



# RESEARCH IN ACTION

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## Managing Osteoarthritis: Helping the Elderly Maintain Function and Mobility

Osteoarthritis is the most prevalent form of arthritis in the United States,<sup>1</sup> affecting over 20 million adults.<sup>2,3</sup> More than half of all people age 65 and over have evidence of osteoarthritis,<sup>3</sup> and it is the leading cause of disability in this age group.<sup>4</sup> Research funded by the Agency for Healthcare Research and Quality (AHRQ) indicates that treatment involving patient self-management, occupational therapy, pharmaceutical therapy, and surgery can reduce pain, maintain or improve joint mobility, and limit functional disability. AHRQ's research shows how elderly patients with osteoarthritis can become more active and responsible for their own care, make more informed decisions, help to control the costs of health care, and improve their quality of life.

### Background

Research funded by AHRQ shows that the effects of osteoarthritis accumulate as people age. The presence of osteoarthritis significantly predicts whether or not elderly people will become functionally limited in their ability to care for themselves.<sup>5</sup> According to AHRQ's Healthcare Cost and Utilization Project (HCUP), 250,000 people ages 65-79 were hospitalized in 1997 because of osteoarthritis.<sup>6</sup> There is no known cure for osteoarthritis, and therapy becomes more and more complicated as people age.<sup>1,4,7-9</sup>

Osteoarthritis of the knee and hip joints causes the most difficulty for the elderly because it significantly impacts their ability to conduct their normal activities of daily living, such as walking, cooking, bathing, dressing, using the toilet, and performing household chores.<sup>1,3,7,9</sup> Joints can become painful, stiff, and swollen.<sup>3</sup> The resulting pain causes limited motion, reduced physical capability, restriction of social activities, and compromised work capacity.<sup>1,4</sup> The interaction of these factors—pain, loss of social contact, and diminished income—can create emotional distress, which further reduces physical activity.<sup>4</sup>

Increased disability results when the affected joints are exercised less, and the elderly begin to lose muscle tone, leading to reduced strength.<sup>4</sup> Because there is no cure, the therapeutic goal of treatment for osteoarthritis is to minimize the effects of the disease and its consequences over time.<sup>4</sup>

### AHRQ research has improved osteoarthritis management

AHRQ has funded studies devoted to helping patients become partners in their own care. These studies have contributed to improved functional ability among older adults. For example:

- The Chronic Disease Self-Management Program (CDSMP) has helped patients manage their symptoms and reduce health care use. The CDSMP is discussed in *Research in Action* Issue 3.<sup>10</sup>

### Making a Difference

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## AHRQ-Funded/Sponsored Research on Osteoarthritis and Elderly Health Care

- **Improving Chronic Disease by Self-Management Education, Stanford University:** This study developed, operated, and evaluated the Chronic Disease Self-Management Program and assessed its effectiveness in improving health while lowering costs for patients with chronic disease.
- **Effectiveness of Two Occupational Therapy Treatments for the Elderly, University of Southern California:** AHRQ co-sponsored this study with the National Institute on Aging and the National Center for Medical Rehabilitation Research. It provided an occupational therapy service to low-income elderly and evaluated the program's cost effectiveness and its impact on quality of life.
- **Assessing and Improving Outcomes: Total Knee Replacements, Indiana University:** Also referred to as the Total Knee Replacement Patient Outcomes Research Team (TKR PORT), this study investigated the variation in total knee replacement rates and outcomes and constructed a decision model to help physicians and patients make decisions regarding surgery.
- **Effectiveness and Outcomes of Noncardiac Surgery, Brigham and Women's Hospital:** This study investigated adverse outcomes among patients undergoing major noncardiac surgery, identified the factors that predict adverse outcomes, evaluated the impact of adverse outcomes on length of postoperative stay, and assessed the long-term effectiveness of high-volume procedures.
- **Improving Outcomes in Elderly NSAID Users, Vanderbilt University:** This study developed and tested an educational program that encouraged physicians to reassess elderly NSAID users with osteoarthritis who were at high risk of peptic ulcer disease.

- The Well Elderly Study showed that providing preventive occupational therapy to the elderly helps improve their personal and social relationships as well as their health status.

