



# Patient satisfaction with follow-up after spinal fusion

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**Background:** Postoperative follow-up visits (PFUs) allow providers to track patient recovery but can be costly to patients. With the advent of the novel coronavirus pandemic, virtual/phone visits have been utilized as an alternative to in-person PFUs. Patients were surveyed to elucidate patient satisfaction with postoperative care in the setting of increased virtual follow-up visits. A prospective survey with retrospective cohort analysis of chart data was conducted to better understand the factors influencing patient satisfaction related to their PFUs after spine fusion with the goal of improving the value of postoperative care.

**Methods:** Adult patients at least 1 year postoperative from cervical or lumbar fusion surgery completed a telephone survey related to their postoperative clinic experience. Medical record data including complications, number of visits and length of follow-up, and presence of phone/virtual visits were abstracted and analyzed.

**Results:** Fifty patients (54% female) were included. Univariate analysis demonstrated no association between satisfaction and patient demographics, rates of complication, mean length or number of PFUs, or incidence of phone/virtual visits. Patients “very satisfied” with their clinic experience were more likely to be “very satisfied” with their outcome ( $P<0.01$ ), and to feel their concerns were “very well addressed” ( $P<0.01$ ). Multivariate analysis additionally demonstrated that satisfaction was positively associated with how well patient concerns were addressed ( $P<0.01$ ) and the incidence of virtual/phone visits ( $P=0.01$ ), and negatively associated with age ( $P=0.01$ ) and level of education ( $P=0.01$ ).

**Conclusions:** After spinal fusion, patient satisfaction is positively related to virtual/phone visits and to how well their concerns are addressed. As long as patient concerns remain adequately addressed, surgeons can eliminate excess PFUs which are not clinically beneficial without adversely impacting patients’ postoperative experience.

**Keywords:** Follow-up; satisfaction; postoperative; spine surgery; spinal fusion

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## Introduction

Postoperative follow-up visits (PFUs) can be a useful resource to track the course of a patient and guide decision-making, however these visits may come at a substantial cost to both patient and provider. Patients may travel significant distances to receive care, and incur costs associated with

the commute and time missed from work, costs which disproportionately impact low income patients (1-3). Even worse, many routine PFUs are of limited clinical utility, with some reports suggesting upwards of 80% of these visits are not clinically useful (1,4,5). In orthopedics, investigators have sought to understand the cost-benefit relationship of PFUs and have demonstrated that in a variety of contexts,

from ankle fractures to hip arthroplasty, routine radiographs seldom change management, and indeed many of these PFUs are unnecessary (6-10). These findings hold true in spine surgery as well, where routine radiographs in patients after lumbar and cervical fusion have limited value (11-13).

One avenue for decreasing the costs of these unnecessary PFUs may be to augment the proportion of virtual/phone visits. The novel coronavirus pandemic transformed the delivery of healthcare in months, and nowhere was the pace of change felt more acutely than in the rapid expansion of telemedicine or virtual health. In one large health system there was a 4,345% increase in non-urgent virtual health visits in only 6 weeks (14). As barriers to the expansion of virtual medicine continue to fall, the role of such visits in improving the postoperative follow-up experience has become more prescient (15,16). Interest in replacing in-person PFUs with telephonic or virtual follow-up is not a new phenomenon; research in general surgery has demonstrated that not only is telephone follow-up safe, patients may actually prefer it to in-person follow up (17,18).

PFUs clearly represent an opportunity to increase the value of perioperative care. The value of care is inversely related to cost and directly related to the quality of care, quality which is determined by both patient satisfaction and clinical outcomes (19). Accordingly, decreases in the frequency and thus the overall costs of PFUs, and increases in patient satisfaction with PFUs are both avenues to increase the value of perioperative care. What remains poorly understood however, are the factors that impact patients' satisfaction with the postoperative

follow-up process itself. Previous studies have examined the relationship between patient satisfaction with overall surgical care and various factors including hospital characteristics, patient characteristics, and surgical outcomes (19,20). These studies have had contradictory findings, and patient satisfaction and clinical outcomes have not consistently found to be related. Importantly, previous studies have focused on satisfaction with overall surgical care, and not specifically with the postoperative follow-up process. Furthermore, they have not examined how the specifics of PFUs such as the effectiveness with which their concerns are addressed, interaction with clinic staff, and impact patient satisfaction and thus the value of care. Regarding the frequency of visits, the anecdotal presumption among surgeons is that patients prefer more frequent PFUs, however there is little evidence to support this. Here, we seek to better understand the factors impacting patient satisfaction regarding the overall experience of PFUs after two of the most common spine procedures, cervical or lumbar spine fusion, with the goal of maximizing the value of these visits (21,22). We present this article in accordance with the STROBE reporting checklist (available at <https://jss.amegroups.com/article/view/10.21037/jss-23-4/rc>).

