Research Activities

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Agency for Healthcare Research and Quality

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New patient safety team training toolkit available for health care settings

The Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense's military health system have released TeamSTEPPS, a new evidence-based team training and implementation toolkit that demonstrates techniques of effective communication and other teamwork skills. The new toolkit, which responds to the Institute of Medicine's call for "interdisciplinary team training programs that incorporate proven methods for team management" to prevent medical errors, is designed to optimize team performance and outcomes across the health care delivery system.

TeamSTEPPS is presented in a multimedia format, with tools to help a health care organization plan, conduct, and evaluate its own team training program. It includes the following components:

- An Instructor Guide that explains how to conduct a pretraining assessment of an organization's training needs, how to present the information effectively, and how to manage organizational change. The Guide also provides an evidence base for each lesson.
- PowerPoint™ presentations that convey basic TeamSTEPPS principles.
- A DVD that contains nine video vignettes that show how failures in teamwork and communication can place patients in jeopardy and how successful teams can work to improve patient safety.
- A spiral-bound pocket guide that summarizes TeamSTEPPS principles in a portable, easy-to-use format.
- A CD-ROM that contains files of all print materials so that users of TeamSTEPPS can adapt the presentations to reflect their institutions' particular situations.
- A 17" x 22" poster to announce TeamSTEPPS activities in a heath care organization.

TeamSTEPPS leverages more than 20 years of research on team performance in industry and the

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TeamSTEPPS

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military. It has been field-tested extensively in military and civilian health care facilities. Designed for high-stress situations such as hospital emergency departments, critical care units, operating rooms, and obstetrical suites, the curriculum can be tailored to any health care setting where communication and teamwork are important, including physicians' offices and ambulatory clinics.

The TeamSTEPPS tools can be viewed on the Web site of the Uniformed Services University of the Health Sciences (www.usuhs.mil/cerps/teamstepps.html). Single copies of the CD-ROM and DVD, the poster, and the pocket guide can be obtained free of charge by using the ordering form on the AHRQ Web site at www.ahrq.gov/qual/teamstepps or ordering directly from AHRQ.* Information on how to obtain multiple printed copies of TeamSTEPPS materials can also be found on the AHRQ Web site. ■

Patient Safety and Quality

Coverage that allows interns to nap during extended shifts can increase their sleep time and decrease fatigue

Fatigue among first-year residents (interns) has been linked to needle sticks and cuts on the job and medical errors that can harm patients. As a result, interns are now limited to working 80 hours per week over a 4-week period. However, extended work shifts up to 30 consecutive hours are still allowed. Naps can increase sleep time and reduce the fatigue of interns during extended shifts, concludes a study supported in part by the Agency for Healthcare Research and Quality (HS10597).

Researchers assessed the effects of taking a nap while on-call at night on sleep and fatigue of 38 internal medicine interns. For 2 weeks during a month-long rotation, other residents provided on-demand nap coverage for on-call interns from midnight to 7 a.m., so that they could finish their work and take a nap. The other 2 weeks of the month were a standard schedule. During the entire month, interns wore an activity monitor to measure sleep time, record on-call and post-call fatigue, and record nap coverage.

Interns slept 41 more minutes on the nap schedule than the standard schedule (185 minutes vs. 144 minutes), a modest increase. When interns with the nap schedule used coverage, they received 68 more minutes of sleep (210 vs. 142 minutes). Despite these small increases in sleep, interns reported less overall fatigue while on the nap schedule than while on the standard schedule (1.74 vs. 2.26 on a 7-point scale with 7 being the most tired).

Fatigue on the post-call day with the nap schedule was lower by nearly 1 point (2.23 vs. 3.16) than the standard schedule, a potentially clinically significant difference. However, interns typically used shorter naps than their coverage allowed due to their desire to care for their patients and concerns about discontinuity of care by covering residents. An alternative to shorter work shifts may be use of an extended long shift with a nap, suggest the researchers.

See "The effects of on-duty napping on intern sleep time and fatigue," by Vineet Arora, M.D., M.A., Carrie Dunphy, B.S., Vivian Y. Chang, B.A., and others in the June 2006 *Annals of Internal Medicine* 144(11), pp. 792-798. ■

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Patient safety indicators are useful tools for tracking and monitoring patient safety events

Based on a recently published study conducted using Veterans Administration (VA) hospital data, the Patient Safety Indicators (PSIs) developed by the Agency for Healthcare Research and Quality (AHRQ) may be useful screening tools for tracking and monitoring patient safety events. PSIs range from bed sores (decubitus ulcers) to complications of anesthesia and accidental puncture/laceration. AHRQ researcher Anne Elixhauser, Ph.D., and colleagues used the VA database of records on all patients discharged from VA facilities over a 4-year period (FY 2001 through FY 2004) to examine trends in national PSI rates over time.

Most PSIs demonstrated consistent rates over time. After accounting for patient and hospital characteristics, hospitals' baseline risk-adjusted PSI rates were the most important predictors of their 2004 risk-adjusted rates for 8 of the 15 PSIs studied. Two PSIs demonstrated significant trends in rates over time, after adjustment for patient risk factors. Rates of iatrogenic (hospital-caused) pneumothorax increased over time, whereas rates of failure to rescue (deaths after major complications such as cardiac arrest and pneumonia) decreased.

The most frequent PSI events in all 4 years were failure to rescue, decubitus ulcer, accidental puncture/laceration, and pulmonary embolism or deep vein thrombosis. In contrast, complications of anesthesia, foreign body left in during a procedure, and postoperative hip fracture were rare occurrences in all 4 years. The researchers suggest that future research investigate whether trends in patient safety events reflect better or worse care or increased attention to documenting patient safety events.

See "Tracking rates of patient safety indicators over time: Lessons from the Veterans Administration," by Amy K. Rosen, Ph.D., Shibei Zhao, M.P.H., Peter Rivard, M.H.S.A., and others, in the September 2006 *Medical Care* 44(9), pp. 850-861. Reprints (AHRQ Publication No. 06-R078) are available from AHRQ.* ■

Use of physical therapist assistants in place of physical therapists may result in lower quality of rehabilitation care

Substituting less expensive support personnel for more highly skilled providers is a growing trend in health care. However, use of physical therapist assistants (PTAs) and therapy aides in place of licensed physical therapists (PTs) may reduce the efficiency and quality of care in outpatient rehabilitation, concludes a new study. Researchers found that high PTA use (more than 50 percent of the time during the treatment episode) and use of therapy aides were each independently associated with more visits per treatment episode and lower functional health upon discharge from treatment.

State regulations requiring full-time on-site PTA supervision were associated with better functional health status of rehabilitation patients. State regulations regarding physical therapy reevaluation, PT/PTA ratio, and PTA licensure did not affect patient outcomes. These findings suggest that use of care extenders such as PTAs and therapy aides in place of PTs is associated with more costly and lower quality care delivery in outpatient rehabilitation. Regulations that specify PTA supervision adopted at the State or institutional level could potentially lead to improved care outcomes, note the researchers.

They analyzed a sample of 63,900 patients from 38 States drawn from 395 clinics that participated in the Focus on

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Physical therapist assistants

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Therapeutic Outcomes Inc. database in 2000 and 2001. They examined the relationship between State regulations of physical therapists and high PTA use, number of visits, and patient self-reported functional status. The study was supported in part by the Agency for Healthcare Research and Quality (T32 HS00011).

See "State regulation and the delivery of physical therapy services," by Linda Resnik, Ph.D., P.T., O.C.S., Zhanlian Feng, Ph.D., and Dennis L. Hart, Ph.D., P.T., in the August 2006 *HSR: Health Services Research* 41(4), pp. 1296-1316. ■

Disparities/Minority Health

Studies examine influence of patient race on primary care quality and hospital discharge against medical advice

Numerous studies document disparities in care among racial/ethnic minorities compared with whites. However, a new study found that the content of primary care visits did not differ based on the racial composition of physicians' practices. A second study found that racial differences in being discharged from the hospital against medical advice largely disappeared after accounting for individual and hospital socioeconomic factors. Both studies were supported by the Agency for Healthcare Research and Quality (HS10910) and led by Kevin Fiscella, M.D., M.P.H., of the University of Rochester School of Medicine, and Peter Franks, M.D., of the University of California, Davis. They are summarized here.

Fiscella, K., and Franks, P. (2006, April). "Does the content of primary care visits differ by the racial composition of physicians' practices?" ***American Journal of Medicine*** **119, pp. 348-353.**

Based on commonly performed procedures during medical visits, the researchers found that primary care physicians with a large proportion of black patients do not provide inferior care compared with their colleagues with a small proportion of black patients. Procedures ranged from Pap smears and vision screening to cholesterol and blood pressure checks, diet and exercise counseling, and mammography screening. In the study, a relatively small proportion of providers (24 percent of physician practices) provided 80 percent of all primary care visits by black patients. This may have been due to a combination of continuing residential racial segregation, as well as racial differences in presence and type of insurance, explain the researchers.

They analyzed the content of office visits using 1997 to 2002 data from the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey. The data revealed few differences in the overall content of visits based on the proportion of black patients in the physician's practice. Only 1 of 16 office procedures (rectal exams) had a difference that approached significance. Physicians whose practice had a larger proportion of

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Primary care quality

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black patients were slightly less likely to perform rectal exams or provide mental health counseling than those with a smaller proportion of black patients. They were significantly less likely to refer patients to specialists, but were more likely to schedule a return appointment.

Previous studies have shown that physician practices with a large black population report more difficulty accessing specialty care. More return appointments may reflect the need of these physicians to follow up on problems that otherwise would have been managed by a specialist. More return appointments also may reflect incomplete adjustment for greater severity of illness among black patients, suggest the researchers.

Franks, P., Meldrum, S., and Fiscella, K. (2006, August). "Discharges against medical advice: Are race/ethnicity predictors?" ***Journal of General Internal Medicine*** **21, pp. 955-960.**

This study found that blacks were twice as likely as whites to be discharged against medical advice (DAMA) at hospitals in three States. Hispanics also had a higher rate of DAMA, while Asian and "other" ethnic groups were less likely than whites to be DAMA. However, racial/ethnic disparities in DAMA largely disappeared once individual and hospital socioeconomic factors were considered. Patient risk factors for DAMA included younger age, male gender, nonelective admission, Medicaid insurance, no insurance, and fewer coexisting medical conditions. Specific coexisting conditions were also associated with greater DAMA risk: HIV/AIDS, liver disease, alcohol or drug abuse, and psychiatric diagnoses other than depression.

