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REVIEW ARTICLE

# Breast Reconstruction for Medicaid Beneficiaries: A Systematic Review of the Current Evidence

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**ABSTRACT**

**Introduction:** Medicaid beneficiaries are a generally disadvantaged population with access to elective specialty services. We sought to better understand utilization of breast reconstruction by Medicaid beneficiaries.

**Methods:** We systematically searched PubMed, Scopus, Web of Science, and CINAHL databases for studies comparing breast reconstruction rates by insurance type. We extracted the information of interest to qualitatively and quantitatively synthesize the results of the studies.

**Results:** We identified seven eligible studies. Overall, the rates of breast reconstruction have increased across insurance groups. However, our results show that Medicaid beneficiaries were on average less likely to receive breast reconstruction in comparison to patients with private insurance. Although, Medicaid patients again were more likely to receive breast reconstruction in comparison to Medicare beneficiaries.

**Conclusion:** There is wide disparity in reconstruction rates by insurance status. However, with continued increase in the adult Medicaid population due to widening eligibility expansion, disparities involving this vulnerable population should be examined for causes and solutions.

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Breast cancer; breast reconstruction; insurance type; Medicaid

## Introduction

Postmastectomy breast reconstruction (BR) has been shown to play a fundamental role in improving the quality of life and outcomes in breast cancer patients who are willing to undergo breast reconstruction [1–5]. Several studies demonstrated that postmastectomy patients experienced a number of long-term psychological disturbances including lower self-esteem, mood disorders, distorted body image and interpersonal and sexual dysfunctions [6,7]. Postmastectomy breast reconstruction (PMBR) in turn has been shown to potentially improve psychosocial well-being of mastectomy patient without compromising survival [8] and could thus be a vital component of breast cancer care for patients, who are interested to under breast reconstruction [1–3].

The Women's Health and Cancer Rights Act of 1998 (WHCRA) provides protections for all women in group or individual health plans who choose to have breast reconstruction in connection with a mastectomy (Women's Health and Cancer Rights Act. H.R. 4328. 1998). Additionally, in 2014, The National Accreditation Program of Breast Centers adopted the requirement that every patient considering mastectomy must be offered a consultation with a plastic surgeon to discuss PMBR. Hence, Medicare and Medicaid usually cover the expense of the procedure for their beneficiaries. Medicare covers patients over the age of 65, people with disabilities, and patient with end stage renal disease, while Medicaid provides coverage to low income individuals and families.

Although the rate of PMBR has increased over the last two decades, there are demonstrable disparities in receipt of PMBR based on nonclinical factors. These factors include race, geographic access to plastic surgeon, socioeconomic status and type of insurance coverage [9–12]. Broadening health insurance coverage was one of the main planks of the Affordable Care Act (ACA) of 2010 which used the Medicaid program to expand coverage to low-income working adults. Hence, it is vital to examine if and how insurance-related disparities apply to beneficial elective procedures like PMBR.

Currently, there are only fewstudies primarily designed to examine associations between utilization of breast reconstruction and insurance type, making it difficult to reliably quantify disparities. We conducted a systematic review of literature in order to improve knowledge regarding the extent of insurance-based disparities in PMBR, especially as it affects Medicaid beneficiaries.

## Methods

### *Literature search*

We conducted a systematic review and meta-analysis of the literature according to the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines [13]. We did not submit a review protocol prior to the completion of the study. We completed our search within the databases on 14 July 2017. We searched PubMed, Scopus, Web of Science, and CINAHL. A

