Research Activities

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Highlights

Departments

Regular Features

Electronic medication alerts reduce inappropriate prescribing of warfarin with interacting drugs

Combining certain medications with the anticoagulant drug warfarin can have serious consequences. Medication interactions that accentuate warfarin's anticoagulant effect increase the risk for brain hemorrhage, other bleeding episodes, and death. Using electronic medical record alerts reduces the frequency of prescribing interacting drugs to patients who are also taking warfarin. This study was supported in part by the Agency for Healthcare Research and Quality (HS11843) through its Centers for Education and Research on Therapeutics and Patient Safety research programs.

Whenever a doctor in 1 of 15 primary care clinics involved in the study prescribed any potentially interacting medications—acetaminophen, non-steroidal anti-inflammatory drugs, fluconazole, metronidazole, or sulfamethoxasole—to a patient taking warfarin, an alert on the computer screen would tell the doctor the potential adverse outcome and suggest an alternative medication. Although these five drugs can accentuate warfarin's blood thinning effect, they were not contraindicated in all situations. The alerts, which were produced by software added to the health care organization's existing computerized prescription system, gave the physician the option of prescribing a different drug or overriding the alert.

At the start of the study, doctors were ordering 3,294 interacting drugs for every 10,000 warfarin patients. At the end of the study, the rate had dropped to 2,804 per every 10,000 warfarin patients – a reduction of 15 percent.

More details are in "Reducing warfarin medication interaction: An interrupted time series evaluation," by Adrienne C. Feldstein, M.D., David H. Smith, R.Ph., M.H.A., Ph.D., Nancy Perrin, Ph.D., and others, in the May 8, 2006 *Archives of Internal Medicine* 166, pp. 1009-1015. ■

Computerized prescribing alerts can be designed to be widely accepted by primary care clinicians

Clinical decision support systems (CDSS) embedded within computerized prescribing systems reduce medication errors by checking entered prescriptions for potential problems such as drug interactions and allergies. If a potential problem is found, the CDSS provides clinicians with real-time alerts, allowing the clinician to make appropriate changes before the prescription is finalized. When the threshold for alerting is set too low, clinicians are inundated with alerts of low clinical significance, leading to high override rates and the potential threat they will override even important alerts.

However, it is possible to design computerized prescribing alerts that will be widely accepted by clinicians, concludes a study supported by the Agency for Healthcare Research and Quality (HS11169 and T32 HS00020). The researchers designated that only critical to high-severity alerts could interrupt clinician workflow. The alerts were presented to clinicians using computerized prescribing within an electronic medical record in 31 primary care practices. A total of 18,115 drug alerts were generated during the 6-month study period.

Of the drug alerts, 71 percent were in noninterruptive display mode and 29 percent were interruptive. Clinicians accepted the 5,182 interruptive (critical or high-severity) alerts two-thirds (67 percent) of the time, which is much higher than previously published acceptance rates.

Their reasons for overriding alerts were varied. In some cases, they were transitioning the patient from one drug to the other (42 percent) or the patient was on long-term therapy with the drug combination (21 percent). In other cases, the patient was being placed on the drug combination for a short-term or as-needed basis only (7 percent) or "new evidence" existed for the drug's use (2 percent). These reasons suggest that clinicians often deviate from prescribing recommendations for good clinical reasons. This information is worth capturing for subsequent evaluation and revision of alerts, suggest the researchers.

See "Improving acceptance of computerized prescribing alerts in ambulatory care," by Nidhi R. Shah, M.D., M.P.H., Andrew C. Seger, Pharm.D., Diane L. Seger, R.Ph., and others, in the January 2006 *Journal of the American Medical Informatics Association* 13(1), pp. 5-11. ■

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Many primary care doctors still do not use electronic antibiotic prescribing for acute infections

Electronic prescribing avoids errors associated with handwritten prescriptions as well as medication interactions, drug allergies, and other problems. Yet many primary care doctors still do not use electronic prescribing systems. A study supported by the Agency for Healthcare Research and Quality (HS14420 and HS14563) found that doctors at nine primary care clinics underused electronic prescribing of antibiotics for acute respiratory infections (ARIs) and urinary tract infections (UTIs).

The researchers noted that barriers to using electronic antibiotic prescribing in primary care must be addressed to leverage the potential that computerized decision-support systems offer in

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Electronic antibiotic prescribing

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reducing costs, improving quality, and improving patient safety. They retrospectively studied the accuracy of electronic claims diagnoses and electronic antibiotic prescribing for ARIs and UTIs for randomly selected patient visits to nine clinics in the Brigham and Women's Practice-Based Research Network between 2000 and 2003.

The study found that electronic, claims-derived diagnosis codes had good accuracy for identifying ARI and UTI visits in primary care clinics. However, the sensitivity of electronic antibiotic prescribing was poor overall, reflecting the gap between physician note-documented antibiotic prescribing and electronic antibiotic prescribing. Sensitivity increased over time from 22 percent in 2000 to 58 percent in 2003; that is, 58 percent of doctors who prescribed antibiotics used the electronic prescribing system in 2003.

See "Acute infections in primary care: Accuracy of electronic diagnoses and electronic antibiotic prescribing," by Jeffrey A. Linder, M.D., M.P.H., David W. Bates, M.D., M.Sc., Deborah H. Williams, M.H.A., and others, in the January 2006 *Journal of the American Medical Informatics Association* 13(1), pp. 61-66. ■

Disparities/Minority Health

Nurse-anchored practice-based research centers help address health disparities

This article highlights the importance of practice-based research networks (PBRNs) in primary health care research and the unique community-based care delivered by nurses in community nursing centers (CNCs). CNCs are in a position to combine the strengths found in community-based participatory research (CBPR) methods with those found within a PBRN to develop and test evidence-based practices to improve health outcomes and decrease health disparities.

The authors point out that CNC services are targeted to individuals and groups whose needs are not being met in the traditional delivery system. For instance, many CNC sites provide primary care management of illness for very low income, underserved clients. They also discuss how to establish a nursing PBRN, describe the Midwest Nursing Centers Consortium Research Network (MNCCRN) located at the University of Wisconsin–Milwaukee CNC sites, and one of the network's research projects to implement behavior changes in primary care providers and patients at high risk for chronic disease.

They assert that nurses can and must enter the field of CBPR, using the power of community partnerships inherent in practice to integrate primary prevention and health promotion principles into nursing research designs. Currently, there are only two PBRNs funded by the Federal government which are anchored by advanced practice nurses in primary care: MNCCRN and APRNet. APRNet is a network of nurse practitioners in clinical settings throughout New England, which is coordinated by a team at the Yale School of Nursing. The authors call for the establishment of more nurse-anchored PBRNs to develop and test interventions that reduce health disparities in the nation's neediest populations. Their study was supported in part by the Agency for Healthcare Research and Quality (HS13573).

See "Practice-based research networks: Nursing centers and communities working collaboratively to reduce health disparities," by Laura Anderko, Ph.D., R.N., Claudia Bartz, Ph.D., R.N., F.A.A.N., and Sally Lundeen, Ph.D., R.N., F.A.A.N., in the December 2005 *Nursing Clinics of North America* 40, pp. 747-758. ■

Also in this issue:

Medicaid may reduce racial/ethnic differences in preventable hospitalizations, but Medicaid managed care adds no extra benefit

Medicaid appears to reduce racial/ethnic differences in preventable hospitalizations of non-elderly adults. Now, a growing number of States are enrolling their Medicaid populations (predominantly ethnic/racial minorities) in managed care plans. However, according to a study by Agency for Healthcare Research and Quality (AHRQ) investigators, Jayasree Basu, Ph.D., M.B.A., Bernard Friedman, Ph.D., and Helen Burstin, M.D, M.P.H., Medicaid managed care (MMC) adds no extra benefit.

The researchers analyzed hospital discharge data from AHRQ's Healthcare Cost and Utilization Project State Inpatient database on adults aged 20 to 64 years who were hospitalized in New York, Pennsylvania, and Wisconsin. The results indicated weak evidence that preventable hospitalization rates consistently declined in any racial group in MMC relative to Medicaid fee-for-service (FFS) plans. The difference in preventable hospitalizations for Medicaid MMC was only significant for minorities in Wisconsin, where both blacks and Hispanics had a lower likelihood of preventable hospitalization in MMC than in Medicaid FFS.

Although Wisconsin has a relatively high MMC penetration, it also is a rural State with a small minority population (8.3 percent in 1997 compared with 23.4 percent and 11.6 percent in New York and Pennsylvania, respectively). While white residents in the more urban State of New York had a significantly lower likelihood of preventable hospitalizations in MMC than in Medicaid FFS, the opposite was found for white residents of the similarly urban State of Pennsylvania. Overall, the evidence is not strong that any particular racial group consistently benefited from MMC, or that any State consistently showed a favorable impact of MMC across racial groups. However, racial/ethnic disparities associated with the risk of preventable hospitalization were significantly less pronounced among Medicaid adults than among private FFS adults. Uniform coverage for Medicaid beneficiaries may reduce some of the racial inequalities in care access, conclude the researchers.

See "Preventable hospitalization and Medicaid managed care: Does race matter?", by Drs. Basu, Friedman, and Burstin, in the February 2006 *Journal of Health Care for the Poor and Underserved* 17, pp. 101-115. Reprints (AHRQ Publication No. 06-R028) are available from AHRQ.* ■

Ethnicity, age, and living arrangements affect the use of assistive devices by people with impaired mobility

Blacks and older people suffer from more impaired mobility than others. Blacks with mobility problems are more likely than whites and Hispanics to use assistive devices such as canes, walkers, or wheelchairs. However, this is not true of the oldest group of blacks, according to a study of ethnic- and age-related differences in assistive device use among people who have trouble walking. Assistive devices help prevent injury and promote independence, but are too often underused, note the Brown University researchers who conducted the study.