Researchers funded by AHRQ were instrumental in identifying the high costs of treatment for osteoarthritis with nonsteroidal anti-inflammatory drugs (NSAIDs) and suggesting alternatives to that treatment. Specifically, AHRQ studies revealed that:

- NSAIDs provided very little relief of pain or improvement in function, and they were associated with ulcers, bleeding, and gastrointestinal perforation.
- Patients who used NSAIDs utilized more hospital and emergency services than nonusers, resulting in increased medical care costs.
- An educational program for physicians and nursing home staff resulted in a significant reduction of NSAID use and increased the use of acetaminophen without any increase in pain.

AHRQ research revealed that the elderly face higher risks of complications and mortality than younger people when they have surgery, including surgical knee repair. However, AHRQ studies also showed:

- The elderly reported better quality of life, less pain, and better physical function after knee replacement surgery.
- Surgical complications and mortality rates were lower for surgeons and hospitals that performed more knee replacement surgeries.

## Physician-patient partnership improves physical functioning

AHRQ research shows that patients have better outcomes when they receive education and training about their condition because they become more involved in their care. Two ways to achieve improved outcomes are through self-management and occupational therapy.

### Self-management of osteoarthritis

AHRQ researchers indicate that the key to good management of osteoarthritis is an effective physician-patient partnership. This partnership should:

- Promote proper use of medications.
- Encourage patients to change their behavior to improve symptoms or slow disease progression.

- Instruct patients on how to interpret and report symptoms accurately.
- Help patients adjust to new social and economic circumstances and cope with emotional consequences.
- Support patients' efforts to participate in treatment decisions and maintain normal activities.<sup>4</sup>

Creating patient education programs helps patients achieve this role by giving them the knowledge and skills they need for self-management. AHRQ funded the development of the Chronic Disease Self-Management Program, which is based on changes in diet, exercise, and compliance with treatment regimens. The CDSMP has been shown to improve health status and reduce costs. Specifically, the CDSMP helps patients interpret and report symptoms accurately and has led to substantial reductions in pain, depression, and the use of health services in patients with chronic disease.<sup>4</sup>

Changing the patient's health behaviors and perception of symptoms can improve the symptoms or slow the progression of osteoarthritis.<sup>4</sup> Regular exercise helps patients retain mobility and counteracts loss of muscle strength.<sup>1,4</sup> Exercise such as walking or aquatics improves aerobic capacity and stamina while decreasing depression and anxiety.<sup>1,7</sup> If patients attribute pain to the progression of osteoarthritis, then they may avoid activities that increase pain. However, if patients attribute pain to loss of muscle tone and strength, then they may increase physical activity.<sup>4</sup>

Patients can be referred to organizations in their community that offer exercise programs, swimming facilities, information meetings, social activities, self-help education, support groups, and mobile services for transportation and meals.<sup>4</sup> Finally, research sponsored by AHRQ indicates that patients can be supported from the physician's office by telephone with no significant increase in costs to either the patients or physicians.<sup>1</sup> These telephone conversations can be used to discuss joint pain, medications, treatment compliance, drug toxicities, date of next scheduled visit, and barriers to receiving care.<sup>1</sup>

### Occupational therapy

Occupational therapists can evaluate a person's ability to perform daily living activities and recommend devices such as elevated toilet seats or wall bars for bathtubs. They also teach joint protection and energy conservation. For example, living on one floor of the home helps to avoid

painful step climbing and avoiding kneeling or squatting helps to protect the joints.<sup>1,7</sup>

AHRQ cofunded the Well Elderly Study with the National Institute on Aging and the National Center for Medical Rehabilitation Research. This study evaluated the effectiveness of preventive occupational therapy as a way to avoid functional disability in people age 60 and over. During a 9-month period, one group of participants received weekly group and individual occupational therapy. This therapy focused on home and community safety, shopping, mastering the public transportation system, joint protection, adaptive equipment, energy conservation, exercise, and nutrition. A second group of patients attended a program that focused only on social activities, such as community outings, craft projects, films, games, and dances. At the end of the study, those who were in the occupational therapy study group reported:

- Better quality of interaction with other people.
- Improved health status.
- More satisfaction with life.
- Improved mental health, physical functioning, role functioning, vitality, and social functioning.
- Less pain.
- Fewer emotional problems.<sup>11</sup>

Six months after the initial study, the patients who received preventive occupational therapy were reassessed. These elderly participants continued to experience:

- Better quality of interaction with other people.
- Improved mental health, physical functioning, role functioning, vitality, and social functioning.
- Less pain.
- Fewer emotional problems.<sup>12</sup>

