

# Exercise after Breast Reconstruction Surgery: Evaluating Current Trends and Practices of U.S. Plastic Surgeons

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**Background:** Breast cancer patients have reported restricted mobility, pain, lymphedema, and impaired sensation and strength after breast reconstruction surgery. Many studies have demonstrated benefits of early exercise intervention (within the first 2 weeks) for functional recovery after breast surgery. From the surgeon's perspective, there is a concern that early postoperative exercise can potentially lead to complications or even reconstruction failure. The purpose of this study was to evaluate current trends and practices related to patient exercise after breast reconstruction among plastic surgeons in the United States.

**Methods:** An anonymous, electronic survey was sent to a random cohort of 2336 active members of the American Society of Plastic Surgeons. The survey consisted of 23 questions and was used to assess how plastic surgeons currently manage patients postoperatively after breast reconstruction.

**Results:** Responses were received from 228 plastic surgeons. Thirty-six (18%) respondents reported never prescribing physical therapy (PT) postoperatively. In total, 154 (76%) prescribe PT to less than 50% of their patients, and those who do most commonly prescribe it more than 3 weeks postoperatively. There was no difference in perceived rate of complications by respondents who prescribe early versus late exercise ( $\chi^2(5) = 8.815, P = 0.117$ ).

**Conclusions:** Based on our survey results, only a small percentage of plastic and reconstructive surgeons support early initiation of exercise, and PT is being prescribed to a minority of patients. Surgeons and physical therapists must work together to devise a recovery program that maximizes functional outcomes for patients while also limiting complications. (*Plast Reconstr Surg Glob Open* 2021;9:e3857; doi: [10.1097/GOX.0000000000003857](https://doi.org/10.1097/GOX.0000000000003857); Published online 7 October 2021.)

## INTRODUCTION

Breast reconstruction surgery after mastectomy has been associated with both psychosocial and aesthetic benefits in breast cancer patients.<sup>1</sup> However, patients have reported restricted mobility, pain, lymphedema, and impaired sensation and strength after breast

reconstruction surgery.<sup>2</sup> Although plastic surgeons aim to balance technical, aesthetic, and functional outcomes, some functional deficits are inevitable, especially in the early postoperative period. The degree of functional deficit experienced by patients is dependent on both the type of reconstruction and the patient's baseline functionality. Although it is true that some functional deficits are to be expected, there is evidence that they can be mitigated by optimizing postsurgical function using exercise and physical therapy.

Exercise has been shown to lead to statistically significant improvements in quality of life in breast cancer patients,<sup>3</sup> and has been associated with lower all-cause and breast cancer-specific mortality.<sup>4</sup> In 2010, McNeely et al found that early structured exercise intervention after oncologic breast surgery leads to significant improvement

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in shoulder range of motion.<sup>5</sup> Introduction of upper extremity exercise as early as postoperative day 1 after axillary lymph node dissection showed clear short-term benefit over delayed exercise (day 5–7 postoperatively) for shoulder range of motion. There was a statistically significant increase in wound drainage that required drains to stay in place approximately one additional day longer than if exercise was delayed by 1 week; however, there was no statistically significant difference in wound healing, seroma formation, pain, or wound aspirations between early and delayed exercise. The authors also found no evidence of a negative effect from upper extremity exercise on the incidence of upper limb lymphedema at any time point following surgery.<sup>5</sup>

With regard to breast reconstruction surgery specifically from a surgeon's standpoint, there is an understandable concern that exercise can potentially lead to postoperative complications or even reconstruction failure. However, breast reconstruction surgery can lead to functional deficits that may largely impact the patient's quality of life.<sup>6–9</sup> Mizgala et al investigated abdominal strength after transverse rectus abdominis myocutaneous (TRAM) flap surgery.<sup>10</sup> The authors found that 46% of women 5–7 years postoperative reported decreased abdominal strength and 25% noted a decrease in the ability to perform exercise, but activities of daily living were rarely affected (4%–5.8%). Sit-up performance was worse in postoperative patients when compared with unoperated controls ( $P < 0.0005$ ).<sup>10</sup>

Unfortunately, literature pertaining to exercise after breast reconstruction surgery is limited. A study in 2013 by de Oliveira et al investigated the functional effects of immediate breast reconstruction with latissimus dorsi flap and concluded that there were no detrimental effects on shoulder motion.<sup>11</sup> It is important to note, however, that all patients in this study were started on physical therapy three times a week for 4 weeks, starting the first day postoperatively.

