

The Impact of Physician Assistants on a Breast Reconstruction Practice

Outcomes and Cost Analysis

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Background: Physician assistants (PAs) are commonly employed in plastic surgery. However, limited data exist on their impact, which may guide decisions regarding how best to integrate them into practice.

Methods: A review of the practices of 2 breast reconstructive surgeons was performed. A comparison was made between a 1-year period before to a 1-year period after the addition of a PA into practice. The practice model was a one-to-one pairing of a plastic surgeon and a PA.

Results: A total of 4141 clinic encounters and 1356 surgical cases were reviewed. After the addition of PAs, there was a significant increase in relative value units (1057 vs 1323 per month per surgeon, $P < 0.001$). Operative times were similar with and without PAs ($P = 0.45$). However, clinic encounter times for surgeons were shorter for all visit types when patients were first seen by a PA before the surgeon: global follow-up ($P = 0.03$), other follow-up ($P = 0.002$), consultation ($P = 0.76$), and preoperative ($P = 0.02$), translating to 9 additional patients seen per day. Charges ($P = 0.001$) and payments ($P = 0.007$) also increased, which offset the cost of using a PA. However, the financial contribution from PA involvement as first assistant in surgery was limited (5.2%). The peak effect of PAs was observed between the third and fourth quarters.

Conclusions: In breast reconstruction, PAs primarily enhance the efficiency of plastic surgeons, particularly in the clinic, with downstream clinical and financial gains of an indirect nature for surgeons.

Key Words: advanced practice provider, breast reconstruction, physician assistant

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Physician assistants (PAs) are medical professionals trained to provide care under physician supervision. Created in 1965, this profession was established to address the growing shortage of primary care physicians at that time.¹ In an era now of resident work-hour restrictions, along with ongoing shortages of physicians including both primary care and specialty fields alike, PAs play an increasing role in our current health care system.^{2–9} As of 2015, there were an estimated 96,800 PAs, an increase of nearly 35% over the estimated 71,950 in 2008.¹⁰ Not only has the absolute number of PAs increased, but also the proportion that has chosen a career in a surgical specialty over primary care. Between 2005 and 2013, the ratio between number of plastic surgery PAs and plastic surgeons increased from 1:13 to 1:8.¹¹

Although PAs are employed in many plastic surgery practices, to our knowledge, this subject has not been previously examined, and therefore the objective of this study was to investigate the impact of PAs on a plastic surgery practice. Given the heterogeneity of functions that PAs can perform both in surgery and the clinic depending on the practice type, we chose to specifically examine PAs within a breast

reconstruction practice. The practices of 2 reconstructive breast surgeons were analyzed, comparing a 1-year period immediately after the addition of a PA into their practice with the 1-year period immediately preceding that year. Clinical and financial outcome measures were used to examine the impact of PAs in surgery, clinic, and overall. These measures included operative times, outpatient visit times, surgery and clinic volume, total relative value units, work relative value units, charges, and payments. Furthermore, an additional 1-year period beyond the first year involving PAs was examined to determine when their peak effect occurred. The results of this analysis may facilitate a better understanding of the impact of PAs and provide insight into how best to implement them into practice.

METHODS

After institutional review board approval, a retrospective review of the practices of 2 plastic surgeons was performed. Both were in academic practice with a focus on breast reconstruction, including both alloplastic and microsurgical autologous techniques. For each surgeon, a 2-year period was reviewed, consisting of a 1-year period immediately after the addition of a PA into their practice, and the 1-year period immediately preceding that year. Both surgeons had been in practice for at least 2 years before the study period.

To determine the impact of PAs, the 1-year period before their addition into practice (B-PA) was compared with the 1-year period after their addition into practice (A-PA). Clinical and financial outcome measures were used to examine their impact in surgery, clinic, and overall. These measures included operative times, outpatient visit times (new patient consultations, global follow-up appointments, non-global follow-up appointments, and preoperative appointments), total relative value units (T-RVUs), work relative value units (W-RVUs), charges, and payments. For operative times, primary breast reconstruction with tissue expanders or abdominal free flaps was chosen for analysis to provide relatively more standardized procedures for comparison. Outpatient visit times were acquired through existing departmental quality improvement databases. The practice model was a one-to-one pairing of a PA with a plastic surgeon, with 1 PA working with their assigned plastic surgeon throughout all of that surgeon's clinical activities. In the clinic, all patients were seen by the plastic surgeon, with or without a PA. Furthermore, an additional 1-year period beyond the first year involving PAs was examined to determine when their peak effect occurred.

Frequency data were compared using the Fisher test or χ^2 test, as appropriate. Continuous data were compared using the Mann-Whitney U test. All tests were 2-tailed. P values less than 0.05 were considered significant. All analyses were performed using SPSS Statistics Version 24.