### Use of NSAIDs contributes to high costs

Medications do not cure osteoarthritis but are intended to relieve pain.<sup>1,7</sup> AHRQ studies indicate that nonsteroidal anti-inflammatory drugs were the medications of choice for osteoarthritis pain until research showed that they affect joint cartilage metabolism, have greater risk of toxicity than acetaminophen, can cause upper gastrointestinal bleeding, and may cause or aggravate peptic ulcer disease.<sup>1,7,13,14</sup> One



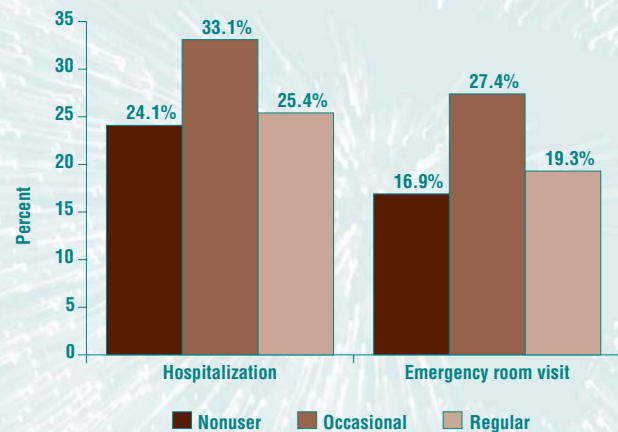
AHRQ-funded study showed that 30-40 percent of all elderly use NSAIDs each year and 10-13 percent of the elderly use NSAIDs every day.<sup>14</sup> A majority of these elderly have a primary diagnosis of osteoarthritis.<sup>14</sup> AHRQ research further showed that NSAIDs provided only a modest decrease in osteoarthritis pain and little improvement in function, and their association with ulcers, bleeding, and perforation caused a four- to five-fold increase in hospitalizations due to gastrointestinal complications.<sup>14</sup>

An AHRQ study of Medicaid recipients who were age 65 and over showed that NSAID users were hospitalized and used the emergency room more often than nonusers (Figure 1). As the elderly increased their use of NSAIDs, medical care costs also increased (Figure 2).<sup>15</sup>

### Educating health care providers reduces NSAID use

An educational intervention supported by AHRQ resulted in about a 70-percent reduction in the use of NSAIDs among nursing home patients. Physicians and nursing staff

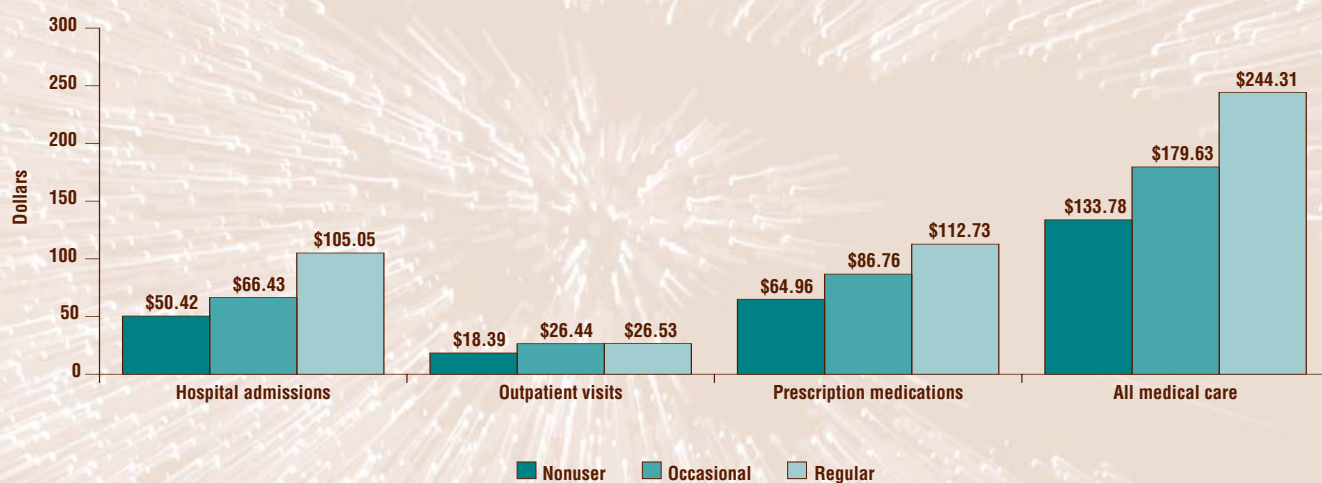
**Figure 1. Percent of elderly Medicaid recipients hospitalized or using emergency room services annually, by NSAID use**



**Note:** NSAID is nonsteroidal anti-inflammatory drug. Occasional users used NSAIDs less than 75% of the time and regular users used them at least 75% of the time.

