

Hand Therapy after Flexor and Extensor Tendon Repair: Assessing Predictors of Loss to Follow-up

Desmond J. Bennett, MD*
 Jugert Bango, MD†
 Douglas M. Rothkopf, MD*

Background: Postoperative hand therapy (HT) is important for regaining function and preventing complications in patients undergoing tendon repair of the hand and wrist. Loss to follow-up (LTFU) can hinder this process; so we sought to determine factors that predict attrition of these patients.

Methods: Charts were retrospectively reviewed for patients who underwent extensor or flexor tendon repair of the hand, wrist, or forearm between 2014 and 2019. Demographic data, including age, sex, zip code, employment status, education level, and insurance type, were collected, and the rate of LTFU was calculated. Logistic regression was used to analyze factors.

Results: A total of 149 patients were identified and analyzed. The rate of LTFU was 42%. Factors that predicted loss were younger age, male gender, lower educational degree, and a documented psychiatric history. Employment status, insurance type, and distance from the HT center did not predict attrition. The number of HT weeks recommended by the occupational therapist did not differ between those who were lost and those who were not. Lost patients completed, on average, 57% of their suggested HT course.

Conclusions: The current study identified demographic factors associated with attrition in patients undergoing tendon repair of the distal upper extremity. Factors included patients who were younger, male gender, less educated, and had a documented psychiatric history. By identifying factors that predict LTFU, specific strategies can be developed to reduce attrition rates, particularly for at-risk populations, to improve patient care after tendon repair. (*Plast Reconstr Surg Glob Open* 2023; 11:e4941; doi: 10.1097/GOX.0000000000004941; Published online 26 April 2023.)

INTRODUCTION

Both hand surgery and laceration repair are among the top five most common reconstructive plastic surgery procedures in the United States.¹ However, flexor and extensor tendon injuries continue to be relatively rare, with an incidence of five per 100,000 persons for flexor and 14 per 100,000 for extensor injuries.^{2,3} Because of their infrequency and complexity, tendon repairs of the

hand, wrist, and forearm present unique challenges. In addition to healing, proper tendon gliding must be achieved to attain functional movement of the wrist and digits. Without appropriate intra- and postoperative management, complications such as loss of motion and tendon rupture can result. Strategies to optimize patient outcomes have thus been extensively researched, and although there are guidelines on surgical techniques⁴ and research on biochemical repair mechanisms,⁵ rehabilitation is consistently regarded as the most important postoperative facet.^{2,3,6}

The goal of hand therapy (HT) is to prevent complications and to regain functionality. In doing so, it is important to consider mobility of the hand, adhesion formation, and muscle atrophy.⁷ Various tensile motion exercises reduce inflammation⁸ and promote collagen synthesis,⁹ and although both active and passive HT techniques involve these motions, there is still much debate over the most beneficial regimen.⁶ Nevertheless, it is widely accepted that lack of HT results in poorer outcomes. Therefore, timely and consistent postoperative follow-up is paramount in preventing complications and achieving maximal long-term functionality.

*Division of Plastic Surgery, University of Massachusetts Medical School, Worcester, Mass.; and †Department of Orthopedic Surgery, University of Florida College of Medicine – Jacksonville, Jacksonville, Fla.

Received for publication November 7, 2022; accepted February 23, 2023.

Presented at New England Hand Society Dec 2020; New England Society of Plastic and Reconstructive Surgeons June 2021; and AAHS Jan 2022.

Copyright © 2023 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](#), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/GOX.0000000000004941

Disclosure statements are at the end of this article, following the correspondence information.

Unfortunately, rehabilitation is not exempt from impediments, one of which—loss to follow-up (LTFU)—is particularly harmful.

A review on rehabilitation regimens after extensor tendon repairs¹⁰ found that LTFU across five studies occurred 19%–33% of the time. Although that study did not, several other studies have analyzed factors that contribute to surgical LTFU, including geographic barriers, patient motivation, physician commitment, dissatisfaction with surgeons, age, socioeconomic status, and documented psychiatric history such as major depressive disorder (MDD).^{11–15} A study on LTFU after distal radius fractures also found that lower educational level was associated with higher rates of attrition.¹⁶ However, none of these studies focused on tendon repairs with subsequent HT. In fact, literature, including a thorough analysis of LTFU after flexor or extensor tendon repairs, is quite limited.

