Agency for Healthcare Research and Quality

RESEARCH ACTIVITIES

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Highlights

Departments

Regular Features

Educating patients before hospital discharge reduces readmissions, emergency department visits, and saves money

Patients who have a clear understanding of their after-hospital care instructions, including how to take their medicines and when to make follow-up appointments, are 30 percent less likely to be readmitted or visit the emergency department than patients who lack this information, according to a new study. Fewer hospital readmissions and emergency department visits also translate to lower total costs. The study found that total costs (a combination of actual hospitalization costs and estimated outpatient costs) were an average of $412 lower for the patients who received complete information than for those who did not.

Currently, one in five patients has a complication or an adverse event, such as a drug interaction, after being discharged from the hospital. These can impair patients' recovery and can cause patients a trip to the emergency department or to be readmitted to the hospital, both of which are costly. One reason why patients have adverse events after they leave the hospital is a lack of understanding about their follow-up care, such as which medications to take or how to take care of their condition. This information is contained in a discharge summary, a standard document that previous studies have shown hospitals often do not make available to patients' primary care doctors in a timely fashion.

The research team, led by Brian W. Jack, M.D., at Boston University Medical Center's Department of Family Medicine, developed a multi-faceted program to educate patients about their post-hospital care plans. It is called the Re-Engineered Hospital Discharge Program, or RED, and it was tested through a randomized controlled trial. The program used specially trained nurses to help one group of patients arrange follow-up appointments, confirm medication routines, and understand their diagnoses using a personalized instruction booklet. A pharmacist contacted patients between two and four days after hospital discharge to reinforce the medication plan and answer any questions.

Thirty days after their hospital discharge, the 370 patients who participated in the RED program had 30 percent fewer subsequent emergency visits and readmissions

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Educating patients

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than the 368 patients who did not. Nearly all (94 percent) of the patients who participated in the RED program left the hospital with a follow-up appointment with their primary care physician, compared with 35 percent for patients who did not participate.

However, making medication review available to patients did not prevent problems from occurring, the study noted. Nearly two-thirds (65 percent) of the RED program participants who completed the medication review with the pharmacist had at least one problem with their drugs. In half of those cases, the pharmacist needed to take corrective action, such as contacting the patient's doctor.

Despite the patient safety and cost benefits, a lack of financial incentives to implement a discharge program such as this poses a barrier to widespread adoption among hospitals, the study authors noted. However, the growing importance to hospitals of demonstrating their quality performance could spur added interest in this type of program. The study was funded in part by the Agency for Healthcare Research and Quality (HS14289 and HS15905).

See "A reengineered hospital discharge program to decrease rehospitalization," by Dr. Jack, Veerappa K. Chetty, Ph.D., David Anthony, M.D., M.Sc., and others, in the February 3, 2009 *Annals of Internal Medicine* 150(3), pp. 178-187. ■

Patient Safety and Quality

Mandatory public reporting of care performance did not affect quality of care for Medicare managed care patients

Medicare managed care (MMC) plans were required to begin publicly reporting their performance on certain care measures in 1997. It was assumed that plans that had to report success in various areas, such as mammogram rates for elderly women, would improve care in that area, so that individuals would want to enroll or continue enrollment in the plans. However, this mandatory reporting requirement did not seem to affect quality of care on four measures for MMC plans, found a new study.

M. Kate Bundorf, Ph.D., of Stanford University, and colleagues examined performance of mammogram rates for women aged 65 to 69 years, use of beta blockers for heart attack patients, rates of flu shots, and annual eye exams for people with diabetes for MMC plans. They studied plan performance from 1993 to 1995 (prior to mandatory reporting) and from 1997 to 1999 (following mandatory reporting). Although

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performance of these measures improved for MMC enrollees following the mandatory reporting, they also improved for Medicare beneficiaries not enrolled in these plans.

For example, rates of increase between 1995 and 1999 among MMC versus non-MMC enrollees were 3 versus 12 percent for mammograms, 14 versus 15 percent for use of beta blockers, and 9 versus 8 percent for flu shots between 1995 and 1999. Rates of eye exams for people with diabetes rose 5 percent from 1997 to 1999 for MMC enrollees and 8 percent for non-MMC enrollees. These findings suggest that the boost in care performance after mandatory public reporting may have been due to factors that affected all Medicare beneficiaries. This should be explored in further studies, suggest the researchers. Their study was supported in part by the Agency for Healthcare Research and Quality (HS11668).

See "Health plan performance measurement: Does it affect quality of care for Medicare managed care enrollees?" by Dr. Bundorf, Kavita Choudhry, B.A., and Laurence Baker, Ph.D., in the Summer 2008 *Inquiry* 45, pp. 168-183. ■

Nurses and office staff can help report prescribing errors in primary care offices

A set of procedures that involves nurses and office staff from primary care practices can bring success in reporting prescribing errors. Researchers at the University of Vermont's College of Medicine and the Institute for Safe Medication Practices developed a voluntary prescribing-error reporting system that was used at seven primary care practices. Nurses and office staff were asked to report whenever a pharmacist called to either get additional information or notify them about a problem with a prescription. Prescribers were also encouraged to report their own errors. None of the practices used electronic medical records.

Of the 103 people from the practices who participated in the study, there were 31 physicians, 8 nurse practitioners, 2 physician assistants, 26 nonprescribing nurses, 10 medical assistants, 20 office staff, and 6 nonphysician office managers. Prescribers submitted 7 of the 216 reports (3.5 percent). Total error reports varied from 10 to 62 per practice (with a median of 32 reports). The most frequent drug classes involved in reports were antidepressants (38 reports), narcotics (32 reports), and drugs to lower blood pressure (24 reports). A fifth of the near-misses or errors involved drugs considered "high-alert," that is, with a high risk of causing injury when misused.

In addition to 49 reports of near misses, there were 165 errors. Almost 90 percent of these errors did not reach the patient, 19 reached the patient without causing harm, and 4 errors caused temporary harm that required intervention. None of the errors resulted in hospitalization, permanent harm, or death. The majority of study participants did not find the reporting system burdensome and indicated that they would be willing to participate beyond the study period. However, none of the practices continued to submit reports after the study ended. The study was funded in part by the Agency for Healthcare Research and Quality (HS13891).

More details are in "Using nurses and office staff to report prescribing errors in primary care," by Amanda G. Kennedy, Pharm.D., B.C.P.S., Benjamin Littenberg, M.D., and John W. Senders, Ph.D., in the August 2008 *International Journal for Quality in Health Care* 20(4), pp. 238–245. ■

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.

Disparities/Minority Health

Blacks report greater difficulty in affording prescription medications than whites

Blacks report far more difficulty in affording prescription medications than whites, even after accounting for income, education, health insurance status, and coexisting medical conditions, according to a new study. Blacks were twice as likely as whites to not fill a medication prescription (50 vs. 25 percent) and were far more likely to report inadequate income to meet basic needs (61 vs. 17 percent). Most of the differences attributed to race/ethnicity were mediated by perceived income inadequacy. Furthermore, the inability of blacks to afford prescription medications may be better predicted by perceived income inadequacy than more traditional measures of socioeconomic status such as income, education, and insurance status.

Researchers at the Center for Education and Research on Therapeutics of Musculoskeletal Diseases at the University of Alabama at Birmingham recruited black and white elderly patients from 48 Alabama primary care practices. The patients were asked about their ability to pay for prescription medications, insurance and socioeconomic status, and coexisting medical conditions.

Of 399 participating patients, 53 percent had an annual household income of less than $15,000. Those who reported not filling a medication during the past year due to cost were more likely to be black, have more coexisting medical conditions, have lower socioeconomic status, and consider their income inadequate to meet basic needs compared to those without problems affording medications. Perceived income inadequacy may serve as a valuable marker for targeting medication access programs, suggest the researchers. Their study was supported by the Agency for Healthcare Research and Quality (HS10389).

See "Effect of racial differences on ability to afford prescription medications," by Daniel J. Cobaugh, Pharm.D., Erik Angner, Ph.D., Catarina I. Kiefe, Ph.D., M.D., and others, in the November 15, 2008 *American Journal of Health-System Pharmacy* 65, pp. 2137-2143. ■

Child/Adolescent Health

Some pediatricians would disclose errors only if harm is evident

Studies show that parents want to know when their children have been harmed by a medical error, and professional organizations, such as the Joint Commission, agree that clinicians should disclose medical errors. However, a new study finds that some pediatricians are inclined to be selective about which errors they report.

From July 1, 2003, to March 31, 2004, 205 pediatricians and pediatric residents responded to an 11-item survey on how they would respond after one of their patients was harmed by a medical error. Researchers from the University of Washington School of Medicine and Washington University School of Medicine posed two error scenarios: an insulin overdose that caused an intensive care unit stay and a failure to prescribe timely antibiotics that caused a hospitalization.

Nearly 80 percent of the pediatricians said the errors were serious, and 83 percent said they would feel responsible for the error. Further, 53 percent said they would definitely report the error, and 40 percent said they would probably report it. However, 7 percent said they would disclose the error only if the parent asked about it. Pediatricians with experience disclosing errors were more likely to explain how the error occurred. Yet training in error disclosure did not increase the likelihood that disclosure would occur.