In a study supported in part by the Agency for Healthcare Research and Quality (T32 HS00011), researchers identified 7,148 mobility-impaired adults from the National Health Interview Survey on Disability. They used models to estimate the influence

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Imparied mobility

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of age, race/ethnicity, and living arrangements on device use. Blacks were 20 percent more likely and Hispanics were 22 percent less likely than whites to use devices. However, these differences were increased with age. There was a 40 percent increased likelihood of use attributable to being black and aged 45 to 75, a 30 percent increased likelihood attributable to being Hispanic and aged 65 to 75, and a 130 percent increased likelihood attributable to being Hispanic and older than 75.

More use of assistive devices by younger blacks may be due to a greater prevalence of disabling conditions, including amputations due to uncontrolled diabetes, that afflict blacks at younger ages. Lower device use among the oldest blacks may be due to lower prevalence of uncontrolled diabetes and disabling chronic disease among blacks who survive this long. Hispanic culture encourages informal caregiving by family, neighbors, and friends, which may substitute for device use by Hispanics with mobility impairments at younger ages. However, the care needs of elderly Hispanics may begin to overwhelm family and friends, at which time use of a mobility device may become more culturally acceptable and hence more prevalent. Finally, the researchers note that those who lived alone were 40 percent more likely to use mobility devices, indicating that assistive devices can substitute or supplement human assistance.

See "Racial and ethnic differences in use of assistive devices for mobility," by Linda Resnik, Ph.D., P.T., O.C.S., and Susan Allen, Ph.D., in the February 2006 *Journal of Aging and Health* 18(1), pp. 106-124. ■

Child/Adolescent Health

Parents of children with special health care needs identify multiple barriers to accessing care for their children

Due to many barriers to care, parents of children with special health care needs often have to be very aggressive to get health care for their children. Researchers, supported in part by the Agency for Healthcare Research and Quality (HS13058), conducted focus groups with English and Spanish-speaking parents who were asked about specific areas of the pediatric care experience: parental skills necessary to gain access to the formal U.S. health care system, how to use those services once gained, care site (front office and clinical visit), and outcomes (for instance, deprivation and distrust).

Each of three focus groups included an average of three participants and was conducted in both languages, for a total of six audiotaped focus groups. Parents said that gaining access to care for their children was a problem in several areas. They often had to wait too many days or weeks for an appointment. Also, getting to appointments often entailed long bus rides with packed lunches, as well as balancing responsibilities such as other children, a job, or getting dinner on the table by a certain time. Parents reported uncaring front office staff, who seemed prejudiced against those who looked poor, were minorities, or did not speak English well.

Parents often endured long waiting times to see the doctor. When finally seen by the doctor, they complained of being treated by doctors not trained in the right specialty, or who focused on the symptoms but did not deal with the underlying causes. The referral system was problematic, as was coordination of information between insurer and provider and among providers. Parents considered the system fragmented and arbitrary. Fees were inconsistent, records were not sent from the lab to the office, referrals were delayed or not forthcoming, and paperwork went missing. As a result, parents distrusted the health care system and felt marginalized. They said that they had to be very assertive to get needed care for their children.

One important feature of this study is the analysis of qualitative data. This analysis allowed for a more holistic perspective on issues related to patient health care experiences and quality than quantitative analysis alone.

See "Parent-identified barriers to pediatric health care: A process-oriented model," by Elisa J. Sobo, Ph.D., Michael Seid, Ph.D., and Leticia Reyes Gelhard, M.S., in the February 2006 *HSR: Health Services Research* 41(1), pp. 148-172. ■

Medicaid managed care plans with case management programs may benefit children with disabilities more than fee-for-service plans

Relatively few State Medicaid plans require children with special health care needs (CSHCN) to enroll in managed care (MC) plans. This is due to concerns that MC financial incentives to control costs may result in undertreatment, less access to procedures and providers, and adverse effects on care quality. However, Medicaid MC plans with case management programs may benefit children with disabilities eligible for Supplemental Security Income (SSI), suggests a study supported in part by the Agency for Healthcare Research and Quality (HS10912). The study was based on telephone interviews with a random sample of over 1,000 caregivers of predominantly black children with disabilities eligible for SSI enrolled in the District of Columbia's Medicaid program.

The interviews revealed fewer unmet health care needs among CSHCN enrolled in the District's partially capitated Medicaid MC plan than those enrolled in its Medicaid fee-for-service (FFS) plan. Almost 46 percent of FFS children had one or more unmet needs reported compared with 37 percent of MC children. Fifteen percent of FFS compared with 11 percent of MC children had an unmet need reported for medical equipment or supplies.

Jean M. Mitchell, Ph.D., of the Georgetown Public Policy Institute, and Darrell J. Gaskin, Ph.D., of Johns Hopkins University, speculate that several factors may account for some of these differences in unmet need. These factors include the case management services offered under the MC option, which assist the family in navigating the health care system in order to obtain medical care for the CSHCN; low Medicaid FFS provider reimbursements compared with MC reimbursement rates, and less FFS provider availability. The partially capitated MC plan used 20 percent of total capitation payments to cover administrative expenses, including case management services and outreach, and the other 80 percent to reimburse providers for services and to cover transportation costs for enrollees.

More details are in "Factors affecting plan choice and unmet need among supplemental security income eligible children with disabilities," by Drs. Mitchell and Gaskin, in the October 2005 HSR: *Health Services Research* 40(5), pp. 1379-1399. ■

Patient Safety and Quality

AHRQ's health care quality and disparities reports can help nurse leaders make key decisions about quality and patient safety

The National Healthcare Quality Report (NHQR) summarizes the quality of care supplied by the U.S. health care delivery system and identifies gaps in health care delivery. The National Healthcare Disparities Report (NHDR) summarizes gaps in health care quality and access by race, ethnicity, and socioeconomic status for the general U.S. population and for priority populations such as women, children, and rural residents. Both reports, prepared by the Agency for Healthcare Research and Quality (AHRQ), contain about 45 core quality measures and focus on 4 dimensions of health care quality: effectiveness, patient safety, timeliness, and patient centeredness. As such, they can assist nurse executives in understanding the status of their health care facility and/or network compared with others in the State or the Nation, according to a recent article.

The article, written by AHRQ researchers Anna Poker, M.S., R.N., Marybeth Farquhar, M.S.N., R.N., and Elizabeth Dayton, M.A., encourages nurse executives to use the reports to compare their facility or network with a national benchmark for care quality in a certain area; further their understanding of health

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

Quality and disparities reports

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care risks; and increase their likelihood of providing excellent health care.

Nurse executives can also use the reports to monitor health care delivery and identify areas where improvement is most needed. For example, the second annual NHQR, published in 2004, found the most improvement in patient safety. It also found more room for improvement in smoking cessation counseling and reducing inappropriate use of antibiotics. The 2004 NDHR found that the rate of hospital admissions for uncontrolled diabetes was much higher for poor blacks and Hispanics than high-income whites, revealing the opportunity to improve diabetes management among poorer minorities. To access the NHQR and NHDR, visit http://www.qualitytools.ahrq.gov. For State resources, visit http://www.qualitytools.ahrq.gov/qualityreport/state.

See "Using the national healthcare quality and disparities reports for executive decision making," by Ms. Poker, Ms. Farquhar, and Ms. Dayton, in the December 2005 *Nurse Leader,* pp. 1-3. ■

Gender-based Research

Researchers examine gender disparities in the quality of preventive care and management of heart disease and diabetes

Studies continue to document persistent disparities in health care associated with women's race, ethnicity, income, education, and other factors. Differences also remain between men and women in the receipt of quality health care. A special March 2006 issue of *Women's Health Issues*, 16(2), addresses disparities in the quality of preventive and chronic care. The five papers and a commentary prepared for the issue are based on analyses of data sources used by the Agency for Healthcare Research and Quality's (AHRQ's) National Healthcare Quality Report (NHQR) and the National Healthcare Disparities Report (NHDR).

The introduction to the theme issue is written by guest editor, Rosaly Correa-de-Araujo, M.D., M.Sc., Ph.D., AHRQ's Director of Women's Health and Gender-Based Research. The commentary is prepared by Dr. Correa-de-Araujo and AHRQ Director, Carolyn M. Clancy, M.D. Following are brief summaries of the introduction, commentary, and five papers in the issue.

Correa-de-Araujo, R. "Introduction: Women, gender, and health care disparities," p. 40.

Dr. Correa-de-Araujo notes that the five journal articles are based on analysis of a variety of well-established reliable national databases such as AHRQ's Medical Expenditure Panel Survey and Healthcare Cost and Utilization Project. The authors of the articles went beyond the condensed analyses presented by the NHQR and NHDR to focus on issues pertinent to women's health care and policy. One major goal of this journal issue is to stimulate further research, targeting the reasons behind gender, racial, and ethnic disparities in care as well as the development of quality improvement strategies to help eliminate disparities.

Correa-de-Araujo, R., and Clancy, C.M. "Commentary: Catalyzing quality of care improvements for women," pp. 41-43.

Despite the amount of data available, in-depth analysis of gender differences in the quality of health services provided in the United States is still limited, say the authors. The studies included in this issue are an important step in that direction. Their findings, combined with the evidence-based information that supports decisionmaking, may serve to catalyze the development of models of care delivery that are patient-centered and customized to individuals' needs and preferences.