Hospital risk factors for DAMA included location in large urban areas, hospitals with a greater proportion of minorities and patients with Medicaid, and the least and most specialized hospitals. Also, patients admitted to non-profit hospitals had lower risk of DAMA. After full adjustment for biomedical and other factors, as well as patient socioeconomic factors and hospital characteristics, the increased risk for DAMA for blacks was eliminated, and Hispanics had lower risk for DAMA.

Neither minority race nor ethnicity status was independently associated with increased risk for DAMA at the individual level. This finding suggests that racial discrimination and poor communication at the individual level are not primary factors in DAMA. Rather, place of hospitalization, income, and insurance contribute to DAMA. The findings were based on analysis of hospital discharge data on adults admitted to hospitals in California, Florida, and New York from 1998 to 2000, which was linked to American Hospital Association data on hospital characteristics. ■

Providing free blood glucose monitors to patients with diabetes initially encourages self-management, especially among blacks

Insurance coverage of patient self-management devices like self-monitoring blood glucose (SMBG) equipment may help to reduce race-related barriers to effective care. For instance, a new study found that black patients with diabetes were as likely as white patients to initiate SMBG before insurers provided free home blood glucose monitors. Following implementation of the coverage policy, blacks were 33 percent more likely than whites to monitor their blood glucose levels; yet blacks who began SMBG following coverage of blood glucose monitors were also more likely than whites to discontinue SMBG over time. After 18 months, 78 percent of blacks and 64 percent of whites had stopped self-monitoring their blood glucose levels.

Given the worse outcomes and higher economic and social costs of diabetes among minorities, these findings are promising. However, the low sustainability of monitoring in both racial groups indicates that additional interventions are necessary to improve adherence and clinical outcomes, suggest the researchers. For instance, SMBG is critical for patients to maintain control of blood sugar levels and avoid complications such as vision, kidney, and wound healing problems. SMBG can also indicate when patients need to intensify their medication to maintain better glucose control.

The study findings were based on use of electronic medical record data from 1992 to 1996 to examine racial differences in rates of initiation of SMBG after coverage and rates of discontinuation 18 months after initiation among 2,275 black and white patients with diabetes who were enrolled in a large HMO. Socioeconomic differences between black and white

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Blood glucose monitors

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patients were relatively small, and all patients were taking oral diabetes medications only. The study was funded in part by the Agency for Healthcare Research and Quality (HS10063).

More details are in "Racial differences in impact of coverage on diabetes self-monitoring in a health maintenance organization," by Connie A. Mah, M.S., Stephen B. Soumerai, Sc.D., Alyce S. Adams, Ph.D., and Dennis Ross-Degnan, Sc.D., in the May 2006 *Medical Care* 44(5), pp. 392-397. ■

Women's Health

Women's self-report of mammography use conflicts with verified reports using claims data

National self-report surveys show minimal racial disparity in women's use of mammography to diagnose breast cancer. However, analysis of medical claims data show a large disparity. This may be due to the less accurate nature of women's self-report of mammography, suggests a study supported by the Agency for Healthcare Research and Quality (HS13173). For that reason, the study's authors caution against exclusive reliance on self-report survey data to assess disparity in mammography. They found that elderly women's self-report of mammography was often not verified by medical claims data, thus providing conflicting evidence of disparities in mammography, particularly among black women.

Researchers analyzed 1998-2002 Medicare Current Beneficiary Surveys, which contained elderly women's self-report and medical claims data. They found no racial/ethnic disparities in self-reported mammography; however, verified mammography revealed significant disparities for race, education, income, insurance, and health status. For example, during survey interviews, 52 percent of white, 45 percent of black, and 46 percent of Hispanic women reported having had a mammogram. However, in only 45 percent of white, 29 percent of black, and 31 percent of Hispanic women could those mammograms be verified by Medicare claims data. Black women had a 23 percent lower likelihood of having their mammograms verified than white women.

For both self- and verified-reports, women with less education, lower income, poorer health, and no Medicare supplemental insurance were less likely to have mammograms than their less vulnerable counterparts. There are two potential explanations for these discrepancies between self-report and medical claims, note the researchers. First, they may represent a greater tendency among minority and other vulnerable women to over-report receipt of mammography. Alternatively, they may reflect suboptimal billing by facilities and physicians who provide medical care for greater numbers of minority women.

More details are in "Mammography self-report and mammography claims: Racial, ethnic, and socioeconomic discrepancies among elderly women," by Kathleen Holt, Ph.D., Peter Franks, M.D., Sean Meldrum, M.S., and Kevin Fiscella, M.D., M.P.H., in the June 2006 *Medical Care* 44(6), pp. 513-518. ■

Child/Adolescent Health

Uninsured children's access to care is influenced by the availability and capacity of a local safety net

Approximately 12 to 13 percent of U.S. children do not have health insurance, which means their access to care is influenced by the proximity of safety net providers (for example, community health centers, public housing primary care programs, and migrant health centers). In addition, the capacity of the safety net to serve the uninsured, as measured by local government funding for health and hospitals (such as outpatient health clinics, public hospitals, and immunization programs), plays a key role in determining access to care. Other

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Uninsured children

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characteristics of the local health care market, such as managed care penetration, play a part as well, according to a study supported by the Agency for Healthcare Research and Quality (HS10770).

Researchers studied a nationally representative group of more than 2,600 children aged 2 to 17 who were uninsured for at least 1 full calendar year from 1996 to 2000. Researchers found that 60 percent of uninsured children did not visit a physician's office during the year, and more than half had no care from a provider of any type (physician or non-physician) in an office-based setting. Nearly half of uninsured children had no medical expenditures or charges during the year. By comparison, other research has shown that nearly three-quarters of privately insured children and more than two-thirds of publicly insured children (such as those insured by Medicaid) had at least one physician visit, and more than 80 percent of privately and publicly insured children had some medical expenditures.

Researchers found differences between urban and rural uninsured children. For example, uninsured children in rural areas who lived closer to a safety net provider and lived in an area with a higher supply of primary care physicians (PCPs) were more likely to make physician visits and have more medical expenditures. Uninsured children in urban areas with a greater local supply of PCPs and higher level of safety net funding from the local government were more likely to have higher medical expenditures. While proximity to safety net providers was not found to be a determinant of access to care among uninsured urban children, researchers caution that other factors influencing the accessibility of providers (such as availability of local public transit) were not measured and may influence the services urban uninsured children receive. The study further found that the greater the percentage of the urban population that was uninsured, the less likely the use of the emergency department (ED) by uninsured children. Thus, ED crowding may be a severe problem in urban areas with many uninsured.

These findings were based on analysis of 1996 to 2000 data from the nationally representative Medical Expenditure Panel Survey, which was linked to other national data sources on hospital and market characteristics.

See "Dimensions of the local health care environment and use of care by uninsured children in rural and urban areas," by Carole Roan Gresenz, Ph.D., Jeannette Rogowski, Ph.D., and José J. Escarce, M.D., Ph.D., in the March 2006 *Pediatrics* 117, pp. 509-517. ■

A continuous subcutaneous glucose monitoring system can safely lower blood sugar levels of children with type 1 diabetes

The continuous glucose monitoring system (CGMS) can safely lower the blood sugar levels of children with type 1 diabetes (also called insulin-dependent or juvenile diabetes), concludes a new study supported by the Agency for Healthcare Research and Quality (HS10397). The CGMS, whose accuracy and reliability has already been established in adults, is used to measure average blood glucose (BG) levels for up to 3 days. It is used to discover trends in BG levels, which would otherwise go unnoticed with standard hemoglobin A1c (HbA1c) tests (which measures average blood glucose level over the past 3 months) and intermittent finger sticks (which measure actual sugar in the blood at that time).

The CGMS is a tiny glucose-sensing device that is inserted just under the skin of the abdomen and taped in place. The sensor measures levels of BG in tissue every 10 seconds and sends information every 5 minutes via a wire to a pager-sized device that is attached to a belt or pants' waistline. The patient also enters insulin use, food intake, and exercise. After 3 days, the information is downloaded into a computer at the doctor's office. The doctor then makes any necessary adjustments in the diabetes management plan, explain researchers at the University of North Carolina Center for Education and Research on Therapeutics.

They randomized 27 children to an intervention group (18 children) or a control group (9 children). Both groups wore the CGMS for 72-hour periods at 0, 2, and 4 months. Therapy adjustment was based on both CGMS and self-

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Note: Only items marked with a single (*) asterisk are available from the AHRQ Clearinghouse. Items with a double asterisk (**) are available from the National Technical Information Service. See the back cover of *Research Activities* for ordering information. Consult a reference librarian for information on obtaining copies of articles not marked with an asterisk.

Glucose monitoring

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monitoring of blood glucose (SMBG) via finger stick for the intervention group and on SMBG data alone for the control group. Hemoglobin A1c was determined at 0, 2, 4, and 6 months. At study entry, HbA1c levels were similar in the intervention and control groups (8.4 and 8.8, respectively; target HbA1c is usually less than 8 percent in childhood). By the end of the 6-month study, HbA1c levels were significantly lower in the intervention group than the control group (7.8 vs. 8.6). There was no significant difference between the two groups in duration or severity of hypoglycemic events (extremely low blood sugar that can cause weakness, heart palpitations, and shock), which are often associated with tight glycemic control. CGMS monitoring may become an important adjuvant to self-monitoring of blood glucose in the treatment of children with type 1 diabetes, conclude the researchers.

See "Continuous subcutaneous glucose monitoring in children with type 1 diabetes mellitus: A single-blind, randomized, controlled trial," by William H. Lagarde, M.D., Frank P. Barrows, D.O., Marsha L. Davenport, M.D., and others, in the June 2006 *Pediatric Diabetes* 7, pp. 159-164. ■

Long-term outpatient central venous catheters for bone infections cause complications in about 40 percent of children

A new study questions the benefit of treating children who have bone infections with prolonged antibiotic treatment through central venous catheters at home. Bone infections account for 1 percent of all pediatric hospitalizations in the United States, typically arising after a bacterial infection in the bone, with a diagnosis of acute hematogenous osteomyelitis (AHO). About 50 percent of cases occur among children younger than 5 years, possibly because of the rich vascularization of rapidly growing bones. A common approach to treating AHO consists of several days of peripheral intravenous (IV) antibiotic administration in the hospital, followed by placement of a central venous catheter (CVC) in a vein that leads directly to the heart, for 4 to 6 weeks of IV antibiotic therapy at home.