Pediatricians who received the insulin overdose scenario were more likely to disclose the error and provide details about how it occurred than the pediatricians who received the antibiotic scenario. The authors suggest that this variation in disclosure practice, in addition to being at odds with disclosure guidelines and patient preferences, presents an

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Disclosing errors

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opportunity for quality improvement work in error disclosure. Training should include opportunities to observe physicians disclosing errors and practice and feedback in error disclosure. This study was funded in part by the Agency for Healthcare Research and Quality (HS11898 and HS14012).

See "Medical error disclosure among pediatricians: Choosing carefully what we might say to patients," by David J. Loren, M.D., Eileen J. Klein, M.D., M.P.H., Jane Garbutt, M.B., Ch.B., and others in the October 2008 *Archives of Pediatric and Adolescent Medicine* 162(10), pp. 922-927. ■

Inducing labor at 40 weeks may reduce infant deaths

When a pregnancy goes to 42 weeks, instead of the typical 40 after the mother's last missed period, doctors usually induce labor. This measure is taken because the placenta, the baby's lifeline, stops providing adequate nutrition and oxygen at that time and this can lead to infant death. A new study suggests that even 41-week-long pregnancies may put an infant at increased risk of death within 28 days after delivery.

Tim A. Bruckner, Ph.D., of the University of California, Berkeley, and colleagues used California Department of Health Services birth data from 1999 to 2003 and found that normal weight infants born between 41 weeks and 42 weeks and 6 days of gestation had a 37 percent greater chance of neonatal death (less than 28 days after birth) compared with infants born at 38 weeks to 40 weeks and 6 days. However, the 37 percent greater risk remained stable between 41 and 42 weeks.

The authors caution that true gestational ages in the study may be in error because the ages were calculated using the date of the mother's last missed period and not with ultrasounds, which are now the gold standard for determining gestational age. California began using ultrasound dating in 2007, and the authors hope researchers will use these data to study this topic when data become available this year. This study was funded in part by the Agency for Healthcare Research and Quality (T32 HS00086).

See "Increased neonatal mortality among normal-weight births beyond 41 weeks of gestation in California," by Dr. Bruckner, Yvonne W. Cheng, M.D., M.P.H., and Aaron B. Caughey, M.D., Ph.D., in the October 2008 *American Journal of Obstetrics and Gynecology* 199(4), pp. 421.e1-7. ■

Strategies are needed to improve immunization rates among adolescents, especially those with high-risk conditions

In their early years, children routinely receive immunizations during regular health checkups. When they become adolescents, however, vaccination rates tend to wane as checkups become less frequent. Two new studies show that opportunities to vaccinate adolescents are missed during health care visits. The first found that vaccination rates among 13-year-olds for hepatitis and measles-mumps-rubella (MMR) were lower than the national estimate. The second study found that influenza vaccination rates for adolescents with chronic conditions improved over a 10-year period, but rates are still low. Both studies, supported in part by the Agency for Healthcare Research and Quality (HS13908 and HS00063), are summarized here.

Lee, G.M., Lorick, S.A., Pfoh, E., and others. (2008, October). "Adolescent immunizations: Missed opportunities for prevention." *Pediatrics* 122(4), pp. 711-717.

The researchers studied 1997 to 2001 data on 23,987 adolescents enrolled in a health maintenance organization in New England. They found that 13-year-olds were 84, 74, and 67 percent up-to-date on their tetanus-diptheria (Td), hepatitis B, and MMR vaccinations, respectively. The Td immunization rate (84 percent) was much higher than the national estimate of 48.3 percent for 13-year-olds. However, the vaccination rates among 13-year-olds for hepatitis and MMR were lower than the national estimate of 88.6 percent and 87 percent, respectively.

The rate for MMR vaccination was lower than expected, considering an up-to-date vaccination is required for attending

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Immunization rates

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school in Massachusetts, where much of the study population lived. Lower immunization rates may be explained, in part, because adolescents' immunizations records may be scattered in locations other than their primary care provider's office, such as schools.

The authors also looked at missed opportunities to vaccinate adolescents for Td by determining whether the vaccine was given during or within 2 weeks of an adolescent's health care visit. They calculated an average of 4.8 missed opportunities for 18,011 adolescents who were eligible for vaccinations during a health care visit. Further, adolescents who did not use preventive care were less likely to receive a timely Td vaccination. These findings stress the need for providers to take every opportunity to assess and record adolescents' immunization status, especially for vaccines that are given in childhood.

Nakamura, M.M., and Lee, G.M. (2008, November). "Influenza vaccination in adolescents with high-risk conditions." ***Pediatrics*** **122(5), pp. 920-928.**

Researchers reviewed records of 18,703 adolescents with high-risk chronic conditions who were enrolled in a health maintenance organization in New England from 1992 to 2002. Vaccination rates for influenza ranged from 8.3 to 15.4 percent, with a significant improvement from 8.3 to 12.8 percent from 1992 to 1993 and a high of 15.4 percent in 2001. For the 377 adolescents continuously enrolled from 1999 to 2002, just 11.1 percent received flu vaccine for all 4 flu seasons; 56.5 percent received no vaccine at all during the 4 seasons.

Of the adolescents who had an outpatient health care visit during the first 4 months of flu season (a prime opportunity to vaccinate), 45 to 55 percent left without receiving a flu shot. These visits were missed opportunities to vaccinate because the office visits were not for conditions that would have prevented receiving a flu shot.

Current practice guidelines recommend that adolescents who have chronic health conditions, such as asthma, HIV, diabetes, or heart disease, should receive yearly flu shots because they are more likely than healthy children to end up in the hospital, in a doctor's office, or on antibiotics if they have a bout of flu. Clearly, preventive health visits alone do not ensure immunization coverage. One solution for ensuring these patients receive yearly influenza vaccinations is to recommend universal influenza vaccination for all pediatric patients, the authors suggest, and interventions to increase vaccination rates should be aimed at providers as well as patients. ■

Elderly/Long-Term Care

Staffing level mix affects quality of care in nursing homes

Quality of care on four quality measures (QMs) changed when the mix of certified nursing assistants (CNAs), licensed practical nurses (LPNs), and registered nurses (RNs) in nursing homes changed, according to a new study by Gregory L. Alexander, Ph.D., R.N., of the University of Missouri. He analyzed the association between staffing-level mix at all Missouri nursing homes and differences in scores for 7 of 14 QMs downloaded from the Nursing Home Compare Web site in February 2004. Five of the QMs were the percentage of long-stay residents whose need for help with activities of daily living (ADLs) increased, who had pressure sores, or who became more depressed or anxious; and percentage of long-stay, low-risk residents who were incontinent or whose ability to move in and around their room got worse. The two other QMS were the percentage of short-stay residents who had moderate to severe pain or who had pressure sores.

Staffing levels for CNAs in the homes were much higher than either LPN or RN staffing levels, ranging from about 2 to nearly 3 hours per resident per day in some facilities. LPNs had nearly a 2 to 1 ratio of hours per resident per day compared with RNs, who spent a little less than one-half hour to less than 1 hour, depending on how well-staffed the facilities were.

As the level of RN staffing was held constant and number of CNA staff increased, and as the level of LPN staffing was held constant and number of CNA staff grew, the percentage of residents who were incontinent increased by about 5 percent. Similarly, more residents had greater need for help with ADLs, such as bathing and eating, when licensed nurses were available to assess their status. Also, the percentage of

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Staffing levels

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short-stay residents who had moderate to severe pain increased by about 10 percent in homes that had constantly lower levels of RNs (less than .30 hours per resident per day), who are needed to administer pain medications. When LPNs were staffed to provide more than 0.73 hours per resident per day and the number of CNAs was also increased, 3 percent fewer short-stay residents suffered from pressure ulcers. The study was supported by the Agency for Healthcare Research and Quality (HS16862).

See "An analysis of nursing home quality measures and staffing," by Dr. Alexander, in the July-September 2008 *Quality Management in Health Care* 17(3), pp. 242-251. ■

Use of physical restraints in nursing homes creates substantial adverse consequences for residents

The use of restraints on nursing home residents has declined markedly from 44 percent of residents in 1989 to about 9 percent currently. Yet in those remaining cases, restraints substantially impair residents' health, reveals a new study. It found that 3 months after being restrained, residents had lower cognitive performance, lower ability to perform activities of daily living (ADLs) like dressing and bathing, and more walking dependence. Specifically, when a resident was restrained, one could expect 5 percent lower ADL performance, 10 percent more walking dependence, and 4 percent lower cognitive performance compared with no restraint use.

Nicholas G. Castle, Ph.D., of the University of Pittsburgh, and colleagues compared the outcomes of newly admitted residents of 740 Pennsylvania nursing homes who were not restrained in the first 2 quarters of their residency. They examined which facility and individual characteristics during the first two quarters were linked with restraint initiation during the third quarter. Finally, they examined third-quarter restraint use with fourth-quarter health status.

The initiation of restraint use was associated with a previous fall, psychoactive medication use, low cognition, ADL scores, and the absence of pressure ulcers, as well as a variety of facility characteristics. In addition to creating adverse health consequences for residents, use of restraints may necessitate subsequent use of additional staff as a result of resident decline. It may then be more expensive to restrain residents than not restraining them in the first place. These findings also provide further justification for policymakers to implement restraint reduction policies and provide resources to promote restraint reduction. The study was supported in part by the Agency for Healthcare Research and Quality (HS13983).