The studies reveal, for example, that older and rural women receive less preventive care than other women, and that women receive less drug therapy for heart disease than men. They also show that minority women, especially Hispanic women, use fewer health care services than white women. A substantial proportion of women are not satisfied with the quality of the care they receive. For women with diabetes, hospitalizations decrease as income and educational levels increase. Finally, the authors note that health care professionals need access to evidence-based information and effective models of care delivery in order to provide the best care to women worldwide.

Correa-de-Araujo, R., Stevens, B., Moy, E., and others. "Gender differences across racial and

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Gender disparities

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ethnic groups in the quality of care for acute myocardial infarction and heart failure associated with comorbidities," pp. 44-55.

This paper provides important insights on gender differences across racial and ethnic groups in a Medicare population in the quality of care received for acute myocardial infarction (AMI, heart attack) or congestive heart failure (CHF). It shows that women with AMI or CHF continue to fare worse than men in the receipt of drug therapy. Also, rates of counseling to quit smoking (a risk factor for heart disease) are low among women and men of any race and ethnicity, but worse among Hispanic and black men. Further, women or men who have other medical conditions associated with AMI or CHF (such as diabetes, hypertension, or end-stage renal disease), do not receive better quality cardiovascular care than those with the heart conditions alone.

Correa-de-Araujo, R., McDermott, K., and Moy, E. "Gender differences across racial and ethnic groups in the quality of care for diabetes," pp. 56-65.

According to this analysis of 10 quality of care measures defined by the NHQR and NHDR, only 29 percent of women and 34 percent of men with diabetes receive the 5 recommended care processes for diabetes care: regular blood sugar measurements, regular eye and foot exams, influenza vaccination within the past year, and lipid profile within the past 2 years. Men and women have similar hospitalization rates for uncontrolled diabetes, yet complications with lower extremity amputations (the result of uncontrolled diabetes) remain higher for black and Hispanic men. Also, avoidable hospitalizations for diabetes decrease as income and education increase among women across racial and ethnic groups.

Taylor, A.K., Larson, S., and Correa-de-Araujo, R. "Women's health care utilization and expenditures," pp. 66-79.

This comprehensive review of U.S. women's health care use and expenditures shows that in 2000, 91 percent of adult women used some form of health care services. Overall, 82 percent of adult women reported an ambulatory care visit and 11 percent were hospitalized. Mean expense per woman was $3,219 for that year. The most notable findings indicate that women with private insurance and those on Medicaid were more likely to use health services than uninsured women. White women continued to use any type of health service more often and used more prescription drugs than minority women and men. However, both white and Hispanic women paid a higher proportion of income for out-of-pocket medical care expenses. Finally, nearly 30 percent of older women in fair or poor health spent 10 percent or more of their income for out-of-pocket medical care.

Larson, S. and Correa-de-Araujo, R. "Preventive health examinations: A comparison along the rural-urban continuum," pp. 80-88.

According to this study, women from rural areas receive less preventive care than those residing in urban areas. The researchers analyzed 2000 data from the Medical Expenditure Panel Survey to examine differences in reports of preventive health service use in four types of counties: large metropolitan counties, small metropolitan counties, counties adjacent to metropolitan areas, and rural counties not adjacent to metropolitan areas or with fewer than 10,000 residents. Rural women were less likely to obtain blood cholesterol tests, dental exams, and mammograms during the previous 2 years when compared with urban women, but were more likely to obtain blood pressure checks during the previous year. Rural residents on average, had lower incomes and less education, and were more likely to be uninsured and face structural barriers to care, such as long travel times, than their urban counterparts.

Kosiak, B., Sangl, J., and Correa-de-Araujo, R. "Quality of health care for older women: What do we know?", pp. 89-99.

Women comprise nearly 60 percent of those on Medicare and depend on the program for an average of 15 years compared with 7 years for men. This article establishes a rough baseline for the quality of care, primarily preventive care, received by older women compared with older men, using selected measures and data from the 2004 NHQR and NHDR. Generally, older white women tend to receive better quality of care than their Hispanic and black counterparts, and more educated women often receive better quality of care than their less-educated peers. Also, older women are significantly less likely than older men to receive a number of preventive tests, have their blood pressure under control, or receive aspirin or beta-blockers upon hospital admission or discharge for heart attack. Results are mixed for certain care measures related to diabetes, but improved rates of eye and foot exams are clearly needed for older women. Rates of influenza and pneumococcal vaccinations are low, but can be improved through Medicare-covered services. ■

Nursing homes that emphasize team effort and staff flexibility are more likely to sustain improvements in quality of care

Nursing home organizational cultures that emphasize a team or group approach and staff flexibility are more likely to implement and sustain quality improvement programs, suggests a survey supported by the Agency for Healthcare Research and Quality (HS12028). Jill Scott-Cawiezell, Ph.D., R.N., of the University of Missouri, and colleagues surveyed the leaders and staff of 31 U.S. nursing homes about their dominant organizational culture: group, developmental, hierarchy, or market.

Staff responses from 84 percent of the nursing homes reflected a dominant group culture, indicating a family and team orientation that provides an optimal context for working conditions that sustain quality improvement efforts. However, the strength of the overall group culture was weak in 55 percent of the homes, suggesting competing values, perhaps from nursing home administrators, who more often reflected a hierarchy value orientation. These facilities emphasized efficiency of operations and the importance of following rules and procedures. Organizational flexibility scores ranged from 46 to 64, with a mean flexibility score of 53.4. Nursing homes with scores lower than 53 more often reported issues with staff morale, team work, and ability to move from crisis management to continuous quality improvement.

See "Nursing home culture: A critical component in sustained improvement," by Dr. Scott-Cawiezell, Katherine Jones, Ph.D., R.N., F.A.A.N., Laurie Moore, M.P.H., and Carol Vojir, Ph.D., in the October 2005 *Journal of Nursing Care Quality* 20(4), p. 341-348. ■

Nursing home working conditions are linked to care performance

Despite years of escalating regulatory oversight, the quality of nursing home care remains a national concern. A new study of 32 Colorado nursing homes found that better-performing nursing homes emphasized the importance of staff, quality communication, teamwork, and clear standards and expectations. Supported by the Agency for Healthcare Research and Quality (HS12028), Jill Scott-Cawiezell, Ph.D., of the University of Missouri-Columbia, and colleagues interviewed staff from nursing homes with higher care performance scores and noted how their leaders explicitly focused on, recognized, and expressed appreciation for staff. Leaders and staff more frequently mentioned feeling involved, empowered, and appreciated. Leaders from homes with lower scores did not emphasize staff and staff informants said that they felt underappreciated and unheard.

Staff working in low-scoring homes discussed a lack of good systems for learning about what is going on and said they did not receive clear communication about their roles or expectations. Conversely, those working in high-scoring homes discussed good communication and described strategies or tools used to enhance it. While staff from low-scoring homes expressed a lack of cohesion or team, staff at high-scoring homes were more likely to use the word teamwork and were able to clearly describe its impact on morale and care of the residents.

Finally, leaders at low-scoring homes were more likely to emphasize the nursing home's census and financial markers to define how well they were doing their work, while leaders at high-scoring homes emphasized an internal commitment to standards of care. These findings were based on staff surveys, secondary data such as State-cited deficiencies, and interviews with nursing home leadership and staff.

The study explained noteworthy points from which high- and low-scoring nursing homes diverged. These points of divergence share a key element: leadership.

See "Linking nursing home working conditions to organizational performance," by Dr. Scott-Cawiezell, Deborah S. Main, Ph.D., Carol P. Vojir, Ph.D., and others in the October 2005 *Health Care Management Review* 30(4), pp. 372-380. ■

Greater Medicare HMO penetration is associated with a shift in elderly stroke deaths from hospital to non-hospital settings

Medicare HMO penetration in a local health care market does not appear to affect in-hospital or overall stroke mortality rates among the elderly. However, increased Medicare HMO penetration is associated with a shift in stroke deaths from hospitals to nursing homes or residences, according to a study supported in part by the Agency for Healthcare Research and Quality (T32 HS00032). HMOs may encourage providers to avoid hospitalizing patients who are unlikely to do well with acute care (such as severely demented individuals with another stroke in a series of strokes) and to discharge them faster when they are admitted. More stroke deaths out of the hospital could also reflect greater appreciation for patient preference, explain the researchers.

They used data from the Nationwide Inpatient Sample of the AHRQ Healthcare Cost and Utilization Project and mortality data from the National Vital Statistics System from 1993 to 1998 to examine the association between Medicare HMO penetration (based on HMO enrollment files) and in-hospital and overall mortality rates among older people insured through Medicare. The hospital discharge sample included 365,479 stroke hospitalizations in 1,327 hospitals in 17 States.

The proportion of stroke deaths occurring in the hospital decreased from 64 percent in 1993 to 58.4 percent in 1998, but the overall population stroke death among older people remained stable at 2.6 per 10,000 people. Medicare total and IPA (Individual Practice Association) HMO penetration grew steadily during the same period, while non-IPA HMO penetration grew at a slower pace. None of the three Medicare HMO penetration variables (total, IPA and non-IPA) was associated with in-hospital or overall population stroke mortality rates. However, a 10 percentage point increase in Medicare total or IPA HMO penetration was associated with a 1 percentage point decrease in the proportion of stroke deaths occurring in hospitals.