## Methods

### Study design

The representative sample of patients consisted of adult patients proficient in spoken English who underwent cervical or lumbar spinal fusions, performed by one of two fellowship-trained spine surgeons. All included patients were at least one year removed from their index surgery prior to administration of the survey. Patients that underwent surgery for tumor were excluded. Patients were also excluded if their fusion surgery constituted a reoperation within 90 days. Of note, some included patients did not show for scheduled follow-up visits beyond the 11-week (approximately 3-month) mark following surgery. At time of survey administration, these patients were also at least one year removed from surgery and had not undergone a revision procedure. Patients were contacted via phone numbers listed in the medical record. Standardized phone scripts were used to administer the survey. A brief outline of the study was provided via a phone script which included: the purpose of the study, the survey layout, the approximate time of participation, risks and benefits, and patient health information (PHI) deidentification. If patients verbally agreed to proceed with

### Highlight box

#### Key findings

- Patients "very satisfied" with clinic experience more likely "very satisfied" outcome & feel concerns "very well addressed". Multivariate analysis demonstrates satisfaction positively associated with how concerns were addressed and incidence of virtual/phone visits.

#### What is known and what is new?

- Postoperative follow-ups (PFUs) allow providers to track patient recovery but can be costly to patients.
- Virtual & telephone visits may adequately substitute for in-person PFUs as long as concerns remain addressed.

#### What is the implication, and what should change now?

- While ensuring patient concerns remain addressed, surgeons can eliminate excess PFUs which are not clinically beneficial without adversely impacting patients' postoperative experience.

Q1. Overall, how satisfied were your outcome after your spine surgery:	Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
Q2. Overall, how satisfied were your clinic visit experience after spine surgery:	Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
Q3. Regarding the frequency of your visits after surgery, did your visits occur:	Far too infrequently	Too infrequently	The right amount	Too frequently	Far too frequently
Q4. Regarding the amount of interaction you had with your surgical team after surgery, did you have:	Fat too little interaction	Too little interaction	The right amount of interaction	Too much interaction	Far too much interaction
Q5. Regarding how your concerns after surgery were addressed, were your concerns:	Very poorly addressed	Poorly addressed	Neutral	Well addressed	Very well addressed
Q6. The following is a "yes" or "no" question. Would you have favored a visit using a telephone call or video-conferencing instead of an in-person visit?					
Q7. Is there anything you would have changed regarding your post-operative visits following surgery?					

**Figure 1** Questions asked during phone survey.

the study after being informed of risks and benefits, a short questionnaire was administered consisting of five questions on a Likert-like scale, one yes or no questions, and one open-ended question, again following a phone script (*Figure 1*). Further information regarding patient demographics and postoperative course was abstracted from chart data after completion of the questionnaire. This abstracted data included basic demographic information and indications for surgery, as well as information regarding their postoperative course including complications, number of follow-up visits, and length of total follow-up. The senior surgeons generally follow-up with patients 2 weeks, 6 weeks, 3 months, 6 months, and 1 year postoperatively. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study received exemption from ethics committee of the University of Michigan/Michigan Medicine and individual consent for this retrospective analysis was waived.

### Data collection

Survey questions were designed to evaluate patient perceptions regarding the content and frequency of follow-up visits in a post-operative setting. The following elements were recorded: satisfaction with surgical outcome, satisfaction with clinic visits, satisfaction with frequency of follow-up visits, satisfaction with frequency of post-operative interaction with the surgical team, degree to which patient concerns were addressed, and preference for telehealth-style follow-up visits in comparison to in-office visits. A single open-ended question provided patients space to comment on anything they would

have changed about their postoperative experience. Naturally, the study design is prone to recall and selection bias. The sample size was arrived at after screening all survey responses received against inclusion/exclusion criteria.