Breast centers around the country have begun to incorporate physical therapy (PT) and exercise into their standard recovery program. For example, McAnaw et al describe a comprehensive PT program for their patients who undergo breast reconstruction surgery at the University of North Carolina-Chapel Hill.<sup>12</sup> Patients begin PT on the first postoperative day and continue therapy with gentle stretches and relaxation techniques while the drains are in place. Patients then progress to more involved PT with longer stretches and greater range of motion once drains are removed. The authors suggest an automatic referral to PT following breast reconstruction surgery. Physical therapists discuss preferences with surgeons and develop a working protocol for each type of procedure, encouraging them to alert the physical therapist about any special precautions for patients.<sup>12</sup>

In the United Kingdom, the usual National Health System postoperative care pathway for breast reconstruction includes routine postoperative physiotherapy that begins during the first postoperative week. In the British Association of Plastic Reconstructive and Aesthetic Surgeons Guidelines for Best Practice in Oncoplastic Breast Surgery, they state that all patients should have

early access to specialist physiotherapy after oncoplastic breast reconstruction surgery. Physiotherapists must be familiar with the surgical techniques and potential surgical complications, so that they may work with patients as early as possible to regain full function of the arm and simultaneously reduce morbidity.<sup>13</sup>

At this time, there are no established guidelines for postoperative exercise and rehabilitation after breast reconstruction surgery in the United States, and there is a paucity of literature to support decision-making regarding this topic. The purpose of this study was to evaluate current trends and practices related to patient exercise after breast reconstruction among plastic surgeons in the United States.

## METHODS

An anonymous, electronic survey was sent to a random cohort of 2336 active members of the American Society of Plastic Surgeons via SurveyMonkey (San Mateo, Calif.). (See survey, **Supplemental Digital Content 1**, which displays exercise after breast reconstruction surgery. <http://links.lww.com/PRSGO/B801>.) Plastic surgeons were invited to participate in March of 2020, and four reminder emails were sent to encourage participation, with the survey closing in June of 2020. The survey consisted of 23 questions related to surgeon demographics and preferences regarding exercise or physical therapy following breast reconstruction surgery. Surgeon variables included sociodemographic characteristics (ie, age, gender), geographic characteristics (by region of the United States), and practice characteristics (ie, years in practice, annual volume of breast reconstruction procedures, types of reconstruction performed). Surgeon opinions and preferences with regard to postoperative exercise and therapy were evaluated using a series of questions. Respondents who did not routinely perform breast surgery were excluded from the study. Additionally, respondents were able to opt out of answering individual questions. Respondents were asked to indicate the time period postoperatively when patients should begin certain activities (arm elevation above shoulder, lifting objects weighing more than 10 pounds, returning to activities of daily living, returning to light exercise, returning to vigorous exercise/sports) with regard to each type of reconstruction (subpectoral implant, prepectoral implant, deep inferior epigastric perforator (DIEP) flap or other perforator autologous reconstruction, TRAM flap, latissimus dorsi muscle flap, other type of reconstruction). For the purpose of this article, we consider “early” exercise intervention to be exercise initiated within the first 2 weeks postoperatively. Initiation of exercise at a time greater than 2 weeks was considered to be “late” exercise intervention. Perceived limitations to discussion about exercise/PT protocols with patients were assessed. Lastly, the surgeons were asked to indicate if their patients have experienced postoperative complications due to return to physical activity within the first 4 weeks postoperatively, and to specify the types of complications experienced.

## RESULTS

Responses were received from 228 plastic surgeons, correlating to a 9.7% response rate. An estimated 169 (74%) of respondents identified as men, 57 (25%) as women, and two (1%) did not specify. In total, 135 (59%) respondents ranged from 45 to 64 years old; 63 (28%) respondents were less than 45 years old and 30 (13%) were 65 or older. With regard to years in practice, 60 (26%) of the respondents have been in practice less than 10 years, 104 (46%) for 10–24 years, and 64 (28%) for 25 years or more. All geographic regions of the United States were represented, with 10 (4%) practicing in New England, 36 (16%) in Middle Atlantic region, 39 (17%) in East North Central region, 19 (8%) in West North Central region, 39 (17%) in South Atlantic region, 11 (5%) in East South Central region, 21 (9%) in West South Central region, 21 (9%) in Mountain region, and 32 (14%) in Pacific region.