RESULTS

A total of 4141 clinic encounters and 1356 surgical cases were reviewed. A comparison of the study outcome measures between the 2 study periods, before PA and after PA, is presented in Table 1. Before the addition of PAs, the annual W-RVUs generated per surgeon were 6428, which is comparable to the median productivity of an academic plastic surgeon in the United States.¹² A significant difference was

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TABLE 1. Clinical and Financial Productivity Before and After the Addition of PAs Into Practice

	Plastic Surgeon 1		Plastic Surgeon 2		Average		P
	Before PA	After PA	Before PA	After PA	Before PA	After PA	
Clinical productivity							
T-RVU (annual)	12,229	15,742	13,145	16,014	12,687	15,878	
T-RVU (monthly)	1019	1312	1095	1335	1057	1323	<0.001
W-RVU (annual)	6437	7751	6419	7637	6428	7694	
W-RVU (monthly)	536	646	535	636	536	641	0.004
Financial productivity							
Charges (annual)	\$2,387,215	\$3,383,496	\$2,709,277	\$3,172,842	\$2,548,246	\$3,278,169	
Charges (monthly)	\$198,935	\$281,958	\$225,773	\$264,404	\$212,354	\$273,181	0.001
Payments (annual)	\$417,127	\$595,577	\$594,881	\$694,599	\$506,004	\$645,088	
Payments (monthly)	\$34,761	\$49,631	\$49,573	\$57,883	\$42,167	\$53,757	0.007
Profit with PA versus without (annual)*	—	\$69,709	—	(\$2644)	—	\$33,533	

*Calculated as follows: (increase in surgeon payments associated with employing a PA) + (payments directly attributable to work performed by a PA) – (the cost of employing a PA).

observed in T-RVUs (average 1057 vs 1323 per month per surgeon, respectively; $P < 0.001$) and W-RVUs (average 536 vs 641 per month per surgeon, respectively; $P = 0.004$), which both increased over the study period. Surgery and clinic accounted for 95.1% and 4.9% of RVUs, respectively. The W-RVUs generated by the PAs averaged 15 per month per PA. A significant difference was also observed in the associated charges (\$212,354 vs \$273,181 per month per surgeon, respectively; $P = 0.001$) and payments (\$42,167 vs \$53,757 per month per surgeon, respectively; $P = 0.007$), which both increased over the study period as well. The payments collected by the PAs averaged \$1329 per month per PA, representing approximately 2.5% of that collected by the surgeons. Overall, the addition of PAs into practice was associated with a positive effect on both clinical productivity and financial outcomes. Of note, the relative proportion of primary alloplastic breast reconstruction (43%), primary autologous breast reconstruction (35%), secondary breast reconstruction procedures (14%), and other plastic surgery procedures (8%) were similar between the 2 periods ($P = 0.80$). The collection rate did not differ between the 2 periods ($P = 1.00$).

An additional 1-year period beyond the first year involving PAs was examined to determine when their peak effect on productivity occurred. This 2-year period with PAs was divided into 8 quarters, and each quarter was compared with the ones immediately preceding and immediately after it. This revealed a plateau in T-RVUs and W-RVUs that occurred during the fourth quarter (1447 and 713 per month per surgeon, respectively), corresponding to 17,364 T-RVUs and 8556 W-RVUs per year per surgeon.

Surgery

Operative times were reviewed for the following types of cases: unilateral breast reconstruction with tissue expander ($n = 199$), bilateral breast reconstruction with tissue expanders ($n = 210$), unilateral breast reconstruction with deep inferior epigastric artery perforator (DIEP) flap ($n = 154$), and bilateral breast reconstruction with DIEP flaps ($n = 169$). No significant differences were identified in the operative times before versus after the addition of PAs into practice: unilateral breast reconstruction with tissue expander (75 vs 65 minutes, respectively; $P = 0.85$), bilateral breast reconstruction with tissue expanders (131 vs 127 minutes, respectively; $P = 1.00$), unilateral breast reconstruction with DIEP flap (531 vs 558 minutes, respectively; $P = 1.00$), and bilateral breast reconstruction DIEP flaps (696 versus 667 minutes, respectively; $P = 1.00$).