See "Medicare HMO penetration and mortality outcomes of ischemic stroke," by John Bian, Ph.D., William H. Dow, Ph.D., and David B. Matchar, M.D., in the January 2006 *American Journal of Managed Care* 12(1), pp. 58-64. ■

Improved recognition and treatment of emotional problems may indirectly improve the elderly's use of preventive care

Elderly people suffering from depression or other emotional problems are much less likely than their nondistressed counterparts to receive certain types of recommended preventive care, concludes a study supported in part by the Agency for Healthcare Research and Quality (T32 HS00032). For instance, elderly people with high levels of psychological distress were 30 percent less likely to receive flu shots, and 23 percent less likely to receive annual dental check-ups.

Also, distressed elderly women were 27 percent less likely to receive a clinical breast examination than their nondistressed counterparts. However, psychological distress was not significantly associated with routine checkups, mammography screening, or screening for hypertension, colon cancer, high cholesterol, or prostate cancer. These findings held after controlling for other factors affecting receipt of preventive care. This suggests that adherence to recommended preventive care guidelines may be improved indirectly by improving recognition and treatment of psychological distress in the elderly, concludes Joshua M. Thorpe, Ph.D., M.P.H., of the University of North Carolina at Chapel Hill.

He points out that the distressed group of elderly patients had significantly more total outpatient medical visits than the nondistressed group. It could be that distressed patients are more likely to access specialty providers, who do not routinely deliver services such as flu shots, dental exams, and clinical breast exams. On the other hand, primary care providers may appropriately focus on addressing the distressed patient's specific reasons for medical visits and miss opportunities to deliver more routine preventive care. The findings were based on analysis of mental health and receipt of 9 preventive care services among 3,655 U.S. community-dwelling elderly, as seen in the 2001 Medical Expenditure Panel Survey of U.S. households.

More details are in "Psychological distress as a barrier to preventive care in community-dwelling elderly in the United States," by Dr. Thorpe, Carolyn T. Kalinowski, M.P.H., Mark E. Patterson, M.P.H., and Betsy L. Sleath, Ph.D., in the February 2006 *Medical Care* 44(2), pp. 187-191. ■

Studies connect patient satisfaction with back pain outcomes

Low back pain is one of the most common reasons why people visit physicians and chiropractors. Regardless of whether patients see doctors or chiropractors, those who are more satisfied with their care are less likely to report suffering from pain and disability at 6 weeks and more likely to perceive improvement during an 18-month period, according to a study supported in part by the Agency for Healthcare Research and Quality (AHRQ) (HS07755). A second AHRQ-supported study (HS09499) links physician-patient agreement to better patient satisfaction and health outcomes. Both studies are discussed here.

Hurwitz, E.L., Morgenstern, H., and Yu, F. (October, 2005). "Satisfaction as a predictor of clinical outcomes among chiropractic and medical patients enrolled in the UCLA low back pain study." ***Spine*** **30(19), pp. 2121-2128.**

Greater patient satisfaction with care for low back pain seems to reduce pain and disability in the short term and leads to greater perception of improvement in the long term, according to this study. Researchers randomized 681 patients with low back pain at 3 California clinics to medical care with and without physical therapy and chiropractic care with and without physical modalities. They followed the patients for 18 months to measure patient care satisfaction and pain and disability at 6 weeks, and at 6, 12, and 18 months.

On a 40-point scale, a 10-point increase in satisfaction, observed at 4 weeks following randomization, boosted the chances of remission from clinically meaningful pain and disability at 6 weeks by 61 percent. However, this was not true at 6, 12, or 18 months for either medical or chiropractic patients. Also, patients who were highly satisfied perceived more improvement than patients who were less satisfied throughout the 18-month followup period. Thus, patient satisfaction with care may be associated with small short-term clinical benefits for low back pain patients.

Staiger, T.O., Jarvik, J.G., Deyo, R.A., and others. (2005, October). "Brief report: Patient-physician agreement as a predictor of outcomes in patients with back pain." ***Journal of General Internal Medicine*** **20, pp. 935-937.**

This study found that agreement between physicians and patients about their diagnosis, diagnostic plan, and treatment plan is associated with greater patient satisfaction and better health outcomes in patients with back pain. Researchers enrolled 380 patients with back pain in a trial comparing rapid magnetic resonance imaging with standard x-rays. One month later, they asked patients to rate their agreement with their physician on diagnosis, diagnostic plan, and treatment plan. They then examined patient satisfaction with care at 1 and 12 months, and functioning and health status at 12 months.

Higher total physician-patient agreement at 1 month was correlated with higher patient satisfaction at 1 month. Higher agreement independently predicted better patient satisfaction, mental health, social function, and vitality at 12 months. ■

One of every five medications approved for certain diagnoses are prescribed by office-based physicians for other conditions

Physicians can legally prescribe approved medications for any diagnosis, even when the diagnosis is not specified on the drug's label or in the application for approval from the Food and Drug Administration. Off-label prescribing allows physicians the freedom to innovate but also raises questions about patient safety and costs, since off-label uses do not receive the same level of scientific scrutiny as approved uses.

According to a new study, supported in part by the Agency for Healthcare Research and Quality (HS13405), off-label medication use is common in outpatient care and most of it occurs without scientific support. Using data from the 2001 National Disease and Therapeutic Index, researchers found that 21 percent of 725 million prescriptions written for 500

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Off-label medication use

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drugs in 2001 were for off-label use and 73 percent of these lacked strong scientific support for that use. The drugs most likely to be prescribed off-label were cardiac medications (46 percent), anticonvulsants (46 percent), and drugs to treat asthma (42 percent).

Off-label use of medications with little or no scientific support was more common than supported off-label use for all therapeutic classes except diabetes therapies. The greatest disparity between supported and unsupported off-label use was found in psychiatric drugs (4 percent strong support vs. 96 percent limited or no support) and allergy therapies (11 percent strong support vs. 89 percent limited or no support).

See "Off-label prescribing among office-based physicians," by David C. Radley, M.P.H., Stan N. Finkelstein, M.D., and Randall S. Stafford, M.D., Ph.D., in the May 8, 2006 *Archives of Internal Medicine* 166, pp. 1021-1026. ■

Primary care doctors often fail to prescribe "controller medications" for asthma patients after an emergency room visit

Use of inhaled corticosteroids (also called "controller medications") can prevent asthma flareups that send patients to the emergency department (ED). However, primary care doctors often fail to add controller medications to the regimen of asthmatic patients after a visit to the ED, according to a study supported in part by the Agency for Healthcare Research and Quality (T32 HS00059). However, when inhaled corticosteroids were initiated in the ED or at hospital discharge, they were almost universally continued at followup by the primary care physician. Thus, the ED visit is an opportunity to improve the care, education, and lifestyle of many asthmatic patients.

Researchers retrospectively studied 629 patients, aged 6 to 45 years, treated for an acute asthma episode in the ED (index visit) during a 6-month period and followed them for up to 1 year. Overall, 414 of these patients were not previously receiving inhaled corticosteroid therapy. One-fourth of patients (24 percent) were prescribed an inhaled corticosteroid at the ED or upon hospital discharge. Of these 99 patients, 37 had a primary care follow-up visit within 6 months. Four patients had their inhaled corticosteroid dose changed and none had the medications discontinued. Of the 315 patients not prescribed an inhaled corticosteroid on ED or hospital discharge, 128 had a primary care followup visit within 6 months. Only 32 patients (25 percent) had an inhaled corticosteroid added to their therapeutic regimen to prevent further flareups and need for emergency care.

See "Inadequate follow-up controller medications among patients with asthma who visit the emergency department," by Rita K. Cydulka, M.D., M.S., Joshua H. Tamayo-Sarver, Ph.D., Christine Wolf, B.A., and others, in the October 2005 *Annals of Emergency Medicine* 46(4), pp. 316-322. ■

Disadvantaged groups infected with hepatitis C can be effectively treated when health care providers collaborate

Hepatitis C virus (HCV), which damages the liver, is more prevalent among groups such as prisoners and people with substance abuse and psychiatric disorders. These groups are often denied therapy, despite government mandates to provide it, because they tend to have higher rates of poor compliance with the rigorous antiviral therapy used to treat HCV and higher incidence of psychiatric side effects such as depression, psychosis, and mania. Thus, the risks of therapy tend to outweigh the benefits, considering the substantial costs that range from $10,384 for a 6-month course to $24,168 for a 12-month course of treatment.

Collaboration between gastroenterologists, who manage many HCV patients, and mental health and substance abuse professionals can minimize the adverse psychiatric effects of antiviral therapy and substance abuse relapse and improve adherence to treatment. In a study supported by the Agency for Healthcare Research and Quality (HS15135), University of New Mexico School of Medicine researchers Cynthia M. Geppert, M.D., and Sanjeev Arora, M.D., conclude that such collaboration might make antiviral treatment cost-effective.

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Hepatitus C

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After examining five clinical-ethical arguments often given for limiting access of disadvantaged patients to HCV treatment, they recommend a case-by-case approach to ensure appropriate and safe treatment of these groups. They point out that a few small studies have shown that depressed patients who are not psychotic or suicidal, and who are well-controlled on antidepressant medications, are suitable candidates for interferon. Another study showed that many relapsed heroin addicts never missed a clinic appointment for HCV treatment, so substance abuse is not always indicative of noncompliance. The good outcomes cited in the studies were generally the result of collaboration between psychiatrists or addiction specialists and gastroenterologists, which is often not possible in prisons, or in rural or impoverished areas.