See "Physical restraint initiation in nursing homes and subsequent resident health," by John Engberg, Ph.D., Dr. Castle, and Daniel McCaffrey, Ph.D., in the August 2008 *Gerontologist* 48(4), pp. 442-452. ■

Available resources, not competition, drive nursing homes to advertise

Health care facilities regularly spend money to advertise their services in hopes of attracting new customers and promoting their facilities as superior to others. Nursing homes have turned to advertising to reach potential customers as well. In a new study of 819 nursing homes in Texas, researchers found that the average annual amount spent on advertising was $6,930. Nursing homes that spent the most on advertising tended to be large, have ample funds, and housed residents who either paid for their care themselves or had Medicare or private insurance. Nursing homes that spent the least on advertising tended to be in rural areas. They also had large numbers of residents for whom Medicaid was their insurer, which likely resulted in the homes having fewer available resources for advertising, as reimbursement rates for Medicaid patients in nursing homes have declined in recent years.

Unlike typical product advertising, market competition did not appear to drive nursing homes' advertising dollars. Further, the nursing homes that spent the most on advertising did not appear to offer higher quality care than those homes that did not pay to advertise. These results indicate that advertising dollars could be better spent as wage increases to help quell the nursing turnover prevalent in homes, according to

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Nursing homes

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researchers Bita A. Kash, Ph.D., of Texas A&M University, and Gregory J. Boyer, a Ph.D. student at the University of North Carolina, Chapel Hill. Additionally, because most families consult primary care physicians and hospital discharge personnel when choosing a nursing home, targeting advertising toward these professionals could be more cost effective. This study was funded in part by the Agency for Healthcare Research and Quality (HS16229).

See "Advertising expenditures in the nursing home sector: Evaluating the need for and purpose of advertising," by Drs. Kash and Boyer in the July-August 2008 *Journal of Healthcare Management* 53(4), pp. 242-255. ■

Outcomes/Effectiveness Research

People with insurance use more health care services and have better health outcomes

The question of whether people who have health insurance use more health care services has been studied in-depth since the RAND Health Insurance Experiment study was published 30 years ago. Notably, the study found that when people were asked to share costs for medical care through copayments, they reduced the amount of services they used but the reduction did not affect health outcomes. To determine if the RAND study's findings have held true over time, researchers from the University of Washington systematically reviewed more than 9,700 studies published since 1991. They located 14 studies that delved deeply into the effect of insurance status on health care use and health outcomes.

Like the RAND study, the authors found that higher copayments were linked to fewer visits to physicians. However, in contrast to the RAND study, they did not find that having insurance increased people's visits to emergency departments or hospitals. They also found that having health insurance brings better health for most people, especially those who have recently been diagnosed with a disease.

The authors suggest that policymakers need to have a firm understanding of the effect of health insurance on health care use and outcomes if they want to promote health successfully. This literature review shows that providing health insurance to the uninsured will both increase health care use and improve health. This study was funded in part by the Agency for Healthcare Research and Quality (HS13853).

See "The causal effect of health insurance on utilization and outcomes in adults: A systematic review of U.S. studies," by Joseph D. Freeman, B.A., B.S., Srikanth Kadiyala, Ph.D., Janice F. Bell, M.N., M.P.H., Ph.D., and Diane P. Martin, Ph.D., in the October 2008 *Medical Care* 46(10), pp. 1023-1032. ■

Visit the AHRQ Patient Safety Network Web Site

AHRQ's national Web site—the AHRQ Patient Safety Network, or AHRQ PSNet—continues to be a valuable gateway to resources for improving patient safety and preventing medical errors and is the first comprehensive effort to help health care providers, administrators, and consumers learn about all aspects of patient safety. The Web site includes summaries of tools and findings related to patient safety research, information on upcoming meetings and conferences, and annotated links to articles, books, and reports. Readers can customize the site around their unique interests and needs through the Web site's unique "My PSNet" feature. To visit the AHRQ PSNet Web site, go to http://psnet.ahrq.gov/.

Prior traumatic brain injury is very common among homeless people and is linked to poorer health

About 5,000 people in Toronto, Ontario, are homeless each night and about 29,000 people use shelters each year. More than half (53 percent) of this homeless group have a history of a traumatic brain injury and 12 percent have suffered a moderate or severe traumatic brain injury. More than two-thirds of this homeless population had suffered the injury before they became homeless, according to a new study. Traumatic brain injury is a head injury that leaves the individual dazed, confused, disoriented, or unconscious, with moderate or severe injuries resulting from unconsciousness that lasts 30 minutes or longer. These injuries often lead to cognitive impairment, attention deficits, lack of inhibition, impulsivity, and emotional instability.

They also seriously affect the overall health of homeless persons, notes Stephen W. Hwang, M.D., M.P.H., of St. Michael's Hospital in Toronto. Dr. Hwang and colleagues found that a history of moderate or severe traumatic brain injury was associated with three times greater likelihood of seizures, 2.5 times greater risk of developing mental health problems, nearly twice the odds of drug problems, and poorer physical health status (8.3 points lower on a status scale) and poorer mental health status (6 points lower on a mental health scale).

These findings underscore the need for clinicians to routinely ask patients who are homeless about a history of traumatic brain injury. Given the dose-response relation between injury severity and current health, clinicians should assess injury severity based on how long the patient says they were unconscious, admission to hospital after the injury, collateral history, and medical records. Brief neuro-psychological screening can provide valuable information on cognitive function. People with moderate or severe cognitive impairment may be eligible for disability benefits or referral to rehabilitation or other appropriate community services. The study was supported in part by the Agency for Healthcare Research and Quality (HS14129).

More details are in "The effect of traumatic brain injury on the health of homeless people," by Dr. Hwang, Angela Colantonio, Ph.D., O.T. Reg., Shirley Chiu, M.A., and others, in the October 7, 2008 *Canadian Medical Association Journal* 179(8), pp. 779-784. ■

Chronic Disease

Nuts, corn, and popcorn are fine for patients with diverticular disease

For years, patients with diverticular disease (which causes pouches, or diverticula, to form in the colon) have shunned nuts, corn, and popcorn, fearing these foods could aggravate their condition. These foods, physicians advised, leave residue that can lodge in the diverticula and cause infection, which in extreme cases can cause bleeding and require surgery. However, a new study dispels this long-held opinion and finds that nuts, corn, and popcorn might actually contribute to colon health.

Lisa L. Strate, M.D., M.P.H., of the University of Washington School of Medicine, and colleagues used the Health Professionals Follow-up Study's survey data that tracked 47,228 male dentists, veterinarians, pharmacists, optometrists, osteopathic physicians, and podiatrists' medical and diet behaviors from 1986 to 2004. Researchers identified 801 cases of diverticulitis and 383 cases of diverticular bleeding for 730,446 person-years of followup. Twenty-seven percent of participants ate nuts at least twice a week, and 15 percent ate corn or popcorn that often.

Consuming nuts, corn, and popcorn was not associated with diverticular disease. In fact, researchers found that these foods were inversely associated with the risk for diverticular disease. The authors suggest that clinicians' advice to avoid these foods is based on the belief that because nuts, corn, and popcorn are not fully digested, particles can lodge in

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Diverticular disease

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diverticula and injure the colon. Nuts may offer protective benefits for patients with diverticular bleeding because nuts contain anti-inflammatory agents, such as vitamin E and unsaturated fatty acids. The authors recommend that clinicians reconsider the recommendation that patients with diverticular disease avoid consuming these foods. This study was funded in part by the Agency for Healthcare Research and Quality (HS14062).

See "Nuts, corn, and popcorn consumption and the incidence of diverticular disease," by Dr. Strate, Yan L. Liu, M.S., Sapna Syngal, M.D., M.P.H., and others in the August 27, 2008 *Journal of the American Medical Association* 300(8), pp. 907-914. ■

Indigent patients with diabetes who get free medications have lower blood-sugar levels

Low-income patients are twice as likely to not take all their medications as other patients because they often cannot afford them, and patients with diabetes can have higher-out-of-pocket medication costs than patients with other diseases. A State medication assistance program (MAP) that provided free outpatient medications to indigent patients with diabetes resulted in lower blood-sugar levels (indicative of better diabetic control) among those who took the medications, especially those who took their medications as directed all the time (complete adherence).

Researchers retrospectively compared pre-MAP and post-MAP HbA1c (blood-glucose) levels for 289 patients (average age of 59 years) with type 2 diabetes both before and after MAP enrollment. MAP participants had a mean decline of 0.60 percent in HbA1c levels. However, effectiveness depended on how many refills they completed (level of medication adherence). Never getting a refill led to no change in HbA1c, while complete adherence led to an estimated decline of 0.88 percent in HbA1c, a clinically significant drop in blood-sugar levels.

These findings suggest that, even when medications are free to patients, other types of patient costs exist that may restrict access. For example, this MAP now refills prescriptions for longer time periods (greater than one month) in order to mitigate the effect of transportation costs and other hidden patient costs on refill behavior on low-income groups. The study was supported in part by the Agency for Healthcare Research and Quality (HS11834).