Overall, the payments attributable to PA involvement as first assistant in surgery corresponded to 2.5% of the total payments of the plastic surgeons. When cases involving only a PA were analyzed (ie,

exclusion of cases involving resident physicians where a PA could not qualify as first assistant), the payments attributable to PA involvement as first assistant in surgery was higher, but still corresponded to only 5.2% of the payments of the plastic surgeons for that same set of cases. This figure was lower than expected when compared with the general rate of reimbursement attributable to PA involvement as first assistant in surgery, which is approximately 13 cents per 1 dollar, or 13% (ie, equaling 85% of the 16% that would be payable if a medical doctor were first assistant).¹³ Further analysis revealed that this finding was due in part to the limited number of *Current Procedural Terminology* (CPT) codes for which there is typically reimbursement for PA involvement as first assistant in surgery.¹⁴ When these reimbursable CPT codes were compared with commonly used breast reconstruction CPT codes,¹⁵ only 16 of 32 codes were associated with reimbursement for PA involvement as first assistant in surgery (Table 2).

Clinic

Overall, 4141 clinic encounters were seen by the plastic surgeons, of which 1702 (41.1%) and 2439 (58.9%) were seen before and after the addition of PAs into practice, respectively. A significant difference was observed in the number of clinic encounters seen per plastic surgeon (average 67 vs 96 per month, respectively; $P < 0.001$), which increased over the study period.

The amount of time required by the plastic surgeons to see patients independently was compared to that required by the plastic surgeons to see patients after they had first been seen by a PA. For all visit types during the A-PA period, less time was required by the plastic surgeon to see patients if they were first seen by a PA: global follow-up (13 vs 6 minutes, respectively; $P = 0.03$), non-global follow-up (20 vs 7 minutes, respectively; $P = 0.002$), preoperative appointment (20 vs 9 minutes, respectively; $P = 0.02$), and consultation (32 vs 30 minutes, respectively; $P = 0.76$). These time savings translated to the ability for plastic surgeons to see approximately 9 additional patients during an 8-hour clinic day.

Cost Analysis

The total expenditure associated with employing a PA (salary plus all other costs including benefits and insurance) was approximately \$121,500 per year. The addition of a PA into practice resulted in an increase in total charges of \$729,923 per year per surgeon and an increase in total payments of \$139,084 per year per surgeon. The amount of payments directly attributable to work performed by PAs was \$15,949 per

TABLE 2. Comparison of the Medicare Surgical Assistant Exclusion List With Commonly Performed Breast Reconstruction Procedures^{14,15}

Covered		Not Covered	
<i>CPT</i>	Description	<i>CPT</i>	Description
1140X	Dog ear excision (with 1203X)	11970	Replacement of tissue expander with permanent prosthesis
11971	Removal of permanent expander injection port only	1203X	Dog ear excision (with 1140X)
19342	Implant placement—delayed	14001	Ryan flap
19357	Insertion of tissue expander—immediate or delayed	15600	TRAM delay
19361	Latissimus dorsi—no implant	15777	Implantation of biologic implant (eg, acellular dermal matrix) for soft tissue reinforcement
19364	Free flap	19328	Implant removal
19366	Reconstruction with local breast tissue after breast-sparing procedure	19330	Removal of implant material
19367	TRAM—single pedicle	19340	Implant placement—immediate
19368	TRAM—single pedicle with supercharging	19350	Nipple/areola reconstruction
19369	TRAM—bipedicle	19370	Capsulotomy
35246	Vein grafts	19371	Reconstruction of inframammary crease
69990	Use of operating microscope	19380	Revision of reconstructed breast

TRAM indicates transverse rectus abdominis myocutaneous.

year per PA. Thus, the net financial profit associated with employing a PA was approximately \$33,533 per year, or \$2794 per month, calculated as follows: (increase in surgeon payments associated with employing a PA) + (payments directly attributable to work performed by a PA) – (the cost of employing a PA).

DISCUSSION

Physician assistants are able to perform a wide variety of functions, including completing medical documentation, performing minor procedures, providing patient care and education, seeing consultations, serving as surgical first assistants, setting up operating rooms, and taking call.^{2,3,10,16–20} Correspondingly, PAs are now employed in virtually every medical specialty, where it has been observed that they can have a number of positive effects, including on cost, efficiency, quality, and safety, as well as the educational experience of residents and the professional satisfaction of physicians.^{4,8} Not only has the absolute number of PAs increased, but also the proportion that has chosen a career in a surgical specialty over primary care.¹¹ As such, their role is likely to continue to increase in our current health care system, including in plastic surgery.

The analyses performed in this study revealed that the addition of PAs into practice was associated with a significant increase in the clinical productivity of the plastic surgeons. This effect appeared to be primarily due to their impact in the clinic rather than the operating room; PAs were associated with improvements in the plastic surgeons' clinic encounter times but not their operative times in surgery. In particular, when patients were seen by a PA before being seen by the plastic surgeon, the time needed by the plastic surgeon to see those patients was significantly shorter. This had a net effect of allowing plastic surgeons to see approximately 9 additional patients per clinic day, amounting to roughly a half day's clinic.

