



# The Association between Resident Involvement and Postoperative Short-term Surgical Morbidity in Immediate Breast Reconstruction: A NSQIP Study of 24,005 Patients

Mohamad E. Sebai, MBBS, Ricardo J. Bello, MD, MPH, Scott D. Lifchez, MD, Damon S. Cooney, MD, PhD, Gedge D. Rosson, MD, Carisa M. Cooney, MPH, CCRP

### BACKGROUND

Periodically, patients have concerns about having residents involved in their surgical care.<sup>1-3</sup> Although postoperative outcomes associated with resident participation have been studied in certain surgical procedures,<sup>4</sup> the association between resident involvement (RI) and surgical morbidity in immediate breast reconstruction (IBR) is not well documented. The purpose of this study was to assess whether RI in IBR is associated with increased 30-day surgical morbidity, readmission and reoperation rates, operative time, and length of stay.

### METHODS

We used the American College of Surgeons National Surgical Quality Improvement Program database to identify patients who underwent IBR from 2005 to 2012. Preoperative demographics, intraoperative variables, RI in surgery, and 30-day postoperative surgical morbidities were identified. We used the  $\chi^2$  test and multivariable logistic regression to estimate the effects of RI on postoperative surgical complications and the  $\chi^2$  test, Wilcoxon rank sum test, multivariable logistic regression, and multiple linear regression (as appropriate) to assess for associations with secondary outcomes (i.e., operative time, readmission, reoperation, and length of stay). In addition, we stratified by the level of training and type of reconstruction and tested for effect modification with likelihood ratio tests.

### RESULTS

A total of 24,005 patients underwent IBR (17,840 with RI). Thirty-day surgical morbidity was observed in 5.25%

(95% confidence interval [CI], 4.92–5.58) of cases involving residents and 5.12% (95% CI, 4.59–5.58) of cases without RI. Multivariable logistic regression adjusting for age, body mass index, ASA class, inpatient status, race, type of reconstruction, and comorbidities showed no evidence for association between cases involving residents and 30-day surgical morbidity (adjusted odds ratio [OR<sub>adjusted</sub>], 0.97; 95% CI, 0.85–1.11;  $P = 0.652$ ). Stratifying by the level of training did not show an association between RI and postoperative surgical morbidity in unadjusted ( $P = 0.066$ ) or adjusted ( $P = 0.344$ ) models. Likelihood ratio test showed effect modification with the type of reconstruction ( $P = 0.026$ ) where RI was not associated with complications in implant-based reconstructions but instead was associated with lower odds of complications in autologous reconstructions (OR, 0.70; 95% CI, 0.53–0.91;  $P = 0.008$ ). For secondary outcomes, only operative time was significantly increased ( $P < 0.001$ ) with RI after adjustment. Stratifying by the level of training showed statistical evidence for lower operative time in PGY-5 and PGY-6 residents, compared with other residents before and after adjusting for confounding ( $P = 0.009$  and  $P = 0.001$ , respectively). Likelihood ratio test showed effect modification between length of stay and type of reconstruction ( $P < 0.001$ ) where RI was not associated with increased length of stay in the unadjusted model but was associated with shorter length of stay in implant-based reconstruction after adjustment (OR<sub>adjusted</sub>, 0.88; 95% CI, 0.79–0.97;  $P = 0.010$ ).

### CONCLUSIONS

In IBR patients, RI was not associated with increased postoperative surgical morbidity, readmission and reop-

*From the Department of Plastic and Reconstructive Surgery, Johns Hopkins Hospital, Baltimore, Md.*

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eration rates, or length-of-stay. Operative time was significantly increased with RI and was longer for cases involving junior residents. These data support the safety of involving residents in the surgical care of IBR cases, which could be used in counseling patients who might have concerns about RI in their surgical care.

**Carisa M. Cooney, MPH, CCRP**

Department of Plastic and Reconstructive Surgery  
 Johns Hopkins University School of Medicine  
 601 N. Caroline Street, JHOC 2114A  
 Baltimore, MD 21287  
 E-mail: ccooney3@jhmi.edu

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