See "Diabetes mellitus medication assistance program: Relationship of effectiveness to adherence," by Ronald L. Horswell, Ph.D., Charles K. Wascom, R.Ph., Frederick P. Cerise, M.D., M.P.H., and others, in the *Journal of Health Care for the Poor and Underserved* 19, pp. 677-686, 2008. ■

Pharmaceutical Research

Risk of bleeding events is reduced among patients who report receiving instructions in warfarin use

Patients who report receiving instructions on how to take the anticlotting drug warfarin from a clinician and a pharmacist are much less likely to experience bleeding problems than patients treated by four or more physicians in a 3-month period or who fill warfarin prescriptions at several different pharmacies over the same period, a new study finds. Warfarin use is frequently involved in preventable serious adverse drug events, notably bleeding problems. The researchers suggest that warfarin patients who experience continuity of clinical and pharmacy care are less likely to be hospitalized for such problems.

In a 2-year study of elderly patients, the researchers identified 126 hospitalizations for internal bleeding related to taking warfarin among 2,370 patients. The risk of hospitalization due to a bleeding event was essentially the same for patients who were new users of warfarin or chronic users of the medication.

The factors that were associated with the largest difference in risk of hospitalization were whether the patient received instructions on

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Warfarin use

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warfarin use from a doctor or nurse, and whether they received warfarin prescriptions from one doctor or at least four different doctors. When other factors were taken into account, patients who said they received no medication instructions had more than twice the number of hospitalizations for bleeding events per 100 person-years of use than patients who reported receiving medication instructions from a doctor or nurse and a pharmacist. In addition, patients who filled prescriptions written by at least four different physicians over the last 3 months had nearly five times the hospitalizations per 100 person-years of warfarin use than patients whose prescriptions were all written by the same physician. Finally, the researchers found that patients given written instructions or a combination of written and verbal instructions on taking the medication had less than half the risk of hospitalization than patients receiving no instructions. Verbal instructions alone did little to reduce the hospitalization risk. The study was funded in part by the Agency for Healthcare Research and Quality (HS11530).

More details are in "Patient reported receipt of medication instructions for warfarin is associated with reduced risk of serious bleeding events," by Joshua P. Metlay, M.D., Ph.D., Sean Hennessy, Pharm.D, Ph.D., A. Russell Localio, J.D., Ph.D., and others, in the October 2008 *Journal of General Internal Medicine* 23(10), pp. 1589–1594. ■

Impact of direct-to-consumer advertising on drug use varies depending on the drug, scope of advertising, and culture

The United States and New Zealand are currently the only countries that allow direct-to-consumer advertising (DTCA) of drugs. In fact, the U.S. Senate recently considered legislation forbidding such advertising during the first 2 years after release of a new drug—the period when safety problems undiscovered during clinical trials typically appear. Both proponents and opponents of DTCA assume that it increases use of the drugs advertised. However, a new study suggests that the impact of DTCA on drug use may be varied and limited, and that its impact on prescribing remains conjecture.

For example, it found that DTCA did not increase use of two of three drugs studied. The researchers examined differences in the number of filled prescriptions for three heavily marketed drugs between English-speaking and French-speaking (control) Canadian provinces before and after the start of DTCA for the drugs in the United States. The drugs were etanercept, used for rheumatoid arthritis; mometasone, a nasal spray to treat allergies; and tegaserod, used to treat irritable bowel syndrome and constipation.

The DTCA campaign did not increase prescription rates for etanercept and mometasone. In contrast, tegaserod prescriptions increased 42 percent (0.56 per 10,000 residents) in English-speaking provinces immediately after the start of the U.S. campaign. Analysis of U.S. Medicaid data showed an even larger 56 percent increase in tegaserod prescriptions. Yet, this was the drug that was removed from the market a short time later due to evidence that it increased risk of heart attacks and strokes. However, this boost in prescriptions did not persist over time in either country, despite continued advertising. The findings do suggest illicit exposure of Canadians to U.S. DTCA, an issue that may assume greater importance due to the growth of advertising over global mediums such as the Internet. The study was supported in part by the Agency for Healthcare Research and Quality (HS10391).

See "Effect of illicit direct to consumer advertising on use of etanercept, mometasone, and tegaserod in Canada: Controlled longitudinal study," by Michael R. Law, Sumit R. Majumdar, M.D., M.P.H., and Stephen B. Soumerai, Sc.D., in the September 2, *2008 British Medical Journal*. The article is available online at www.bmj.com. ■

Economic and housing instability are linked to poor access to health care and higher rates of hospitalization

Individuals who are struggling financially and whose housing situation is unstable are likely to have poorer access to health care and more hospitalizations than those in more fortunate circumstances. A new study by University of California, San Francisco researchers found that rates of having no usual source of care were 14.1 to 17.6 percent in the general population, but 26.1 percent in the unstably housed population. Rates of being uninsured ranged from 16.6 percent in the general population to 30.9 to 36.9 percent in the low-income population, 35.6 percent of the unstably housed, and 55 percent of the homeless population. Rates of postponing medical care ranged from 6.5 to 11.6 percent of the general population to 17.4 percent of the unstably housed population and 24.6 percent of the homeless.

Of the low-income population, 7 percent reported postponing getting needed medications versus 13.9 percent of the unstably housed and 32.2 percent of the homeless. Finally, among the general population, 7.3 to 8.5 percent reported being hospitalized within the past 12 months compared with 10.6 percent of the unstably housed and 23.6 percent of the homeless. These findings were based on analysis of four nationally representative surveys: the Medical Expenditure Panel Survey, the National Health Interview Survey, the National Survey of America's Families, and the National Survey of Homeless Assistance Providers and Clients. The study was supported by the Agency for Healthcare Research and Quality (HS11415).

More details are in "Association between the level of housing instability, economic standing and health care access: A meta-regression," by Kristen W. Reid, M.D., Eric Vittinghoff, Ph.D., M.P.H., and Margot B. Kushel, M.D., in the November 2008 *Journal of Health Care for the Poor and Underserved* 19, pp. 1212-1228. ■

Hospitals spend less for patients in Medicare Advantage than for patients in fee-for-service Medicare

Treating a patient enrolled in the Federal Medicare Advantage health insurance program costs hospitals an average of $10,800 per patient compared with an average of $11,100 for those enrolled in Medicare's traditional fee-for-service program, according to data from the Agency for Healthcare Research and Quality (AHRQ). Medicare Advantage, launched in 1997, allows patients to enroll in managed care plans. Nationally, patients enrolled in Medicare Advantage accounted for 14 percent of the 12.2 million Medicare patient stays in 2006.

To explore differences, AHRQ conducted an analysis of 5.7 million hospital stays of patients over age 65 in 13 States in 2006. Findings show that:

- Patients in Medicare Advantage had shorter stays than their fee-for-service counterparts—5.2 days compared with 5.9 days.
- In Medicare Advantage, 35.5 percent of patients were categorized as most severely ill, compared with 38.5 percent among fee-for-service Medicare patients.
- Fifty-two percent of the patients in Medicare Advantage went home after their hospital stay and not to a nursing home or under the care of home health care agency. This compares with 47 percent of fee-for-service Medicare patients.

For more information, see *Medicare Hospital Stays: Comparisons between the Fee-for-Service Plan and Alternative Plans, 2006*, HCUP Statistical Brief #66 (www.hcup-us.ahrq.gov/reports/statbriefs/sb66.pdf). The report uses statewide hospital discharge data for 13 States in 2006. The inpatient stays are in short-term, non-Federal hospitals and include all patients over age 65 who were Medicare beneficiaries, with or without other insurance coverage. n

Winter weather hospitalizes thousands and kills hundreds

Each year, frigid temperatures cause hypothermia and other cold-related heath problems, and, in 2006, resulted in more than 6,000 hospitalizations and 827 deaths, according to data from the Agency for Healthcare Research and Quality (AHRQ). AHRQ's analysis of 6,182 cold weather-related hospitalizations found:

- Men accounted for about 40 percent more hospitalizations for exposure to cold weather than women.
- People age 65 and older were the most likely to be hospitalized—about seven times more likely than people aged 18 to 44 and three times as likely as people aged 45 to 64.
- The most common reasons for cold weather-related hospitalizations included hypothermia (which can cause loss of physical and mental abilities and, in extreme cases, death), frostbite, respiratory failure, and pneumonia.

For more information, see *Hospital Stays Resulting from Excessive Heat and Cold Exposure Due to Weather Conditions in U.S. Community Hospitals, 2005*, HCUP Statistic Brief #55 (www.hcup-us.ahrq.gov/reports/statbriefs/sb55.jsp). The figures reported here are updated to reflect 2006 statistics from the Nationwide Inpatient Sample, a database of hospital inpatient stays that is nationally representative of inpatient stays in 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. ■

Five therapeutic categories of prescribed drugs dominate spending on prescription medicines

Medications that affect a person's metabolism by helping to lower cholesterol, control diabetes, and control weight accounted for $38 billion of the $208.1 billion that American adults spent on medications in 2006, according to data from the Agency for Healthcare Research and Quality (AHRQ). The estimate comes from an AHRQ analysis that found five therapeutic categories of prescribed drugs accounted for more than 60 percent of consumer spending on drugs in 2006. Among the conclusions:

- Spending was highest for metabolic drugs, which included cholesterol-lowering medications, diabetes drugs, and weight control drugs.
- Cardiovascular drugs, which include blood pressure drugs, as well as diuretics and drugs to control heart rhythm problems: $33 billion.
- Central nervous system drugs, which include analgesics for pain: $28 billion.
- Psychotherapeutic drugs, which include antidepressants: $17.5 billion.
- Hormones that are used for osteoporosis, menopausal symptoms, cancer treatment, and other medical problems: $14 billion.