**Source:** Smalley WE, Griffin MR, Fought RL, et al. Excess costs from gastrointestinal disease associated with nonsteroidal anti-inflammatory drugs. *J Gen Intern Med* 1996;11(8):461-9.

**Figure 2. Annual Medicaid/Medicare payments per person-year for gastrointestinal disorders among the elderly, by NSAID use**



**Note:** NSAID is nonsteroidal anti-inflammatory drug. Occasional users used NSAIDs less than 75% of the time and regular users used them at least 75% of the time.

**Source:** Smalley WE, Griffin MR, Fought RL, et al. Excess costs from gastrointestinal disease associated with nonsteroidal anti-inflammatory drugs. *J Gen Intern Med* 1996;11(8):461-9.

participated in an educational program focused on the best treatments for muscle and joint pain, which included information on osteoarthritis, recognizing pain in patients, and various methods to control pain. These health care providers were asked to stop regular NSAID therapy in all patients age 65 and over and substitute acetaminophen. If the acetaminophen did not control the patient's pain, the providers were allowed to add ibuprofen to the patient's treatment regimen. If this regimen did not control the patient's pain, the providers were to begin using their standard NSAID therapy again.<sup>16</sup>

After 3 months, nursing home residents reduced their NSAID use from an average of 7 days a week to less than 2 days per week and increased their use of acetaminophen from 2 days per week to 5 days per week. These patients did not report any significant increase in pain or disability. It is expected that, over the long term, these patients will also decrease their risk for gastrointestinal problems caused by NSAIDs and the costs associated with them.<sup>16</sup>

Researchers sponsored by AHRQ have indicated that acetaminophen (up to 4,000 milligrams per day) is the recommended drug of choice for osteoarthritis. NSAIDs can be prescribed if acetaminophen fails to relieve pain.<sup>1,7,13</sup> Adverse effects from acetaminophen were limited but included liver toxicity in patients who were fasting or

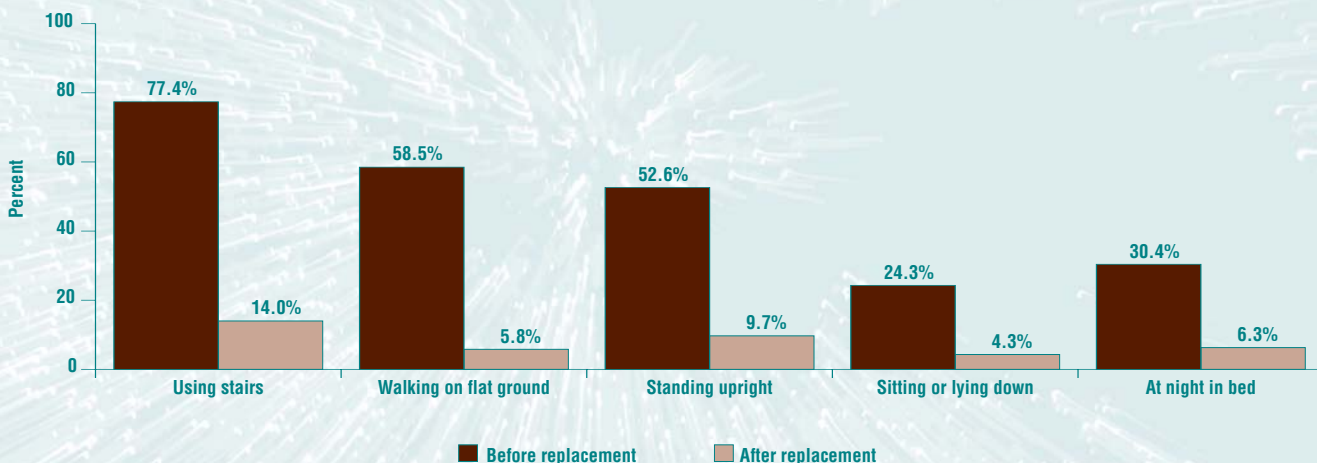
consumed large amounts of alcohol and renal failure from long-term use.<sup>1,13</sup> Opioids have been shown to be effective for short-term treatment of acute exacerbation of pain, but the elderly have difficulty tolerating codeine on a long-term basis.<sup>1,13</sup>