See "Ethical issues in the treatment of hepatitis C," by Drs. Geppert and Arora, in the October 2005 *Clinical Gastroenterology and Hepatology* 3(10), pp. 937-944. ■

Pharmaceutical Research

Physician compliance with medication black box warnings is mixed

Over 40 percent of outpatients received at least one medication with a Food and Drug Administration black box warning (BBW) that applied to them during a 30-month period, according to a new study supported by the Agency for Healthcare Research and Quality (HS11843). Physicians varied in their compliance with these warnings, which can range from prohibiting use of a medication by pregnant women to contraindications for use with another medication.

Researchers determined the frequency of use of BBW medications in outpatient care using data from 10 U.S. health plans that form the HMO Research Network's Center for Education and Research on Therapeutics. They evaluated prescribing compliance for 19 drugs or drug groups with 4 types of BBWs: requiring laboratory monitoring before a patient starts a medication; monitoring during continued therapy (such as liver enzyme testing for isoniazid); listing contraindicated co-medications; and mentioning contraindicated prescribing during pregnancy.

Few instances were found of absolutely contraindicated BBW drugs prescribed in pregnant women. Also, there was almost no co-prescribing of contraindicated drugs with the BBW drugs that prolong the heart's QT-interval, which can lead to dangerous arrhythmia. However, 9 percent of the four drugs with warnings about contraindicated co-medications were prescribed on the same day as a contraindicated drug. Finally, for nearly half of the 74,666 newly dispensed and 13 percent of 51,560 continued dispensed BBW medications, patients did not get the recommended laboratory test for baseline or routine monitoring, respectively.

See "FDA drug prescribing warnings: Is the black box half empty or half full?" by Anita K. Wagner, Pharm.D., M.P.H., D.P.H., K. Arnold Chan, M.D., Sc.D., Inna Dashevsky, M.Sc., and others, in the November 2005 *Pharmacoepidemiology and Drug Safety*, available online at www.interscience.wiley.com. ■

Health Care Costs and Financing

Study examines national trends in the costs of bariatric surgery

Bariatric surgery is quickly emerging as the leading method of weight loss among the 5 percent of Americans who are morbidly obese (body mass index of 40 or more), with 11.5 million adult candidates for the surgery in 2002. The surgery can result in loss of 47 to 70 percent of pre-surgery weight. While the high demand for bariatric surgery is prompting insurance companies in some States to discontinue its coverage, many health plans are beginning to acknowledge the potential cost-savings of bariatric surgery, according to a study of national trends in the costs of bariatric surgery from 1998 through 2003.

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Beriatric surgery

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Agency for Healthcare Research and Quality researchers, William E. Encinosa, Ph.D., Didem M. Bernard, Ph.D., and Claudia A. Steiner, M.D., M.P.H., analyzed data from the Nationwide Inpatient Sample of the Healthcare Cost and Utilization Project for 1998 and 2003. They found that from 1998 to 2003, the total number of bariatric surgeries increased by more than 740 percent from 13,386 to 112,435. In 2003, privately insured patients accounted for 82 percent of surgeries. Medicare, Medicaid, and self-pay accounted for 6, 5, and 3 percent of surgeries, respectively, with the remaining 3 percent of surgeries paid for by other payers.

National hospital costs for bariatric surgeries increased by more than 10 times from $173 million in 1998 to $1.74 billion in 2003, with the largest cost increase among the privately insured. Nationally, average hospital cost per bariatric surgery increased by 21 percent from $12,872 in 1998 to $15,533 in 2003, with the largest increase (27 percent) for Medicaid-covered surgeries. In 2003, high-volume hospitals (with at least 387 bariatric surgeries per year) had 3 times lower in-hospital deaths than low-volume hospitals (with fewer than 118 surgeries per year).

Long-term health benefits may outweigh the costs of bariatric surgery. One meta-analysis found that diabetes (for which care cost nearly $11,000 per person with diabetes in 2002) was resolved in 77 percent of patients who received bariatric surgery, cholesterol problems were improved in 70 percent, and hypertension was resolved in 62 percent.

See "National trends in the costs of bariatric surgery," by Drs. Encinosa, Bernard, and Steiner, in *Bariatrics Today* 3, pp. 10-12, 2005. Reprints (AHRQ Publication No. 06-R031) are available from AHRQ.* ■

Employers are least likely to offer insurance coverage for preventive care services that provide the financial return they seek

Clinical preventive services such as immunizations, cancer screening, and tobacco cessation can improve a person's health. Health insurance coverage helps people access these services, but a new study indicates that employers are least likely to offer coverage for the preventive services that are most likely to provide the financial return they seek.

David Atkins, M.D., M.P.H., of the Center for Outcomes and Evidence, Agency for Healthcare Research and Quality, and colleagues analyzed data from the 2001 National Survey of Employer-Sponsored Health Plans. The survey asked about coverage of clinical preventive services in these plans and at the worksite, as well as employers' approaches to covering these services and factors affecting their decisions. The researchers examined responses by 2,180 employers to 8 survey questions on health promotion.

More than 90 percent of employers included increased productivity and decreased health care costs among their most important reasons for coverage of clinical preventive services. Plan coverage of physical examinations, immunizations, and screenings generally exceeded 50 percent, but coverage of lifestyle modification services was less than 20 percent. For example, only 20 percent of employers offered counseling to help people quit smoking and 18 percent offered alcohol problem prevention. Also, only 55 percent of employers covered adult influenza vaccination. Yet, all of these preventive services have been found to have a positive impact on health.

Coverage for preventive procedural services, such as immunizations and screenings for cancer and other diseases, was better. Coverage rates for colorectal cancer screening and adult immunizations were low, however, compared with their relatively high value in preventing costly health problems. Employers could substantially increase the impact and value of their health-related benefits by small additions to coverage of clinical preventive services, conclude the researchers.

See "Employer coverage of clinical preventive service in the United States," by Maris Ann Bondi, M.P.H., M.H.S., Jeffrey R. Harris, M.D., M.P.H., M.B.A., Dr. Atkins, and others, in the January 2006 *American Journal of Health Promotion* 20(3), pp. 214-222. Reprints (AHRQ Publication No. 06-R032) are available from AHRQ.* ■

Multidisciplinary physician/nurse practitioner teams can reduce the costs of hospital care while maintaining care quality

A growing number of hospitals are using hospitalists, physicians who are specialized in hospital care, to manage patients while they are at the hospital. However, attending physicians in academic medical centers usually cannot spend enough time on inpatient activities to meet the definition of a hospitalist. A new study supported by the Agency for Healthcare Research and Quality (HS10734), indicates that teams comprised of multidisciplinary physicians and nurse practitioners (NPs), working together on daily rounds and postdischarge patient follow-up, can reduce the costs of inpatient care.

The Multi-Disciplinary Doctor-Nurse Practitioner (MDNP) intervention examined the costs of the MDNP alternative to costs of the pure hospitalist model. Researchers randomized 1,207 general medicine inpatients at the center to usual care or the intervention. Usual care was that care commonly used by physicians and used hospitalists to provide care and once-weekly multidisciplinary rounds. The intervention group were physicians who were given inservice education regarding the role of the hospitalist, the "physician/hospitalist." In addition, the intervention added an NP to each of the two general medicine teams of physician/hospitalist; daily multidisciplinary rounds; a hospitalist medical director; and increased staffing of attending hospitalists. Hospital-based physicians directed the intervention ward, but unlike the usual hospitalist model, hospitalists did not supplant other internists involved in the care of the patients.

NPs followed protocols to minimize overuse of unneeded services, such as limiting the use of cardiac monitoring and narrowing use of broad-spectrum antibiotics when indicated. Intervention costs were $1,187 per patient and were associated with a significant $3,331 reduction in usual care costs. About $1,947 of the savings were realized during the initial hospital stay, with the remainder attributable to reductions in postdischarge service use. A reasonable estimate of the cost offset was $2,165, minus an estimated $1,187 per-patient cost for the intervention, for a net cost savings of $978 per patient. Patient perceptions of care and health-related quality of life were at least as good for intervention as usual care patients.

See "An alternative approach to reducing the costs of patient care? A controlled trial of the multi-disciplinary doctor-nurse practitioner (MDNP) model," by Susan L. Ettner, Ph.D., Jenny Kotlerman, M.S., Abdelmonem Afifi, Ph.D., and others in the January 2006 *Medical Decision Making* 26, pp. 9-17. ■

The recommended dose of intravenous morphine does not control severe acute pain in patients presenting to the emergency department

Intravenous morphine is the standard analgesic to treat severe, acute pain due to burns, extremity fractures, or sickle cell crises seen in the emergency department (ED). However, the recommended weight-based intravenous dose of morphine of 0.1 mg/kg is not effective for controlling severe acute pain in the majority of ED patients, concludes a study supported in part by the Agency for Healthcare Research and Quality (HS13924). Only one-third of ED patients in the study obtained more than 50 percent relief of pain with this dose.

Titration of additional doses of morphine may be necessary for many ED patients in acute pain, conclude Polly E. Bijur, Ph.D., and colleagues at the Albert Einstein College of Medicine. They note that the study dose may be even higher than what is routinely administered in many EDs due to clinicians' concern about the adverse effects of opioids, such as respiratory depression. However, none of the patients in this study had significant adverse effects requiring the administration of an opioid antagonist. Also, individuals vary in their response to opioids. Thus, it should not be surprising that a fixed dose of morphine does not produce adequate analgesia in all patients, notes Dr. Bijur.