These data are taken from the Medical Expenditure Panel Survey, a detailed source of information on the health services used by Americans, the frequency with which they are used, the cost of those services, and how they are paid. For more information, go to *The Top Five Therapeutic Classes of Outpatient Prescription Drugs Ranked by Total Expense for Adults Age 18 and Older in the U.S. Civilian Noninstitutionalized Population, 2006*, MEPS Statistical Brief #232 (www.meps.ahrq.gov/mepsweb). ■

Spending on outpatient prescription pain medicines has tripled in 10 years

Expenditures for outpatient prescription analgesics—commonly known as painkillers and medicines that treat aches and pains—increased from $4.2 billion in 1996 to $13.2 billion in 2006, according to data from the Agency for Healthcare Research and Quality (ARHQ). These medications include narcotic analgesics, non-steroidal anti-inflammatory drugs, and Cox-2 inhibitors, among others. AHRQ also found that for outpatient prescription analgesics from 1996 and 2006:

- The average annual expenditure jumped from $83 to $232 for people who purchased one or more prescription analgesics
- For each analgesic purchased, the average expenditure rose from $26 to $57.
- The total number of prescription purchases increased from about 164 million to 231 million.

The data are taken from the Medical Expenditure Panel Survey, a detailed source of information on the health services used by Americans, the frequency with which they are used, the cost of those services, and how they are paid. For more information, go to *Outpatient Prescription Analgesics Utilization and Expenditures for the U.S. Civilian Noninstitutionalized Population, 1996 and 2006*, MEPS Statistical Brief #235 (www.meps.ahrq.gov/mepsweb/). ■

Announcements

10-State project to study methods to reduce central line-associated blood stream infections in hospital ICUs

Hospital associations in 10 States have been selected to participate in a program to test methods of reducing central-line associated blood stream infections in hospital intensive care units (ICUs), according to the Agency for Healthcare Research and Quality (AHRQ). The States are California, Colorado, Florida, Massachusetts, Nebraska, North Carolina, Ohio, Pennsylvania, Texas, and Washington. In addition, the California Hospital Patient Safety Organization, the North Carolina Center for Hospital Quality and Patient Safety, and the Ohio Patient Safety Institute will participate in the project.

Last October, AHRQ awarded a 3-year, $3 million contract to the Health Research & Educational Trust (HRET), an affiliate of the American Hospital Association, to coordinate the project. The project will continue the work that originated at the Johns Hopkins University School of Medicine in Baltimore and was later implemented statewide in Michigan by the Johns Hopkins Quality and Safety Research Group and the Michigan Health & Hospital Association. The project will implement a comprehensive unit-based patient safety program across the 10 States to help prevent infections related to the use of central line catheters.

Central venous catheters or central line catheters are tubes placed into a large vein in a patient's neck, chest or groin to administer medication or fluids or to collect blood samples. Each year, an estimated 250,000 cases of central line-associated bloodstream infections occur in hospitals in the United States, leading to at least 30,000 deaths, according to the Centers for Disease Control and Prevention. The average additional hospital cost for each infection is over $36,000, which totals over $9 billion in excess costs annually. Results from this project can potentially improve care, save lives, and lead to substantial cost savings for participating hospitals and the health care system.

The comprehensive safety program is designed to help ICU staff ensure patient safety. The program, which has been used successfully in more than 100 ICUs in Michigan, includes tools to help health care professionals identify opportunities to reduce potential health care-associated infections and implement policies to make care safer. Within 3 months of implementation in Michigan, the program helped reduce infection rates to zero in more than 50 percent of participating hospitals.

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10-State project

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The new 10-State project aims to reduce the average rate of central line-associated blood stream infections in hospitals by 80 percent, from the national average of 5 infections per 1,000 catheter days to 1 infection for every 1,000 catheter days. Researchers from HRET, Johns Hopkins University School of Medicine, and the Keystone Center for Patient Safety & Quality in Michigan will work together to provide participating hospitals with the necessary tools and training to reduce these infections in their ICUs. Participating hospitals will implement a checklist to ensure compliance with safety practices, educate staff on evidence-based practices to reduce bloodstream infections, educate staff on team training, provide feedback on infection rates to hospitals and hospital units, and implement monthly team meetings to assess progress.

This project is funded through AHRQ's Accelerating Change and Transformation in Organizations and Networks initiative, an implementation model of field-based research designed to promote innovation in health care delivery by accelerating the diffusion of research into practice. For more information on AHRQ's patient safety research, visit www.ahrq.gov/qual/errorsix.htm.

In January, HHS released its first departmental action plan for preventing health care-associated infections. This comprehensive plan establishes national goals and outlines key actions for enhancing and coordinating HHS-supported efforts. These include development of national benchmarks, prioritized recommended clinical practices, a coordinated research agenda, an integrated information systems strategy, and a national messaging plan. This 10-State project supports the actions outlined in the plan and fosters a safer, more affordable health care system through rapid translation of research into practice. ■

Research Briefs

Blewett, L. A., Ziegenfuss, J., and Davern, M. E. (2008). "Local access to care programs (LACPs): New developments in the access to care for the uninsured." (AHRQ contract no. 290-00-0017). *Milbank Quarterly* 86(3), pp. 459-479.

Local access to care programs (LACPs) are community initiatives to facilitate access to needed health care services to the uninsured through a local organizing entity. To learn more about these little-studied entities, the researchers performed a literature review, Internet search, and interviews with key actors. They developed a typology and described a set of characteristics of the 47 LACPs they were able to document. They found that LACPs may be sponsored by counties, local provider-based programs, national provider networks working through networks of local providers, or local initiatives using funding from employers, employees, and the community. LACPs serve people not qualified for public programs for reasons such as income levels or lack of citizenship; public funding for them is generally unstable and dwindling. Their size varies greatly, from 80 enrollees to over 50,000 and they usually offer only primary care services. Few formal evaluations of the impact of LACPs have been completed but several are currently underway.

Brady, J., Ho, K., and Clancy, C. M. (2008). "The quality and disparities reports: Why is progress so slow?" *American Journal of Medical Quality* 23(5), pp. 396-398.

Health care quality improvement is an aspirational endeavor, never completely fulfilled. As a nation, however, we are improving, according to Carolyn M. Clancy, M.D., Director of the Agency for Healthcare Research and Quality (AHRQ) and colleagues. However, the rate of improvement is modest, and appears to be slowing, as shown by AHRQ's annual reports on quality and disparities. The data indicate that the pace of improvement is unacceptably slow. Between 2000 and 2005, the annual median rate of improvement based on measures of five areas of health care reported in AHRQ's annual National Healthcare Quality Reports (NHQRs) was 1.5 percent, down from 2.3 percent annually for the longer period from 1994 to 2005. Many measures with the greatest variation show that patients are treated very differently from State to State and that there has been little change in this situation since the first NHQR (2003). Similarly, patient safety measures showed an average annual improvement of only 1 percent.

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Brown, T. M., and Bittner, V. (2008). "Biomarkers of atherosclerosis: Clinical applications." (AHRQ grant HS13852). *Current Cardiology Reports* 10, pp. 497-504.

Numerous blood-based biomarkers are associated with increased cardiovascular risk after adjusting for traditional risk factors. The authors conducted a literature review on these biomarkers and examined whether incorporating these markers may improve clinical decisionmaking. Studies have identified the following biomarkers as risk factors for cardiovascular disease: apolipoprotein B; cardiac troponin-I; brain natriuretic peptide; cystatin C; inflammatory biomarkers such as myeloperoxidase, lipoprotein-associated phospholipase A2, and C-reactive protein; and plasma fibrinogen, a coagulation marker. Recent investigations have also focused on incorporating multiple biomarkers simultaneously into traditional risk prediction models to improve prediction. To be clinically useful, biomarkers must change management. When biomarkers associated with cardiovascular risk are elevated, intensification of therapy may be directed toward reducing the biomarker itself. However, the data on biomarkers thus far has been limited to assessing cardiovascular risk, with no studies examining whether changing treatment plans on the basis of these data modifies this risk.

Cohen, J. T., and Neumann, P. J. (2008). "Using decision analysis to better evaluate pediatric clinical guidelines." (AHRQ grant HS16760). *Health Affairs* 27(5), pp. 1467-1475.