### Statistical analysis

Questionnaire responses were collated using an electronic database. Statistical analyses were conducted using SPSS (IBM SPSS Statistics for Mac, Version 27.0, Armonk, NY, USA). Descriptive statistics were used to characterize the enrolled cohort of patients, with continuous, nominal, and ordinal variables measured on a 5-point Likert scale with means  $\pm$  standard deviations (SDs). Fisher's Exact test was used to compare categorical variables, and an unpaired *t*-test was used to compare means of continuous variables ( $P < 0.05$ ). Patients were grouped and analyzed based on overall satisfaction with clinic experience. Survey responses were treated as ordinal variables for the purposes of analysis, and ordinal multivariate regression was performed. There was no missing data from survey responses included in the study, aside from demographic factors including living status (alone versus with others) and educational level.

## Results

### Subject cohort

A total of 50 patients completed a phone questionnaire. To determine the target sample size, satisfaction outcomes were divided into dichotomous groups, where very satisfied and satisfied represented "satisfied", and neutral, unsatisfied,

**Table 1** Demographics of patients responding

Individual characteristics	Numbers
Age (years), mean $\pm$ SD	60.70 $\pm$ 11.88
Gender, n [%]	
Male	23 [46]
Female	27 [54]
Home setting, n [%]	
Urban	32 [64]
Rural	18 [36]
Living status, n [%]	
Alone	14 [28]
With others	32 [64]
Unknown	4 [8]
Education level, n [%]	
< HS	1 [2]
HS graduate	13 [26]
Some college	11 [22]
College graduate	5 [10]
Advanced degree	4 [8]
Unknown	16 [32]

SD, standard deviation; HS, high school.

and very unsatisfied represented “unsatisfied”. To detect a 20% difference between satisfied and unsatisfied patients, 50 patients were required (two-tailed  $\alpha = 0.05$ ; 80% power). Survey administration and data collection were performed from May 2020–June 2020. Included patients were at least one year postop from index surgery. Dates of surgery ranged from January 2018–April 2019. Patients were consecutively enrolled. Among these patients, mean age was 60.70 $\pm$ 11.88 years with 27 (54.0%) of the patients being female. Patient demographics are shown in *Table 1*. Living status (alone versus with others) was unknown for 4 patient (8%), and education level was unknown for 16 patients (32%).

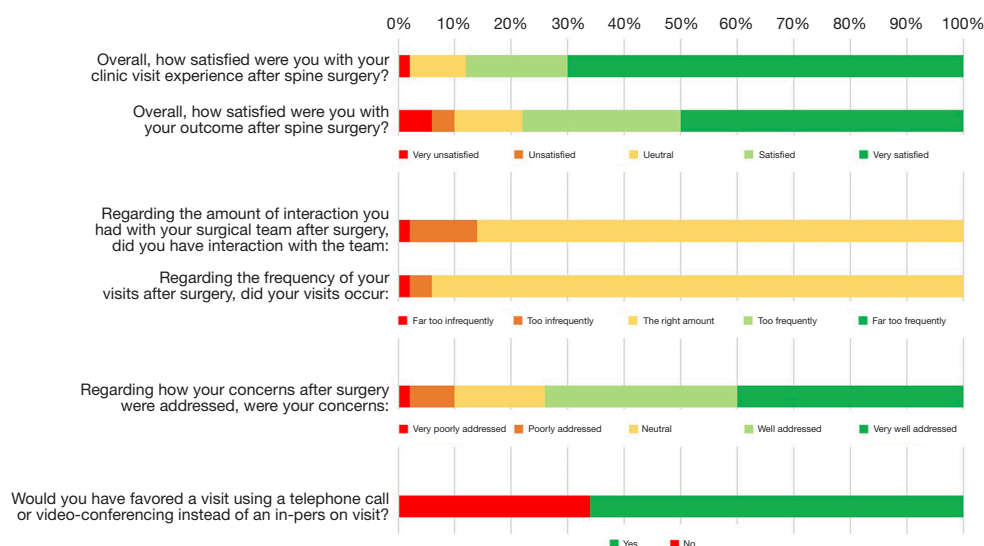
Patients were seen for concerns of all regions of the spine, most frequently cervical (n=23, 46.0%) and lumbar (n=15, 30.0%) (*Table 2*). Common primary diagnoses included degenerative stenosis (n=12, 24.0%) and cervical myelopathy (n=8, 16.0%). Eighteen (36.0%) patients experienced surgical complications, of which 8 (16.0%) patients required reoperation. Nine (18.0%) patients had