Two hundred five (90%) respondents reported that they routinely perform breast reconstruction surgery. Of those, 71 (35%) reported performing 25 breast reconstructions or less annually, 56 (28%) perform between 26 and 50, twenty-three (11%) between 51 and 75, seventeen (8%) between 76 and 100, and 35 (17%) perform 101 or more. Surgeons who did not regularly perform breast reconstruction surgery were excluded from the survey. Respondents were asked to specify which types of breast reconstruction surgeries they perform on a regular basis. In total, 162 (80%) respondents reported that they commonly perform subpectoral implant reconstruction, 150 (74%) prepectoral implant reconstruction, 67 (33%) DIEP flap or other perforator autologous breast reconstruction, 59 (29%) TRAM flap reconstruction, 131 (64%) latissimus dorsi muscle flap reconstruction, and 18 (9%) perform other types of reconstruction such as oncoplastic breast conservation or autologous fat grafting.

A total of 177 (89%) respondents reported providing their patients with specific instructions for postoperative exercises and limitations. With regard to physical therapy, 36 (18%) reported never prescribing physical therapy postoperatively. An estimated 154 (76%) respondents prescribe physical therapy to less than 50% of their patients, and those who do most commonly prescribe it more than 3 weeks postoperatively (Table 1). Ninety-six (58%) respondents reported providing physical therapists with specific instructions regarding limitations (Table 1).

A chi-square analysis was conducted to examine the relationship between respondent case volume (SDC1,

Question 7) and percentage of patients prescribed physical therapy after breast reconstructive surgery (SDC1, Question 8). The results indicated that respondents with higher annual volume of breast reconstruction surgeries are more likely to prescribe physical therapy to their patients ( $\chi^2(16) = 37.446, P = 0.002$ ).

With regard to the time postoperatively when patients should begin certain activities, results varied depending on the type of reconstruction. The majority of respondents feel comfortable with their patients elevating their arm above the shoulder less than 2 weeks postoperatively for nearly all types of reconstruction (Fig. 1). Respondents were more conservative when it came to lifting more than 10 pounds, with the majority preferring patients to wait until at least 2 weeks postoperatively to begin this activity regardless of the type of reconstruction (Fig. 2). With regard to returning to activities of daily living, results varied depending on the type of reconstruction. Surgeons were most comfortable with their patients returning to activities of daily living (ADLs) within the first 2 weeks after prepectoral implant reconstruction (82 respondents, 66%), followed by subpectoral implant reconstruction (80 respondents, 58%) (Fig. 3). Respondents preferred that their patients wait more than 2 weeks before returning to ADLs after undergoing TRAM flap reconstruction (28 respondents, 57%) and DIEP flap or other perforator autologous reconstruction (31 respondents, 54%) (Fig. 2). For all types of reconstruction, respondents prefer that patients wait more than 2 weeks postoperatively to begin light exercise (Fig. 4). For return to vigorous exercise and/or sports, most respondents prefer patients to wait at least 6 weeks (Fig. 5) for each type of surgery with the exception of the “other types of reconstruction” category, with two (14%) respondents indicating that they are comfortable with patients returning to vigorous exercise within the first 2 weeks postoperatively, eight (57%) within 2–6 weeks, and four (29%) preferring to wait more than 6 weeks postoperatively (Fig. 5).