Topical therapy, such as capsaicin cream, has been shown to be appropriate for patients with knee osteoarthritis who did not respond to or did not want to take oral analgesics.<sup>7,9,13</sup> Corticosteroid injections into the joint were helpful in diminishing symptoms in patients with knee osteoarthritis who had swelling and inflammation,<sup>4,7</sup> but they were not recommended for hip osteoarthritis because of progressive cartilage damage from repeated injections.<sup>1</sup> Patients who do not respond to medical therapy<sup>1</sup> or who require more than three or four joint injections each year to control symptoms of knee osteoarthritis are candidates for surgical intervention.<sup>7</sup>

### Knee surgery has benefits and risks

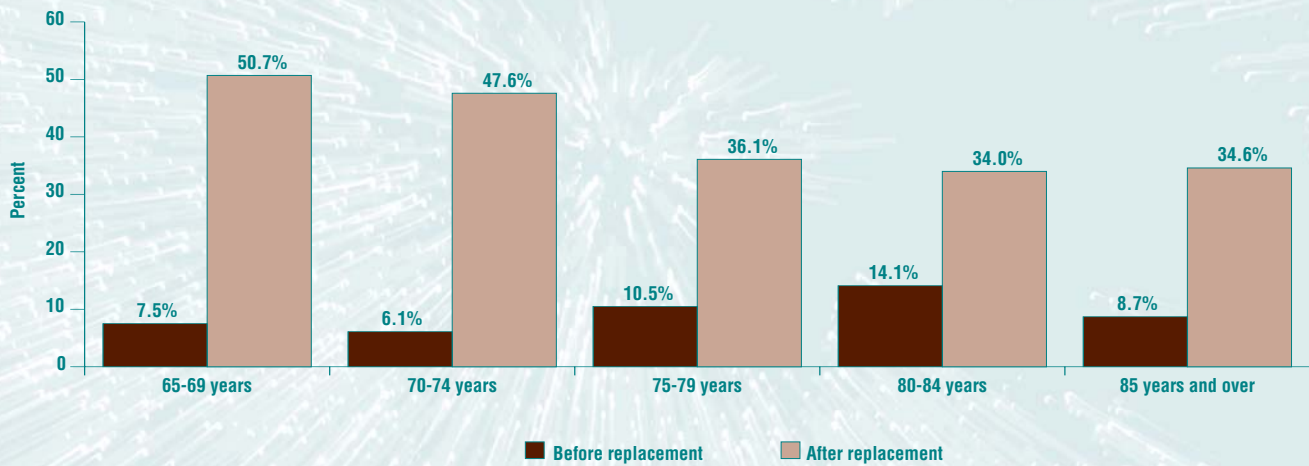
Surgical repair and replacement of the knee joints provide durable pain relief and functional improvement in patients with osteoarthritis.<sup>7,17</sup> However, the elderly need to consider certain factors, such as surgical complications and the pros and cons of having surgery performed on both knees at the same time.

**Figure 3. Percent of elderly patients in severe pain before and after knee replacement surgery, by type of activity**



Source: Hawker G, Wright J, Coyte P, et al. Health-related quality of life after knee replacement. *J Bone Joint Surg Am* 1998;80(2):163-73.

**Figure 4. Elderly patients' ability to walk more than 10 blocks before and after knee replacement surgery, by age**



Source: Hawker G, Wright J, Coyte P, et al. Health-related quality of life after knee replacement. *J Bone Joint Surg Am* 1998;80(2):163-73.

### Knee replacement surgery improves quality of life

The AHRQ total knee replacement Patient Outcomes Research Team (TKR PORT) showed that, despite the risk of complications, quality of life improves for the elderly after knee replacement surgery.<sup>18</sup> Elderly patients reported less pain and better physical function (Figures 3 and 4).