**Table 2** Characteristics of surgery and surgical follow-up

Individual characteristics	Numbers
Spine region focus, n [%]	23 [46]
Cervical, n [%]	
Thoracic	3 [6]
Thoracolumbar	1 [2]
Lumbar	15 [30]
Lumbosacral	8 [16]
Primary diagnosis, n [%]	
Disc herniation	6 [12]
Degenerative stenosis	12 [24]
Degenerative instability	3 [6]
Cervical radiculopathy	1 [2]
Cervical myelopathy	8 [16]
Sagittal deformity	2 [4]
Revision	5 [10]
Cervical myeloradiculopathy	1 [2]
Cervical stenosis	6 [12]
Other	6 [12]
Surgical complications, n [%]	
None	33 [66]
Complications $\geq 1$	18 [36]
Reoperation, n [%]	
Early reoperation	3 [6]
Late reoperation	5 [10]
Follow-up visits	
Total follow-up visits, mean $\pm$ SD	5.40 $\pm$ 1.98
Range	2–12
Follow up (weeks), mean $\pm$ SD	45.78 $\pm$ 27.15
Range (weeks)	11–108
Virtual/phone visits, n [%]	
None	41 [82]
Virtual/phone visits $\geq 1$	9 [18]

SD, standard deviation.

phone or virtual follow-up visits. Mean length of follow-up was 45.78 $\pm$ 27.15 weeks, with patients ranging from 11 to 108 weeks at latest follow-up. Mean total number of follow-up visits was 5.40 $\pm$ 1.98.



**Figure 2** Survey issued to patients and survey results (number of participants =50).

### Survey data

Overall, 35 (70.0%) patients indicated they were “very satisfied” with their overall clinic experience, 9 (18.0%) were “satisfied”, 5 (10.0%) were “neutral”, and 1 (2.0%) was “very unsatisfied” (Figure 2). Of patients who did not have telephone or virtual visits, 14 (34.1%) would have preferred a phone visit, while 27 (65.9%) would not. Between patients who were “very satisfied” with their clinic experience and those who were not, there were no significant differences in demographics including patient age, gender, home setting, living status, or education level (Table 3), nor were there significant differences in spine region of focus ( $P=0.41$ ) or primary diagnosis ( $P=0.25$ ).

### Multivariate analysis

Within the survey, our multivariate analysis revealed that patient satisfaction with clinic experience was significantly associated with their satisfaction with their surgical outcome ( $P=0.01$ ), their level of interaction with surgical staff ( $P=0.01$ ), how well their concerns were addressed ( $P=0.01$ ), and how appropriate they felt the frequency of their follow-up was ( $P=0.03$ ) (Table 4). From the abstracted chart data, our analysis revealed that age ( $P=0.01$ ) and level of education ( $P=0.02$ ) both had significant negative associations with satisfaction with clinic experience. Further factors found to have significant associations with clinic satisfaction were the spine region fused ( $P=0.02$ ), the total

length of follow-up ( $P=0.02$ ), and the incidence of a virtual or phone visit ( $P=0.01$ ). The occurrence of a postoperative complication was predictive of poorer patient satisfaction.

### Discussion

The present study demonstrates multiple independent factors predictive of patient satisfaction with the postoperative clinic experience after spine surgery which may be useful in guiding decisions to increase the value of postoperative care. In our study, 70.0% of patients were “very satisfied” with their clinic experience. This proportion is consistent with previous large surveys of perioperative patient satisfaction such as Lobo Prabhu *et al.*, where 74.5% of 2,957 patients were found to be “very satisfied” on a similar Likert scale (20).

At our institution, as is likely the case in many practices, the PFUs tend to follow a roughly standard schedule thus precluding retrospective analysis of the relationship between PFU frequency and clinic satisfaction. However, here we found that patients’ perceptions about the frequency of postoperative follow-up were not related to satisfaction with postoperative follow-up. Indeed, even within a standardized follow-up schedule, patients who were “very satisfied” with their clinic experience had fewer PFUs on average (5.29 *vs.* 5.67,  $P=0.54$ ) and shorter total follow-up (43.49 *vs.* 51.13 weeks,  $P=0.37$ ). While it remains to be demonstrated that less frequent follow-up would not adversely affect patient satisfaction, it is notable that patients themselves do