However, the new study found that 41 percent of children who received more than 2 weeks of CVC therapy at home had one or more CVC-associated complications. Many of these complications were serious enough to warrant a visit to the emergency department or readmission to the hospital. Most CVC-associated complications occurred after 2 weeks of catheter placement. A total of 23 percent of children had a CVC malfunction or displacement, 11 percent had a catheter-associated bloodstream infection, 11 percent had fever with negative blood culture results, and 5 percent had a local skin infection at the site of catheter insertion.

Complications were more likely among younger children and those living in Zip codes with the lowest household incomes. Parents of these children may benefit from more teaching and nursing supervision, note researchers at the University of Pennsylvania Center for Education and Research on Therapeutics, who were supported in part by the Agency for Healthcare Research and Quality (HS10399). They retrospectively studied 80 children diagnosed with AHO (median age of 5 years), who were admitted to one children's hospital between January 1, 2000 and December 31, 2003. Overall, 94 percent of children received over 2 weeks of IV antibiotic therapy via a CVC. Six percent received less than 2 weeks of IV antibiotic therapy before conversion to oral therapy for a median of 25 days. Recent studies have shown the latter approach to be effective for AHO.

See "Complications of central venous catheters used for the treatment of acute hematogenous osteomyelitis," by Rebecca Ruebner, M.D., Ron Keren, M.D., M.P.H., Susan Coffin, M.D., M.P.H., and others, in the April 2006 *Pediatrics* 117(4), pp. 1210-1215. ■

Fungal infections in immunocompromised children dramatically increase mortality rate, length of hospital stay, and costs

Some children's immune systems are compromised by diseases such as cancer or treatments such as bone marrow transplantation. The most common fungal infection to strike immunocompromised children, invasive aspergillosis (IA), dramatically increases their mortality rate, length of hospital stay, and care costs, according to a new study supported in part by the Agency for Healthcare Research and Quality (HS10399). During 2000, 0.5 percent of hospitalized immunocompromised children

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Fungal infections

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developed IA. Nearly one in five (18 percent) of these children died in the hospital. Children with malignant cancer accounted for the majority (74 percent) of IA cases. The highest incidence of IA was seen in children who had undergone allogeneic bone marrow transplantation (4.5 percent) and those with acute myelogenous leukemia (4 percent).

Children with cancer and IA had a 13.5 percent higher risk of dying in the hospital than children with cancer without IA (21 vs. 1 percent). The risk of dying from IA ranged from 13 to nearly 22 times greater in children with central nervous system malignancies, acute lymphocytic leukemia, and lymphoma than it was in children with similar cancers without IA. Immunocompromised children with IA also had over 5 times longer median length of hospital stays (16 days) than their counterparts without IA (3 days), and over 5 times higher median total hospital charges ($49,309 vs. $9,035).

These findings are the first from a nationally representative study to examine IA-related outcomes and costs in immunocompromised children. They were based on retrospective analysis of hospital inpatient data from the 2000 Kids' Inpatient Database, part of AHRQ's Healthcare Cost and Utilization Project.

See "Epidemiology, outcomes, and costs of invasive aspergillosis in immunocompromised children in the United States, 2000," by Theoklis E. Zaoutis, M.D., M.S.C.E., Kateri Heydon, M.S., Jaclyn H. Chu, M.H.S., and others in *Pediatrics* 117, pp. 711-716, 2006. ■

Men's Health

Many men still confuse benign prostatic hyperplasia with prostate cancer, even after viewing an instructional videotape

Decision aids can increase a patient's knowledge about a particular medical condition or procedure, including its possible benefits and harms, but they don't always work, according to a new study supported in part by the Agency for Healthcare Research and Quality (HS10608). Researchers found that some men who watched a video about treatment for benign prostatic hyperplasia (BPH, enlarged prostate) still considered BPH and prostate cancer related to one another, despite explicit statements to the contrary in the video. Overall improved knowledge using decision aids may mask incorrect theories of disease process, suggests Margaret Holmes-Rovner, Ph.D., of Michigan State University.

Dr. Holmes-Rovner and fellow investigators analyzed transcripts from interviews about BPH treatment with a racially and ethnically diverse group of 188 men. First, the men completed a survey which measured BPH and prostate cancer knowledge, health literacy, BPH symptoms, and demographic characteristics. The men then watched an educational videotape about BPH treatment, which identified BPH as different from prostate cancer; it explicitly said the video was NOT about cancer. They then participated in a semi-structured interview while watching the video and a postvideo debriefing.

During the interviews, 18 of the men spontaneously talked about BPH and cancer as related to each other. Pre- and post-video survey responses suggested that up to 67 percent of the men persisted in misconceptions even after viewing the video. The researchers identified three basic misconceptions voiced by men while viewing the videotape: BPH and cancer are similar, BPH surgery is for removing cancer, and BPH leads to cancer. The researchers call for more studies to identify decision support designs and clinical counseling strategies to address persistence of beliefs contrary to new information presented in evidence-based decision aids.

More details are in "Men's theories about benign prostatic hyperplasia and prostate cancer following a benign prostatic hyperplasia decision aid," by Dr. Holmes-Rovner, Chrystal Price, B.A.,B.S., David R. Rovner, M.D., and others, in the January 2006 *Journal of General Internal Medicine* 21, pp. 56-60. ■

Increasing the time that nurses spend with nursing home residents is key to improving their job satisfaction

The work of nurses and certified nursing assistants (CNAs) at U.S. long-term care (LTC) facilities is physically difficult and emotionally exhausting with a turnover rate of more than 100 percent among these frontline workers. Increasing the time that nurses spend with nursing home residents is key to improving their job satisfaction, concludes a study supported by the Agency for Healthcare Research and Quality (HS12031). Researchers found that nurse satisfaction was primarily influenced by intrinsic feedback from nursing home residents: for example, when residents tell them how much their care has helped them or meant to them or when nurses are able to see the tangible results of their efforts (such as the satisfaction of seeing a resident eat well at a meal as a result of patient coaching).

The researchers conducted job design and satisfaction surveys of 1,146 employees of 20 Massachusetts LTC facilities. They also interviewed 144 employees representing all staffing levels from nursing directors to CNAs, and observed 37 frontline nurses and CNAs. Contrary to expectations, CNAs were more satisfied with their jobs than nurses and reported significantly higher levels of intrinsic feedback from residents, with whom they worked more closely than nurses. Nurses spent more time coordinating patient care than tending to patients.

For CNAs, satisfaction was influenced by task identity, autonomy, and intrinsic feedback. However, satisfaction among nurses was influenced only by intrinsic feedback from residents. In fact, nurses described lack of interaction with residents as the worst part of their jobs, along with the burden of paperwork they had to complete. The LTC administrators interviewed in this study said that retaining nurses was their main concern. The researchers suggest that managers may improve nurse retention rates by hiring nurses who are seeking less direct patient care and more managerial positions. Another approach would be to permanently assign individual nurses to certain residents with whom they could build relationships.

See "An exploration of job design in long-term care facilities and its effect on nursing employee satisfaction," by Denise A. Tyler, M.A., Victoria A. Parker, D.B.A., Ryann L. Engle, M.P.H., and others, in the April 2006 *Health Care Management Review* 31(2), pp. 137-144. ■

Health Information Technology

Computerized drug alerts when ordering medications reduce inappropriate prescribing for the elderly

Experts describe certain medications that should be avoided in elderly people due to problems such as daytime sedation and falls. Computerized alerts can substantially reduce inappropriate drug prescribing for the elderly, concludes a study supported by the Agency for Healthcare Research and Quality (HS11843). Researchers examined drug prescribing over a 39-month period for elderly patients of a large HMO, 12 months before and 27 months after implementation of computerized order entry system (CPOE) alerts. The computer alerts popped up when a clinician from 1 of 15 HMO primary care clinics ordered medications from 2 drug classes: long-acting benzodiazepines and tertiary amine tricyclic antidepressants (TCAs).

Besides noting the inappropriate prescription, the alerts also suggested alternatives, such as shorter-acting and less-sedating benzodazepines and secondary amine TCAs or other medications such as buspirone. The order could be changed by accepting the alternative medication. The alerts led to a 22 percent decline (5.1 prescriptions per 10,000 members per month) in inappropriate or nonpreferred prescribing

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Computerized drug alerts

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from these 2 drug classes compared with the month prior to the drug-specific alerts. This reduction was sustained over the entire 2-year post-alert period, and was driven primarily by decreased dispensing of nonpreferred TCAs.

Among all the medications studied, the TCAs amitriptyline and nortriptyline had the largest changes in dispensing rates. Before the alert, the nonpreferred TCA amitriptyline was prescribed more often at every time point than the preferred TCA nortriptyline. However, after the alert, this finding was reversed.

Despite decreased use of nonpreferred medications for the elderly, there was no overall offsetting increase in the use of preferred medications. This suggests that the alerts decreased overall prescribing of both nonpreferred and preferred drugs. While this may have been clinically appropriate for some patients, it is possible that others were denied appropriate medication, or the clinicians may have switched to other medications that were not included in the analysis.

More details are in "The impact of prescribing safety alerts for elderly persons in an electronic medical record," by David H. Smith, R.Ph., Ph.D., Nancy Perrin, Ph.D., Adrianne Feldstein, M.S., M.D. and others, in the May 22, 2006 *Archives of Internal Medicine* 166, pp. 1098-1104. ■

Acute Care/Hospitalization

Patient and hospital factors may contribute to worse outcomes for patients who suffer heart attacks

Patients who suffer heart attacks usually have higher mortality rates when their physician is a generalist rather than a cardiologist. This has led some to conclude that cardiologists know better than generalists how to manage heart attacks. However, patient and hospital factors may contribute to these different outcomes, suggests a new study. University of Iowa investigators Arthur Hartz, M.D., Ph.D., and Paul A. James, M.D., reviewed articles published from 1990 to 2003 that compared the mortality rates of heart attack patients of cardiologists and generalist physicians. They identified factors in each study that could have influenced the comparisons.

