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Nonresponse bias in survey research: lessons from a prospective study of breast reconstruction

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ABSTRACT

Background: Survey-based research is essential for evaluating the outcomes of health care in an era of patient-centered care. However, many such studies are hampered by poor response rates in completion of study questionnaires, thus limiting the generalizability of any findings. The objectives of this analysis were to identify independent variables associated with nonresponse to surveys following breast reconstruction to improve future patient-reported outcomes research.

Materials and methods: The Mastectomy Reconstruction Outcomes Consortium is a prospective cohort study involving 11 leading medical centers from the United States and Canada. Nonresponse rates for surveys assessing satisfaction with breast, satisfaction with care (BREAST-Q), depression (Patient Health Questionnaire-9), and anxiety (Generalized Anxiety Disorder-7) were measured at 1 y and 2 y postoperatively. Clinical complication rates were compared between responders and nonresponders, and multivariable models were used to assess predictors of nonresponse.

Results: Among 2856 women in the analytic cohort, 1882 (65.9%) underwent implant-based, 817 (28.6%) received autologous, and 157 (5.5%) underwent latissimus dorsi myocutaneous flap breast reconstructions. Nonresponse rates to surveys at 1 y and 2 y were 27.8% and 34.4%, respectively. Race, ethnicity, and annual household income were associated with nonresponse to surveys. Women who underwent implant-based procedures were less likely to complete long-term surveys.

Conclusions: As survey-based research plays an increasingly prominent role in evaluating the outcomes of breast reconstruction, we found socioeconomic and procedure-related differences in survey response rates. Investigators must consider systematic differences in response rates among particular groups of women on the generalizability and validity of findings and perform rigorous nonresponse bias analyses.

This study was presented at the annual meeting of the Plastic Surgery Research Council in Durham, North Carolina on May 6, 2017.

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Introduction

Advances in the measurement of patient-reported outcomes (PROs) have enabled surgeons and health services researchers to investigate improvements in health-related quality of life related to surgical care. Furthermore, as comparative effectiveness research becomes increasingly prominent in nearly all areas of surgery, survey-based research methods are also frequently used to compare the impact of different surgical procedures. As we move forward in this era of patient-centered care, it has become increasingly clear that survey-based research is an essential component of assessing the impact of surgical procedures.

The American Cancer Society estimates that breast cancer is the most common nonskin cancer among women in the United States.[1] Although breast conservation remains the primary surgical treatment for breast cancer, mastectomy is still performed on a routine basis.[2-5] To decrease the adverse effects of mastectomy on psychosocial functioning, many women undergo breast reconstruction after mastectomy. According to the American Society for Plastic Surgeons, approximately 109,256 women underwent breast reconstruction after mastectomy in the United States in 2016.[6] Building on recent advances in survey-based research, surgeons and health services researchers commonly use validated PRO instruments to evaluate health-related quality of life and psychosocial functioning among women undergoing breast reconstruction after mastectomy.[7-12]

In contrast to medical records or claims data, measuring PROs is entirely dependent on the patients' willingness to complete surveys. Importantly, systematic differences between patients who respond to surveys and those who do not respond may lead to nonresponse bias, which as a form of measurement bias threatens the generalizability and validity of study findings. Although PRO measures have been increasingly applied in breast reconstruction and other areas of surgery, few authors have assessed or adequately adjusted for nonresponse bias in study findings.

Investigators should not assume that nonresponse to surveys occurs randomly. Patients' willingness to complete postoperative surveys may be affected by patient, clinical, or procedure-related differences. To assess patient outcomes in a rigorous manner, investigators should perform nonresponse bias analyses. Using data collected in a multiinstitutional, prospective cohort study of breast reconstruction, our objective in the current analysis was to identify sociodemographic, clinical, and procedural characteristic associated with not completing postoperative surveys. In this article, we also discuss approaches to assessing and adjusting for nonresponse bias for PRO surveys in this study population.

Patients and methods

Data source and analytic cohort

The Mastectomy Reconstruction Outcomes Consortium Study is a 5-year National Cancer Institute–funded, longitudinal, prospective cohort study assessing clinical and PROs of breast reconstruction after mastectomy. This study enrolled eligible patients at 11 participating centers in the United States and Canada between February 2012 and July 2015. Institutional approval was obtained at all participating institutions, and informed consent was obtained from all women who participated in the study. Women undergoing immediate or delayed reconstructive procedures, unilateral or bilateral reconstruction, prophylactic or therapeutic mastectomy, and one of eight commonly used methods of breast reconstruction were eligible for recruitment into the study. The 11 centers of the consortium encompassed urban, rural, academic, and private practice settings. Data were predominantly collected through web-based structured surveys and reviews of medical records. Research protocols were developed and reviewed with study personnel to promote retention of study participants. If study participants failed to complete postoperative surveys, personnel attempted to contact the participants by email, telephone, and/or mail. If requested, paper versions of the questionnaires were mailed to study participants. No monetary incentives were offered to encourage patient participation in this study.

Potential predictors of nonresponse

Baseline socioeconomic information, including race, ethnicity, age, highest level of education attained, and annual household income were collected by structured web-based surveys in the preoperative period. Clinical information, including surgery date, histologic diagnosis, date and sides of mastectomy, date and type of radiation therapy, body mass index, smoking status, and medical comorbidities were collected from electronic medical records. Breast reconstruction procedures were categorized as implant-based, latissimus dorsi myocutaneous flap, and autologous reconstructions. Autologous breast reconstruction included all methods of abdominally based breast reconstruction (free tissue transfer and pediclied myocutaneous flaps) as well as superior and inferior gluteal artery perforator flap procedures. One-year and 2-year clinical complication rates were compared between survey responders and nonresponders. Variations in nonresponse rates at 1 y were compared with overall patient satisfaction with postoperative care at 3 mo. The effect of study site on likelihood of nonresponse to surveys was also assessed in multivariable models.

Nonresponse to survey instruments

The PRO measures chosen to evaluate nonresponse to survey instruments included the BREAST-Q survey for satisfaction with breast and with care, the Patient Health Questionnaire (PHQ) for symptoms of depression, and the Generalized Anxiety Disorder Survey (GAD). All survey instruments have been validated and are commonly employed to study the patient-reported benefits of breast reconstruction.[13-15] The primary outcome of interest, nonresponse to surveys, was defined as nonresponse for all subscales of either the BREAST-Q or PHQ/GAD questionnaires at prespecified postoperative time points. Furthermore, if answers were so limited that the surveys could not be scored for measurement of PROs, this outcome was categorized as nonresponse. Nonresponse to survey instruments was assessed at 1 y and 2 y after breast reconstruction.