**Table 3** Demographics of patients “very satisfied” with clinic experience and all others

Variables	Very satisfied	All others	P value
Age (years), mean $\pm$ SD	59.77 $\pm$ 11.01	62.87 $\pm$ 13.87	0.40
Gender, n [%]			0.55
Male	15 [43]	8 [53]	
Female	20 [57]	7 [47]	
Home setting, n [%]			1.00
Urban	22 [63]	10 [67]	
Rural	13 [37]	5 [33]	
Living status, n [%]			0.56
Alone	9 [26]	5 [33]	
With others	22 [63]	10 [67]	
Unknown	4 [11]	0 [0]	
Education level, n [%]			0.75
< HS	1 [3]	0 [0]	
HS graduate	8 [23]	5 [33]	
Some college	9 [26]	2 [33]	
College graduate	3 [9]	2 [13]	
Advanced degree	2 [6]	2 [13]	
Unknown	12 [34]	4 [27]	

SD, standard deviation; HS, high school.

not appear to attribute better care to more frequent PFUs, and instead focus on other aspects of postoperative care.

Using data obtained from patients’ medical records, we were able to identify factors which were predictive of satisfaction with clinic experience. Education was found to be negatively associated with clinic experience; 4/9 (44.4%) of patients with college or advanced degrees were less than “very satisfied” with clinic experience compared to 5/25 (20.0%) of patients with less than a college degree felt the same. Age was also negatively associated with clinic experience with 2/4 (50.0%) of patients  $\leq$ 40 years old with neutral or worse impressions of their clinical experience. Furthermore, the only patient in our study indicating that they were “very unsatisfied” was also the youngest patient at age 33. Those factors such as age and level of education, which are not directly related to the patient’s clinical experience or surgical care, should impact patient satisfaction reflects the complex multidimensional nature of satisfaction itself. As a subjective measure, it is influenced by myriad factors including patient expectations which in turn

can be influenced by a variety of psychosocial factors such as age, gender, education, and mental health.

More closely related to surgical care, we also found that region of surgery was associated with clinic satisfaction; 5/23 (21.7%) of patients who had undergone cervical fusion reported neutral or worse impressions of clinic, while only 1/27 (3.7%) of patients having undergone thoracic or lumbar fusions felt the same. We also found that the presence of a virtual or phone visit did not negatively impact patient satisfaction. While our data did not differentiate between anterior and posterior approaches, given the well-known differences in postoperative pain it is worth considering if patients having undergone posterior fusions are disproportionately responsible for this increased risk of dissatisfaction.

One factor which we did not find to be related to satisfaction with clinic experience was the incidence of a postoperative complication. As noted above, there is a substantial body of literature which indicates that patient satisfaction is not consistently associated with outcome



**Table 4** Ordered logistic regression model for survey responses and clinical variables as predictors of patient satisfaction with clinic experience

Variables	Parameter estimate	95% confidence interval	P value
Survey questions			
PFU visit frequency	24.278	2.088 to 46.469	0.03*
Interactions with surgical team	66.161	18.022 to 114.300	0.01*
Concerns addressed	-52.156	-91.443 to -12.869	0.01*
Satisfaction with outcome	70.722	19.922 to 121.522	0.01*
Preference for virtual visit	-11.587	-25.302 to 2.127	0.10
Patient and clinical factors			
Age	-0.770	-1.370 to -0.169	0.01*
Sex	5.706	-5.614 to 17.026	0.32
Urban or rural	-8.076	-23.120 to 6.969	0.29
Living status	-1.483	-9.391 to 6.425	0.71
Education	-5.850	-10.615 to -1.085	0.02*
Region of surgery	7.854	1.366 to 14.343	0.02*
Diagnosis	4.125	0.883 to 7.367	0.02*
Complication	-9.811	-21.493 to 1.872	0.10
Total PFUs	-1.341	-3.209 to 0.528	0.16
Length of follow-up	0.479	0.088 to 0.870	0.02*
Virtual/phone visit	20.841	5.247 to 36.435	0.01*

\*, P&lt;0.05. PFU, postoperative follow-up.

and patient safety measures such as the incidence of complications. In spine surgery specifically, Godil *et al.* found that neither patient satisfaction with overall provider care nor patient satisfaction with outcome were associated with 90-day morbidity, reoperation, or readmission (23). One interpretation of our findings is that as patient satisfaction with the general perioperative experience is not negatively impacted by adverse outcomes (i.e., complications), neither is patient satisfaction specifically with the postoperative clinic experience. Our finding that patient satisfaction with outcome is associated with improved satisfaction with clinic experience would seem to contradict this interpretation. This may be seen as further evidence that patient satisfaction is a poor indicator of outcome; that is, while patients' overall impression of their outcome may impact their satisfaction, neither their impression of their outcome nor their satisfaction with the clinic follow-up process are closely related to traditional measures of outcome such as complications. While we did not include patient reported outcome measures in the

present study, it may be useful to examine if there is a better relationship between these validated outcome measures and clinic satisfaction in the future.