Based on all of the aforementioned findings, we designed the current study and predicted that LTFU in our study population would occur at least 25% of the time. Further, we hypothesized that lower educational level, as well as increased distance from the care center would be associated with LTFU. In short, the current study seeks to determine factors that contribute to LTFU so that care providers can better identify at-risk populations and provide appropriate resources, with the goal of improving attrition rates and, ultimately, patient care.

MATERIALS AND METHODS

Design

This is a retrospective cohort study using routinely collected data found in Epic (Epic Systems Corporation, Verona, Wis.), the electronic medical record software utilized at the UMass Memorial Medical Center (Worcester, Mass.). The institutional review board at the University of Massachusetts Medical School approved the study on December 4, 2019 (approval no.: H00017856).

Data Source and Cohort

Data were extracted from the UMass Epic database, which at the time of collection included a total of 2,256,963 patients. Current Procedural Terminology billing codes were used to identify procedure names involving flexor and extensor tendon repairs or transfers of the hand, wrist, and forearm. The procedure names were then entered into Epic’s data organizer, SlicerDicer, to identify patients. SlicerDicer does not use Current Procedural Terminology codes directly; rather, procedure names. These names are shown in Table 1. We included all adult patients older than 18 years of age who had undergone these procedures in the operating room setting at UMass Memorial locations between 2014 and 2019. We chose 2014 as a starting date because this is when notes in Epic became accessible.

Data collected in Microsoft Excel (Microsoft Corp., Redmond, Wash.) included patient demographics such as age, legal sex, race, zip code, language, employment status, education level, and other factors, including HT details (frequency, location), psychiatric history, and insurance.

Takeaways

Question: What patient factors predict loss to follow-up after tendon repair?

Findings: Younger age, male gender, lower educational degree, and a documented psychiatric history predict loss to follow-up in tendon repair patients.

Meaning: Specific patient populations should receive additional education and attention regarding the importance of continued hand therapy, to reduce postoperative complications and increase functionality.

Table 1. Procedure Names Used to Identify Patients

▪ Repair, tendon, forearm
▪ Repair, extensor tendon sheath, forearm and/or wrist, with free graft
▪ Repair, extensor tendon, hand, primary or secondary, without graft, each tendon
▪ Repair extensor tendon of wrist
▪ Secondary repair extensor tendon of hand with free graft, including harvesting of graft
▪ Repair, flexor tendon of hand, zone 2, primary, without graft, each tendon
▪ Repair, flexor tendon of hand, zone 2, secondary, without graft, each tendon
▪ Repair, flexor tendon of hand, non-zone 2, secondary, with graft, each tendon
▪ Repair, flexor tendon of hand, non-zone 2, primary or secondary, without graft, each tendon
▪ Repair single flexor tendon of wrist
▪ PR repair, flexor tendon, hand, with graft, each tendon
▪ PR repair, flexor tendon, hand, without graft, each tendon

Educational degrees were divided into “no high school,” “high school,” “college,” and “graduate,” while employment status was categorized as “unemployed/retired,” “part-time,” and “full-time.” Insurance was divided into “worker’s comp,” “state insurance,” “private insurance,” and “none/self-pay.” State insurance included Medicare, Medicaid, and MassHealth, while all insurances not included in worker’s comp and state were considered private. Finally, using patient zip codes, Google Maps was used to determine distance to UMass Medical Center’s primary HT location (Worcester, Mass.).

Outcomes

The primary outcome of the study was the rate of LTFU to HT appointments after tendon repairs of the forearm, wrist, or hand. All UMass Memorial rehab locations were included in the study. However, if patients attended a non-UMass Medical Center HT site, those patients were not included in the analysis, as we did not have access to outside sites’ medical records. Chart review on Epic was done to determine HT appointments and absences. Encounters and notes were sorted by “surgery,” “plastic surgery,” “orthopedic surgery,” and “occupational therapy.” All “initial evaluation” HT notes included a recommended number of HT weeks. LTFU was defined as any missed

appointment after which the patient did not return. This included patients who had attended some, but not all, of their HT appointments. It also included patients who did not attend a postoperative surgical appointment and hence never initiated HT. Completion of HT was defined as having a formal HT discharge note. Chart review was also used to gather demographic information and any additional relevant history. Demographic factors were compared between the LTFU and completion groups.