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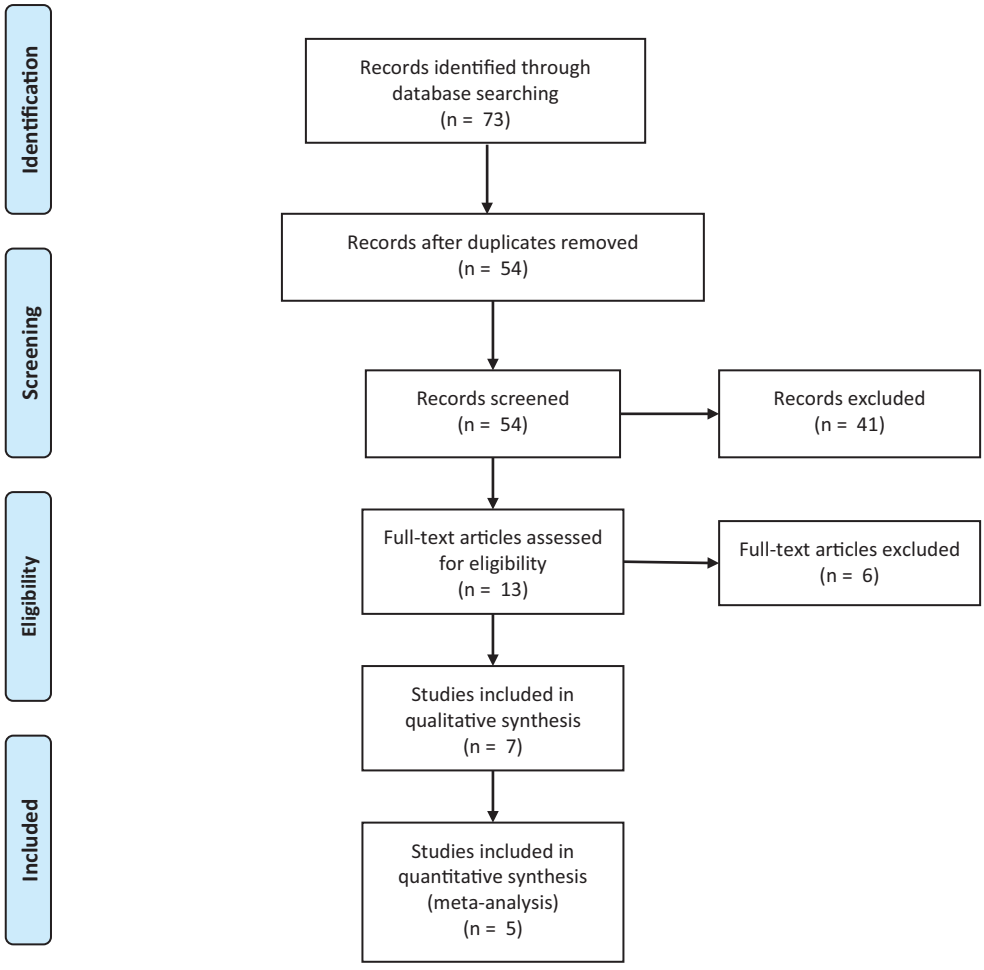


Figure 1. Flow diagram of literature search.

qualified librarian [SMS] performed the database search using specific search terms and search strategies, which are available as supplementary appendix. We included trials or observational studies on breast reconstruction rates for patients with Medicaid insurance coverage. We did not apply language or date restriction. We excluded conference proceedings, letters to the editors, reviews and experts' opinions. Two authors [CS, AA] independently screened the titles and abstracts based on predetermined eligibility criteria. We then assessed the remaining relevant papers in full-text and selected the ones eligible for our systematic review and meta-analysis. We also assessed the list of references of the included papers for eligible studies.

### Data assessment

Two authors independently collected the information of interest. We extracted the year of publication, study design, sample size, number of Medicaid beneficiaries, and rates of postmastectomy breast reconstruction. In addition, the first author [CS] evaluated the quality of included observational studies based on the methodological index for non-randomized studies (MINORS) criteria [14].

