recommendations. Pediatric pulmonologists did not follow the guidelines in 8 percent of return visits and 18 percent of new visits.

Hoeksema, Bazy-Asad, Lomotan, et al., *JAMIA* 18(3):243-250, 2011 (AHRQ contract 290-08-10011). See also Fifield, McQuillan, Martin-Peele, et al., *J Asthma* 47:718-727, 2010 (AHRQ HS11068) and Bell, Grundmeier, Localio, et al., *Pediatrics* 125(4):e770-777, 2010 (AHRQ HS14873).

- *Parents using an electronic kiosk provide more accurate information than ED providers.*

This study involved children being seen in urban and suburban Boston emergency departments for a variety of complaints, including head trauma, ear pain, respiratory problems, fever, and painful or difficult urination. Parents using the software program ParentLink in an electronic ED kiosk provided more

accurate information relevant to the care of their children than the chart entries and paper records compiled by providers, according to the researchers. The year-long study alternated 3-month intervention periods when ParentLink was used with 3-month control periods when only provider entry was used. Porter, Forbes, Manzi, et al., *Qual Saf Health Care* 19(5):e34, 2010 (AHRQ HS14947).

- *Parents find telemedicine to be a helpful and convenient option for delivering health care to their child at school or in day care.*

During telemedicine "visits," a telehealth assistant at a school or child care site can use computer-linked instruments to capture a child's heart and lung sounds and a camera to visualize the child's eyes, ears, etc. These sounds and images are stored in a central server and uploaded to the off-site primary care provider for review. The doctor can talk with and assess the child via videoconference to make decisions about diagnosis and treatment. According to this study, parents found the telemedicine experience to be a great way to ease the family burdens associated with a sick child. They also liked not having to miss work and the ability to have medications delivered directly to the child care or school site.

McConnochie, Wood, Herrendeen, et al., *Telemed J E Health* 16(5):533-542, 2010 (AHRQ HS15165).

- *Automated screening has the potential to reduce medication errors due to look-alike, sound-alike drugs.*

Look-alike, sound-alike (LASA) medication errors occur when a drug is erroneously prescribed or delivered because the name of the drug sounds like or is similar in spelling to another drug. These researchers conducted a

pilot study to discover the extent of LASA errors in outpatient prescriptions for children. They found that LASA errors are less likely than other types of medication errors and may be best addressed by automated processes to improve the readability of prescriptions and the ability of providers, including pharmacists, to cross-check any new prescriptions with those the child has received before. Basco, Ebeling, Hulsey, and Simpson, *Acad Pediatr* 10(4):233-237, 2010 (AHRQ HS156709).

Tools/Models

- *Tools can be used to measure performance and adverse events related to tracheal intubation in pediatric ICUs.*

Tracheal intubation is often performed on critically ill children in pediatric intensive care units (PICUs), but it can result in adverse events ranging from esophageal intubation to a drop in blood pressure to cardiac arrest. Two recent studies describe tools that can be used to characterize care and improve safety outcomes for children undergoing tracheal intubation in a PICU. In the first study, the National Emergency Airway Registry was adapted to identify intubation-associated adverse events. In the second study, an assessment tool was used to rate the technical and behavioral performance of airway management teams during real intubation events. Nishisaki, Ferry, Colborn, et al., *Pediatr Crit Care Med* 13(1):e5-e10, 2012; Nishisaki, Nguyen, Colborn, et al., *Pediatr Crit Care Med* 12(4):406-414, 2012 (AHRQ grant HS16678).

- *Expert panel identifies quality of care measures for complex pediatric patients.*

The goal of this work was to assess through expert consensus recommended primary care processes for complex pediatric patients by using the patient-centered medical home approach as a first step toward establishing a candidate set of quality measures. Using a systematic literature review and an established methodology, a national expert panel was able to select 35 primary care quality measures for complex pediatric patients. Chen, Schragger, and Mangione-Smith, *Pediatrics* 129(3):433-445, 2012 (AHRQ HS18087).

For More Information

AHRQ's World Wide Web site (www.ahrq.gov) provides information on the Agency's children's health services research agenda and funding opportunities. In addition, AHRQ also offers a child and adolescent health email update service to which users may subscribe (go to www.ahrq.gov and select Email updates at the top of the Web page).

Items in this program brief marked with an asterisk (*) are available free from the AHRQ Clearinghouse. To order, contact the AHRQ Clearinghouse at 800-358-9295, or send an email to ahrqpubs@ahrq.hhs.gov. Please use the AHRQ publication number when ordering.

Further details on AHRQ's programs and priorities in child health services research are available from:

Kamila Mistry
Senior Advisor, Child Health &
Quality Improvement
Agency for Healthcare Research
and Quality
540 Gaither Road
Rockville, MD 20850
Email:
Kamila.Mistry@ahrq.hhs.gov