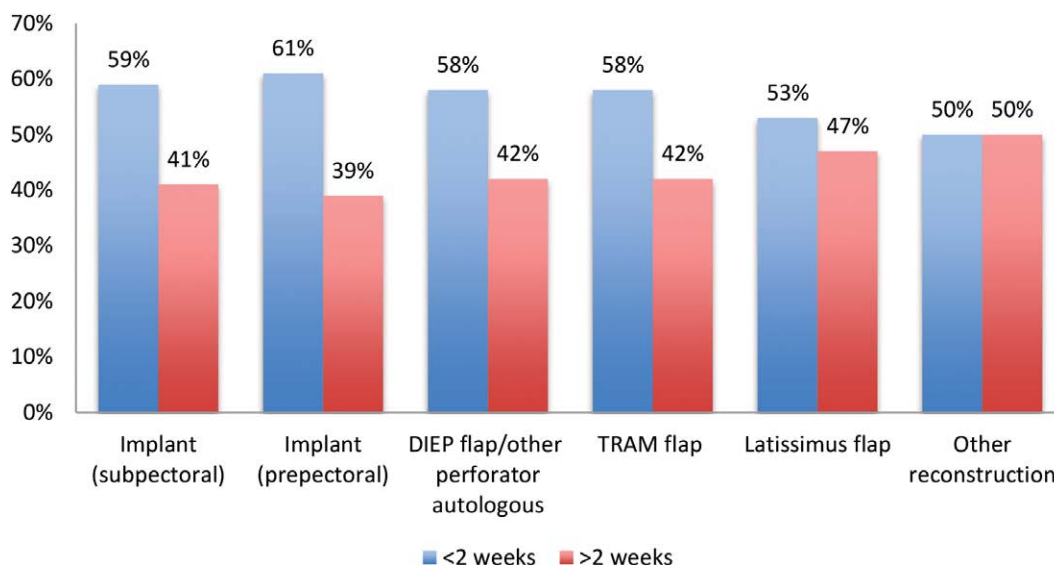
Twenty-seven (14%) respondents felt that postoperative exercise increased pain, 105 (54%) felt that it decreased pain, and 62 (32%) felt that it neither increased nor decreased pain. With regard to the effect of physical therapy on postoperative pain, only nine (5%) felt that it increased pain, 131 (68%) felt that it decreased pain, and 54 (28%) felt that it neither increased nor decreased pain. The majority of respondents (145; 75%) felt that the plastic surgeon should be responsible for discussing postoperative exercises and PT protocols with patients, 22 (11%) felt that this was the job of the physical therapist, and 12 (6%) indicated that this should be a discussion between multiple providers, including physical therapists and surgeons. Respondents identified several barriers to discussion about exercise/PT protocols with patients (Table 2).

Eighty-six (44%) respondents reported that some of their patients who returned to activity within 4 weeks of surgery experienced complications such as seroma, hematoma, wound dehiscence, or displacement of implant or expander (Fig. 6). Other types of complications specified by respondents were increased postoperative pain, swelling, separation of ADM attachment, and internal suture disruption.

**Table 1. Time between Breast Reconstruction Surgery and Initiation of Physical Therapy**

How Soon after Surgery Do Your Patients Start Physical Therapy?	No. Respondents
Immediately	12 (7%)
1–2 weeks postoperatively	25 (15%)
2–3 weeks postoperatively	35 (21%)
3–4 weeks postoperatively	37 (22%)
>4 weeks postoperatively	48 (29%)
Not applicable: I do not recommend that my patients participate in physical therapy	8 (5%)

\*Sixty-two respondents did not respond to this question. In a previous question, 36 (18%) respondents report never prescribing physical therapy.



**Fig. 1.** Arm elevation above shoulder (% = percent of respondents who preferred beginning activity <2 weeks or >2 weeks postoperatively).