Ultimately, one of the starkest associations in our study was between clinic satisfaction and patients' concerns being addressed; 20/35 (57.1%) of patients who were "very satisfied" with their clinic experience (20/35) felt their concerns were very well addressed, while no patients (0/15) who were less than "very satisfied" felt their concerns were very well addressed. Taken together with the association between virtual visits and clinic satisfaction, we can conclude two things. Even in the context of a many influencing factors, addressing patients' concerns remains central to developing a positive postoperative experience. Furthermore, though virtual visits may create barriers to effective communication, and may limit the range of clinic activities possible, they do not appear to adversely impact the important aspects of postoperative care from the patient perspective, including, presumably their ability to communicate concerns and get them addressed. In

fact, patients who experienced virtual visits were similarly satisfied with their clinic experience, suggesting that the increased access and convenience may outweigh these limitations from their perspective. However, further study with greater sample size to allow for adequately powered subgroup analysis is necessary to fully investigate this point.

Together, these data paint a complex picture of the factors underlying patient satisfaction with the postoperative experience after spine fusion, however we believe there are some important points of emphasis which may be useful in optimizing patient satisfaction and thus increasing the value of PFUs. It is important to recognize that as a multifactorial measure, satisfaction with clinic experience is influenced by factors beyond simply what happens in the clinic office or even the quality of their postoperative care. Perhaps the most effective way of addressing these “extra-clinical” factors is to set accurate expectations about the postoperative period beforehand. This includes setting both expectations about anticipated surgical recovery and symptom improvement, as well as expectations about clinic such as wait times, and typical follow-up schedule. This strategy has previously been successful in improving clinic satisfaction, and patient derived surveys to assess expectations have been developed in spine surgery which may be useful in identifying patients for whom targeted preoperative education may be useful (24,25). Our findings underscore the importance of adequately addressing patient concerns in the postoperative period as this remains central to satisfaction. Changes to clinic scheduling and clinic workflows, and even the incorporation of more virtual visits are likely to be acceptable to patients as long as they do not adversely impact patients’ ability to communicate and get concerns addressed. Surgeons should feel empowered to use clinical utility to optimize the mix of in-person *vs.* virtual PFUs without fear of degrading the postoperative clinic experience. This provides an opportunity to decrease in-person visits of minimal clinical value and their attendant costs to both patient and provider.

Our study is limited by its retrospective nature and small size. Substantial recall bias is expected given our survey was administered at least one year postoperative from the relevant procedure. Furthermore, while patients were contacted consecutively, not all attempted contacts were successful, which introduced a potential for selection bias. Even though our survey administration followed a standardized script, there is the concern for interviewer bias. Finally, to minimize heterogeneity but maximize sample size, we included only spinal fusions and excluded

decompressions, discectomies, and foraminotomies. We felt that a “spinal fusion” cohort would be similar with regards to postoperative course and overall complications. Combining cervical and lumbar procedures may still introduce some heterogeneity. This was done to maximize the included sample size but introduces potential for confounding. Prospective studies may be helpful to augment our findings here, as well subgroup analysis based on type of surgery performed.

## Conclusions

This study sought to better understand patient preferences regarding the postoperative follow-up after spine surgery. After spine fusion, patient satisfaction may be improved with phone/virtual visits and is related to how well patients’ concerns are addressed. If patient concerns remain adequately addressed, surgeons can eliminate excess PFUs which are not clinically beneficial without adversely impacting patients’ postoperative experience.

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## Footnote

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at <https://jss.amegroups.com/article/view/10.21037/jss-23-4/rc>

*Data Sharing Statement:* Available at <https://jss.amegroups.com/article/view/10.21037/jss-23-4/dss>

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*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://jss.amegroups.com/article/view/10.21037/jss-23-4/coif>). IA reports Nuvasive & Orthofix research grants (not relevant to this study); he is a Globus consultant (not relevant to this study). RP is a Globus & Bioventus consultant (not relevant to this study). The other authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related



to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study received exemption from ethics committee of the University of Michigan/Michigan Medicine and individual consent for this retrospective analysis was waived.

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