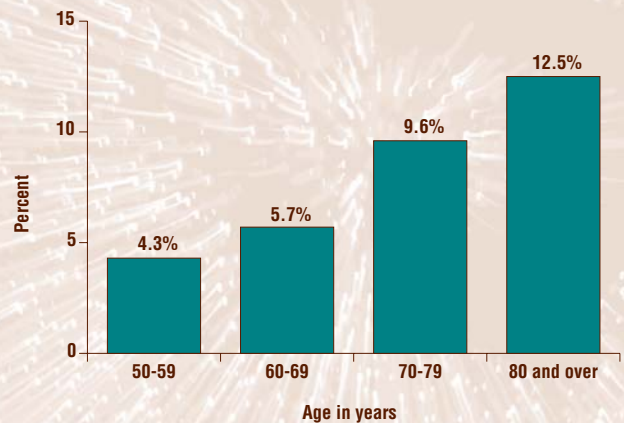
Additional AHRQ-funded research confirmed the value of total knee replacement surgery in a study of patients whose average age was 65 years. After 4 years, nearly 90 percent of patients had a good to excellent outcome. After 5 years:

- 75 percent had no pain.
- 20 percent had mild pain.
- 3.7 percent had moderate pain.
- Only 1.3 percent had severe pain.<sup>19</sup>

### Complications from surgery increase with age

AHRQ research has indicated that the elderly face more risks of major or fatal complications when undergoing noncardiac surgery, including orthopedic surgery, than younger patients (Figure 5). Specifically, older patients have a significantly higher risk of pulmonary edema, heart attack, abnormal heart rhythms, bacterial pneumonia, respiratory failure, and in-hospital mortality.<sup>20</sup>

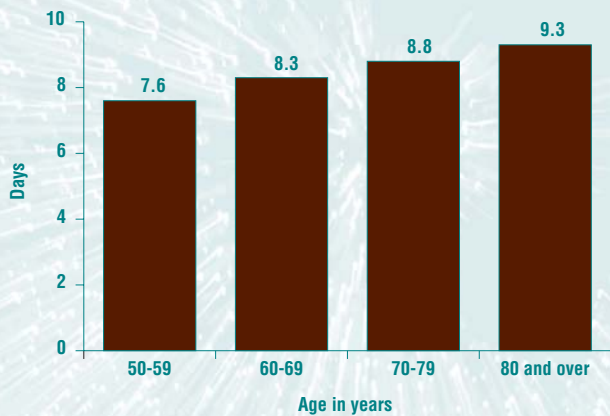
**Figure 5. Major or fatal postoperative complications in patients undergoing noncardiac surgery, by age**



Source: Polanczyk CA, Marcantonio E, Goldman L, et al. Impact of age on perioperative complications and length of stay in patients undergoing noncardiac surgery. *Ann Intern Med* 2001;134(8):637-43.



**Figure 6. Average length of stay in days among patients undergoing noncardiac procedures, by age**



**Source:** Polanczyk CA, Marcantonio E, Goldman L, et al. Impact of age on perioperative complications and length of stay in patients undergoing noncardiac surgery. *Ann Intern Med* 2001;134(8):637-43.

**Table 1. Estimated rates and ranges of complications following total knee replacement surgery**

Complication	Average rate (%)	Range (%)
Superficial infections	3.9	0-14.8
Deep infections	1.7	0-11.4
Pulmonary embolism	2.0	0-9.7
Deep venous thrombosis	6.5	0-56.6
Peripheral nerve damage	2.1	0-18.8

**Source:** Callahan CM, Drake BG, Heck DA, et al. Patient outcomes following tricompartmental total knee replacement. *JAMA* 1994;271(17):1349-57.

Patients ages 70-79 were twice as likely and patients 80 years and over were three times as likely to suffer postoperative complications or death when compared to patients ages 50-59.<sup>20</sup> Older patients also had longer hospital stays (Figure 6) regardless of sex, ethnicity, preoperative clinical characteristics, functional status, and type of procedure.<sup>20</sup>

AHRQ research showed that about 18 percent of patients undergoing knee replacement surgery, whose average age was 65, had complications (Table 1). The mortality rate was 7.1 percent at 30 days but dropped to 1.5 percent after 1 year.<sup>19</sup>

Patients who require surgical repair (arthroplasty) on both knees often face a choice whether to have the procedure