The studies consistently found that patients of generalists had higher unadjusted mortality rates. However, generalists' patients also were at greater risk of dying from both cardiac and noncardiac risk factors. After adjusting for patient risk factors for dying, the differences between cardiologists and generalists decreased. The studies that seemed to do the best job of taking into account patient differences had similar adjusted mortality rates for patients of cardiologists and generalists. No studies adequately took into account reasons the patient did not have care by a cardiologist, such as patient preference, severity of coexisting disease, general health status, or resource availability.

Thus, patient outcomes are often influenced by important patient or resource characteristics that were not taken into account in the studies reviewed, note the researchers. For example, the generalists may have treated higher risk patients, because patients who were too old or sick to want heroic intervention measures or revascularization procedures did not want to be referred to cardiologists. Also, generalists' patients may have had greater delay in accessing care, which increased their risk of dying. Nevertheless, this review did not resolve the appropriate role for generalists in managing heart attack patients. The study was supported in part by the Agency for Healthcare Research and Quality (HS10739).

More details are in "A systematic review of studies comparing myocardial infarction mortality for generalists and specialists: Lessons for research and health policy," by Drs. Hartz and James, in the May 2006 *Journal of the American Board of Family Medicine* 19(3), pp. 291-302. ■

Men, young children, and elderly people are most likely to sustain traumatic brain injury from blunt head trauma

Significant traumatic brain injury (TBI), which occurs in 5 to 10 percent of all patients with blunt head trauma, can cause serious problems and death. Examples of TBIs include skull fractures, hematomas, diffuse cerebral edema, intraventricular hemorrhage, and multiple cerebral contusions. Among emergency department (ED) patients who underwent computed tomography (CT) for blunt head trauma at 21 hospital EDs, men, children younger than 10 years, and elderly people were most likely to have significant TBI. This information might help determine ED physicians' thresholds to use CT in patients of extreme ages.

Anatomic factors may play a prominent role in TBI in children. Children have larger head-to-body ratios that may allow more energy from a traumatic impact to be distributed to their head. Also, certain mechanisms of injury are unique to children and may increase the risk of TBI, such as child abuse. The increased risk of TBI in the elderly may be secondary to several factors. Stretching of bridging veins as a consequence of cerebral atrophy, and being on blood thinners (common in the elderly) may increase elderly risk of serious TBI associated with even minor blunt trauma. Also, the elderly are prone to falling, which is also associated with TBIs.

Age also plays a role in the type of injury sustained. For example, nearly half the children younger than 10 years with TBI had a skull fracture, but less than 20 percent of those older than 65 did. Similarly, intraparenchymal hemorrhages were exceedingly rare in children younger than 10 years. Epidural hematoma was much less common among the elderly, perhaps due to increased adherence of the dura mater to the skull with aging.

Finally, men were about 30 percent more likely to suffer a TBI than women, highlighting the public health problem of trauma in the male population. The study was supported by the Agency for Healthcare Research and Quality (HS09699).

See "Epidemiology of blunt head injury victims undergoing ED cranial computed tomographic scanning," by James F. Holmes, M.D., M.P.H., Gregory W. Hendey, M.D., Jennifer A. Oman, M.D., and others, in the March 2006 *American Journal of Emergency Medicine* 24, pp. 167-173. ■

Depression among heart attack survivors can persist for a year after leaving the hospital

From one-fifth to nearly one-third of patients hospitalized for heart attack suffer from significant depression afterwards, according to a recent review of studies on the topic. A significant proportion of these patients continue to be depressed in the year after they leave the hospital. Patients who have had a heart attack and also have depression are more likely to have unhealthy blood thickening, are less likely to comply with therapy, and are more likely to die than their counterparts without depression.

Thus, screening hospitalized heart attack patients for depression seems like a good idea, but screening results will differ considerably, depending on the method of depression screening used. Structured interviews identified major depression in 1 in 5 patients (20 percent). The Beck Depression Inventory identified mild-to-moderate depression (score of 10) in 1 in 3 patients (31 percent). Using a Hospital Anxiety and Depression Scale (HADS) score of 8 percent or more, 15.5 percent of heart attack patients had possible clinically significant depression. An HADS score of 11 percent or more identified 7.3 percent with probable clinically significant depression.

It seems reasonable to use a validated questionnaire to screen heart attack patients for symptoms of depression while they are hospitalized, and then to assess patients who screen positive using a structured clinical interview, suggest the researchers. Although a substantial proportion of patients continued to be depressed in the year after discharge, only four studies examined this issue. The findings were based on a systematic review of research studies on the prevalence of depression among heart attack survivors that were published from 1980 through April 2004, and included data on more than 14,000 patients. The study was supported by the Agency for Healthcare Research and Quality (290-02-0018).

More details are in "Prevalence of depression in survivors of acute myocardial infarction: Review of the evidence," by Brett D. Thombs, Ph.D., Eric B. Bass, M.D., M.P.H., Daniel E. Ford, M.D., and others, in the January 2006 *Journal of General Internal Medicine* 21, pp. 30-38. ■

"Off-pump" bypass surgery is associated with reduced occurrence of stroke and other complications

Performing a common heart surgery without bypassing the cardiopulmonary system may cut down on the number of surgery-related strokes and other short-term complications, according to a new report by the Agency for Healthcare Research and Quality (AHRQ). Traditionally, coronary artery bypass graft (CABG) surgery has depended heavily on cardiopulmonary bypass (CPB), particularly as the harmful effects of CPB have been reduced. However, many cardiac surgeons have become interested in avoiding CPB altogether, a procedure known as "off-pump" CABG surgery. CABG surgery creates new paths around blocked arteries to improve blood flow to the heart. CPB stops the heart to allow surgeons to create the new pathways. The surgery was originally conceived as requiring CPB; however, CPB carries risks of adverse effects on the heart, brain, lungs, kidney, and other organs, and some surgeons believe that CPB is not required for a surgery aiming to restore blood supply to the heart—leading them to consider off-pump CABG as a less-invasive alternative with the potential to be less costly.

Researchers found that off-pump CABG is associated with lower incidence of stroke, atrial fibrillation, and health care-associated infection. The study, conducted by Artyom Sedrakyan, M.D., Ph.D., a cardiothoracic surgeon and health services researcher at AHRQ, and colleagues, is the first to document significant benefits of off-pump CABG in randomized trials. Specifically, they found the off-pump procedure could prevent approximately 10 strokes per 1,000 CABGs, a 50 percent reduction in the risk faced by patients undergoing the surgery.

The researchers analyzed data from 41 randomized clinical trials that included 3,996 patients whose procedures took place after 1999. They found that off-pump CABG was associated with a 30 percent reduction in atrial fibrillation (abnormal heart rhythm) and a 48 percent reduction in wound infection (translating to avoidance of 80 cases of atrial fibrillation and 40 infections, respectively, per 1,000 off-pump CABGs).

The study also found that off-pump surgery often involved fewer grafts to bypass coronary lesions as compared with traditional surgery. Fewer grafts could lead to re-interventions, such as repeat angioplasties or surgeries, and have unknown long-term effects. However, researchers found evidence that the difference between off-pump and traditional surgery in the number of bypass grafts used seemed to be small in studies in which more surgeries were performed. This indicates a relationship between the volume of procedures and their outcome. In other words, off-pump surgeries are more successfully performed at facilities that perform many of them.

Dr. Sedrakyan cautioned that this report provides limited evidence of off-pump CABG's benefits. He notes that traditional CABG may still be warranted in many cases and that off-pump CABG carries its own risks, and requires substantial training to learn and perform comfortably.

See "Off-pump surgery is associated with reduced occurrence of stroke and other morbidity as compared with traditional coronary artery bypass grafting," by Dr. Sedrakyan, Albert W. Wu, M.D., M.P.H., Amish Parashar, M.Sc., M.P.H., and others, in the November 2006 *Stroke* 37(11), pp. 2759-69. Reprints (AHRQ Publication No. 07-R011) are available from AHRQ.* ■

Oncology nurses tend to follow guidelines to alleviate post-prostatectomy symptoms

Men who have undergone surgical removal of the prostate (prostatectomy) due to prostate cancer can suffer from pain, incontinence, impotence, and depression. Oncology advanced practice nurses (APNs) appear to follow clinical guidelines aimed at alleviating their pain, incontinence, and depression, concludes a new study. APNs consistently followed clinical guidelines for treating pain a mean of 91 percent of the time, incontinence 80 percent of the time, and depression 69 percent of the time. APNs may be a valuable resource to generalist nurses, helping them interpret and implement guidelines and influencing the overall quality of

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Oncology nurses

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care delivery, suggests Regina S. Cunningham, Ph.D., R.N., A.O.C.N., of the Yale University School of Nursing.

In the study, 12,317 nursing interventions documented in nursing logs were coded as consistent or not consistent with clinical guidelines. Most of the interventions were related to managing urinary incontinence (60 percent), followed by pain interventions (33 percent), and interventions focused on depressive symptoms (7 percent). Nurses were described as consistently following clinical guidelines if they performed 75 percent or more interventions that followed the guidelines.

Yet consistency did not predict patient outcomes. This may have been due to the small sample of 59 men who underwent prostatectomy. Also, nurses varied little in their consistency of following guidelines, making it more difficult to determine differences in outcomes of patients for whom guidelines were not followed. Finally, nurse interventions that were not consistent with clinical guidelines were, in many respects, congruent with good clinical practice. The study was supported in part by the Agency for Healthcare Research and Quality (HS13124).

See "Clinical practice guideline use by oncology advanced practice nurses," by Dr. Cunningham, in the August 2006 *Applied Nursing Research* 19, pp. 126-133. ■

Risk models can help predict medical and surgical complications of carotid endarterectomy

Carotid endarterectomy (CEA), the surgical removal of plaque from the carotid artery so that it can better supply oxygenated blood to the brain, is performed to reduce the risk of stroke. Ethan A. Halm, M.D., M.P.H., of the Mount Sinai School of Medicine in New York, and colleagues compared the predictive ability of 6 risk indexes to predict complications among a group of 1,998 patients who underwent CEA at 6 hospitals. They evaluated the ability of four cardiac risk indexes - the Goldman, Detsky, and Revised Cardiac Risk (RCR) Indexes and the American Society of Anesthesiologists index, as well as two CEA-specific risk models (the Halm and Tu scores) to predict a broad range of complications within 30 days of surgery.