### Statistical analysis

We used Review Manager (The Cochrane Collaboration, Copenhagen, Denmark) to quantitatively synthesize and present our results [15]. We calculated Odds Ratio (OR) and 95% Confidence Intervals (CI) for binary outcomes. Due to heterogeneity among the studies, we performed our analysis with the Random Effects Model using the Mantel-Haenszel method [16]. This approach enabled us to draw conclusions less affected by the heterogeneity among the studies. We investigated statistical heterogeneity across the studies with the Q statistic, generated by $\chi^2$ test. We measured the size of the heterogeneity based on the $I^2$ measurement. We considered $I^2$ values less than 50% to be low heterogeneity, values between 50% and 75% to be medium, and greater than 75% to be high [17]. We did not assess publication bias and funnel plot asymmetry due to the small number of the included studies [18].

## Results

### Literature search

After removing duplicate articles, we identified 54 in the initial search. These studies were screened based on their title and abstract in order to exclude irrelevant studies. For the remaining 13 articles, we read the full-text article and following that we included seven studies in our qualitative analysis. A flow diagram of our search is displayed in Figure 1. Methodological quality of the included studies based on the MINORS score ranged from 13 to 16, indicating moderate quality.

### Qualitative analysis

Ballard et al. published a cross-sectional study using data from Nationwide Inpatient Sample database from 2005 to 2011. After

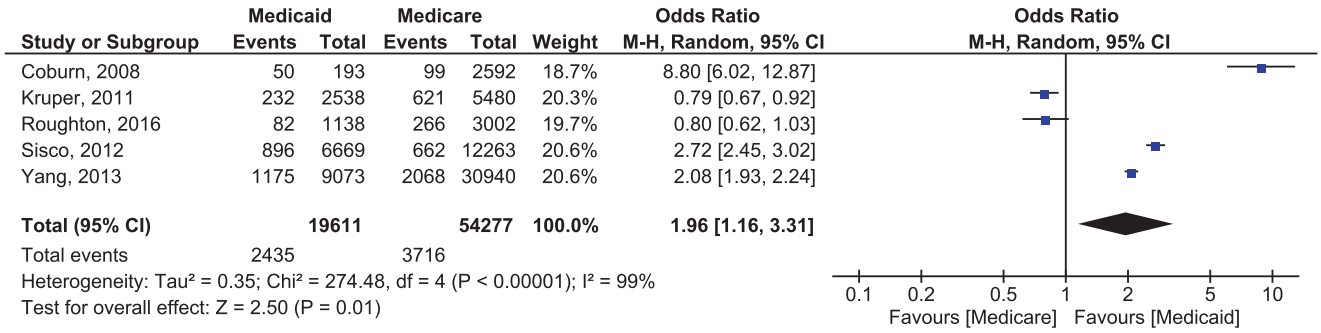


Figure 2. Forest plot of breast reconstruction rates among Medicare and Medicaid beneficiaries.

controlling for confounders, patients with Medicaid were significantly less likely to receive immediate breast reconstruction (OR = 0.37, 95% CI [0.35–0.40], $p < .0001$) [19]. Coburn et al. conducted a retrospective study of 6876 cases of invasive breast cancer using data from Rhode Island Cancer Registry from 1996 to 2005. In their study, approximately 26% of Medicaid beneficiaries received breast reconstruction. They found no statistically significant differences in breast reconstruction rates between patients with Medicaid coverage compared to other insurance types. Their study had a small number of Medicaid beneficiaries who underwent mastectomy ($n = 23$) [20]. Kruper et al. used data from California Office of Statewide Health Planning and Development (OSHPD) from 2003 to 2007 to examine changes in reconstruction rates by a variety of factors including age, race and type of insurance. Their results showed that privately insured patients had almost 10 times greater odds of undergoing immediate reconstruction compared to Medi-Cal [Medicaid] beneficiaries (OR = 9.35, 95% CI [7.94–11.01], $p < .001$) [21].