Statistical Analysis

Data were entered to a de-identified spreadsheet. A value of P less than 0.05 was considered statistically significant. The chi-square test for categorical values was used to compare differences between patients who were lost and those who were not. For data with mean values, averages are expressed as mean \pm standard deviation. Means were compared using two-way t tests. For categorical results, logistic regression was used to evaluate possible predictors of being lost to follow-up. Chi-square test was used to compare LTFU in flexor only versus extensor only injuries; repairs involving both extensor and flexor tendons at the same time were not included. P values, odds ratios (OR), and confidence intervals (CI) from these tests are presented.

RESULTS

SlicerDicer identified a total of 213 patients, six of whom were excluded due to age younger than 18 years, and 58 who were excluded because they attended HT at an outside center. The remaining 149 attended UMass HT, and these patients were included in the final analysis (Fig. 1). Of these 149 patients, 86 successfully completed their entire course of UMass HT, while 63 patients were lost to follow-up, resulting in a LTFU rate of 42.3%. Please refer to Table 2 for a summary of the following results.

The average age of patients in the LTFU group was significantly less than that of the completion group ($P < 0.001$). Men were also more likely to be lost to follow-up compared with women (OR = 2.1; 95% CI, 1.1–4.1; $P = 0.038$). The majority of patients in both groups were English-first speakers, followed by Spanish and Portuguese. There were no significant differences between groups for any languages. Similarly, all race comparisons (including White, Black, Hispanic, Asian, and “other”) were nonsignificant.

In the LTFU group, 33.3% had a documented psychiatric history, including MDD, bipolar disorder, generalized anxiety disorder, posttraumatic stress disorder and adjustment disorder. This was significantly more than in the completion group, which had documented psychiatric history in 3.5% of cases (two cases of MDD and one case of unspecified psychosis) (OR = 13.8; 95% CI, 3.9–49.0; $P < 0.001$).

In the completion group, educational data were available for 47 of 86 patients, and of those 47 patients, 29 (61.7%) completed high school or less. In the LTFU group, educational data were available for 47 of 63 patients, and of those 47 patients, 38 (80.9%) completed high school or less. There were significantly more patients with a high school degree or less in the LTFU group when compared with the completion group (OR = 2.6; 95% CI, 1.1–6.7; $P = 0.043$).

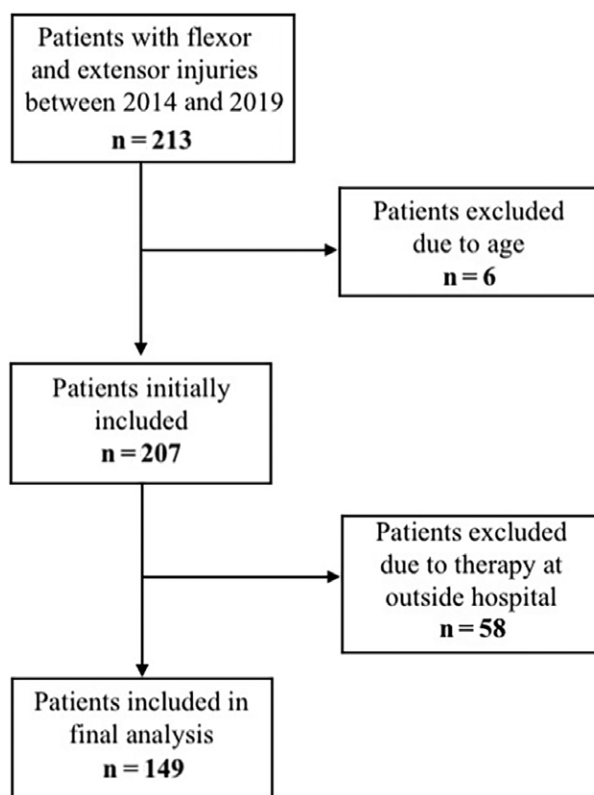


Fig. 1. Patients included and excluded. Patients younger than 18 years old were excluded.