Overall, 3.2 percent of patients died or suffered a stroke, 4 percent developed cardiac complications, 3.2 percent developed noncardiac medical complications, 6.9 percent suffered from minor neurologic complications, and 6 percent developed wound complications. Patients with cardiac, noncardiac medical, minor neurologic, or wound complications had 3- to 16-fold greater likelihood of dying or suffering a stroke.

Overall, a CEA-specific risk model (Halm score) had the best overall performance. It was superior for predicting the most important complications of death and stroke. It also predicted all other medical, neurological and surgical complications. Among the generic cardiac risk assessment tools, all cardiac indices predicted cardiac outcomes equally, and the RCR index performed best in predicting the broad range of major and minor complications of CEA. The study was supported by the Agency for Healthcare Research and Quality (HS09754).

See "Predicting medical and surgical complications of carotid endarterectomy," by Matthew J. Press, M.D., Mark R. Chassin, M.D., M.P.H., Jason Wang, Ph.D., and others, in the April 24, 2006 *Archives of Internal Medicine* 166, pp. 914-920. ■

Pharmaceutical Research

Faxed pharmacy alerts to doctors when patients miss their antidepressant prescription refill does not improve compliance

Only about one-fourth of patients diagnosed with depression take antidepressant medication for the 6 months recommended by the National Committee on Quality Assurance and others, concludes a new study. Over a 6-month period, researchers found that 75 percent of patients with depression delayed refilling their antidepressant prescription 10 days beyond when their last prescription should have

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Faxed pharmacy alerts

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been completed. Many of these patients did not refill their prescription within 30 days. This suggests that those with 10-day refill gaps are quite likely to drop the medication altogether.

The researchers also found that a pilot program did not improve compliance with antidepressant therapy. The antidepressant compliance program (ACP) used pharmacy faxes to alert physicians when their patients had gaps of more than 10 days in refilling antidepressant prescriptions during the first 6 months of treatment. Following the beginning of the ACP, there was an immediate, but insignificant, 2 percent decrease in medication noncompliance. Thus, faxed pharmacy feedback to physicians should be carefully evaluated before widespread implementation. It is insufficient as a stand-alone tool, conclude researchers at the HMO Research Network Center for Education and Research in Therapeutics (CERTS), which is supported by the Agency for Healthcare Research and Quality (HS10391).

The researchers used pharmacy claims data between May 2002 and May 2004 to examine the impact of the ACP, begun in May 2003, on antidepressant compliance among 13,128 members diagnosed with depression in a managed care plan in 3 States. They examined compliance rates before and after program inception. Rates of nonadherence among the adults who started antidepressant treatment remained relatively constant, averaging about 75 percent over the 2-year study period. Rates were the same whether patients were treated by psychiatrists or internal medicine physicians.

See "Physician alerts to increase antidepressant adherence: Fax or fiction?" by Kara Zivin Bambauer, Ph.D., Alyce S. Adams, Ph.D., Fang Zhang, Ph.D., and others in the March 13, 2006 *Archives of Internal Medicine* 166, pp. 498-504. ■

States with longstanding opioid prescription monitoring programs have fewer outpatient prescriptions for opioid analgesics

Use of opioid analgesics such as morphine and oxycodone, which are typically used for postoperative and other severe pain, increased steadily from 1990 to 2002. Because of their potential for abuse and addiction, opioid analgesics are regulated under Federal laws as Schedule II controlled substances. States vary substantially in the number of prescriptions for Schedule II oral opioid analgesics and specifically for controlled-release oxycodone. However, States with longstanding opioid prescription monitoring programs have the lowest rates of outpatient prescriptions for opioid analgesics, according to a new study. Some States, for example, require the physician to save duplicate copies of these prescriptions.

The study was conducted by researchers at the Center for Education and Research on Therapeutics at the University of Arizona Health Sciences Center, which is supported by the Agency for Healthcare Research and Quality (HS10385). They measured the prevalence of outpatient claims for opioid analgesics and controlled-release oxycodone at the State level based on the drug claims database of a national pharmaceutical benefit manager for nearly 8 million people in 2000. They also examined factors related to opioid analgesic claims at the county level.

A total of 567,778 claims (64.2 per 1,000 claims) were for oral opioid analgesics. Claim rates by State ranged from fewer than 20 to more than 100 claims per 1,000 total claims. In the county-level data, presence of a State-wide opioid prescription monitoring program and proportions of the population aged 15 to 24 and 65 years and older were independently and negatively associated with claim rates for all opioid analgesics. Surgeons per 1,000 claims, the proportion of the population reporting illicit drug use, and the proportion who were female were independently and positively associated with claim rates for all opioid analgesics. Only the proportion of the population aged 25 to 32 and number of surgeons per 1,000 claims were independently and positively associated with claim rates for oxycodone.

More details are in "Geographic variation in the prescription of schedule II opioid analgesics among outpatients in the United States," by Lesley H. Curtis, M.S., Ph.D., Jennifer Stoddard, M.S., Jasmina I. Radeva, M.A., and others, in the June 2006 *HSR: Health Services Research* 41(3), pp. 837-855. ■

Many outpatients taking drugs with a narrow therapeutic range do not receive drug concentration monitoring to prevent toxicity

Therapeutic drug monitoring is useful for avoiding drug toxicity for patients taking drugs that have a narrow therapeutic range (NTR). Yet a substantial number of outpatients using these drugs go 12 months or longer without receiving blood tests to monitor drug concentration, according to a new study. NTR drugs are those in which there is a narrow range between the dose necessary to achieve beneficial effects and the dose that causes serious adverse effects when there is a direct concentration-effect relationship. Drug monitoring that evaluates the drug's concentration in the blood can help individualize the drug dosage and the dosing interval. This, in turn, can minimize the toxicity and maximize the therapeutic benefit of NTR drugs, explain researchers at the HMO Research Network Center for Education and Research in Therapeutics.

The researchers retrospectively examined the monitoring of NTR drugs among 17,748 ambulatory patients at 10 HMOs, who were receiving ongoing continuous therapy with specific NTR drugs for at least 12 months between January 1, 1999 and June 30, 2001. They assessed serum drug concentration monitoring from administrative data and from medical record data. Fifty percent or more of patients receiving digoxin, theophylline, procainamide, quinidine, or primidone were not monitored, and 25 to 50 percent of patients receiving divalproex, carbamazepine, phenobarbital, phenytoin, or tacrolimus were not monitored. In contrast, lithium and cyclosporine drug serum concentrations were monitored in most patients.

Younger patients were 1.5 to nearly 2 times more likely than older patients to not be monitored for digoxin and theophylline, respectively. Older patients were half as likely to be monitored for carbamazepine and divalproex. Patients with fewer outpatient visits were less likely to be monitored in general. The study was supported by the Agency for Healthcare Research and Quality (HS11843).

More details are in "Monitoring of drugs with a narrow therapeutic range in ambulatory care," by Marsha A. Raebel, Pharm.D., Nikki M. Carroll, M.S., Susan E. Andrade, Sc.D., and others, in the May 2006 *American Journal of Managed Care* 12, pp. 268-274. ■

HIV/AIDS Research

More convenient HIV treatment can be as effective as more complex regimens

HIV treatment regimens based on a non-nucleoside reverse transcriptase inhibitor (NNRTI) are at least as effective as treatment with a protease inhibitor, but require patients to take fewer pills each day, according to a new study supported in part by the Agency for Healthcare Research and Quality (290-02-0024).

Researchers found that disease progression was similar for both regimens, but NNRTI-based treatment appeared more effective at decreasing the amount of virus in the blood. The new study is the first to review all published research that directly compares the two classes of antiretroviral drugs used in highly active antiretroviral therapy (HAART). NNRTI-based regimens were found to be up to 60 percent more likely to suppress the amount of virus in patients' blood than protease inhibitor-based regimens. The percentages of patients who died or experienced disease progression were similar between the two treatments, and the number of patients who stopped taking the medications because of side effects or adverse events was also similar.

Roger Chou, M.D., and colleagues from the Oregon Health & Science University in Portland completed an analysis of 26 trials, including 12 head-to-head trials comparing NNRTI-based regimens with protease inhibitor-based regimens. Fourteen other trials compared two-drug regimens with either NNRTI-based or protease inhibitor-based, triple-drug regimens. Among 3,337 patients analyzed in the head-to-head trials, NNRTI-based regimens were 20 to 60 percent better than protease inhibitor-based regimens at achieving viral suppression.

Dramatic decreases in the rate of HIV-related illnesses and deaths have occurred since the introduction of HAART therapy using three or more antiretroviral

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agents. However, until now, comparisons of head-to-head trials were not available to support selection of a protease inhibitor or an NNRTI as part of that combination therapy. Researchers concluded that earlier analyses might be unreliable because their results differed dramatically from the analysis of head-to-head trials, even after excluding patients who had previously received HIV therapy and those who had received older NNRTIs, such as delaviridine, that are now used infrequently because they are less effective. Prior antiretroviral treatment can cause drug resistance and treatment failure.

See "Initial highly-active antiretroviral therapy with a protease inhibitor versus a non-nucleoside reverse transcriptase inhibitor: Discrepancies between direct and indirect meta-analyses," by Dr. Chou, Rongwei Fu, Ph.D., Laurie Hoyt Huffman, M.S., and P. Todd Korthius, M.D., in the October 28, 2006 *Lancet* 368, pp. 1503-1515. ■

Health Care Costs and Financing

Physicians view some financial incentives as encouraging and others as discouraging services to patients

Physicians often face a complex and cascading set of financial incentives from health plans, physician groups, and others. Incentive structures can differ in how strongly they apply to an individual physician and can sometimes have contradictory influences on physicians within the same practice. Physicians vary in their perceptions of how these incentives motivate an increase or decrease in services to individual patients, according to a study supported in part by the Agency for Healthcare Research and Quality (HS10803).

The Community Tracking Study Physician Survey of over 12,000 physicians revealed that 70 percent of physicians considered that their financial incentives had a neutral effect on the quantity of services they provided. However, 7 percent of physicians believed that financial incentives prompted physicians to reduce services to patients, whereas 23 percent stated that they encouraged increased services. Productivity was the factor most often cited by physicians as affecting their compensation.