The researchers' findings were based on a prospective study of a

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Intravenous morphine

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predominantly poor, inner-city group of 119 Hispanic and black adults who arrived at an academic urban ED with acute, severe pain. Patients rated their pain intensity on a scale ranging from 0 for no pain to 10 for worst possible pain immediately before they received 0.1 mg/kg of intravenous morphine and 30 minutes later. The median numeric rating scale pain score at baseline was 10. Sixty-seven percent of the patients receiving morphine reported a less than 50 percent decrease in pain. Sixteen percent of patients reported no change or an increase in pain in the 30-minute interval.

See "Intravenous morphine at 0.1 mg/kg is not effective for controlling severe acute pain in the majority of patients," by Dr. Bijur, Mark K. Kenny, Ph.D., and E. John Gallagher, M.D., in the October 2005 *Annals of Emergency Medicine* 46(4), pp. 362-367. ■

Accidental lung puncture is a substantial threat to hospitalized patients undergoing a wide range of procedures

When a patient's lung is accidentally punctured during an invasive medical or surgical procedure, air leaks from the lung into the space surrounding the lungs (pleura), leading to partial or complete lung collapse. This accidental iatrogenic pneumothorax (AIP) is a substantial threat to hospitalized patients undergoing a wide range of procedures. Agency for Healthcare Research and Quality (AHRQ) researcher Chunliu Zhan, M.D., Ph.D., and colleagues found that patients who were admitted to the hospital for pleurisy (inflammation of the lining of the lungs), cancer of the kidney and renal pelvis, or conduction disorders and complications of cardiac devices had the highest rates of AIP during hospitalization, with AIP rates of 2.24 percent, 1.14 percent, and 0.83 percent, respectively.

The researchers identified AIP risk for specific procedures, which varied from 2.68 percent for patients who underwent thoracentesis (fluid removed from the pleural space), to 1.30 percent for those who underwent nephrectomy (surgical removal of a kidney), and 0.06 percent for those who underwent gastrostomy (surgical construction of a hole for a feeding tube).

These findings were based on analysis of 7.5 million hospital discharge abstracts from 994 short-term acute hospitals across 28 States based on 2000 data in AHRQ's Healthcare Cost and Utilization Project Nationwide Inpatient Sample. The researchers used patient safety indicators to identify AIP that might have been prevented with better care.

More details are in "Accidental iatrogenic pneumothorax in hospitalized patients," by Dr. Zhan, Maureen Smith, M.D., Ph.D., and Daniel Stryer, M.D., in the February 2006 *Medical Care* 44(2), pp. 182-186. Reprints (AHRQ Publication No. 06-R029) are available from AHRQ.* ■

Preoperative risk factors and surgical complexity are more predictive of hospital costs than postoperative complications

Patient preoperative risk factors and the complexity of the surgery are more predictive of hospital costs than postoperative complications, according to a study of nearly 6,000 patients undergoing different types of major surgery.

Researchers, supported by the Agency for Healthcare Research and Quality (HS11913), analyzed 60 National Surgical Quality Improvement Program (NSQIP) preoperative risk factors, surgical complexity, patient outcomes, and hospital costs for a random sample of 5,875 patients undergoing 6 surgical services at 1 medical center. They assessed operation complexity by work RVUs (hospital resources used based on the Centers for Medicare and Medicaid Services Resource Based Relative Value Scale). Overall, 51 of the 60 preoperative risk factors, 22 of 29 postoperative complications, and work RVUs were associated with higher variable direct costs. Preoperative risk factors predicted 33 percent of cost variation, work RVUs predicted 23 percent, and complications predicted 20 percent.

Risk factors and work RVUs together predicted 49 percent of cost variation. Adding complications to this combined model only modestly increased prediction of costs by 4 percent for a total of 53 percent.

See "Preoperative risk factors and surgical complexity are more predictive of costs than postoperative complications," by Daniel L. Davenport, M.B.A., William G. Henderson, Ph.D., Shukri F. Khuri, M.D., and Robert M. Mentzer Jr., M.D., in the October 2005 *Annals of Surgery* 242(2), pp. 463-471. ■

One of every 10 women and men has a diagnosed cardiovascular disease

Data from the Agency for Healthcare Research and Quality (AHRQ) show that 11.6 percent (12.9 million) of women and 11.4 percent (11.7 million) of men age 18 and older reported being told by a doctor they have cardiovascular disease. Cardiovascular heart disease includes coronary heart disease, congestive heart failure, heart attack, and stroke.

AHRQ data on women and cardiovascular disease also show that:

- Roughly one-third of women age 65 and older have been diagnosed with cardiovascular disease, compared with 12.4 percent of those ages 45 to 64 and 3.6 percent of younger adult women.
- Nearly 22 percent of women who are no longer married have cardiovascular disease, compared with 9.8 percent of married women and 4.6 percent of single women.
- Cardiovascular disease is diagnosed most in non-Hispanic white women (13.4 percent) and in Asian, Hawaiian, and Pacific Islander women the least (3.4 percent). Black and Hispanic women fall in between (9.9 percent and 5.9 percent, respectively).
- Women account for nearly half (48.3 percent) of the more than 6 million hospital stays a year for cardiovascular disease and other circulatory disorders.
- Women account for more than half of all hospital stays for nonspecific chest pain and congestive heart failure, half the stays for irregular heart beat, and 40 percent of those for heart attack and stroke.
- One-third more women (9.3 percent) than men (6.2 percent) die in hospitals from heart attack.

These statistics, which are for 2003, were drawn from the data files of AHRQ's Medical Expenditure Panel Survey (http://www.meps.ahrq.gov/) and from *Hospitalizations for Women with Circulatory Disease, 2003*, HCUP Statistical Brief #5 at http://www.hcup-us.ahrq.gov/reports/statbriefs.jsp. ■

One-third of all patients admitted to the Nation's community hospitals are elderly

Although only 12 percent of the U.S. population was age 65 and older in 2003, data from the Agency for Healthcare Research and Quality shows that they accounted for one-third (over 13 million) of all hospital stays. In addition, hospital charges for the elderly totaled nearly $329 billion, or 43.6 percent of the national hospital bill in 2003.

The most common procedure performed on elderly patients was blood transfusion. Nearly one of every 11 elderly patients in the hospital received a transfusion (1.2 million transfusions). Other common procedures performed in the hospital for the elderly were diagnostic cardiac catheterization and coronary arteriography (852,300), upper gastrointestinal endoscopy and biopsy (690,700), respiratory intubation and mechanical ventilation (500,900), and percutaneous coronary angioplasty (401,900). The 5 leading reasons why elderly patients were hospitalized, by number of admissions, were congestive heart failure (839,300), pneumonia (770,400), coronary atherosclerosis or hardening of the arteries (675,700), cardiac dysrhythmias (484,200), and acute myocardial infarction or heart attack (449,000).

These and other data are in *Hospitalizations in the Elderly Population, 2003*, HCUP Statistical Brief #6 at http://www.hcup-us.ahrq.gov/reports/statbriefs.jsp. ■

AHRQ expands the therapeutics education and research network

The Agency for Healthcare Research and Quality (AHRQ) will award $16 million over the next 5 years to establish four new Centers for Education and Research on Therapeutics (CERTs). The purpose of the new CERTs is to increase awareness of the benefits and risks of therapeutic products, including prescription medicines, biological products and medical devices, and to translate research findings into improved health care.

The four new AHRQ-funded CERTs are located at Rutgers, the State University of New Jersey in New Brunswick; the University of Iowa in Iowa City; Baylor College of Medicine in Houston; and Weill Medical College of Cornell University in New York City. The 5-year cooperative agreement grants expand the existing CERTs network from 7 to 11 AHRQ-funded centers and 1 coordinating center. Each center will work collaboratively with AHRQ and the Food and Drug Administration (FDA) to conduct research and provide education that advances the optimal use of medications, medical devices, and biologic products.

AHRQ administers the CERTs program in partnership with the FDA. The program was authorized by Congress in 1997 to examine the benefits, risks, and cost-effectiveness of therapeutic products; educate patients, consumers, doctors, pharmacists, and other clinical personnel; and improve quality of care while reducing needless costs by increasing appropriate use of therapeutics and preventing adverse effects and their consequences.

The Rutgers CERT will work on improving the safe and effective use of treatments for mental health problems. The center will initially develop research and education programs to improve appropriate antidepressant and antipsychotic use in children and adolescents, including balancing the risks and benefits of childhood antipsychotic use; psychotropic drug use among adults and the frail elderly, including those in nursing homes; and improving the quality and outcomes of pharmaceutical care under the Medicare Prescription Drug Improvement and Modernization Act for beneficiaries with mental illnesses.

The University of Iowa CERT will focus on improving the safety and effectiveness of medication use among the elderly. Its activities will include identifying and resolving medication problems in the elderly; examining age disparities in chemotherapy treatments; studying age-related changes in patient decisionmaking and their effect on health outcomes; and testing a model program for physician-pharmacist teams to manage hypertensive patients, with particular attention to barriers in achieving and sustaining blood pressure control among the elderly.

The Baylor College of Medicine CERT will focus on consumers and strategies to help patients take prescription medications appropriately. The center will initially focus on health communication with English- and Spanish-speaking patients, and will include key areas such as consumer health education, clinician-patient interactions, health care decisionmaking, and patient adherence to therapeutic recommendations. A central part of its activities will be the creation of a Consumer Health Advisory Information Network to deploy a system for rapid response to emerging therapeutic issues posing risks to the public (e.g., drug interactions or toxicities) or requiring enhanced dissemination to achieve maximal benefit (e.g., rapid implementation of evidence-based therapeutic guidelines).