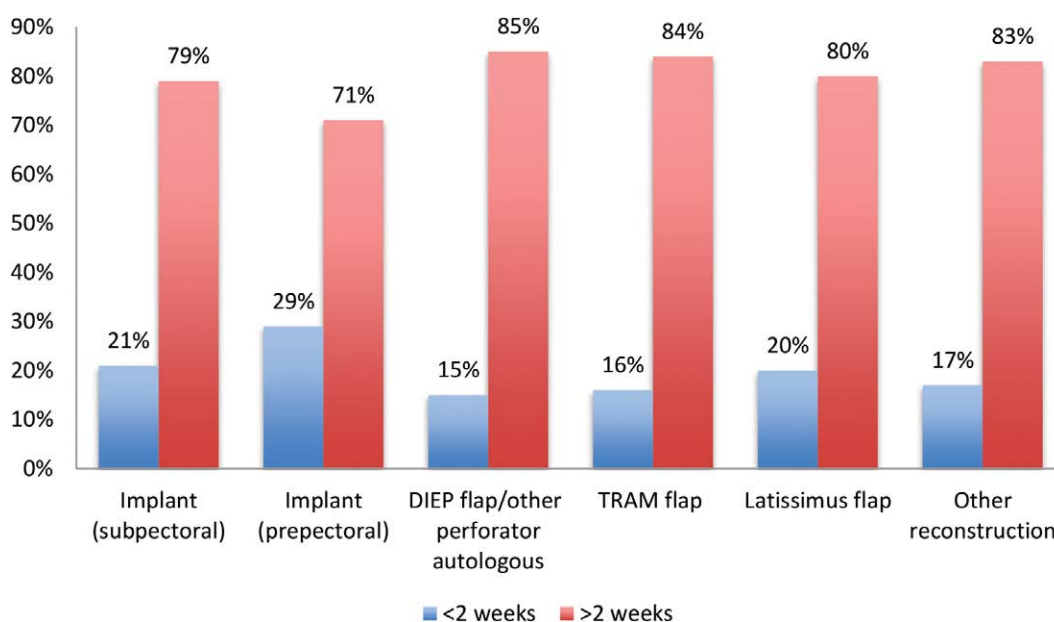
A chi-square analysis was conducted to examine the relationship between early versus late initiation of physical therapy (SDC1, Question 9) and percentage of perceived complications due to early initiation of exercise (SDC1, Question 22). The results indicate that there is no significant statistical difference in the rate of complications perceived by respondents that prescribe early exercise intervention and those who prescribe late exercise intervention ( $\chi^2(5) = 8.815, P = 0.117$ ).

### DISCUSSION

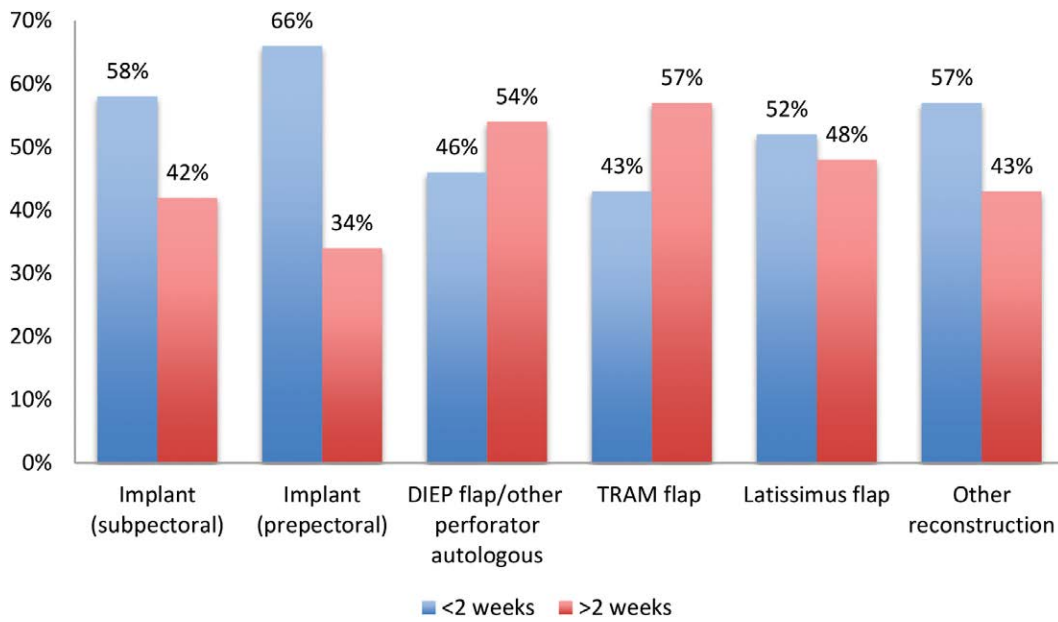
There are limited data pertaining to exercise after breast reconstructive surgery specifically; however, there

is substantial evidence supporting early exercise intervention for functional recovery after oncologic breast surgery. Although this evidence has been clinically applied to postoperative care models for breast reconstruction surgery in other countries, there are currently no established guidelines for postoperative exercise and rehabilitation after breast reconstruction surgery in the United States.