Mahmoudi et al. conducted a retrospective study using data from the New York Inpatient Database between 1998 and 2006. They examined 44,621 patients who underwent mastectomy to assess changes in receipt of immediate PMBR before and after the implementation of the New York State Medicaid expansion in 2001. Their results show that compared to privately insured patients, Medicaid beneficiaries were half as likely to receive immediate postmastectomy breast reconstruction (OR = 0.45, 95% CI [0.41–0.50], $p < .0001$). However, Medicaid beneficiaries had the highest increase in rates of immediate postmastectomy breast reconstruction between 1998 and 2006 ($p < .0001$) [22]. Roughton et al. evaluated data from North Carolina Central Cancer Registry from 2003 to 2006. They studied the impact of multiple barriers in receipt of PMBR in women diagnosed with breast cancer who had PMBR within 6 months of their mastectomy. Their results demonstrated that Medicaid beneficiaries were significantly less likely to receive breast reconstruction, whether immediate or delayed. (OR = 0.24, 95% CI [0.19–0.32], $p < .001$) [23]

Sisco et al. used the National Cancer database data from 1998 to 2007 in two intervals of 1998–2000 and 2005–2007 to investigate trends in the receipt of immediate and early delayed breast reconstruction. Their results demonstrated that Medicaid beneficiaries were significantly less likely to undergo PMBR than managed care and privately insured patients. The odds of PMBR for Medicaid beneficiaries were similar between the 1st and 2nd intervals: (OR = 0.28, 95%CI [0.26–0.31]) and (OR = 0.27, 95%CI [0.25–0.29]), respectively [24]. Yang et al. used the Nationwide Inpatient Sample database to study trends in immediate breast reconstruction rates by insurance status. They found that, from 2000 to 2009, rates of immediate breast reconstruction increased 4.2-fold among Medicaid beneficiaries. However, after adjustment for confounders, Medicaid beneficiaries were still significantly less likely to receive immediate breast reconstruction than patients with private insurance (OR = 0.34, 95% CI [0.32–0.37], $p < .01$) [9].

All studies were of moderate quality based on MINORS criteria. For all studies, except for one, [20] the results were adjusted for potential confounders including age, race, comorbid illness, type of insurance, and estimated household income. Overall the cumulative results suggested that Medicaid beneficiaries are less likely to undergo postmastectomy breast reconstruction. Over time, all insurance groups had increases in immediate breast reconstruction rates with Medicaid beneficiaries registering the highest increases. Sisco et al. and Yang et al. in particular showed 2-fold and 4-fold increases, respectively, in the rate of breast reconstruction among Medicaid beneficiaries during 1998–2007 and 2000–2009, respectively [9,23]. However, only few studies separated their results based on the timing of breast reconstruction (immediate and delayed) [11,22].

### *Statistical analysis*

We attempted to perform two meta-analyses. Our first meta-analysis consisted of five studies including 73,888 patients with Medicare or Medicaid [9,11,20,22,23]. Medicaid beneficiaries had 96% higher odds of receiving post-mastectomy breast reconstruction (6.84% vs. 12.41%, OR = 1.96, 95% CI [1.16–3.31], $p < .001$, $I^2 = 99\%$, Figure 2) in comparison to Medicare beneficiaries. Our second analysis of the same five studies included 116,244 patients with Medicaid or private insurance [9,11,20,22,23]. In this analysis, Medicaid beneficiaries had 76% lower odds of receiving post-mastectomy breast reconstruction (12.41% vs. 34.69%, OR = 0.24, 95 CI [0.15–0.39], $p < .001$, $I^2 = 99\%$, Figure 3). It is apparent that the results of both meta-analyses were affected by high level of heterogeneity that subsequent subgroup analysis could not explain; therefore, we advise the reader to use the results of meta-analyses only as guide for the trend of the studied associations and exercise caution when interpreting summative odds ratios.