Employment status was available for 59 of 63 LTFU and 77 of 86 completion group patients. There were no significant differences between the LTFU and completion group for unemployed, part-time, and full-time employment.

The mean distance to UMass Hahnemann Hand Therapy for the LTFU group was 31.1 ± 26.4 km, while the mean distance for the completion group was 31.1 ± 33.5 km. This difference was not significant ($P = 0.497$). It should be noted that three patients in the completion group were outliers and not included due to distance away more than 160 km (100 miles). The majority of patients in both groups had private insurance, followed by state insurance, and worker’s comp. Three patients in each group did not have insurance. All comparisons were nonsignificant. The number of HT weeks suggested by occupational therapy for the LTFU group was not significantly different from the number suggested for the completion group (9.7 ± 3.8 versus 8.9 ± 3.8 , $P = 0.630$, range: 3–24 weeks). On average, LTFU patients completed 5.1 weeks (52.6% of suggested; range: 0–19 weeks) before being lost. Finally, there were no significant differences in LTFU for patients undergoing flexor only repairs compared with those undergoing only extensor repairs ($\chi^2 = 0.02$, $P = 0.89$).

DISCUSSION

Hand therapy after tendon repair is crucial in preventing complications and regaining function,⁶ but attrition

Table 2. Characteristics of Study Participants

Characteristic	Patients		P
	LTFU	Completion	
Number, n	63	86	
Age, y	40.2 (17.0)	49.7 (16.1)	<0.001
Gender, n (%)			0.038
Men	45 (71.4)	47 (54.7)	
Women	18 (28.6)	39 (45.3)	
Language, n (%)			
English	57 (90.5)	78 (90.7)	0.964
Spanish	3 (4.7)	3 (3.5)	0.698
Portuguese	2 (3.2)	4 (4.7)	0.651
Albanian	1 (1.6)	1 (1.2)	0.822
Race, n (%)			
White	46 (73.0)	68 (79.1)	0.391
Black	8 (12.7)	5 (5.8)	0.142
Hispanic	4 (6.3)	6 (7.0)	0.880
Other	4 (6.3)	5 (5.8)	0.892
Multi-racial	1 (1.6)	0 (0.0)	0.242
Asian	0 (0.0)	2 (2.3)	0.224
Insurance, n (%)			
Worker's comp	11 (17.5)	17 (19.8)	0.223
State	23 (36.5)	29 (33.7)	0.725
Private	26 (41.3)	37 (43.0)	0.832
None	3 (4.8)	3 (3.5)	0.698
Psychiatric history* (%)	21 (33.3)	3 (3.5)	<0.001
Education‡, n (%)			0.043
High school or less	38 (80.9)	29 (61.7)	
College or graduate	9 (19.1)	18 (38.3)	
Employment‡, n (%)			
Unemployed	13 (22.0)	16 (20.8)	0.861
Part-time	2 (3.4)	3 (3.9)	0.876
Full time	44 (74.6)	58 (75.3)	0.922

For age, data are presented as the mean (standard deviation).
 *Included major depressive disorder, post-traumatic stress syndrome, adjustment disorder, and generalized anxiety disorder.
 ‡Data reported only for patients in which data was available.

can hinder this process. The purpose of this study was to determine the rate of LTFU after flexor and extensor tendon repairs of the hand, wrist, and forearm, and to predict factors that contribute to LTFU. In this study, 42% of patients did not complete the entirety of their HT course. The factors identified to predict LTFU included male gender, younger age, lower educational level, and a documented psychiatric history.

Previous studies have proposed similar demographic factors to predict LTFU. Rosenbaum et al¹⁷ retrospectively reviewed 2563 upper extremity cases and found that men were more likely to be lost. Our results corroborate this finding. Prior studies^{15,18,19} have shown men to be less compliant with medical follow-up, possibly because they have decreased perception of their medical problems when compared with women.²⁰ Men tend to downplay medical problems more than women, so perceiving less of a need to complete HT does not come as a surprise.