The Weill Medical College of Cornell University CERT will focus on medical devices. As part of its program, the Cornell CERT will help clinicians, regulators, and payers make decisions about how best to use prosthetic orthopedic devices, including total hip, total knee, and shoulder replacement. In addition, the CERT will apply the tools of outcomes research, technology assessment, and medical economics to evaluate other medical devices and develop strategies for providing timely evidence to informing patients and consumers, as well as clinicians and others.

The new CERTs will also work in coordination with the other CERTs, AHRQ, and the FDA as part of a comprehensive research and education network. The other seven AHRQ-funded CERTs and their areas of concentration are: Duke University (therapies for disorders of the heart and blood vessels); HMO Research Network (drug use, safety, and effectiveness in managed care); University of Alabama at Birmingham (therapies for disorders of the joints and bones); University of Arizona (drug interactions, particularly in women); University of North Carolina at Chapel Hill (therapies for children and adolescents); University of Pennsylvania (therapies for infectious diseases); and Vanderbilt University (prescription drug use in vulnerable populations).

Total AHRQ funding for the CERTs program, including the new and existing CERTs and the Coordinating Center, in fiscal year 2006 is approximately $9.2 million. More information on the CERTs and their activities is available at http://www.ahrq.gov/clinic/certsovr.htm. ■

AHRQ releases pay-for-performance decision guide

The Agency for Healthcare Research and Quality has a new resource to help employers, health plans, Medicaid agencies, and others who are considering starting a pay-for-performance program make decisions about how to design, implement, and evaluate the activity.

The free tool, *Pay for Performance: A Decision Guide for Purchasers,* poses 20 key questions that leaders from an employer group, health plan, or other health care purchasing group should ask themselves as they consider a pay-for-performance program. Included are questions such as whether or not to partner with other purchasers, focus on clinicians or hospitals first, make provider participation mandatory or voluntary, how much money to allot to the activity, and how to address provider concerns about risk adjustment for severity of illness. The decision guide also includes special advice for Medicaid agencies and Medicaid managed care plans. Each question is followed by a discussion that includes possible options and potential unintended consequences.

To access P*ay for Performance: A Decision Guide for Purchasers*, go to http://www.ahrq.gov/qual/p4pguide.htm. ■

Business coalitions join AHRQ to improve the quality of diabetes care

The Agency for Healthcare Research and Quality (AHRQ) has formed a new partnership with three of the Nation's leading business coalitions that is designed to help improve the quality of diabetes care within and across communities. The new partnership, Improving Diabetes Care in Communities Collaborative, brings AHRQ together with the Greater Detroit Area Health Council, the MidAtlantic Business Group on Health, and the Memphis Business Group on Health.

The goal of this partnership is to support local communities in their efforts to reduce the rate of obesity and other risk factors that can lead to diabetes and its complications. The partners will work together to ensure that people with diabetes receive appropriate health care services. Nationally, only one-half of patients with diabetes routinely receive recommended health care services, including eye exams, blood sugar (hemoglobin A1c) tests, and foot exams, and this rate has not shown improvement over the last few years, according to data from AHRQ's National Healthcare Quality Report released in January.

Each of the coalitions has convened stakeholders, including businesses, providers, health plans, insurers, consumers, and academics, to set priorities in their efforts to improve diabetes care and develop solutions that fit within the community's needs and capabilities. Cross-cutting strategies for addressing diabetes quality improvement include a return on investment calculator for estimating financial returns from disease management, application of the chronic care model, and an employer guide on managing diabetes care with health plans. The strategies and tools developed under the partnership and any lessons learned will be disseminated broadly for communities around the nation to use in improving the quality of diabetes care.

In 2004, AHRQ, in partnership with the Council of State Governments, developed *Diabetes Care Quality Improvement: A Resource Guide for State Action* (AHRQ Publication No. 04-0072) and its companion workbook (AHRQ Publication No. 04-0073), both books are designed to help States assess the quality of diabetes care and develop quality improvement strategies. They can be found online at http://www.ahrq.gov/qual/diabqualoc.htm. Printed copies are also available through the AHRQ Publications Clearinghouse.* ■

Transition to electronic submission of grant applications continues at AHRQ

The Agency for Healthcare Research and Quality (AHRQ) has joined the National Institutes of Health (NIH) in the transition to electronic submission of grant applications. A new research grant application, the SF 424 Research and Related (R&R) form, replaces the PHS 398 form. Applications are submitted electronically through Grants.gov, a Web portal that serves as the single access point for all Federal grant programs. Grants.gov provides the interface for agencies to announce their grant funding opportunities and for all grant applicants to find and submit applications to those funding announcements.

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Grant applications

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In December 2005, AHRQ successfully completed the transition of its Small Conference grant program (R13) through Grants.gov using the new SF424 (R&R) form. As of April 10, 2006, AHRQ's Dissertation grant program (R36) became the second grant funding mechanism to be converted to electronic submission. The Small Research grant program (R03) transition to electronic application will begin later this year. The transition of other AHRQ grant programs to electronic application submission will continue through May 2007.

Electronic grant application submission will enhance the efficiency of grants administration and shorten the time from application submission to grant award. The new submission process and integration with Grants.gov gives applicants a convenient one-stop shop for finding and applying for grant funding opportunities. The format provides a consistent look and feel to grant applications across Federal agencies. The benefits of the new technology include a streamlined application process and post-receipt transactions such as automated notifications, corrections to applications, and renewals.

AHRQ is committed to providing reliable, available, and responsive support to the grant applicant community. Based on feedback from applicants who took part in the initial submission of electronic applications, AHRQ offers the following advice to applicants:

Be prepared: register early. One time registrations for both Grants.gov (http://grants.gov) and eRA Commons (era.nih.gov/commons) systems must be completed before application submission. These are two distinct systems with separate registration requirements.

Be informed: for up to date general information on electronic submission, the SF 424 (R&R), and Grants.gov, visit the AHRQ Electronic Submission of Grant Applications Web Site: http://www.ahrq.gov/path/egrants.htm ■

Research Briefs

Clancy, C., Sharp, B.A., and Hubbard, H.B. (2005, November). "Guest editorial: Intersections for mutual success in nursing and health services research." *Nursing Outlook* 53, pp. 263-265.

In this editorial, Carolyn Clancy, M.D., director of the Agency for Healthcare Research and Quality, and colleagues discuss the importance of the AHRQ-sponsored conference "The Intersection of Nursing and Health Services Research." Articles from the conference are profiled in the same journal issue. The conference addressed issues of access to care/nursing workforce, health behavior, quality of care, cost/cost-effectiveness, and organization/delivery of care. These topics represent an agenda that can provide a roadmap for success for nursing health services research, notes Dr. Clancy. AHRQ has commissioned a report—"The Effect of Health Care Working Conditions on Patient Safety"—to provide guidance to nurse partners on how to design a work environment in which nurses can provide safer patient care. AHRQ has also funded a special program of research on working conditions, with most projects focusing on nursing. Reprints (AHRQ Publication No. 06-R026) are available from AHRQ.*

Cohen, S.B., Ezzati-Rice, T., and Yu, W. (2005). "The utility of probabilistic models to identify individuals with future high medical expenditures." *Journal of Economic and Social Measurement* 30, pp. 135-144.

Oversampling techniques are often used in nationally representative population-based surveys in order to ensure sufficient sample size for certain subgroups, such as race/ethnicity, gender, or age. However, achieving sample size targets for population subgroups that are more dynamic in nature—for example, the poor or near poor, individuals with high levels of medical expenditures, and the uninsured—is a more difficult task. The authors of this paper present an evaluation model to assess the utility of probabilistic models in successfully oversampling policy-relevant population subgroups subject to transitions. This type of modeling effort enhances the ability to discern the causes of high health care expenses and the characteristics of the individuals who incur them. Reprints (AHRQ Publication No. 06-R033) are available from AHRQ.*

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Collins-Sharp, B.A., Hubbard, H., and Jones, C.B. (2005). "Translating research into practice: Agency for Healthcare Research and Quality." *Nursing Outlook* 53(1), pp. 46-48.

This article cites several opportunities for nurses to work with AHRQ intramural programs to help translate research into practice. External nurses routinely serve on AHRQ research study sections and the National Advisory Council, and can volunteer for evidence-based practice initiatives. AHRQ also provides research opportunities for senior nurse scientists through the collaborative AHRQ-American Academy of Nursing Nurse Scholars Program to develop areas of investigation that integrate clinical nursing care questions with AHRQ portfolios of research. Finally, AHRQ provides a number of publications and databases of use to nurses, to aid them in translating research into practice. For more details, see "nursing research" under special interests on the Agency's Web page at http://www.ahrq.gov. Reprints (AHRQ Publication No. 06-R025) are available from AHRQ.*

Gellad, W.F., Huskamp, H.A., Phillips, D.A., and Haas, J.S. (2006, January). "How the new Medicare drug benefit could affect vulnerable populations." (AHRQ grants HS10771 and HS10856). *Health Affairs* 25(1), pp. 248-255).

Lower-income seniors and those with chronic illnesses could continue to have difficulty paying for their medications under the new Medicare prescription drug benefit, which became effective in January 2006, concludes this study. It estimated how out-of-pocket drug costs could change for vulnerable populations (racial and ethnic minorities, the near-poor, and seniors with a multiple chronic conditions) who qualify for the standard Medicare drug benefit. Although the new benefit might be associated with modest-to-moderate declines in out-of-pocket spending for seniors who do not qualify for subsidies, it may not reduce financial barriers to medication use for vulnerable groups. The deductible and benefit structure (a gap in coverage known as the doughnut hole) will require substantial out-of-pocket drug spending for many beneficiaries.