## Discussion

The findings from this systematic review demonstrates agreement in the existing literature that post mastectomy breast reconstruction (PMBR) rates increased overall after 1998, likely due to the mandatory coverage policy established by Women's Cancer Health Right Act (WCHRA) [21]. A comprehensive examination of PMBR in the United States between 1998–2007 following WCHRA, showed that overall PMBR increased from 13% to 26% in that decade and this increase was distributed throughout most subpopulations including race and insurance categories [23]. However, all the studies included in our review demonstrated that in spite of the

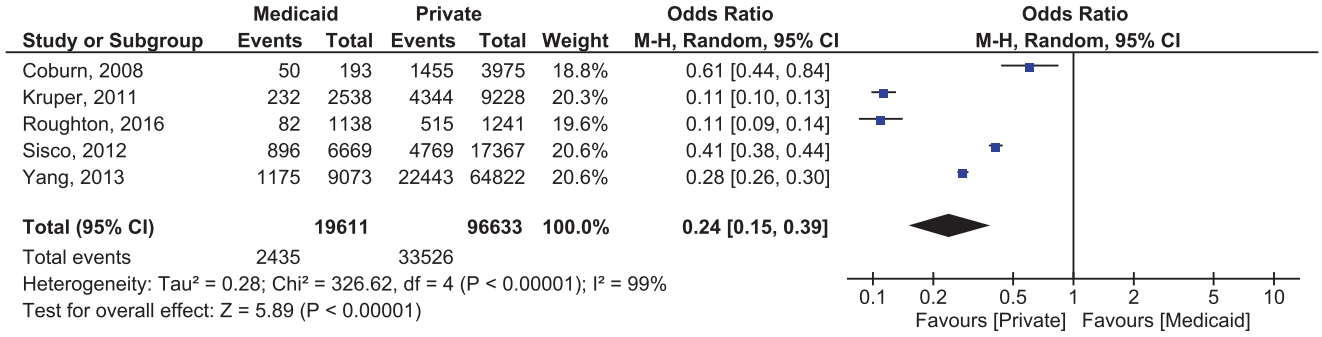


Figure 3. Forest plot of breast reconstruction rates among Medicaid beneficiaries and private insurance clients.

overall increase in PMBR rates, there are still significant disparities in utilization of breast reconstruction associated with insurance coverage type. Specifically, receipt of PMBR remains more likely in privately insured patients compared to Medicaid beneficiaries [9,11,20,22,23]. This finding was consistent in studies using different data sources, from large databases to single institution data. Our analysis showed that Medicaid patients had approximately 80% lower odds of receiving PMBR in comparison to patients with private insurance.

Since there is a paucity of studies primarily designed to examine insurance-related associations with receipt of PMBR, there is consequently little to no evidence of specific factors contributing to the significantly lower odds of PMBR among Medicaid beneficiaries. Generally, the discussion in studies that report poorer access to and lower utilization of specialist provided services among Medicaid beneficiaries does converge on a familiar list of factors. These factors range from the patient-related such as adverse social circumstances, poor health literacy, and poor physical and mental health status with co-morbid conditions to the system-related such as low provider participation in Medicaid due to inferior reimbursements and onerous administrative burden, geographic access barriers and provider bias in referral to specialists [24–27]. There is indeed a considerable body of knowledge on patient-related factors that influence utilization of PMBR. In addition to clinical factors, such as disease severity and health status, and demographic factors, such as age and race, lack of interest in additional surgical procedures, cultural perspectives about reconstruction, anxiety regarding disease recurrence, perceived impact of reconstruction on surveillance, and concerns about implants are some of the other patient-related factors that have been shown to influence decisions about undergoing PMBR [28–34]. However, there is little to no evidence that any one of the patient-related factors studied to date mediate the association between low utilization of PMBR and Medicaid enrollment status.