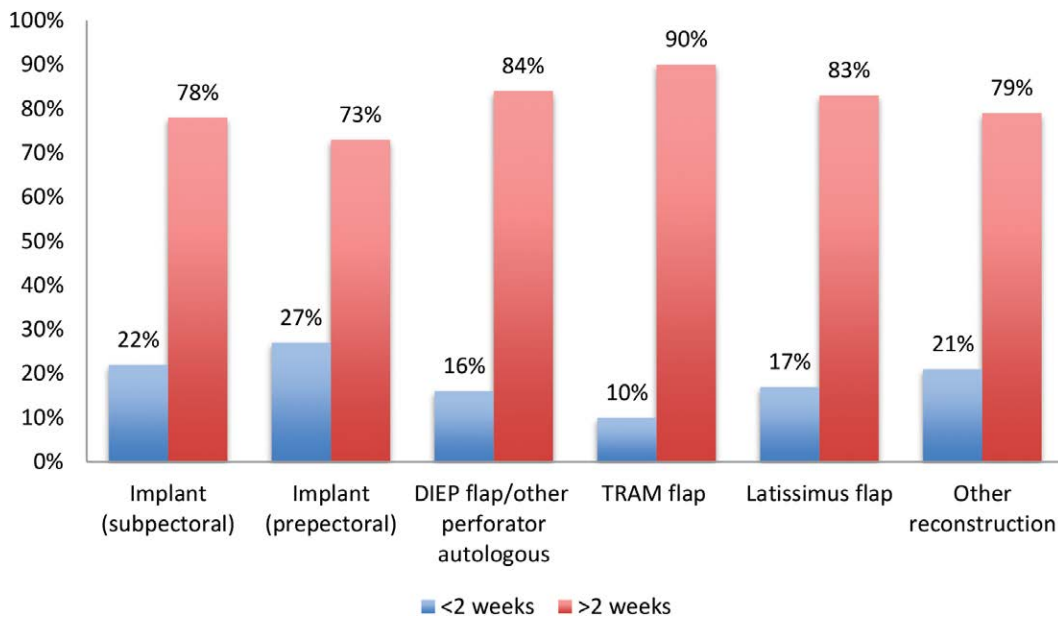
Despite evidence that more structured exercise programs (such as physical therapy) significantly benefit patients recovering from breast surgery by improving quality of life and decreasing all cause and breast cancer specific mortality,<sup>5,14</sup> 36 (18%) respondents report never prescribing physical therapy to any of their patients.



**Fig. 2.** Lifting greater than 10 lbs (% = percent of respondents who preferred beginning activity <2 weeks or >2 weeks postoperatively).



**Fig. 3.** Returning to Activities of Daily Living (% = percent of respondents who preferred beginning activity <2 weeks or >2 weeks postoperatively).

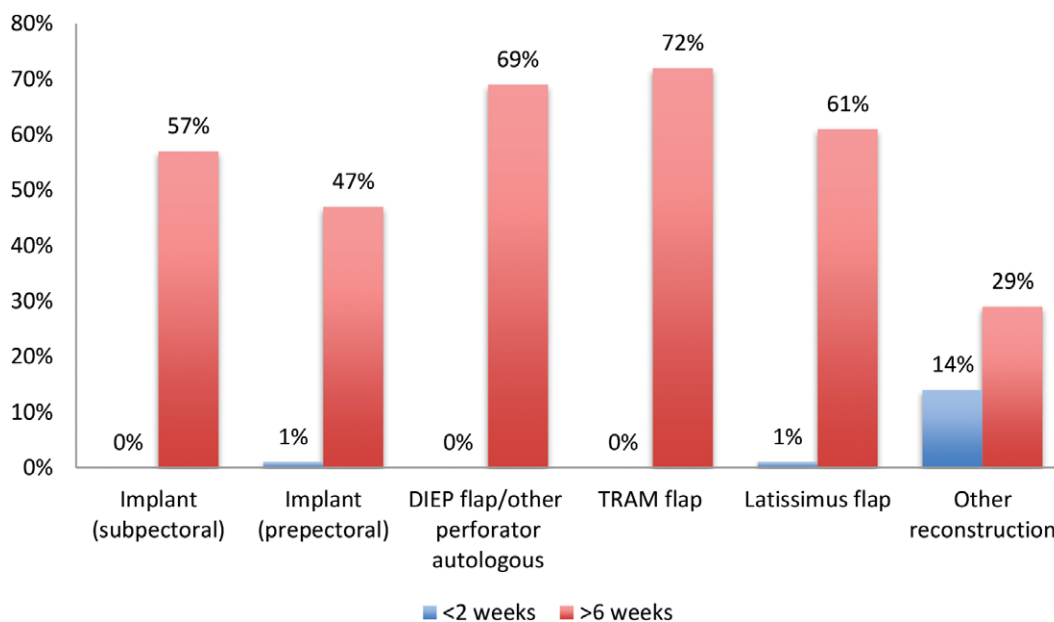


**Fig. 4.** Returning to light exercise (% = percent of respondents who preferred beginning activity <2 weeks or >2 weeks postoperatively).