Working in a practice with capitated revenue and, for primary care physicians, participation in gatekeeping arrangements, were associated with incentives to provide fewer services. Physicians also felt that incentives to reduce services lowered their ability to provide quality care.

Physicians with financial incentives incorporated into physician compensation through adjustable salaries, bonus payments, or through partial group ownership, were more likely to report incentives as encouraging more services to patients. Full ownership of groups, productivity incentives, and perceived competitive markets for patients were associated with incentives to both increase and reduce services. Physician group owners receive a share of the residual profits and are more likely to be aware of and internalize incentives from contractual arrangements with heath plans than employee physicians. Nearly 44 percent of surveyed physicians were employees, 24 percent were part owners, and 32 percent were full owners of their practices.

More details are in "Effects of compensation methods and physician group structure on physicians' perceived incentives to alter services to patients," by James D. Reschovsky, Ph.D., Jack Hadley, Ph.D., and Bruce E. Landon, M.D., M.B.A., in the August 2006 *HSR: Health Services Research* 41(4), pp. 1200-1220. ■

Pay-for-performance incentives were adopted by half of U.S. HMOs, but their use depends on health plan type and physician payment arrangements

More than half of the nation's HMOs used pay-for-performance programs in their contracts with doctors or hospitals in 2005, according to a new study supported by the Agency for Healthcare Research and Quality (HS13335). Researchers found that nearly 90 percent of health plans with pay-for-performance programs included these arrangements as part of their physician

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Pay-for-performance

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compensation and 38 percent included them in their hospital contracts.

Pay-for-performance arrangements are an increasingly popular way for payers to reward doctors and hospitals for adhering to evidence-based standards of clinical care. According to the study findings, these arrangements are more often associated with HMOs that use primary care physicians as gatekeepers to specialty care, use "capitation" arrangements that give primary care doctors set payments each month based on the number of patients they have in a given health plan, or are themselves rewarded by performance-based incentives.

Researchers from the Harvard School of Public Health and Harvard Medical School in Boston surveyed health plans with at least 100,000 HMO enrollees that offered commercial HMO products in 41 U.S. markets. The markets in the sample represented 91 percent of U.S. HMO enrollees and 78 percent of the U.S. metropolitan population.

Health plan respondents answered a series of questions about characteristics that might be associated with the use of pay-for-performance arrangements and their scope and structure. For example, information pertaining to physicians' participation in pay-for-performance programs focused on the magnitude and structure of incentive payments, the types of performance indicators included (clinical quality, patient satisfaction, information technology, and cost/efficiency), and whether physicians practiced individually or as a group.

For hospital pay-for-performance programs, researchers asked about three specific measures promoted by the Leapfrog Group, a quality improvement organization. Those measures included intensive care unit staffing, use of computerized physician order entry systems, and volume standards for high-risk procedures.

Of the 242 HMOs surveyed, 52 percent said they used pay-for-performance in provider contracts in 2005. The 126 HMOs using these programs represented 81 percent of enrollees in the sampled plans (the average enrollment in each sample plan was 323,553). HMOs that required enrollees to designate a primary care physician as a gatekeeper to specialty services were more likely to use pay-for-performance programs compared with those who did not require this designation (61 vs. 25 percent).

Among 113 HMOs using pay-for-performance programs for physicians, 13 percent focused on the individual doctor as the unit of payment. One-third of programs were designed to reward only the top-rated physicians or physician groups. Nearly two-thirds offered rewards for attaining a predetermined performance threshold. The bonus potential for physicians in these programs was generally equal to 5 percent of payments from the plan.

See "Pay for performance in commercial HMOs," by Meredith B. Rosenthal, Ph.D., Bruce E. Landon, M.D., M.B.A., Sharon-Lise T. Normand, Ph.D., and others, in the November 2, 2006 *New England Journal of Medicine* 355(18), pp. 1895-1902. ■

HMOs do not appear to adversely affect the health of the near-elderly and may benefit those with chronic health conditions

HMOs are a major and growing source of health insurance for the near-elderly (those aged 55 to 64) in the United States. Many have questioned the use of capitation by HMOs (doctors are reimbursed a set fee per patient, regardless of services provided), saying it motivates providers to order fewer tests or perform fewer procedures and puts the patient's needs last. However, a new study, supported by the Agency for Healthcare Research and Quality (HS13992), found no ill effects of HMOs on the health status of the near-elderly. In fact, those with chronic health conditions actually fared better upon enrolling in managed care plans.

Xiao Xu, Ph.D., of the University of Michigan, and Gail A. Jensen, Ph.D., of Wayne State University, studied 4,044 adults with employer-sponsored health insurance who participated in the 1994 to 2000 waves of the Health and Retirement Study, a national survey. The researchers developed a model to examine whether enrolling in an HMO or Preferred Provider Organization (PPO) affected the health of this group and a subgroup of those with chronic health problems such as arthritis, high blood pressure, and diabetes. The model included the type of health insurance plan (HMO or PPO), lifestyle behaviors, demographics, family characteristics, baseline health, and survey year.

The study uncovered some modest beneficial effects of HMOs on adults in this age group who had

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serious and longstanding chronic health conditions. They were 1.26 times as likely to report very good as opposed to good health when they were enrolled in HMOs. For relatively healthy near-elders, however, being in a particular type of plan—whether HMO, PPO, or fee-for-service (FFS)—had no bearing on health status. The typical benefit provisions in HMOs may underlie their benefit to the chronically ill. Most HMO plans charge either nothing or a very modest copay ($10 to $20) for a doctor's visit, whereas PPOs and FFS plans generally entail higher out-of-pocket expenses via both an annual deductible and coinsurance for expenses above the deductible. HMOs also emphasize preventive care, preventing the worsening of diagnosed chronic conditions.

See "Health effects of managed care among the near-elderly," by Drs. Xu and Jensen, in the August 2006 *Journal of Aging and Health* 18(4), pp. 507-533. ■

Agency News and Notes

Fewer women are having inpatient breast cancer surgery

Hospital admissions for breast cancer fell by a third between 1997 and 2004, according to a new report by the Agency for Healthcare Research and Quality (AHRQ). The decline reflects, in part, the shift to outpatient facilities for breast cancer surgeries, plus the growing use of breast-conserving operations such as lumpectomies, which are typically performed on an outpatient basis.

The hospitalization rate for women with breast cancer dropped from 90 per 100,000 women to slightly fewer than 61 per 100,000 women during the period, and the number of hospital stays for the disease declined from about 125,000 to 90,000. The study also found that:

- In 2004, mastectomies – the removal of the entire breast and some of the lymph nodes under the arm – accounted for 70 percent of breast cancer surgeries in the hospital. Lumpectomies, which remove the malignant tumor and some surrounding tissue, comprised 14 percent.
- Between 1997 and 2004, inpatient mastectomy rates decreased by 32 percent and lumpectomy rates fell by 45 percent.
- Breast cancer hospitalizations occurred the most in Massachusetts, New York, Pennsylvania, and other northeastern States (76 per 100,000 women), and the least in Arizona, California, Hawaii, and other western States (54 per 100,000 women).
- The average cost for a breast cancer patient stay – what it cost hospitals to treat the patients — was $6,500, and nearly 85 percent of all hospital stays were billed to private insurance and Medicare.

These statistics are from the Nationwide Inpatient Sample, a database of hospital inpatient stays that is nationally representative of all short-term, non-Federal hospitals. The data are drawn from hospitals that comprise 90 percent of all discharges in the United States and include all patients, regardless of insurance type as well as the uninsured. For more data, see *Hospital Stays for Breast Cancer, 2004, HCUP Statistical Brief #15* at http://www.hcup-us.ahrq.gov/reports/statbriefs/sb15.pdf. ■

Scientific evidence is lacking for patients choosing among treatments for narrowed kidney arteries

Increasing numbers of patients with narrowed renal (kidney) arteries are undergoing vessel-widening angioplasty and placement of a tubular stent, but the latest scientific evidence does not show a clear advantage of that treatment over prescription drug therapy, according to a new review funded by the Agency for Healthcare Research and Quality (AHRQ). The review, titled *Comparative Effectiveness of Management Strategies for Renal Artery Stenosis,* is the newest in a series of Comparative Effectiveness Reviews produced by AHRQ's Effective Health Care Program.

Narrowed kidney arteries – a condition known as renal artery

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Narrowed kidney arteries

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stenosis (RAS) – are the most common cause of correctable high blood pressure. The progressive condition reduces the supply of blood to the kidneys. In most cases, the problem is caused by atherosclerosis, the gradual build-up of fat-containing plaque. RAS may occur alone or in combination with high blood pressure and chronic kidney disease. It is found in about 30 percent of patients with coronary artery disease and up to 50 percent of seniors or people who have diffuse atherosclerotic vascular diseases.

RAS patients have three treatment options: angioplasty, which reopens the narrowed artery with a small balloon; angioplasty in combination with a stent, a metal mesh tube placed inside the artery; or therapy with drugs, such as angiotensin converting enzyme (ACE) inhibitors or angiotensin-receptor blockers (ARBs), calcium channel blockers, and/or beta blockers. Some doctors also recommend statins to lower cholesterol, or antiplatelet medicines, such as aspirin. Patients treated only with drugs, which may need to be taken for a lifetime, can experience diminished kidney function due to RAS. That can lead to sickness and death, and these patients may be at increased risk of heart disease. However, it is unclear whether angioplasty leads to better outcomes for most patients.

While many RAS patients are treated with drugs, a growing number of RAS patients are opting for angioplasty. Medicare data show that angioplasty more than doubled from 7,660 in 1996 to 18,520 in 2000. The average charge of RAS angioplasty done in the hospital was $27,800 in 2004, according to data from AHRQ's Healthcare Cost and Utilization Project. The procedure, like any surgery, carries risks of complications or even death. In addition, the durability of benefits of angioplasty with or without a stent is unclear.

