Benchmarking total hip arthroplasty implant combinations using data from a United States total joint replacement registry

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INTRODUCTION:
We sought to apply benchmarking guidelines created through the International Society of Arthroplasty Registries (ISAR) International Prothesis Benchmarking Working Group to total hip arthroplasty (THA) implant combinations in a US healthcare system using information from a total joint replacement registry (TJRR).

METHODS:
We identified all primary THA for osteoarthritis (2001-2020) from a TJRR. The registry identifies all patients who undergo elective THA within a United States healthcare system that covers more than 12 million members in eight geographical regions. For each THA, the operating surgeon completes a registry intraoperative form that includes a predefined set patient characteristics, medical comorbidities, intraoperative details, and implant information. All THA included in the TJRR are longitudinally monitored for outcomes using electronic screening algorithms until healthcare membership, termination, or death. Identified outcomes are validated by trained research associates. Participation to the TJRR was 95% in 2018.
All-cause revision incidence during follow-up was evaluated using one minus the Kaplan-Meier estimator and reported as cumulative percent revision (CPR). Per ISAR benchmarking guidelines, early benchmarks were at 2-years follow-up, mid at 5-years follow-up, and late benchmarks were at 10-years follow-up. Constructs with at least 250 still at risk and the lower bound of the 95% CI ≤2.0% at 2-years follow-up received an early benchmark, while constructs with at least 250 still at risk and the lower bound of the 95% CI ≤3.0% at 5-years follow-up received a mid-benchmark; constructs where the 95% CI was above the benchmark standard were considered poorly performing. At the 10-year mark, both non-inferiority and superiority were considered. Constructs with at least 250 still at risk and the upper bound of the 95% CI ≤6.0% were considered non-inferior, those where the upper bound was ≤5.0% were considered superior.

RESULTS:
There were 35 implant constructs with at least 250 THA at risk at 2-years follow-up. Of the 35 combinations, 32 met the benchmark requirement at 2-years of the lower bound of the 95% CI being below 2.0%. 3 systems did not meet the benchmark, having 2-year CPR ranging from 3.0-4.9%.
30 of the implant constructs still had enough patients at risk for consideration of the 5-year benchmark, and 29 met the 5-year requirement of the lower bound of the 95% CI being below 3.0%. One implant system failed to meet both 2-year and 5-year benchmarks.
There were 20 implant constructs with at least 250 THA at risk at the 10-year benchmark. 6 constructs did not meet the criteria for a benchmark. Non-inferiority was observed for 2 implant systems that all had the upper bound of the 95% CI within 6.0%. 12 implant constructs were identified as best performing, meeting superiority at the 10-year benchmark with the upper bound of the CPR ≤5.0%.

DISCUSSION AND CONCLUSION:
Identifying and reporting implant combinations with both superior and inferior survivorship performance provides valuable information to surgeons as well as implant manufacturers. Total joint registries can be an effective resource to perform benchmarking analyses.