Murnaghan²¹ reported that younger patients were more likely to be lost in a study investigating intraarticular calcaneal fractures. Similarly, Sielatycki et al²² also reported that younger age was associated with LTFU after spine surgery. Younger patients are more likely to have

educational and work commitments compared with older adults who may be retired. Also, younger patients likely do not fully appreciate the severity of their injuries. This could be in part because injuries may heal more quickly and without as many consequences in younger patients. Finally, younger patients are less likely to have a stable income, which has been shown to influence LTFU in surgical patients.²³ However, it should be noted that not all studies have found age to be a significant predictor.¹⁶

Tejwani et al,¹⁶ in their study assessing attrition rates in 293 patients with distal radius fractures, found that patients who had not surpassed secondary education were more likely to be lost. This was also the case in the present study. Lower levels of education have been linked to poorer health outcomes,²⁴ and this is in part due to lower levels of income. Patients with lower levels of education might not completely understand the importance of therapy and its role in healing, though we realize this may be unfair speculation. Regardless, increasing time spent explaining the importance of HT could improve attrition rates in all populations.

Our study found that a documented psychiatric history predicted LTFU. A history of MDD has been linked to increased rates of loss. Kedestig and Stenberg²⁵ found that depression was linked to LTFU in their study of 2495 surgical patients. Lamers et al¹⁵ found that those with comorbid depression and anxiety were 2.4 times more likely to drop out. In concordance with those articles, the present study stresses the importance of mental health and coordinated care between surgeon and primary care physician and/or psychiatrist.

In contrast to some studies,^{26,27} we did not find distance to be a significant predictor of LTFU. This was contrary to our expectations but has indeed been shown in another study. Sharif-Askary et al¹⁴ investigated LTFU for cleft lip/palate care at Duke hospitals and found distance was not a significant factor. Rather, they found “pockets” of high-risk communities that were more likely to be lost, irrespective of distance. It has been shown that in rural communities, like those in central Massachusetts, patients are willing to drive longer distances for follow-up care,²⁸ and this could explain why we did not find any significance in distance. Our study did not demonstrate any significant differences in insurance types, differing from other studies^{17,29} which have shown that nonprivate insurance is associated with LTFU. This may have been due to the smaller numbers in each of the private and nonprivate insurance groups.

Identifying predictors of LTFU is certainly important, but more important is implementing methods to prevent it. Gourash et al³⁰ attempted to longitudinally assess patients after bariatric surgery, and to increase retention, they used flexible schedules, shorter visit options, reminder letters, frequent contact, and reimbursement for travel. At 12 months, over 98% remained active in the study. While some of these strategies may not apply to HT, frequent contact and reminder letters can certainly be applied to all patients requiring therapy after tendon repair. A recent 2021 study³¹ contacted and surveyed patients who were originally lost to follow-up after upper extremity surgery and found that 65% of these patients

were unaware that they did not complete follow-up. This suggests that more frequent contact could prove beneficial by reminding patients to continue care. Further, 49% of patients who knew they did not complete follow-up stated that an additional intervention would have encouraged their return to clinic. In our study, younger patients were more likely to be lost, so to improve attrition rates in younger patients, using electronic means such as emails, texts, and social media could be effective.³² A meta-analysis³³ reviewed 28 studies evaluating the effectiveness of short message service (text) in clinic follow-up and reported an OR of 1.62 (1.35–1.94) of attending a postoperative visit after short message service messages were sent. This may be the single-most important means of improving LTFU, as it serves as a reminder, is not transient, and targets a population in which texting is the most common form of communication. Unlike a missed phone call, a text message literally displays the reminder, stays on the phone, and is easier to access than voice-mail or a return phone call. These texts could be done in several stages, up to a day or two before the scheduled appointment, though specifics on timing remain to be investigated.³³

Patient education is of paramount importance. Research³⁴ has shown that surgical patients can have poor medical knowledge, but that knowledge retention can be improved by a better understanding of risks and consequences. Thus, providing more information via handouts, conversations, or emails/texts about the importance of HT could improve attrition rates. In addition, with increasing frequency of out-of-office appointments, telehealth visits can be offered for patients, especially male patients who have already missed a scheduled follow-up. While there are massive benefits to in-person HT appointments, telehealth visits could at the least help to reestablish contact, to provide education, to partially assess progress, and to work toward setting up in-person meetings. These meetings could be attempted in the days after a missed appointment.