**Table 2. Comparisons between simultaneous and staged bilateral knee arthroplasties among Medicare beneficiaries**

Surgery groups	Surgical complication (%)	Mortality rate (%)		Average intensive care days	Median	
		30-day	2-year		Length of stay (days)	Total charges
Simultaneous	2.4	0.99	3.75	2.11	12	\$20,562
<b>Staged:</b>						
6 weeks	3.5	0.48	4.05	1.35	20	\$24,343
3 months	3.5	0.29	3.27	1.03	20	\$23,753
6 months	3.4	0.31	3.42	1.09	21	\$24,589
1 year	3.9	0.36	2.98	1.28	21	\$25,009

**Source:** Ritter M, Mamlin LA, Melfi CA, et al. Outcome implications for the timing of bilateral total knee arthroplasties. *Clin Orthop* 1997;345:99-105.

done on one knee at a time (staged) or both knees at once (simultaneous). The AHRQ-funded TKR PORT found that patients who had surgical repair on both knees at the same time experienced more days in intensive care than those who chose staged procedures (Table 2). Although the total length of stay and costs were less for patients receiving simultaneous surgical repair,<sup>21</sup> these patients have been found to have an increased risk of complications overall.<sup>22</sup> Mortality at 30 days was highest for the simultaneous procedure group but by 2 years, it was nearly the same for all groups. Researchers concluded that staging the procedure 3 to 6 months appeared to offer the fewest disadvantages, was only slightly more expensive than simultaneous arthroplasty, and had the lowest mortality rate.<sup>21</sup>

Surprisingly, AHRQ studies show that patients who reported having worse knee function prior to surgery were the least likely to suffer complications.<sup>22</sup> Other factors that help reduce complications include having surgery during the middle of the week and having surgery performed by surgeons or in hospitals that perform more knee replacement surgeries.<sup>22-24</sup>

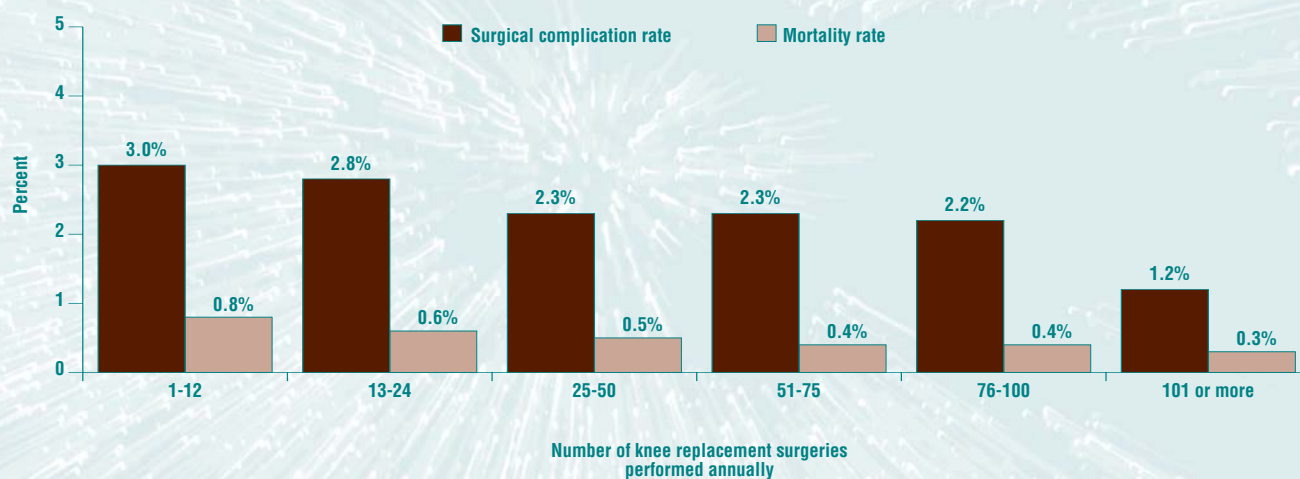
## High-volume hospitals and surgeons have lower complication rates

AHRQ-funded studies conducted as a part of the TKR PORT indicated that patients generally have fewer complications when their surgeons perform more than 20 knee replacements per year<sup>22</sup> or patients have their surgery in hospitals that perform at least 40 operations per year.<sup>23</sup> One study showed that average surgical complication and mortality rates declined as the hospital performed more knee replacement surgeries (Figures 7 and 8).<sup>24</sup> These reductions were consistent in both medium- and large-size hospitals.<sup>24</sup>