Glance, L.G., Dick, A.W., Osler, T.M., and Mukamel, D.B. (2006, February). "Does date stamping ICD-9-CM codes increase the value of clinical information in administrative data?" (AHRQ grant HS13617). HSR: *Health Services Research* 41(1), pp. 231-251.

The clinical information used in patient risk adjustment is captured in the primary and secondary diagnoses coded using the International Classification of Diseases (ICD-9-CM) system. These administrative data sets, however, fail to distinguish between conditions present at admission (preexisting conditions) and those that develop subsequent to admission (complications). Adding the condition present at admission (CPAA) modifier to administrative data would significantly enhance the ability of the Dartmouth/Charlson index and the Elixhauser algorithm to accurately map ICD-9-CM codes to diagnostic categories, concludes this study. For example, in analysis of 178,838 patients hospitalized in California in 2000, the Dartmouth/Charlson index underestimated the prevalence of problems such as heart attack or paraplegia by 65 to 70 percent. The Elixhauser comorbidity measure misclassified complications as preexisting conditions for 43 percent of coagulopathies and 18 percent of cardiac arrhythmias.

Glaser, B.E., and Bero, L.A. (2005). "Attitudes of academic and clinical researchers toward financial ties in research: A systematic review." (AHRQ grant T32 HS00086). *Science and Engineering Ethics* 11(4), pp. 553-573.

Private industry has become increasingly involved in academic and clinical research since the early 1980s. Private companies not only sponsor research, but individual investigators often have stock ownership or consulting fees from the same company that sponsors their research. This review of 17 studies on researchers' attitudes toward industry involvement revealed their concerns about the impact of financial ties on choice of research topic, research conduct, and publication. Researchers approve of industry collaboration and financial ties when the ties are indirectly related to the research, disclosure is upfront, and results and ideas are freely publicized. However, the authors suggest that their trust in disclosure as a way to manage conflicts may be naive.

Jacobson, M., O'Malley, A.J., Earle, C.C., and others. (2006, March). "Does reimbursement influence chemotherapy treatment for cancer patients?" (AHRQ grant HS10803). *Health Affairs* 25(2), pp. 437-443.

Medicare reimbursement has little effect on who gets cancer treatment, but it does influence the kind of treatment received, according to this study. The researchers examined the effect of

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physician reimbursement on chemotherapy treatment of 9,357 elderly Medicare beneficiaries with metastatic lung, breast, colorectal, or other gastrointestinal cancers between 1995 and 1998. A physician's decision to administer palliative chemotherapy to metastatic cancer patients was not measurably affected by higher Medicare reimbursement for chemotherapy drugs, but it appeared to have affected the choice of drugs used. Providers who were more generously reimbursed prescribed more costly chemotherapy regimens. However, recent changes in Medicare drug reimbursement substantially limit physician profit from certain drugs. This, the researchers believe, should prompt physicians to choose drugs based more on clinical considerations and patients' preferences and less on reimbursement decisions.

Marsden, P.V., Landon, B.E., Wilson, I.B., and others. (2006, February). "The reliability of survey assessments of characteristics of medical clinics." (AHRQ grant HS10227). HSR: *Health Services Research* 41(1), pp. 265-282.

Combining reports from multiple organizational informants may raise the reliability of survey assessments of organizational characteristics of medical clinics, concludes this study. The investigators surveyed 330 informants (clinicians and medical directors) in 91 medical clinics providing care to HIV-infected people to assess the reliability of survey measures of organizational characteristics (barriers to quality care, quality improvement activities, priorities assigned to aspects of HIV care) based on reports of single and multiple informants. Medical directors tended to give more optimistic assessments of clinics than clinicians. For most measures studied, obtaining adequate reliability required multiple informants.

Miller, G.E., Moeller, J.F., and Stafford, R.S. (2006). "New cardiovascular drugs: Patterns of use and association with non-drug health expenditures." *Inquiry* 42(4), pp. 397-412.

The potential role of new drugs in reducing expenditures for non-drug health services such as hospital stays has received considerable attention in recent policy debates. The authors of this study used nationally representative data from the Medical Expenditure Panel Survey to determine whether the use of newer drugs to treat cardiovascular conditions was associated with lower non-drug health expenditures (for example, inpatient, outpatient, and home health care) for these conditions. They failed to substantiate the findings of previous research that newer drugs were associated with reductions in non-drug expenditures for cardiovascular conditions. There may be specific instances where newer drug therapies outperform older drugs by reducing non-drug expenses in treating specific cardiovascular conditions or older drugs outperform newer drugs by the same standards. Reprints (AHRQ Publication No. 06-R027) are available from AHRQ.*

Neumann, P.J., Lin, P.-J., Greenberg, D., and others. (2006, January). "Do drug formulary policies reflect evidence of value?" (AHRQ grant HS10919). *The American Journal of Managed Care* 12, pp. 30-36.

This study underscores the paucity of published cost-utility data available to drug formulary committees. The researchers used 1998-2001 data from a large registry of cost-effectiveness analyses to examine the cost-utility ratios of preferred and nonpreferred drugs from formularies of two large health plans, the 2004 Florida Medicaid preferred drug list and the 2004 Harvard Pilgrim Pharmacy Program 3-tier formulary. Few drugs on the formularies had any cost-utility data available. Of those that did, the cost-utility ratios were somewhat higher (less favorable) for Florida's preferred drugs compared with nonpreferred drugs ($25,465 vs. $13,085). Ratios did not differ for drugs on tiers 1 and 2 of the Harvard Pilgrim formulary, although they were higher for tier 3 and for excluded drugs. The authors call for more and better data to move toward value-based formulary decisionmaking.

Nix, M.P., Coopey, M., and Clancy, C.M. (2006, March). "Quality tools to improve care and prevent errors." Journal of *Nursing Care Quality* 21(1), pp. 1-4.

The current nursing shortage has intensified the need for nurses to be able to access already developed usable evidence-based information and tools that can be adapted to their clinical situation, note the authors. The Agency for Healthcare Research and Quality has funded the creation of many quality tools and resources that can be readily adapted to clinical settings. Nurses can find more than 600 quality tools at AHRQ's Web site, www.qualitytools.ahrq.gov. AHRQ's National Guideline Clearinghouse can be accessed at www.guideline.gov, which can help nurses and other health care providers implement clinical guidelines in practice. Tools developed for use in patient safety programs can be identified through AHRQ's new Web site, the AHRQ

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Patient Safety Network at http://psnet.ahrq.gov/.

Nurses are encouraged to submit tools that meet the criteria for submission, which can be found on each site. Reprints (AHRQ Publication No. 06-R034) are available from AHRQ.*

Paliwal, P., Gelfand, A.E., Abraham, L., and others. (2006). "Examining accuracy of screening mammography using an event order model." (AHRQ grant HS10591). *Statistics in Medicine* 25, pp. 267-283.

The authors of this study examined the accuracy of screening mammography to detect breast cancer using an event order model. For each mammogram, they considered the initial assessment, a follow-up assessment if the initial one was positive, and, eventually, a determination of whether cancer was present or not. The model can be built at each stage reflecting effects due to patient characteristics, the facility where the mammogram was performed, and the radiologist reading the mammogram. They illustrate this approach with screening mammography data from the Group Health Cooperative in Seattle, Washington. After adjusting for patient characteristics, they found significant differences in radiologists with regard to initial assessment of the mammogram. They are currently surveying radiologists and facilities to explain differences in radiologists and facilities in accuracy of screening mammography.

Raab, S.S., Andrew-JaJa, C., Condel, J.L., and Dabbs, D.J. (2006). "Improving Papanicolaou test quality and reducing medical errors by using Toyota production system methods." (AHRQ grant HS13321). *American Journal of Obstetrics and Gynecology* 194, pp. 57-64.

New costly technological advances (for example, liquid-based preparations, automated screening, and human papillomavirus testing) that have improved Pap test sensitivity have increased the detection of low-grade cervical cancer lesions, without increasing the detection of invasive disease. However, redesign of clinical office workflow using the Toyota production system (TPS) without new technology also can improve Pap testing, concludes this study. The researchers implemented a TPS, 1-by-1, continuous workflow process in the office of a single gynecologist and cytology laboratory. They examined 464 case and 639 control women who had a Pap test performed in the practice during an 8-month period. After the TPS intervention, the proportion of Pap tests with a diagnosis of atypical squamous cells of undetermined significance decreased from 7.8 to 3.9 percent. The frequency of error per correlating cytologic-histologic specimen pair decreased from 9.52 to 7.84 percent.

Ridley, D.B., Kramer, J.M., Tilson, H.H. and others. (2006, March). "Spending on postapproval drug safety." (AHRQ grant HS10548). *Health Affairs* 25(2), pp. 429-436.

Recent market withdrawals of high-profile drugs have focused attention on the safety of marketed drugs, whose risks often only become evident after the drug has been widely used in the market. The drug firms that spend the most on postapproval drug safety produce more new and "blockbuster" drugs than their competitors, concludes this study. The researchers surveyed 25 large drug manufacturers regarding drug safety efforts. Mean spending on postapproval safety per company in 2003 was $56 million or 0.3 percent of sales, with nearly 70 percent of this cost dedicated to personnel. The researchers estimated that total spending on postapproval safety by the top 20 drug manufacturers was $800 million in 2003. Safety spending and full-time-equivalent personnel were highly correlated with new drugs and blockbuster drugs. ■

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