This study has several limitations. First, it is retrospective in nature. Second, it looked at patients in central Massachusetts, so the generalizability of the study may be limited. Third, the study used chart review, and some data were missing for a portion of patients. Fourth, our sample size was not as robust as expected, as several patients underwent HT at outside hospitals where we did not have access to data. Lastly, this study did not assess outcomes. Future studies should test implementation strategies and assess functional outcomes of patients with tendon repairs who are lost and not lost to follow-up. In addition, studies should be done in other geographic locations, with different patient populations, to either corroborate or contradict our findings.

It is clear that HT is an important facet of tendon surgery rehabilitation. Identifying factors that predict LTFU has the potential to improve attrition rates to HT and ultimately improve patient outcomes. Specific patient populations deserve more attention, and coordinated care must be a focus. Future studies are needed to test implemented strategies and measure patient outcomes.

Desmond J. Bennett, MD

Division of Plastic Surgery

University of Massachusetts Medical School

55 Lake Avenue N

Worcester, MA 01655

E-mail: desmond.bennett@umassmemorial.org

DISCLOSURE

The authors have no financial interests to declare in relation to the content of this article.

HELSINKI DECLARATION

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

REFERENCES

1. American Society of Plastic Surgeons. 2018 plastic surgery statistics report. 2018. Available at <https://www.plasticsurgery.org/documents/News/Statistics/2018/plastic-surgery-statistics-full-report-2018.pdf>. Accessed June 2020.
2. Klifto CS, Capo JT, Sapienza A, et al. Flexor tendon injuries. *J Am Acad Orthop Surg*. 2018;26:e26–e35.
3. Yoon AP, Chung KC. Management of acute extensor tendon injuries. *Clin Plast Surg*. 2019;46:383–391.
4. Strickland JW. Development of flexor tendon surgery: twenty-five years of progress. *J Hand Surg Am*. 2000;25:214–235.
5. Sammer DM, Chung KC. Advances in the healing of flexor tendon injuries. *Wound Repair Regen*. 2014;22:25–29.
6. Wong JKF, Peck F. Improving results of flexor tendon repair and rehabilitation. *Plast Reconstr Surg*. 2014;134:913e–925e.
7. Rrecaj S, Martinaj M, Murtezani A, et al. Physical therapy and splinting after flexor tendon repair in zone II. *Med Arch (Sarajevo, Bosnia Herzegovina)*. 2014;68:128–131.
8. Iwuagwu FC, McGrouther DA. Early cellular response in tendon injury: the effect of loading. *Plast Reconstr Surg*. 1998;102:2064–2071.
9. Li F, Li B, Wang QM, et al. Cell shape regulates collagen type I expression in human tendon fibroblasts. *Cell Motil Cytoskeleton*. 2008;65:332–341.
10. Ng C, Chalmer J, Macdonald D, et al. Rehabilitation regimens following surgical repair of extensor tendon injuries of the hand—a systematic review of controlled trials. *J Hand Microsurg*. 2016;04:65–73.
11. Belo G de QMB, de Siqueira LT, Melo Filho DAA, et al. Predictors of poor follow-up after bariatric surgery. *Rev Col Bras Cir*. 2018;45:e1779.
12. Daffner SD, Hilibrand AS, Riew KD. Why are spine surgery patients lost to follow-up? *Glob Spine J*. 2013;3:15–19.
13. Shen R, Dugay G, Rajaram K, et al. Impact of patient follow-up on weight loss after bariatric surgery. *Obes Surg*. 2004;14:514–519.
14. Sharif-Askary B, Bittar PG, Farjat AE, et al. Geospatial analysis of risk factors contributing to loss to follow-up in cleft lip/palate care. *Plast Reconstr Surg – Glob Open*. 2018;6:e1910.
15. Lamers F, Hoogendoorn AW, Smit JH, et al. Sociodemographic and psychiatric determinants of attrition in the Netherlands study of depression and anxiety (NESDA). *Compr Psychiatry*. 2012;53:63–70.
16. Tejwani NC, Takemoto RC, Nayak G, et al. Who is lost to followup?: a study of patients with distal radius fractures. *Clin Orthop Relat Res*. 2010;468:599–604.