The primary criterion for Medicaid eligibility among working age adults is low income. Thus, a search for testable patient-related factors mediating lower utilization of PMBR among Medicaid beneficiaries may well take root from this criterion. Breast reconstruction is a staged process that involves more clinic visits, surgical procedures and ultimately time added to that required for definitive surgical and adjunctive treatments for breast cancer. Recently, there has been burgeoning interest in the economic burden, on patients, of cancer-related care. The consensus term for this economic burden is 'financial toxicity' broadly defined as treatment related financial distress as a result of out of pocket healthcare costs [35–38]. These include direct costs of care, like co-payments and indirect costs, such as transportation, lost wages due to time away from work [37,38]. There is considerable evidence that working age adults in the low-income bracket are particularly vulnerable to financial toxicity [38–40]. Moreover, patients who endorse financial toxicity are more likely to forego clinic visits and avoid procedures to avoid the prospect of financial distress [37,38,41]. Hence, it is plausible, although so far untested, that the potential financial toxicity associated with the additional clinical commitments for breast reconstruction, a discretionary endeavor, contributes to discouraging utilization of PMBR among low-income working age adult Medicaid beneficiaries.

Of the nonpatient-related factors often examined in context of lower utilization of specialist provided services among Medicaid beneficiaries, physician participation garners sizable interest [24–27]. The evidence for lower physician participation in Medicaid comes largely from physician surveys and 'mystery-caller' studies. Using 2011 data from an annually conducted nationally representative survey of office-based physicians in the United States, the National Ambulatory Medical Care Survey (NAMCS), Decker reported that 31% of physicians would not accept new Medicaid beneficiaries compared to 17% and 18% for Medicare and commercially insured patients respectively [42]. Moreover, the most recent summary available from the same survey (2015) shows that the percentage of physicians who would not accept new Medicaid beneficiaries was stable at 32%. The percentage who would not accept new commercially insured patients decreased from 17% to 11% [43]. Similarly, Cunningham et al. used another nationally representative survey, the Community Tracking Survey (CTS), to demonstrate an increasing trend of total nonparticipation in Medicaid (i.e. no receipt of revenue from Medicaid) by office-based physicians in the United States [27]. Currently, the majority of US states (39 of 50) contract with Managed Care Organizations (MCOs) to provide healthcare services to Medicaid beneficiaries. In most of these states, 75% of Medicaid beneficiaries receive healthcare services through these MCOs with usually tight provider networks [44]. Theoretically, lower physician participation in Medicaid increases the difficulty of establishing adequate networks for an MCO's population of beneficiaries. Indeed, MCO leaders have reported difficulties maintaining adequate networks for adult surgical specialist providers [45]. Finally, the results of a multitude of mystery-caller studies have demonstrated significantly less access for Medicaid beneficiaries compared to commercially insured patients, particularly with surgical specialists [46–48]. In the majority of these studies, 'mystery-callers' are significantly less likely to secure appointments when they present as Medicaid beneficiaries compared to presenting as commercially insured patients [46–48].

The study is based on a meticulous search of the literature on utilization of PMBR among Medicaid beneficiaries; however, this review study has its limitations. As has been previously mentioned, none of the investigators in our search defined the association between breast reconstruction and Medicaid coverage as their primary outcome; on the contrary, most of the data were

derived from secondary analyses. Moreover, majority of the included studies used inpatient databases for their data source, which does not account for outpatient procedures . Thus, it is possible that there is underestimation of breast reconstruction rates across all subpopulations. Finally, our quantitative results showed high heterogeneity most likely due the inherent differences in the conduction of each individual study and the study populations. Thus, the results of the meta-analyses should be used as tools that depict the trend of the studied associations only.

### *Conclusion*

Medicaid beneficiary status has mostly served the co-variate function in many studies on utilization of breast reconstruction. With the expansion of Medicaid eligibility, the proportion of breast cancer patients with Medicaid has potentially increased. However, according to our study, patients with Medicaid are still less likely to receive breast reconstruction in comparison to patients with private insurance. This warrants a closer examination of patient, provider, and system-related factors mediating the significantly lower rate of utilization of PMBR in this population.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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