Additionally, 12 (6%) respondents did not feel that exercise was relevant to postoperative care in general. The majority of respondents do allow for elevation of the arm above shoulder level within the first 2 weeks regardless of reconstruction type, and the majority of respondents allow return to ADLs for implant-based reconstruction and for latissimus flaps, but not for TRAM flaps and DIEPs. However, those who do prescribe physical therapy most commonly do so more than 3 weeks postoperatively. While most respondents felt that the plastic surgeon should be responsible for discussing postoperative exercises and PT

protocols with patients, they also reported that limited time during a patient visit was the most common barrier to discussing postoperative exercise and physical therapy limitations with patients.

Eighty-six (44%) respondents reporting complications perceived to be secondary to exercise intervention within the first 4 weeks postoperatively, most commonly seroma, hematoma, wound dehiscence, delayed wound healing, and implant or expander displacement. Based on our data, however, there is no significant statistical difference in the rate of complications perceived by respondents that prescribe early



**Fig. 5.** Returning to vigorous exercise (% = percent of respondents who preferred beginning activity <2 weeks or >6 weeks postoperatively).

exercise intervention and those who prescribe late exercise intervention ( $\chi^2 (5) = 8.815, P = 0.117$ ). Literature pertaining to exercise after breast surgery shows no convincing evidence of adverse outcomes (eg, wound healing, seroma formation, lymphedema) due to early exercise intervention when compared with delayed exercise intervention.<sup>5</sup> However, literature pertaining to exercise after breast reconstruction surgery specifically is limited. With 154 (76%) respondents reporting that they prescribe physical therapy to less than half of their patients, one must consider that a structured exercise program with a licensed physical therapist guiding patients to perform postoperative exercises correctly could potentially prevent these surgical complications from occurring. It is also important to identify patients who are at risk for poor functional outcomes (eg, patients with preexisting shoulder problems), as well as patients who are at increased risk for postoperative complications such as seroma, wound dehiscence, and reconstruction failure.

While postoperative exercise can be carried out under the guidance of a physical therapist or at home with pamphlets of recommended exercises, a recent study conducted

in the United Kingdom (UK-PROSPER) demonstrated a significant benefit in arm, shoulder, and hand function at 12 months in patients who underwent structured physiotherapy after breast surgery versus those who were provided with home exercises alone.<sup>14</sup> Comprehensive models that involve collaboration between surgeons and physical therapists, in order to promote safe and graded return of upper extremity movement, performance of ADLs, guided physical therapy of the affected extremity, and eventual return to exercise in a safe and controlled manner will allow a more dynamic recovery where functional, aesthetic, and technical outcomes are considered equally important.