17. Rosenbaum JA, Blau YM, Fox HK, et al. Patient loss to follow-up after upper extremity surgery: a review of 2563 cases. *Hand*. 2019;14:836–840.
18. Alefan Q, Huwari D, Alshogran OY, et al. Factors affecting hypertensive patients' compliance with healthy lifestyle. *Patient Prefer Adherence*. 2019;13:577–585.
19. Ochieng-Ooko V, Ochieng D, Sidle JE, et al. Influence du sexe de la personne sur la perte du suivi dans un vaste programme de traitement du VIH dans l'ouest du Kenya. *Bull World Health Organ*. 2010;88:681–688.
20. Gijssbers van Wijk C, Kolk AM. [Sex differences in perceived health]. *Ned Tijdschr Geneesk*. 1997;141:283–287.
21. Murnaghan LM, Buckley RE. Lost but not forgotten: patients lost to follow-up in a trauma database. *Can J Surg*. 2002;45:191–195. <https://pubmed.ncbi.nlm.nih.gov/12067171/>
22. Sielatycki JA, Parker SL, Godil SS, et al. Do patient demographics and patient-reported outcomes predict 12-month loss to follow-up after spine surgery? *Spine (Phila Pa 1976)*. 2015;40:1934–1940.
23. Wheeler E, Prettyman A, Lenhard MJ, et al. Adherence to outpatient program postoperative appointments after bariatric surgery. *Surg Obes Relat Dis*. 2008;4:515–520.
24. Geyer S, Hemström O, Peter R, et al. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. *J Epidemiol Community Health*. 2006;60:804–810.
25. Kedestig J, Stenberg E. Loss to follow-up after laparoscopic gastric bypass surgery—a post hoc analysis of a randomized clinical trial. *Surg Obes Relat Dis*. 2019;15:880–886.
26. Jennings N, Boyle M, Mahawar K, et al. The relationship of distance from the surgical centre on attendance and weight loss after laparoscopic gastric bypass surgery in the United Kingdom. *Clin Obes*. 2013;3:180–184.
27. Lara MD, Baker MT, Larson CJ, et al. Travel distance, age, and sex as factors in follow-up visit compliance in the post-gastric bypass population. *Surg Obes Relat Dis*. 2005;1:17–21.
28. McGrail MR, Humphreys JS, Ward B. Accessing doctors at times of need—measuring the distance tolerance of rural residents for health-related travel. *BMC Health Serv Res*. 2015;15:212.
29. Zelle BA, Buttacavoli FA, Shroff JB, et al. Loss of follow-up in orthopaedic trauma: who is getting lost to follow-up? *J Orthop Trauma*. 2015;29:510–515.
30. Gourash WF, Ebel F, Lancaster K, et al; LABS Consortium Retention Writing Group. Longitudinal assessment of bariatric surgery (LABS): retention strategy and results at 24 months. *Surg Obes Relat Dis*. 2013;9:514–519.
31. Samade R, Colvell K, Goyal KS. An update on loss to follow-up after upper extremity surgery: survey of patient responses. *Hand (N Y)*. 2021;16:104–109.
32. Wong CA, Merchant RM, Moreno MA. Using social media to engage adolescents and young adults with their health. *Healthcare*. 2014;2:220–224.
33. Boksmati N, Butler-Henderson K, Anderson K, et al. The effectiveness of SMS reminders on appointment attendance: a meta-analysis. *J Med Syst*. 2016;40:1–10.
34. Mulsow JJW, Feeley TM, Tierney S. Beyond consent—improving understanding in surgical patients. *Am J Surg*. 2012;203:112–120.