

## Impact Of A National Enhanced Recovery Programme On Patient Outcomes Of Primary Hip Replacement: An Interrupted Time Series Analysis From England

Orthopaedics / Pelvis, Hip & Femur / Epidemiology, Prevention & Diagnosis

Cesar Garriga<sup>1</sup>, Andrew Price<sup>1</sup>, Daniel Prieto-Alhambra<sup>1</sup>, Andrew Carr<sup>1</sup>, Nigel Arden<sup>1</sup>, Jose Leal<sup>1</sup>, Rachael Gooberman-Hill<sup>2</sup>, Cyrus Cooper<sup>3</sup>, George Peat<sup>4</sup>, Ray Fitzpatrick<sup>1</sup>, Karen Barker<sup>1</sup>, **Andrew Judge**<sup>2</sup>

1. University of Oxford, Oxford, United Kingdom
2. University of Bristol, Bristol, United Kingdom
3. University of Southampton, Southampton, United Kingdom
4. Keele University, Keele, United Kingdom

Keywords: Hip Replacement, Osteoarthritis, Enhanced Recovery, Epidemiology, Patient Outcomes

### Background

Between April 2009 and March 2011 the UK Department of Health established an Enhanced Recovery Programme (ERP) in hip replacement that was introduced across all NHS hospitals. Enhanced recovery focuses on key areas of care to improve patient care: pre-operatively (ensuring individuals are in the best possible condition for surgery); peri-operatively (best management during and after operation); post-operatively (best rehabilitation following surgery).

### Objectives

We aimed to test whether introduction of the ERP has had an impact on patient reported outcomes, complications and length of stay (LOS) for primary hip replacement surgery.

### Study Design & Methods

We used the UK National Joint Registry, which contains data on hip replacement surgeries. Primary operations were linked with Hospital Episode Statistics data which contains records of all inpatient episodes undertaken in National Health Service (NHS) trusts in England, and Patient Reported Outcome Measures (PROMs). Primary elective hip replacements in persons aged  $\geq 18$  years or over between April 2008 and December 2016 were identified. The intervention of interest was the period of time ERP was implemented (April 2009 to March 2011). Outcomes of interest included: Length of stay; change in Oxford hip (OHS) score 6-months after surgery; 5-year revision surgery rates; 6-month complications rates. An interrupted time-series regression model was used to assess whether trends in outcomes changed during and after ERP implementation.

### Results

438,944 hip primary replacements were identified. 60% of patients were women, with an average age 69 years (SD  $\pm 11$  years). Overall LOS decreased from 5.6 days in April 2008 to 3.6 in December 2016. Although older patients had a longer LOS, the trend in decreasing LOS was seen across all age groups (e.g. 4.7 days to 3.0 days in those age  $< 60$  and 8.1 days to 5.3 days in age 85+). The trend in decreasing LOS was seen in patients with and without pre-existing co-morbidity. Over the study period there was an improvement in OHS PROMs, with an improvement in OHS 6 months after surgery of 17.7 points in April 2008, with this change increasing to 22.9 points in December 2016. This trend was seen in patients with and without co-morbidities, and in all age groups except in those age 85+ where the change in OHS was consistent stable over the time period. 5-Year revision rates declined from a rate of 5.8 per 1000 implants years (95% CI: 4.7 to 7.2) at risk in 2008 to 3.4 (95% CI: 2.5 to 4.6) in 2012. Overall complication rates were low and remained stable over the study period from 4.1 % to 1.9 %. Trends in LOS and patient reported outcomes were consistent with a continuation of a pre-existing

secular trend and were not temporally related to implementation of the national enhanced recovery program.

**Conclusions**

This study shows that outcomes are even better for patients having THR now than it was 10 years ago. LOS has declined substantially over the study period, consistent across all age groups and in people with and without co-morbidity. Patient reported outcomes in respect of pain and function have improved, revision rates are in decline and complication rates remain stable.