Sound Exposure in the Total Joint Arthroplasty Operating Room- Are All Operating Room Personnel at Risk?

Matthew T Hoffa, Justin M Lapow, Abbey E Debruin, Rachael L Tolsma, David M Rossi[1], Bradley A Foulke, Brian Thomas Nickel

[1]UW Health Orthopedic Surgery Department

INTRODUCTION: A hearing conversation program is recommended by the Occupational Safety and Health Administration (OSHA) for prolonged exposure >85 decibels (dB). Arthroplasty surgeons experience levels above this threshold, and have 3.7x increased odds of hearing loss compared to non-surgical colleagues. Current literature lacks a thorough analysis of sound exposure for all arthroplasty operating room (OR) personnel. The purpose of this study was to compare the degree to which all OR personnel are exposed to dangerous sound exposure during arthroplasty surgery.

METHODS: Utilizing an OSHA compliant sound recorder, data was obtained for a minimum of 18 total hip and 18 total knee arthroplasty cases. Recordings were obtained by direct operative staff- primary surgeon, assistant, and surgical technician- as well as at anesthesia and circulating nurse stations. T-test and ANOVA were completed to compare between case type and OR personnel/stations respectively.

RESULTS: Sound exposure was similar between knee and hip arthroplasty. Average sound level exceeded 85dB for the primary physician in hip and knee arthroplasty. Primary surgeon and surgical techs experienced peak sound exceeding >100dB. All operating room personnel experienced some degree of sound exceeding 90dB during hip arthroplasty, while only direct operative staff exceeded 90dB exposure during knee arthroplasty. The primary surgeon had significantly higher average sound level ($p<0.01$) and percentage of time with exposure >90dB as compared to all other OR personnel ($p<0.0001$). Time exposed to >90dB was similar between assistant and surgical tech.

DISCUSSION AND CONCLUSION: All total joint arthroplasty OR personnel may be exposed to some degree of potentially dangerous sound. This risk is most notable for direct operative staff, and significantly higher for the primary surgeon. Per OSHA guidelines, our data suggests hearing protection is indicated for the primary surgeon; however, all direct operative staff would likely benefit based on our measured exposures.