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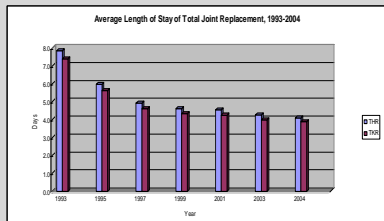
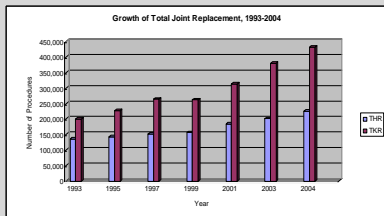
## Abstract

**Objective:** To describe and characterize the trends in the numbers of total hip and knee replacements among Americans in the last decade, the factors shaping the increase in the use of the procedure, and its implications for post-acute rehabilitative care and post-acute health policy.

**Why:** (1) Rapid increase in the use of rehabilitation services from patients with joint replacement. (2) Upstream events impact all downstream post-acute rehabilitation.

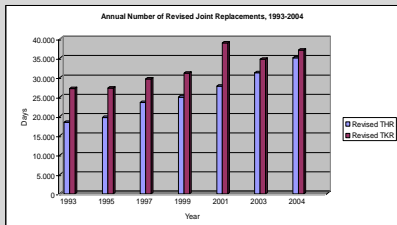
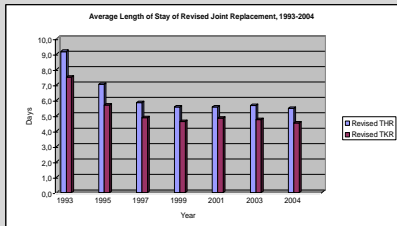
**Keywords:** total joint replacement; hip replacement, knee replacement, demand for post-acute rehabilitation.

## Joint Replacement Trends



Source: HCUP National Inpatient Sample  
Computed by NRH Center for Post-acute Studies

## Joint Replacement Trends (cont.)



Source: HCUP National Inpatient Sample  
Computed by NRH Center for Post-acute Studies

## Projected Increases in Number of Joint Replacements

▲ The number joint replacements is expected to increase in next 2-3 decades:

- Aging of the population
- Increasing acceptance of joint replacement by potential patients

▲ Kurtz *et al.* project, that by 2030:

- The number of total hip replacements will grow 226 percent from 201,000 in 2005 to 453,000 in 2030 per year.
- The number of total knee replacements will increase from 428,000 in 2005 to 2.16 million in 2030 per year.

▲ The estimation may be still conservative.

## Variation of Joint Replacement Use

Disparities in gender, race, and geographic location

▲ Women are more likely to have total hip and knee replacements.

- Higher incidence rate of osteoarthritis among women
- Women are more likely live alone
- Women' preference with respect to procedures.

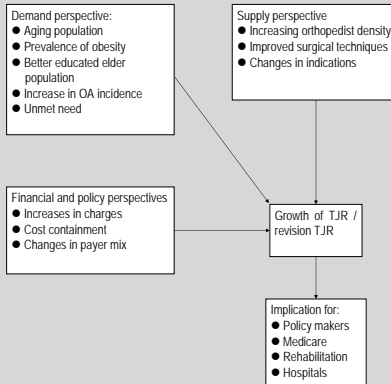
▲ Joint replacement was performed predominantly among those who were white.

- Socioeconomic status
- Patient characteristics, such as literacy, education level, familiarity with joint replacements, cultural traditions and beliefs, different perceptions of risk, competency, trust in the medical profession, and preferences for other treatment approaches
- Patient-physician relationship
- Social factors.

▲ Highest rates of both joint replacements were in the Midwest and Northwest, and the lowest rates were in the South and East.

- Variations in the supply of healthcare professionals.
- Reflection of racial disparities
- Characteristics of providers
- Patient life-style, cultural traditions

## Factors influencing the Use of Joint Replacement



## Factors Influencing the Use of Joint Replacement (cont.)

### The Demand Side

- **Aging population.** Aging is the strongest identified risk factor for the development of osteoarthritis, which is the major disease that leads to joint replacements. By 2005, 37 million or 12.4% of the US population was older than 65 years.
- **Prevalence of obesity.** Obesity is associated with an increased risk of knee and hip osteoarthritis. One-third of the elderly population (60 to 79 years old) was obese in 1999-2000.
- **Better educated elder population.** Patients' educational level is a marker of patient familiarity with, and knowledge of, the risk and benefits of any medical procedure. In 2000, 32% of individuals older than 65 had completed high school education and 33.5% had a college degree or some higher education.
- **Increased in osteoarthritis** incidence led by aging and obesity, and more willingness to use the procedure produce a large volume of candidates for joint replacements.
- **Unmet need** among those with a potential need for knee replacement, only 13% of women and 9% of men expressed definite willingness to undergo the procedure (NIH, 2003).

### The Supply Side

- Orthopedic practice has changed over time: from 2000-2005, (1) the number of certified orthopedists increased slightly (2) the density of orthopedists increased, and (3) the portions of orthopedists whose focus areas of practice were adult hip and adult knee increased.
- **Improving surgical techniques:** The improvement in surgery led to better outcome, additional indications, and decreased the average length of stay.
- **Changes in indications:** the indications of joint replacements have been broadened to include (1) both younger and older patients, and (2) patients with more comorbidities.

### The Role of Financial Intermediaries

- **Increases in charges:** the average charges per patient for total joint replacement increased from \$22,938 in 1993 to \$38,079 in 2004 (HCUP NIS).
- **Cost containment:** (1) pressures from CMS, and (2) implementation of clinical pathway (CP), implant standardization program (ISP).
- **Changes in payer mix:** between 1997 and 2004, the portion of total joint replacement charges covered by Medicare decreased from 66.1% to 57.9%, while the portion of private insurance increased from 27.3% to 33.4%.

## Implications of Joint Replacement Growth

### For Medicare

- Cost pressure from increasing number of joint replacement procedures as well as follow-up rehabilitation services.
- Quality issue possibly caused by cost reduction.
- Appropriateness of Medicare reimbursement and strategies.
- Assure access to joint replacement and rehabilitation services for those who need these services but do not use them.
- Appropriateness of choice of post-acute care setting for rehabilitation.

### For post-acute care settings

- Rapid increase in the admission of patients with joint replacement because of (1) growth of joint replacement procedures, and (2) reduced length of stay.
- Capacity of providing rehabilitation service to a huge volume of joint replacement in the future.
- Cost shifting from hospitals to post-acute care settings.
- Cost containment pressure from CMS and other health plans.

### For hospitals

- Issue of surgery provision because of (1) a large volume of candidates for joint replacement, (2) large unmet need, and (3) shortage of orthopedic surgeons
- Pressures from CMS's cost containment strategies
- Quality issue

### Conclusion

Increasing demand, changes in supply, and fiscal incentives from intermediaries have fueled the rapid growth in the number of total hip and knee replacements. This growth has had spillover effects for post-acute rehabilitative care that are not well understood and need to be taken into account when shaping post-acute health policy and payment for joint replacement rehabilitation.

### Acknowledgments

This poster was produced under the auspices of the JOINTS I & II Studies funded by HealthSouth, ARA Research Institute, Brooks Health, American Hospital Association, Federation of American Hospitals, National Rehabilitation Hospital, and many other individual organizations.

The JOINTS Study Team is a collaboration of the following organizations:

- Center for Post-acute Studies, National Rehabilitation Hospital
- Institute for Clinical Outcomes Research
- IT Healthtrack
- The Lewin Group