## Arthritis research continues

AHRQ funded a Center for Education and Research on Therapeutics (CERTs) focused on musculoskeletal disorders at the University of Alabama at Birmingham. By having an arthritis center collaborate with private-sector entities, the researchers hope to identify variations in musculoskeletal therapy and explore the causes of these variations. They will also develop a facility to disseminate

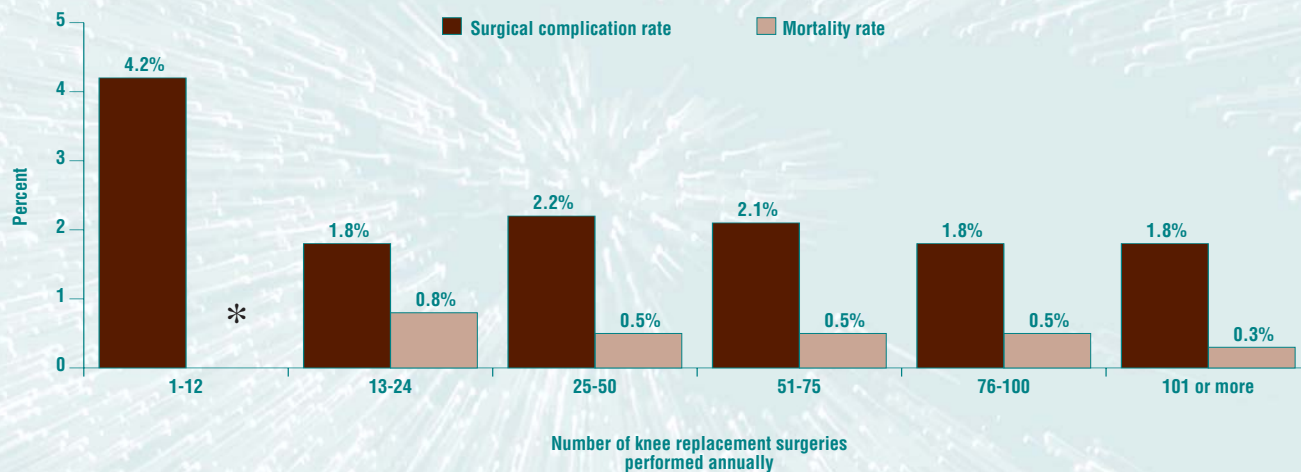
**Figure 7. Surgical complication and mortality rates for knee replacement surgery in medium-size hospitals (100-399 beds)**



**Source:** Gutierrez B, Culler SD, Freund DA. Does hospital procedure-specific volume affect treatment costs? A national study of knee replacement surgery. *Health Serv Res* 1998;33(3):489-511.



**Figure 8. Surgical complication and mortality rates for knee replacement surgery in large hospitals (400 beds or more)**



\* Not applicable.

Source: Gutierrez B, Culler SD, Freund DA. Does hospital procedure-specific volume affect treatment costs? A national study of knee replacement surgery. *Health Serv Res* 1998;33(3):489-511.

new knowledge about musculoskeletal therapy, including minimizing adverse effects, cost effectiveness, and effects on quality of life.

## With new funding, researchers can make a difference

AHRQ’s program announcement “Patient-Centered Care: Customizing Care to Meet Patients’ Needs” is intended to support the redesign and evaluation of new care processes that lead to greater patient empowerment, improved patient-provider interaction, easier navigation through health care systems, and improved access, quality, and outcomes. Examples of specific strategies include electronic clinical communication, self-management programs, Web-based applications for patients and/or health care providers, and shared decisionmaking programs. AHRQ encourages projects that emphasize chronic illness, episodes of care that extend beyond hospitalization, longitudinal care, and priority populations. For more information, see the AHRQ Web site at <<http://grants1.nih.gov/grants/guide/pa-files/PA-01-124.html>>.

## Conclusion

AHRQ research has shown that the disabling effects of osteoarthritis can be reduced or prevented through the use of patient self-management, physical and occupational therapy, and surgery. As a result of AHRQ-sponsored research, self-management programs have helped prevent disability and improve health status. Although the elderly suffer proportionately more complications and adverse effects from surgical therapy than younger patients, AHRQ research has indicated that hospitals that perform more surgeries have lower complication rates. Finally, surgical knee repair helps the elderly gain improved functional ability and quality of life.

## For more information

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*\* AHRQ-funded/sponsored research*

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