AHRQ's new review of published studies, completed by the Agency's Tufts-New England Medical Center Evidence-based Practice Center, has concluded:

- Available evidence on RAS treatments is inadequate to clearly support angioplasty, with or without a stent, over drug therapy. No studies have directly compared the use of stents versus medications.
- The published literature did confirm that drug therapy and angioplasty both improve blood pressure, and they have similar impacts on slowing down the worsening of kidney function. But actual improvements in kidney function have only been reported in angioplasty studies that lacked direct comparisons with other therapies.
- For people with stenosis in both renal arteries, angioplasty may control blood pressure better than drug therapy alone.
- The evidence is inadequate to determine whether the treatments differ in lowering the risks of death, kidney failure, or heart disease.
- The risks of adverse events have not been adequately measured. Some studies suggested up to 3 percent of angioplasty patients died within 30 days. Other risks of angioplasty include kidney deterioration, injury to the renal artery or kidney tissue, and heart attack.
- Adverse events related to blood pressure medications (ACE inhibitors, beta blockers, and hydralazine) include dizziness when standing, problems with the digestive or nervous systems, and Raynaud's syndrome, which restricts blood flow to the fingers and toes.

A summary and full report of the *Comparative Effectiveness of Management Strategies for Renal Artery Stenosis* are available at the Effective Health Care Web site at http://www.effectivehealthcare.ahrq.gov. Printed copies of the executive summary (AHRQ Publication No. 07-EHC004-1) are also available from AHRQ.* ■

Influenza is the most deadly illness for the very elderly

Nearly 8 percent of patients age 85 and older who are hospitalized for influenza do not survive the disease. This death rate is more than twice the 3 percent for hospitalized patients aged 65 to 84, according to a new report by the Agency for Healthcare Research and Quality (AHRQ).

Influenza, or flu, is a contagious respiratory illness caused by viruses. Flu kills more than 36,000 Americans each year and afflicts between 5 and 20 percent of the U.S. population, according to Federal estimates. Experts endorse vaccinations though November and December since most flu activity occurs in January or later in most years.

The study also concluded that:

- More than 21,000 people were hospitalized specifically for influenza in 2004—a 62 percent decrease from 2003, but twice the number of hospitalizations in 2001.

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Influenza

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- Elderly patients were the most likely to be hospitalized for influenza. Among those 65 or older, there were 28 hospitalizations per 100,000 population, a rate that is over 3 times higher than the rate for children younger than 18 (8 hospitalizations per 100,000). Among younger adults (aged 18 to 44 and 45 to 64), there were 2 to 4 hospitalizations, respectively, per 100,000 population.
- Among those elderly patients who were hospitalized for influenza or had influenza in addition to other problems, about 75 percent were admitted through hospital emergency departments.
- Patients hospitalized for influenza stayed an average 5.3 days, slightly longer than the 4.6 average days for other illnesses.

These statistics are from the Nationwide Inpatient Sample, a database of hospital inpatient stays that is nationally representative of all short-term, non-Federal hospitals. The data are drawn from hospitals that comprise 90 percent of all discharges in the United States and include all patients, regardless of insurance type as well as the uninsured. For more data, see *Hospital Stays for Influenza, 2004, HCUP Statistical Brief* #16 (www.hcup-us.ahrq.gov/reports/statbriefs.jsp). ■

Announcements

AHRQ and United Health Foundation to distribute the latest clinical prevention recommendations

The Agency for Healthcare Research and Quality (AHRQ) is partnering with United Health Foundation to distribute more than 400,000 copies of the *2006 Guide to Clinical Preventive Services*, a new guide to evidence-based clinical preventive services recommendations, to clinicians nationwide.

The guide contains 53 new or revised recommendations from the AHRQ-sponsored U.S. Preventive Services Task Force, which is the leading independent panel of private-sector experts in prevention and primary care. It conducts rigorous, impartial assessments of the scientific evidence for a broad range of preventive services, and their recommendations are considered the gold standard for clinical preventive services.

Recommendations focus on screenings for obesity, breast cancer, abdominal aortic aneurysm, and HIV; hormone therapy for the prevention of chronic conditions in postmenopausal women; and diet and behavioral counseling. The recommendations are grouped by cancer; cardiovascular problems; infectious diseases; mental and substance abuse disorders; metabolic, nutritional, and endocrine disorders; musculo-skeletal conditions; and obstetric and gynecological conditions.

United Health Foundation is working with medical and nursing societies, including the American College of Physicians, the American Academy of Family Physicians, the American Academy of Pediatrics, the American Academy of Nurse Practitioners, and the American Osteopathic Association to provide free copies of the guide to their members.

AHRQ will also distribute the guide on request. For a free copy of *The Guide to Clinical Preventive Services 2006: Recommendations of the U.S. Preventive Services Task Force*, go to http://www.ahrq.gov/clinic/pocketgd.htm. Print copies (AHRQ Publication No. 06-0588) are also available from AHRQ.* ■

AHRQ launches Electronic Preventive Services Selector (ePSS) tool for primary care clinicians

A new Electronic Preventive Services Selector (ePSS) tool for primary care clinicians to use when recommending preventive services for their patients was unveiled by the Agency for Healthcare Research and Quality (AHRQ) at the National Prevention Summit on October 26, 2006. The interactive tool is designed for use on a personal digital assistant (PDA) or desktop computer to allow clinicians to access the latest recommendations from the AHRQ-sponsored U.S. Preventive Services Task Force. The tool can be viewed and is available for download from the AHRQ Web site at www.ePSS.ahrq.gov.

The ePSS is designed to serve as an aid to clinical decisionmaking at the point of care and contains 110 recommendations for specific populations covering 59 separate preventive services topics. The "real time" search function allows a clinician to input a patient's age, gender, and selected behavioral risk factors, such as whether or not they smoke, in the appropriate fields. The software cross-references the patient characteristics entered with the applicable Task Force recommendations and generates a report specifically tailored for that patient.

The associated database includes information on screening tests ranging from mammograms to ultrasound tests to detect abdominal aortic aneurysms, as well as counseling topics and information on preventive medications. The ePSS PDA has user-friendly components that makes it easy to navigate and allows it to work on platforms for Palm and Windows® operating systems. The desktop computer version also provides clinicians with the ability to print out individualized health reports that can be shared with their patients.

In addition, AHRQ recently released the Adult Preventive Services Timeline, a wall chart based on Task Force recommendations that illustrates who needs preventive services and when.

The chart is available for downloading from the AHRQ Web site at www.ahrq.gov/ppip/timelinead.pdf. Print copies (AHRQ Publication No. APPIP06-IP001) are also available from AHRQ.* ■

New disaster-preparedness resource provides valuable information for pediatricians and emergency response planners

The Agency for Healthcare Research and Quality (AHRQ), in partnership with the American Academy of Pediatrics, has released *Pediatric Terrorism and Disaster Preparedness: A Resource for Pediatricians*. The resource is intended to increase awareness of the unique needs of children and encourage collaboration among pediatricians, State and local emergency response planners, health care systems, and others involved in planning and response efforts for natural disasters and terrorism.

Children have increased vulnerability to injury from catastrophic events because of their unique anatomic, physiologic, immunologic, and developmental characteristics. Local, State, regional, and Federal emergency response plans that recognize and address these differences can reduce harm and even save lives, according to the resource.

The publication provides an overview of the role of national, regional, and local emergency response systems before, during, and after disasters and terrorism events. The pediatrician's role in collaborating with this infrastructure and local emergency departments, schools, and daycare facilities is highlighted. Individual chapters provide detailed information on the triage, supportive care, and referral of children affected by natural, biological, chemical, radiological, nuclear, and blast events. Children's emotional and mental health needs are also described, including the treatment of post-traumatic stress disorder, depression, and behavioral problems that often result from these incidents. In addition to advice on integrating the information into emergency response plans, the resource also contains an extensive list of suggested references and a discussion of lessons learned from Hurricane Katrina.

Development of the resource was funded by AHRQ, the Office of Public Health Emergency Preparedness, and the Health Resources and Services Administration. The resource is available online at www.ahrq.gov/research/pedprep/resource.htm. Printed copies of *Pediatric Terrorism and Disaster Preparedness: A Resource for Pediatricians* (AHRQ Publication No. 06-0056) and the summary

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(AHRQ Publication No. 06-0048) are available from AHRQ.*

Editor's note: AHRQ has several related resources to help clinicians, policymakers, and the public address the special needs of children in emergency situations, including the report *Pediatric Anthrax: Implications for Bioterrorism Preparedness* (go to www.ahrq.gov/clinic/tp/pedanthtp.htm) and the video *Decontamination of Children: Preparedness and Response for Hospital Emergency Departments* (for information about the video and to see a clip, go to www.ahrq.gov/research/decontam.htm). To learn more about all AHRQ-supported research, tools, and activities related to bioterrorism and public health emergency preparedness, visit the AHRQ Web site at www.ahrq.gov/browse/bioterbr.htm. ■

Research Briefs

Baker, R.S., Bazargan, M., Calderon, J.L., and Hays, R.D. (2006, August). "Psychometric performance of the National Eye Institute Visual Function Questionnaire in Latinos and non-Latinos." (AHRQ grant HS14022). *Opthalmology* 113, pp. 1363-1371.

A growing number of health surveys are being adapted for the large Spanish-speaking population and other ethnic groups in the United States. This study found that the overall performance of the National Eye Institute Visual Function Questionnaire (NEI VFQ) in the Latino population was adequate. However, in the absence of modifications to improve the reliability of specific Spanish version subscales, comparisons between Latino and non-Latino groups using the NEI VFQ must be interpreted with caution, note the researchers. They compared the psychometric performance of Spanish versions of the 25-item NEI VFQ and the 30-item NEI VFQ administered to Latino patients with the psychometric performance of the same tests administered to non-Latino patients.

Corriveau, C., and Slonim, A.D. (2006). "Improving access to intensive care: Is insurance the problem?" (AHRQ grant HS14009). *Critical Care Medicine* 34(8), pp. 2235-2236.

This commentary discusses a study of data from five States that found that critically ill uninsured adults were less likely to be hospitalized, less likely to be admitted to the intensive care unit (ICU), and more likely to die than their insured counterparts. This study helps to draw attention to the effect of the problem of the uninsured, note the commentary authors. It also demonstrates that true differences in hospital and ICU care exist among multiple subgroups of the uninsured. They assert that critically ill patients need to receive definitive services warranted by their medical condition, not their insurance status or discriminators such as age, race, or ethnicity.