The addition of PAs into practice was also associated with a significant increase in the revenue generated by plastic surgeons. However, only a small fraction of this was composed of the revenue directly generated by the PAs themselves (ie, resulting from serving as first assistant in surgery). This appeared to be due in part to the limited number of types of breast reconstruction procedures for which there is reimbursement for PA involvement as first assistant in surgery, as well as the presence of a residency training program. Together, our findings indicate that in an academic breast reconstruction practice, PAs primarily

enhance the efficiency of plastic surgeons, particularly in the clinic, with downstream clinical and financial gains of an indirect nature for surgeons.

Our findings are consistent with studies in other specialties that have found that the employment of PAs results in significant increases in the revenue-generating potential of physicians, including allowing physicians to spend more time in the operating room.^{3,10,18,21} For example, in trauma surgery, PAs have been found to save trauma surgeons an average of 4 to 5 hours per day by performing duties such as wound evaluation and treatment, patient transport, and acting as surgical first assistants.^{6,19} In orthopedic surgery, PAs were found to save surgeons 815 hours per year as a result of performing functions such as documentation and wound closure.³

In our cost analysis, we found that the financial gains associated with having a PA offset the cost of their employment, although the net profit was not substantial when viewed from the perspective of actual payments. Despite this, we believe that the overall impact of PAs observed in this study, including that on surgeon productivity, supports their use in an academic breast reconstruction practice, especially when also considering that their peak effect appeared to be attained within their first year of practice. In many cases, the employment of PAs may be a practical option when considering alternatives such as hiring additional surgeons, who typically require years for their practices to reach full capacity, as well as a larger amount of unmet patient care needs upfront. Our findings are consistent with studies that have found that, although PAs do not always directly cover their own cost in terms of billing for services they perform, this is made up for in the increased efficiency they contribute to the system, as has been observed in other specialties such as family/general medicine and orthopedic surgery.^{2,21}

The practice model used at our institution entails a one-to-one pairing of a plastic surgeon and a PA, which was intended to maximize the effectiveness of the PAs. Through this arrangement, PAs would theoretically have a better knowledge of the particular preferences of a given plastic surgeon, as well as of their patients, which might be especially advantageous in a breast reconstruction practice where patients typically undergo multiple surgical procedures over time. The continuity of care delivered within a one-to-one practice model may have been partially responsible for the observation that PAs appeared to contribute most significantly in the clinic, although based on our study design, we are unable to comment further.

While the analyses in this study were performed in the setting of an academic breast reconstruction practice, our results may have implications for private breast reconstruction practices as well. In the clinic, the finding that PAs significantly increase the efficiency of plastic surgeons, thereby increasing their capacity for surgery, is likely to be relevant to academic and private breast reconstruction practices alike. On the other hand, in the operating room, the most optimal employment of PAs in a private breast reconstruction practice would most likely depend on a variety of other factors, including the practice scope (ie, relative proportion of primary alloplastic, primary autologous, and secondary breast reconstruction procedures), and whether cases were performed using a single- versus dual-surgeon approach. Physician assistants are generally able to contribute more to financial revenue particularly for primary rather than secondary breast reconstruction procedures (Table 2). In a dual-surgeon model involving 2 plastic surgeons per case, an approach frequently used in autologous breast reconstruction, co-surgeon billing may be a more effective strategy.

One of the limitations of this study is that our analyses apply specifically to an academic breast reconstruction practice. This was partly intentional to control as much as possible for the wide array of potential functions PAs carry out, which can be substantially different depending on the practice type (eg, breast reconstruction, cosmetic, wound). Some of our results, such as those related to clinic encounters, may be more generalizable. However, our other results may not necessarily translate to other types of practices, and, as such, it may be prudent for centers to analyze their own practices to develop customized strategies for how best to integrate PAs. Another limitation is that we were only able to specifically examine the practices of 2 of our reconstructive breast surgeons. This aspect of our study was of a historical nature, as the majority of our reconstructive breast surgeons began their practices already working with a PA. However, we believe that the 72 months of data examined in this study may still provide valuable insight into the impact of PAs. Lastly, there are a number of functions PAs perform that may increase efficiency or enhance patient care that were not examined, such as placing orders, completing documentation, and addressing patient calls, and thus PAs may confer additional value to a plastic surgery practice that may be less readily measurable and not apparent from this study.

CONCLUSIONS

In a breast reconstruction practice, PAs enhance the efficiency of plastic surgeons, particularly in the clinic, with downstream clinical and financial gains of an indirect nature for the surgeons. In contrast, the revenue directly attributable to PAs is relatively insubstantial. These findings may be of utility in determining how best to integrate PAs into practice.

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