**Limitations**

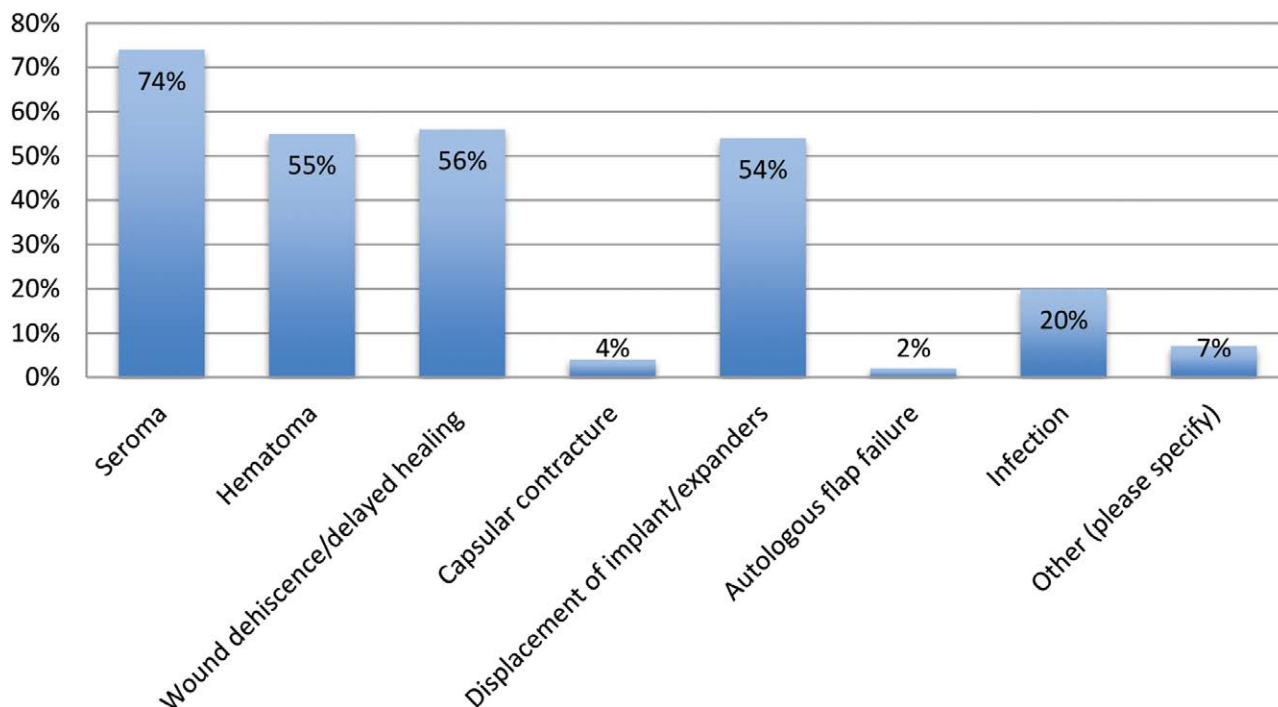
There are several limitations to this study. We had a low overall number of survey respondents with a 9.7% response rate. This was also a voluntary survey, and thus, the study is susceptible to bias. Our survey was sent to a random cohort of plastic surgeons who are active members of the ASPS, but was specifically targeted to those who perform breast reconstruction surgery. Additionally, respondents were able to opt out of answering individual questions. (See survey, Supplemental Digital Content 1. <http://links.lww.com/PRSGO/B801>.) Both factors likely contributed to nonresponse error. Our respondents were otherwise well distributed geographically, lending to the generalizability of the results. Given the nature of the study and the survey format, no objective measures could be imposed and thus many responses were based on subjective interpretation (eg, reporting complications perceived to be secondary to exercise intervention). This, however, was appropriate, given our goal of evaluating current practices from the surgeon’s point of view.

**CONCLUSIONS**

Based on our survey results, only a small percentage of plastic and reconstructive surgeons support initiation

**Table 2. Barriers to Discussion about Exercise/PT Protocols**

What Are Barriers to Discussion about Exercise/PT Protocols with Postoperative Patients? (Select all that Apply)	No. Respondents
Limited time during a patient visit	80 (41%)
Feel that exercise/PT could lead to postoperative complications	57 (29%)
Limited knowledge on how or where to refer a patient	42 (22%)
Not convinced of the literature with respect to exercise or PT after breast reconstruction	43 (22%)
Not feeling qualified to discuss exercise or PT with a patient	26 (13%)
Do not feel exercise is relevant to the patient’s postoperative care	12 (6%)



**Fig. 6.** Complications experienced in patients with return to physical activity within 4 weeks of surgery.

of exercise in the early postoperative period, and physical therapy is being prescribed to a minority of patients. However, we found no significant statistical difference in the rate of complications perceived by respondents that prescribe early exercise intervention and those who prescribe late exercise intervention ( $\chi^2(5) = 8.815, P = 0.117$ ). More effort must be made to ensure good functional outcomes for patients. This will require a collaborative effort between surgeons and physical therapists to devise a recovery program that is conscientious of surgical techniques and complications associated with breast reconstruction surgery specifically, with the ultimate goal of maximizing technical, aesthetic, and functional outcomes for patients after breast reconstruction surgery while also limiting complications.

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