Decision analysis synthesizes information and focuses on estimating the consequences of alternative health measures. The authors propose the use of decision analysis as a way of augmenting the traditional frameworks of evidentiary criteria for clinical guidelines. Their analysis of criteria used by major medical organizations such as the American Academy of Family Physicians (AAFP), the American Academy of Pediatrics (AAP), the Canadian Task Force on Preventive Medicine (CTFPM), and the U.S. Preventive Services Task Force (USPSTF) suggests that these frameworks do not independently characterize evidence quality and net benefits and do not systematically evaluate research needs. For example, both the AAP and the CTFPM place strong emphasis on randomized controlled trials (RCTs) in evaluating evidence quality. A study design itself might not be a reliable indicator. There can be external validity differences in generalizing RCT results because RCT studies focus on carefully selected patients, in carefully monitored settings. For interventions intended for children, the frequent absence of direct evidence highlights a key advantage of decision analysis: its focus on quantifying outcomes of interest to the decisionmaker, regardless of the availability of direct evidence.

Gerhard, T. (2008, November). "Bias: Considerations for research practice." (AHRQ grant HS16097). *American Journal of Health-System Pharmacists* 65, pp. 2159-2168.

The author provides an introduction to the concept of bias for pharmacy practice researchers to help facilitate the conduct of methodologically sound research. "Bias" refers to the presence of systematic error in a study. The most common classification systems distinguish between confounding, selection, and information bias. Bias can be introduced by factors that determine who is exposed to the drug or intervention of interest in the population (confounding bias), factors related to who is included in the study (selection bias), and errors of assessment and measurement (information bias). Bias can only adequately be discussed in the context of a study's population. Investigators should aim to avoid bias in the design of a study, adjust for bias in the study analysis if bias cannot be avoided, and quantify and discuss the effects of residual bias on study results.

Holden, R. J., Or, C. K. L., Alper, S. J., and others. (2008). "A change management framework for macroergonomic field research." (AHRQ grant HS13610). *Applied Ergonomics* 39, pp. 459-474.

The authors present a new framework for macroergonomic field research, one based on proposals that (a) such research can be conceptualized as a change in itself, complete with necessary perturbations and a need for adoption and acceptance, and (b) principles derived from the literature on organization-level change management can be applied by field researchers in order to achieve a variety of research implementation goals, including adoption, acceptance, and data quality. They review the literature on change management and derive 30 principles of change management, covering topics such as political awareness, assembling the change team, generating buy-in, and management support. For each of the change management

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principles, practical considerations for field research management are given. The authors urge other field researchers to develop their own principle-based research practices and to further explore literature on change management for inspiration. Finally, they suggest that other researchers adopt research frameworks such as theirs in order to guide not only how to design research but also how to implement it successfully.

Huskamp, H. A., Donohue, J. M., Koss, C. and others. (2008). "Generic entry, reformulations and promotion of SSRIs in the US." (AHRQ grant HS10803). *Pharmacoeconomics* 26(7), pp. 603-616.

The level of pharmaceutical promotional expenditures for a given drug is usually affected by the introduction of competing generic products, but other factors may also be important. The researchers examined the impacts of generic competition, the introduction of reformulated products, and new indication approval on promotional expenditures for one class of antidepressants, the selective serotonin reuptake inhibitors (SSRIs). Between 2001 and 2006, four SSRIs (Prozac, Paxil, Zoloft, and Celexa) lost patent protection and consequently faced generic competition. Their manufacturers responded by introducing new product formulations of existing brand molecules (the original brand name drug products) and obtaining FDA approval to market their SSRI for new clinical indications other than depression. The researchers found that promotional spending for a specific brand name drug product generally declined after generic versions entered the market. However, the effect of generic competition on promotional spending appeared to be closely linked to the choice of product reformulation strategy pursued by the manufacturer. For example, the manufacturer of Paxil increased detailing expenditures after the FDA approved its use for generalized anxiety disorder but did not alter direct-to-consumer advertising. By contrast, when both Paxil and Zoloft received FDA approval to be marketed for social anxiety disorder, detailing expenditures did not change.

Jerant, A., DiMatteo, R., Arnstein, J., and others. (2008, November). "Self-report adherence measures in chronic illness." (AHRQ grant HS13603). *Medical Care* 46(11), pp. 1134-1139.

Medication adherence has been associated in some studies with improved chronic illness outcomes. Although a number of measurement approaches for medication adherence are commonly used, there is no gold standard measure. The researchers explored the reliability and validity of three different kinds of self-report medication adherence measures focusing on general adherence tendencies, medication-taking habits, and specific quantities of pills taken over an identified period of time, expressed as a proportion [number of pills taken/number of pills prescribed (PT/PP)]. The participants were mostly women over 40 years of age with one or more chronic diseases. The correlations observed among PT/PP and general adherence measures were modest. The researchers also found that PT/PP recall over 3–4 days may yield adherence estimates that are practically as reliable and valid as those collected over longer recall intervals. Also, better PT/PP adherence measured at 2 weeks was associated with improved adjusted Health Assessment Questionnaire scores at 6 months.

Jiang, H. J., Friedman, B., and Andrews, R. (2008, July). "Changes in hospital readmissions for diabetes-related conditions: Differences by payer." *Managed Care Interface*, pp. 24-30.

This study examines changes in long-term (180-day) hospital readmissions for diabetes-related conditions between 1999 and 2003. Information on hospital stays was obtained from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). For both years, Medicaid patients had the highest observed readmission rates, which were more than 10 percent higher than those for Medicare patients and over 50 percent higher than those for private patients. Between 1999 and 2003, there was a small and significant (4.5 percent) decrease in the observed readmission rate among the privately insured. In comparison, no significant changes were found in readmission rates for the Medicare and Medicaid populations, except among the Medicare HMO population, where the risk of readmission was significantly lower (5.8 percent).These findings suggest that diabetes care and outcomes are improving in the United States, particularly among those enrolled in private health plans. Reprints (AHRQ publication no. 09-R013) are available from AHRQ.*

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Lautenbach, E., Bilker, W.B., Tolomeo, P., and Maslow, J. N. (2008, September). "Impact of diversity of colonizing strains on strategies for sampling escherichia coli from fecal specimens." (AHRQ grant HS10399). *Journal of Clinical Microbiology*, pp. 3094-3096.

This study analyzes the genetic diversity of *Escherichia coli* colonization in fecal samples from long-term care facility (LTCF) residents. The researchers' goal was to determine the likelihood of identifying both common and uncommon strains of *E. coli* using different strategies for colony sampling from fecal specimens. They found that approximately 40 percent of the 49 LTCF residents were colonized with multiple strains of E. coli. Of 83 total strains from all subjects, 17 accounted for fewer than 20 percent of colonies in the samples tested. Of 49 total subjects, 12 had at least 1 strain present in fewer than 20 percent of colonies. The results demonstrated that the ability to accurately characterize *E. coli* strain diversity in human subjects is directly related to the number of colonies sampled and the underlying prevalence of the strain.

Linder, J. A. (2008, September). "Antibiotics for treatment of acute respiratory tract infections: Decreasing benefit, increasing risk, and the irrelevance of antimicrobial resistance." (AHRQ grant HS14563). *Clinical Infectious Diseases* 47, pp. 744-746.

In an editorial commentary, the author argues against the overprescribing of antibiotics with special emphasis on the use of antibiotics for treatment of predominantly viral acute respiratory tract infections. Overall, such infections (excluding pneumonia) account for 50 percent of antibiotic prescribing to adults and 75 percent of antibiotic prescribing to children. He discusses a new study that found that antibiotics were responsible for nearly 20 percent of emergency department visits for drug-related adverse events. According to a recent systematic review, multidimensional interventions involving physicians and patients appeared more effective in reducing inappropriate prescribing of antibiotics than either clinician educational interventions or interventions that used audit and feedback. He concludes by arguing that treating a viral illness with antibiotics does not make sense microbiologically. Also, the benefit of antibiotics for treatment of most acute respiratory tract infections appears to be decreasing and the real risks of antibiotic prescribing are becoming clearer. These risks include a 5 to 25 percent chance of causing diarrhea and a 1 in 1000 likelihood of an emergency department visit due to a bad reaction.

Liu, L., Ma, J. Z., and O'Quigley, J. (2008). "Joint analysis of multi-level repeated measures data and survival: an application to the end stage renal disease (ESRD) data." (AHRQ grant HS16543). *Statistics in Medicine* 27, pp. 5679-5691.

For patients with end stage renal disease, increases in hematocrit level have been associated with significant clinical benefits and improved survival rates. However, the longitudinal pattern of hematocrit level and its impact on patient survival have not been fully explored. The researchers sought to model both longitudinal hematocrit level and patient survival by the use of a joint model of repeated measures. They propose a multilevel joint random effects model and then present the corresponding estimation method by Gaussian quadrature. To assess the performance of the proposed estimation method, simulation studies were conducted. Using the U.S. Renal Data System (USRDS), they then applied their method to the joint model of longitudinal measures of hematocrit level and death for patients clustered within 126 dialysis centers. In this application, the researchers show a significant association between longitudinal hematocrit measurements and survival at the subject level, but not at the cluster level for the USRDS data.

Liu, L., and Yu, Z. (2008). "A likelihood reformulation method in non-normal random effects models." (AHRQ grant HS16543). *Statistics in Medicine* 27, pp. 3105-3124.