Dellefield, M.E. (2006). "Organizational correlates of the risk-adjusted pressure ulcer prevalence and subsequent survey deficiency citation in California nursing homes." (AHRQ grant HS10022). *Research in Nursing & Health* 29, pp. 345-358.

The proportion of nursing home residents who suffer from pressure ulcers (PUs), many of which are preventable and treatable, is an important measure of nursing home quality of care. This study examined the relationships between risk-adjusted pressure ulcer prevalence and subsequent nursing home deficiency citations with selected organizational variables such as nurse staffing levels and facility ownership. Organizational variables explained a small amount of the variation in PU prevalence. A higher PU prevalence was associated with lower licensed nurse centralization, and facilities participating exclusively in the Medicaid program. Receipt of a deficiency was less likely in facilities having a higher total nurse staffing level. It was more likely in facilities having a higher risk-adjusted PU prevalence, more licensed nurses, a size of 160 beds or more, and survey teams from specific counties.

Halpern, S.C., Barton, T.D., Gross, R., and others. (2005). "Epidemiologic studies of adverse effects of anti-retroviral drugs: How well is statistical power reported?" (AHRQ grant HS10399). *Pharmacoepidemiology and Drug Safety* 14, pp. 155-161.

Regulatory approval of a new drug typically occurs after it is studied in samples large enough to document efficacy, but too small to

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adequately document safety. That is the job of post-marketing surveillance programs and pharmacoepidemiologic studies. Researchers studied all published pharmacoepidemiologic studies of adverse drug effects (ADEs) associated with 15 anti-retroviral drugs approved through the end of 1999. The poor reporting of statistical power in the 48 studies examined suggests a need for guidelines to improve the reporting of pharmacoepidemiologic studies of ADEs, conclude the researchers. They call for more studies to determine whether the observed paucity of industry-sponsored observational studies of anti-retroviral ADEs extends to other clinical areas, and if so, to identify the causes of this phenomenon.

Miller, N., Eggleston, K., and Zeckhauser, R. (2006). "Provider choice of quality and surplus." (AHRQ grant HS13362). *International Journal of Health Care Finance and Economics* 6, pp. 103-117.

Health care providers such as physicians, hospitals, and HMOs, must trade off the quality of care they deliver against financial returns. The authors of this paper studied the quality choices of institutional health care providers such as hospitals, assuming that the utility function of the key organizational decisionmaker includes both quality of care and financial surplus. Using a coefficient of relative risk aversion as a measure of the providers' utility-from-money function, they show that increasing the surplus retention rate (fraction of surplus remaining after deducting all outside claims) increases (decreases) quality if the provider's coefficient of relative risk aversion is greater than (less than) 1.

Paliwal, P., and Gelfand, A.E. (2006). "Estimating measures of diagnostic accuracy when some covariate information is missing." (AHRQ grant HS10951). *Statistics in Medicine* 25, pp. 2981-2993.

The authors of this paper propose a generic approach to estimate measures of diagnostic accuracy, when one or more risk factors in an explanatory model is not available. They refer to these as conditional rates, that is, rates conditioned on only a subset of risk factors. They perform a simulation study to compare these estimated conditional rates with frequently used ad hoc estimates. They also illustrate the proposed methodology to compute the conditional positive predictive value for a screening mammography data set.

Reinertsen, J.L., and Clancy, C. (2006, August). "Foreword to: Keeping our promises: Research, practice, and policy issues in health care reliability. A special issue of *Health Services Research.*" *HSR: Health Services Research* 41(4), pp. 1535-1538.

The health care system is not doing a very good job of keeping its promise not to harm patients and to do everything possible for patients who come to the system for care. That's the assertion of the authors of this foreword to a special journal issue on health care reliability. The issue papers fall into three broad categories. The first three papers focus on how principles of reliability can address the problem of not harming patients. The second set of papers clusters around a particularly important factor in an organization's reliability - the patterns of behavior that constitute the organization's culture, such as its safety culture. The third set of papers focuses on translation of reliability theory into practice. Reprints (AHRQ Publication No. 06-R074) are available from AHRQ.*

Schroeder, M.E., Wolman, R.L., Wetterneck, T.B., and Carayon, P. (2006, August). "Tubing misload allows free flow event with smart intravenous infusion pump." (AHRQ grant HS14253). *Anesthesiology* 105, pp. 434-435.

The clinical introduction of new medical products may result in unanticipated consequences despite preintroduction evaluation, institution-specific usability testing, and carefully planned user training. Such training cannot be relied on to overcome design flaws in equipment, conclude the authors of this paper. They describe one such case of a problem with a "smart" intravenous infusion pump. Despite all the testing and training, a door gap caused by "front loading" the hard plastic upper fitment resulted in free flow of nitroglycerin during heart surgery on a patient. The failure mode and effects analysis conducted before initial use of the pump was lengthy and thorough, but did not predict the failure mode causing the free flow. Second, the alarm message displayed during setup indicated an occlusion as opposed to a potential free flow. Finally, this event occurred despite intensive user training before implementation that emphasized correct upper fitment loading.

Stockwell, D.C., and Slonim, A.D. (2006). "Volume-outcome relationships: Is it the individual or the team?" (AHRQ grant HS14009). *Critical Care Medicine* 34(9), pp. 2495-2497.

Policymakers, health services researchers, and clinicians tend to view volume-outcome relationships

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Research briefs

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differently, according to the authors of this paper. They refer to a large Canadian study of the relationship between hospital volume of mechanical ventilation and patient outcomes. Hospital volume was not associated with the mortality of mechanically ventilated surgical patients. Yet, mechanically ventilated medical patients at the lowest-volume hospitals had an increased risk of mortality. For the policymaker, this study investigated population-based outcomes and may suggest the need for regionalization of ventilatory care. For the researcher, the study provides several important methodologic considerations for future work, for example, the use of clustering to control for institution-level effects. The clinician tends to view this study from the perspective of process of care and teamwork.

Tamuz, M., and Harrison, M.I. (2006, August). "Improving patient safety in hospitals: Contributions of high-reliability theory and normal accident theory." ***HSR: Health Services Research*** **41(4), pp. 1654-1676.**

This paper discusses the distinct contributions of high-reliability theory (HRT) and normal accident theory (NAT) as frameworks for examining five popular patient safety practices. These include double-checking medications, crew resource management (CRM), computerized physician order entry (CPOE), incident reporting, and root cause analysis (RCA). According to the authors, HRT highlights how double-checking, which is designed to prevent errors, can undermine mindfulness of risk. NAT emphasizes that social redundancy can diffuse and reduce responsibility for locating mistakes. CRM promotes high-reliability organizations by fostering deference to expertise, rather than rank. However, HRT also suggests that effective CRM depends on fundamental changes in organizational culture. NAT calls attention to one feature of CPOE; it tightens the coupling of the medication ordering process. This, in turn, boosts the chances of rapid spread of infrequent, but harmful errors. Reprints (AHRQ Publication No. 06-R076) are available from AHRQ.* ■

Applications for R01 grants are transitioning to electronic submission

The Agency for Healthcare Research and Quality (AHRQ) is continuing its transition to electronic submission of grant applications. All applications for R01 grants submitted for the February 5, 2007 receipt deadline must be submitted electronically using the SF 424 (R&R) form set. AHRQ encourages applicants to:

- Be prepared and register early. One time registrations for both Grants.gov (http://grants.gov) and eRA Commons systems must be completed before application submission. These are two distinct systems with separate registration requirements.
- Be informed. For up-to-date general information on electronic submission, the SF 424 (R&R), and Grants.gov, visit the AHRQ Electronic Submission of Grant Applications Web site: www.ahrq.gov/fund/

Applicants are encouraged to submit their applications early; 4 weeks prior to the receipt date is recommended, and applicants should work with their central grants office to learn how each institution is handling the changes. This transition will continue through May 2007; a specific announcement will precede each grant funding mechanism transition, giving the date when electronic submission and use of the SF 424 (R&R) will be required. For help, go to www.ahrq.gov/fund/esubhelp.htm. ■

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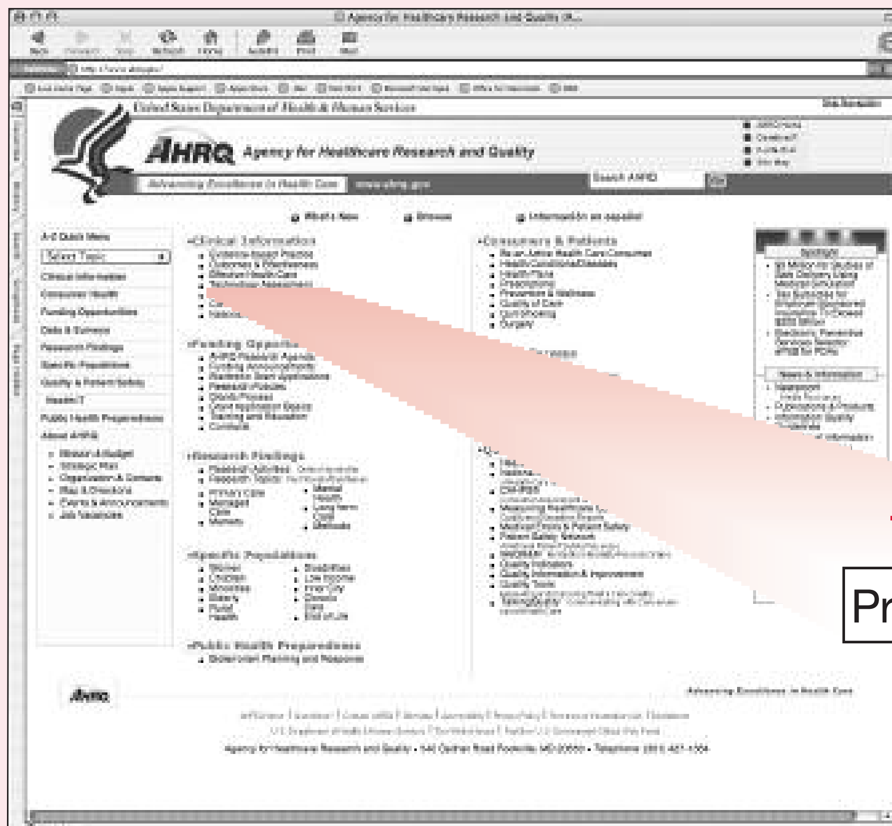

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