The researchers propose a novel estimation method that reformulates the conditional likelihood on nonnormal random effects. By dividing and multiplying the conditional likelihood by a normal density function, they reformulate the resulting likelihood for integration over normal random effects in the Gaussian quadrature scenario. Standard computing programs, such as SAS Proc NLMIXED, can then be employed for parameter estimates. This method of "likelihood reformulation" yields similar results to the probability integral transformation method, while reducing computational time tremendously. This method only needs to specify the density

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function explicitly. Thus, it can handle random effects whose inverse cumulative distribution function is of no closed form or not available in the specific software. Therefore, it can accommodate a much wider range of applications. The researchers give three examples to illustrate the implementation of their method and present simulation studies to assess its performance. Finally, they apply the method to two real data sets.

Mutter, R., Rosko, M. D., and Wong, H. S. (2008, December). "Measuring hospital inefficiency: The effects of controlling for quality and patient burden of illness." ***HSR: Health Services Research*** **43(6), pp. 1992-2013.**

Existing hospital efficiency measures that do not explicitly account for quality of care may overstate actual levels of hospital inefficiency. The researchers sought to assess the impact of employing a variety of controls for hospital quality and patient burden of illness on the mean estimated inefficiency and relative ranking of hospitals as generated by stochastic frontier analysis (SFA).They also compare strategies for controlling multiple dimensions of patient burden of illness. Thirty comorbidities contributing to a patient's burden of illness were identified by the application of the Comorbidity Software to hospital data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases and an SFA model developed by Jondrow, et al., was used to estimate hospital cost-inefficiency. A principal finding was that measures produced by the Comorbidity Software, when applied to hospital data from the HCUP databases, appear to account for variations in patient burden of illness that had previously been masquerading as inefficiency. Reprints (AHRQ publication no. 09-R011) are available from AHRQ.*

Plantinga, L. C., Fink, N. E., Melamed, M. L., and others. (2008). "Serum phosphate levels and risk of infection in incident dialysis patients." (AHRQ grant HS08365). ***Clinical Journal of the American Society of Nephrology*** **3, pp. 1398-1406.**

Hyperphosphatemia occurs frequently in dialysis patients and may be associated with immune dysfunction. Although the evidence is conflicting, the risk for infectious morbidity and mortality has been shown to be increased in patients with increased phosphate levels. This national prospective cohort study of 1,010 dialysis patients in 80 treatment centers found that high levels of phosphate (greater than 5.5 mg/dl) early in the course of dialysis were associated with increased risk for subsequent infection. The association was not explained by evidence of secondary hyperparathyroidism or uremia as a result of poor dialysis, suggesting that phosphate may be an independent risk factor for infection. When sepsis was examined, high phosphate was associated with increased risk but only with adjustment. Regardless of adjustment, high phosphate was associated with increased incidence of osteomyelitis; however, the association of high phosphate with respiratory infections was not statistically significant. The researchers conclude that their results are consistent with the call for better hyperphosphatemia management in dialysis patients.

Rosen, J., Mulsant, B. H., Marino, P., and others. (2008). "Web-based training and interrater reliability testing for scoring the Hamilton Depression Rating Scale." (AHRQ grant HS11976). ***Psychiatry Research*** **161, pp. 126-130.**

In clinical trials, the reliability of the data collected ultimately determines the validity of the studies' conclusions. When multiple raters are used in a clinical psychiatry trial, differences between raters in terms of interviewing technique and scoring criteria introduce variability that can distort outcome measures. Rater reliability is an issue often ignored in clinical trials. The researchers performed an initial evaluation in which 17 raters (naïve, experienced, expert) completed a tutorial and then rated 6 videotaped interviews in which patients responded to interviewer questions regarding the items on the Hamilton Depression Rating Scale (HDRS). The interview subjects were seven patients taking part in a National Institute of Mental Health study, who each had three HDRS interviews at different stages of treatment. In the second stage field trial, 13 raters also completed a tutorial and rated 6 videotaped HDRS interviews. The interrater reliabilities were excellent for both groups. The study used a Web-based system with three components: a scoring-tutorial program, a reliability testing program, and an administrative program.

Rosolowsky, E.T., Niewczas, M.A., Ficociello, L.H., and others. (2008). "Between hyperfiltration and impairment: Demystifying early renal functional changes in diabetic

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nephropathy." (AHRQ grant T32 HS00063). ***Diabetes Research and Clinical Practice*** **25, pp. S46-S53.**

The reliability and accuracy of serum cystatin-C-based estimates of glomerular filtration rates (GFR) have made feasible large-scale prospective studies directed at monitoring patterns of renal function change prior to the development of proteinuria. Contrary to earlier studies, these recent studies have found that the process of renal function loss may begin prior to the onset of proteinuria. The 2nd Joslin Kidney Study on the Natural History of Microalbuminuria in Type 1 Diabetes sought to identify clinical and biochemical factors that are associated with early renal decline. It found that both serum uric acid and components of the tumor-necrosis-factor-alpha (TNF alpha) may be involved in early renal decline. However, the exact nature of the roles that serum uric acid and TNF alpha pathway play in the setting of early reductions in renal function has yet to be elucidated.

Scanlon, D. P., Swaminathan, S., Lee, W., and Chernew, M. (2008, December). "Does competition improve health care quality?" (AHRQ grant HS10771). ***HSR: Health Services Research*****, 43(6), pp. 1931-1951.**

Advocates of the competitive approach assert that competition will both reduce costs and improve quality; however, empirical evidence relating health maintenance organization (HMO) competition to HMO quality is sparse. The researchers examined the effects of competition on HMOs' quality measures. They used measures from the Healthcare Effectiveness Data and Information Set (HEDIS) and the Consumer Assessment of Healthcare Providers and Systems Survey (CAHPS) to measure quality. To measure competition, they used the Herfindahl-Hirschman Index, InterStudy data on the number of HMOs, and other sources. The results suggest that there is not a consistent relationship between HMO competition and quality. Some results are even conflicting, with estimates from CAHPS measures suggesting that more competition results in a worse plan rating, but also a better physician rating. Estimates from the HEDIS measure on the beta-blocker medication rate suggest that performance decreases with greater competition.

Sege, R. D., and Flaherty, E. G. (2008, December). "Forty years later: Inconsistencies in reporting of child abuse." (AHRQ grant HS16359). ***Archives of Disease in Children*** **93, pp. 823-824.**

Many case of child abuse go unrecognized and unreported, occasionally with tragic consequences. The authors review recent health services literature that reveals the current barriers to reporting, which fall into two major areas: the failure to identify maltreatment and deciding not to report suspected abuse to State authorities. Lack of knowledge about child abuse and common presenting complaints may be a substantial cause of underreporting. Pediatricians in children's hospitals seem to recognize child abuse at substantially greater rates than emergency physicians in general hospitals, according to one study. One study of 15,000 children with physical injuries found that only 1 in 4 with injuries judged "likely," "possibly," or "very likely" to have been caused by abuse were reported to child protective services (CPS). Clinicians may have been influenced not to report by negative media reports, by published studies that suggest that children who have been reported continue to experience abuse, or a belief that they could intervene with family more effectively than CPS. The authors conclude by recommending steps that would lead to improved outcomes for children.

Selden, T. M. (2008). "The effect of tax subsidies on high health care expenditure burdens in the United States." ***International Journal of Health Care Finance and Economics*** **8, pp. 209-223.**

Previous studies of families with high health care expenditure burdens have ignored the role of tax subsidies in helping to reduce both the prevalence and magnitude of high burdens. In 2002, tax subsidies accounted for 16 percent of total health care expenditures by the civilian noninstitutionalized population. Tax subsidies of this magnitude might be expected to have at least a modest effect on the prevalence and size of high burdens. The researcher presents evidence on pre- and post-subsidy high burden frequency using data from the Household Component of the Medical Expenditure Panel Survey. He found that regardless of the burden threshold chosen or the definition of private health care spending, tax subsidies had little effect on the share of the poor who were living in families with high burdens. In general, tax subsidies do not have a differentially large or targeted effect on the prevalence of high burdens, although the effect is larger among families above the poverty line. Reprints (AHRQ publication no. 09-R010) are available from AHRQ.*

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Shih, C., and Berliner, E. (2008, December). "Diffusion of new technology and payment policies: Coronary stents." *Health Affairs* 27(6), pp. 1566-1576.

The implementation of a higher payment rate for bare metal stenting has been thought to be responsible for the acceleration in the use of stenting. The authors sought to determine if this was true or were other factors involved. They first examined the evidence on the balance of benefits and harms provided by the stents when they were initially introduced. They then considered whether the data suggest that Medicare patients were denied stents prior to the payment increase. The early studies on stenting during percutaneous transluminal coronary angioplasty found improved coronary diameter among patients with new lesions in the main coronary arteries. Analysis of later studies did not shed light on whether the diffusion of stents might have followed a different course if payment policies had been different. Both bare metal stents and the later drug-eluting stents diffused rapidly to off-label indications, suggesting the need for continuing evaluation of new technology. Reprints (AHRQ publication no. 09-R012) are available from AHRQ.*

Sprague, B. L., Trentham-Dietz, A., Klein, B. E. K., and others. (2008). "Physical activity, white blood cell count, and lung cancer risk in a prospective cohort study." (AHRQ grant HS06941). *Cancer Epidemiology Biomarkers Prevention* 17(10), pp. 2714-2722.

Lung cancer is the leading cause of cancer death among men and women in the United States. The researchers investigated the relation between self-reported physical activity and lung cancer in a group of 4,831 subjects, 43 to 86 years of age who were followed for an average of 13 years. They also measured two inflammatory markers, white blood cell (WBC) count, and serum albumin to evaluate whether inflammation mediates the relation between physical activity and lung cancer. The study found that higher levels of physical activity at baseline were inversely associated with lung cancer incidence. After adjustment, the risk of lung cancer was reduced by over 40 percent among participants reporting 12 or more city blocks walked per day. It also found evidence for a positive association between lung cancer risk and WBC count, but not serum albumin. Finally, there was no evidence that the associations of physical activity and WBC count with lung cancer risk were mediated through the same biological pathway.

Valdmanis, V.G., Rosko, M.D., and Mutter, R.L. (2008, December). "Hospital quality, efficiency, and input slack differentials." *HSR: Health Services Research* 43(5), Pt. II, pp. 1830-1848.

This study uses an advance in data envelopment analysis (DEA), termed congestion analysis, to ascertain whether some hospitals might be experiencing poor quality that could be corrected by changing the number and mix of inputs. The researchers found that public hospitals were more inefficient on all four measures of inefficiency (overall, technical, scale, and quality congestion). Not-for-profit (NFP) hospitals were the next most inefficient, although there was little difference between public and NFP hospitals. Council of Teaching Hospitals member hospitals were significantly less efficient on the overall and scale measures, but did outperform the other two types of hospitals in both pure technical inefficiency and quality congestion. Organizationally, high-quality hospitals tended to have too many labor inputs, leading to inefficiency. Overall, the hospitals in the sample could increase the total amount of outputs produced by an average of 26 percent by eliminating inefficiency. Reprints (AHRQ publication no. 09-R005) are available from AHRQ.*

Wall, R.J., Ely, E.W., Talbot, T.R., and others. (2008). "Evidence-based algorithms for diagnosing and treating ventilator-associated pneumonia." (AHRQ grant HS15934). *Journal of Hospital Medicine* 3(5), pp. 409-422).

Ventilator-associated pneumonia (VAP) is a serious and common complication for patients in the intensive care unit (ICU). The goal of this descriptive study was to develop practical algorithms that assist ICU clinicians in the diagnosis and management of VAP during daily practice. The authors first review the current evidence for diagnosing VAP, then describe their approach to developing the algorithms, and finally illustrate the utility of the diagnostic algorithms using clinical teaching cases. Separate algorithms were developed for infant, pediatric, immunocompromised, and adult ICU patients. These algorithms may provide evidence-based practical guidance to clinicians seeking a standardized approach to diagnosing and managing this challenging problem. The data used in the study came from a national collaborative focused on reducing VAP and catheter-related bloodstream infections.

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Weinstock, P., and Halamek, L.P. (2008). "Teamwork during resuscitation." (AHRQ grant HS 12022). *Pediatric Clinics of North America* 55, pp. 1011-1024.

Despite calls for effective teamwork in health care by prominent organizations, there is no accepted model of team performance. The authors examine the available evidence supporting teamwork both in pediatric health care in general and in pediatric and neonatal resuscitation. Data are just beginning to emerge on how to measure and improve teamwork among health care providers. One study showed a trend toward risk reduction for inhospital cardiorespiratory arrest after implementing a rapid response team in a pediatric tertiary care hospital. Structured simulation-based crew resource management (CRM) strategy programs (first developed in commercial aviation) have begun to fill the critical gap in teamwork training. Virtual reality-based learning opportunities also allow learners to control the learning process. In the area of neonatal resuscitation, the NeoSim program uses realistic simulation-based experiences and video debriefings to create a safe environment for hands-on practice of neonatal resuscitation. A growing number of pediatric centers have come to appreciate the value of this type of training. The researchers concluded that as this type and other types of training focused on developing teamwork spread, the quality of practice of resuscitation will improve and patients will benefit.

Westfall, J.M., Kiefe, C.I., Weissman, N.W., and others. (2008). "Does interhospital transfer improve outcome of acute myocardial infarction? A propensity score analysis from the Cardiovascular Cooperative Project." (AHRQ grant HS09446). BMC Cardiovascular Disorders 8(22), pp. 1-9.

The impact of interhospital transfer of patients with acute myocardial infarction (AMI) on the processes and outcomes of care has gone largely unstudied. Since transfer rates have increased dramatically in the past decade, it is even more important to understand the risks and benefits associated with transfer. Using clinical and administrative data on 184,295 Medicare patients with AMI, the researchers found that the transferred patients (28 percent of the total) were significantly younger, less critically ill, and had lower co-morbidity than the non-transferred patients. After propensity-matching, transferred patients had generally higher quality of care and lower mortality than non-transferred patients. When they had accounted for the numerous and large differences between transferred and non-transferred patients, the researchers found that mortality for patients cared for in a rural hospital was similar to that for patients cared for in an urban hospital. Previous studies that deleted transferred patients from their analyses had found that rural and smaller hospitals had worse outcomes.

Willging, C.E., Waitzkin, H., and Nicdao, E. (2008, September). "Medicaid managed care for mental health services: The survival of safety net institutions in rural settings." (AHRQ grant HS09703). *Qualitative Health Research* 18(9), pp. 1231-1246.

Few accounts document how safety net institutions (SNIs) have responded to the introduction of Medicaid managed care (MMC) for the provision of mental health services. The researchers conducted an ethnographic study in two rural, culturally distinct regions of New Mexico to assess the effects of MMC and the implications for future reform. In conducting 160 interviews at 6 SNIs, they found that the responses of SNIs to MMC varied from nonparticipation in MMC to forming an alliance with other SNIs to enhance collective bargaining power with managed care organizations. Other survival strategies included trying to reduce exposure to low-income clients and tapping into non-MMC clients to cover the costs of caring for the uninsured. The researchers found that numerous barriers impaired access under MMC: service fragmentation, transportation, lack of cultural and linguistic competency, Medicaid enrollment, stigma and confidentiality, and immigration status. In general, MMC did not improve quality of care for Hispanics or American Indians.

Yelin, E. (2008, August). "Out-of-pocket payments in arthritis: Spur to prudent purchasing or red herring?" (AHRQ grant HS13893). *Arthritis & Rheumatism* 58 (8), pp. 2225-2227.

Cost-sharing, i.e., requiring patients to pay more out-of-pocket for health care, has become a central feature of health policy in the United States. In particular, the Medicare Prescription Drug Improvement and Modernization Act has a complex set of cost-sharing rules for the drug benefit. The author challenges the view that cost-sharing fosters prudent buying by creating an incentive for the patient to equilibrate costs and benefits more thoroughly. Conceptions of "good value" may differ, with some patients choosing

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to relieve pain rather than cure disease and others being more averse to losses than to gains of equal expected value and prevalence. In addition, an earlier study found that higher levels of cost sharing led to indiscriminate reductions in both appropriate and inappropriate care. A new study found that cost-sharing for persons with arthritis is increasing. Without evidence to show that cost-sharing does not have a harmful effect on the health of persons with arthritis, discussion about prudent buying is a red herring, notes this author.

Yost, K.J., Hahn, E. A., Zaslavsky, A.M., and others. (2008). "Predictors of health-related quality of life in patients with colorectal cancer." (AHRQ grant HS09869). *Health and Quality of Life Outcomes* 6(66), pp. 1-10.

Since most patients with colorectal cancer survive at least 5 years after diagnosis, health-related quality of life (HRQL) is an important outcome for them. The researchers sought to identify variables that predict HRQL in a prospective, population-base study of 830 patients with colorectal cancer. HRQL was measured in the initial and followup surveys by the Functional Assessment of Cancer Therapy-Colorectal (FACT-C). This survey includes subscales measuring physical, functional, social/family, and emotional well-being as well as a colorectal cancer subscale. The average time between initial and followup surveys was 10.2 months. Emotional well-being scores were the most stable over time. The most consistent finding was that patients with poor general health and problems with certain domains of perceived quality of cancer care may be at risk for poor HRQL. Being male, unmarried, or Hispanic were also characteristics associated with being at risk for specific poor HRQL outcomes.

Zettel-Watson, L., Ditto, P.H., Danks, J.H., and Smucker, W.D. (2008). "Actual and perceived gender differences in the accuracy of surrogate decisions about life-sustaining medical treatment among older spouses." (AHRQ grant HS08180). *Death Studies* 32, pp. 273-290.

Because accurate substituted judgment is instrumental in the maintenance of patient autonomy at the end of life, researchers have begun to investigate patient and surrogate factors that may be associated with surrogate accuracy. One factor that has received surprisingly little attention is surrogate gender. Using a series of nine hypothetical illness scenarios, the researchers examined the influence of surrogate gender on the accuracy of substituted judgments about the use of life-sustaining treatment. The sample consisted of 249 older adults and their self-selected surrogate decisionmakers. In eight of the nine scenarios, wives tended to be more accurate than their husbands, although this difference was statistically significant for only the Alzheimer's disease scenario. In all instances where gender differences were found, husbands committed significantly more overtreatment errors than did wives acting as surrogates. Also, husbands had more confidence than their wives in their spouses' accuracy. ■

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