Title

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Journal

Journal of Neurological Surgery Part B Skull Base, 83(06)

ISSN

1526-8012

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Publication Date

2022-12-01

DOI

10.1055/a-1840-9874

Peer reviewed

Audit of Postoperative Readmissions and Patient Messages following Endoscopic Transnasal Transsphenoidal Surgery

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J Neurol Surg B Skull Base 2022;83:611–617.

Abstract

Objectives The aim of this study was to identify the reasons for patient messages, phone calls, and emergency department (ED) visits prior to the first postoperative visit following discharge after endoscopic transnasal transsphenoidal (eTNTS) surgery.

Design This is a retrospective review of patients at a tertiary care academic center who underwent eTNTS for resection of a sellar region tumor between May 2020 and August 2021. Patient, tumor, and surgical characteristics were collected, along with postoperative, postdischarge, and readmission information. Regression analyses were performed to investigate risk factors associated with postdischarge phone calls, messages, ED visits, and readmissions.

Main Outcome Measures The main outcomes were the number of and reasons for phone calls, patient messages, and ED visits between hospital discharge and the first postoperative visit. We additionally determined whether these reasons were addressed in each patient's discharge instructions.

Results A total of 98 patients underwent eTNTS during the study period. The median length of hospital stay was 2 days (interquartile range [IQR]: 1–4 days), at which point most patients (82%) were provided with eTNTS-specific discharge instructions. First postoperative visit took place 9 days after discharge (IQR: 7–10 days). Within that time, 54% of patients made at least one phone call or sent at least electronic message and 17% presented to the ED. Most common reasons for

Keywords
- endoscopic skull base surgery
- TNTS
- discharge instructions
- readmissions

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received
January 15, 2022
accepted after revision
April 26, 2022
accepted manuscript online
May 3, 2022
article published online
July 5, 2022

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Rüdigerstraße 14,
70469 Stuttgart, Germany

DOI https://doi.org/10.1055/a-1840-9874.
ISSN 2193-6331.

call/message were nasal care, appointment scheduling, and symptom and medication questions.

Conclusion Through this work, we highlight the most common reasons for resource utilization via patient phone calls, messages, and ED visits among our cohort to better understand any shortfall or gap in the discharge process that may reduce these events.

Introduction

Endoscopic transnasal transsphenoidal (eTNTS) surgery has become the primary technique for the removal of pituitary adenomas and other sellar region tumors.[1] This procedure has been demonstrated to be safe and effective, particularly when compared with open approaches.[2–4] As endoscopic techniques improve alongside surgeon experience and institutional familiarity, hospital stays continue to decrease. In general, patients are discharged from the hospital 1 to 5 days after surgery and are scheduled for their first follow-up appointment within 2 weeks of discharge.[1,3,5] While this has led to a reduction in costs associated with prolonged hospital stays, studies have shown the quick turnaround time is associated with a higher risk of readmission within 30 days.[1,3,6] This quality improvement metric is of particular importance because hospital readmissions within 30 days of discharge account for $17 billion in unplanned Medicare expenditures, and 30-day readmission rate is one of the fundamental measures of quality of care in the Affordable Care Act. High readmission rates result in reimbursement penalties incurred by hospital systems from the Centers for Medicare and Medicaid Services. Though the reasons for readmissions following eTNTS have been studied, few have looked closely at the reasons for patient phone calls, messages, and emergency department (ED) visits and how these contribute to readmissions and patient satisfaction.[2,7]

In the time between discharge and the first follow-up visit, patients often resort to telephone calls or messages via the electronic medical record (EMR) system as the first step in contacting their surgeons with concerns in the postoperative period.[8] As has been demonstrated within other surgical and nonsurgical disciplines, understanding the nature of postoperative phone calls may lead to reduction of ED or urgent care facilities use and provide guidance for improvement in overall patient satisfaction ratings. In the case of eTNTS, patients may experience a wide range of possible acute and delayed complications including endocrine and metabolic dysfunction, cerebrospinal fluid (CSF) leaks, and epistaxis, among others.[1,3] While these more serious complications may require readmission, clear discharge instructions should be able to address many of the questions related to the logistics of scheduling postoperative follow-up appointments, wound care, expected postoperative symptoms, and pain control.

Our primary objective was to evaluate reasons for postdischarge patient communication and ED visits/readmissions in the immediate postoperative period. We also aimed to identify factors associated with the number of phone calls and electronic messages and to evaluate whether the reasons for these encounters were addressed in the discharge instructions.

Materials and Methods

A retrospective single-center review was conducted for consecutive patients undergoing eTNTS from May 2020 through August 2021. All patients were operated on by one of two senior neurosurgeons (M. B., W. K.) and one of three senior rhinologists (M. B. W., J. D. S., J. T. L.) . Patient, tumor, and surgical characteristics were collected, along with postoperative, postdischarge, and readmission information. The primary indication for surgery was treatment of sellar or parasellar lesions. This included both resection of tumors and treatment of encephalocele/meningocele; patients undergoing TNTS for repair of CSF leak were excluded. Additionally, patients who were not discharged within 2 weeks of operation date and those who were lost to follow-up were also excluded. Following aforementioned exclusion criteria, a total of 10 patients were excluded, bringing the total number of patients for analysis to 98 from an original list of 108 patients.

Standard postoperative care at our institution entails postoperative admission to a ward bed. Patients may be discharged as early as postoperative day 1. General discharge criteria include ambulation $>$ 50 feet, passing a voiding trial, and tolerating an oral diet. Rhinology-specific discharge criteria include removal of any temporary nasal packing/Coude catheter/nasal trumpet, when relevant. Neurosurgical-specific criteria include absence of ongoing CSF leak and removal of lumbar drain, when relevant. Endocrinologic discharge criteria include resolution of diabetes insipidus/syndrome of inappropriate antidiuretic hormone when present versus optimization of scheduled outpatient regimen (desmopressin, fluid intake), as well as optimization of other pituitary axes when relevant. Standard postdischarge care includes an outpatient sodium level 5 to 7 days after discharge followed by a clinic/telemedicine visit with both the rhinologist and the neurosurgeon within 1 to 2 weeks after discharge.

Data collected included patient age and sex, tumor pathology and functional status, and presence and grade of intraoperative CSF leaks as previously described by Esposito et al, as well as any postoperative complications.[9] Information about length of stay, discharge instructions received and the contents of these instructions, and postdischarge events was also collected. Postdischarge events included information about patient inquiries by phone or EMR messaging and the responses that were provided, patient ED visits and what was done during the visit, patient readmissions within

30 days of surgery, and date of postoperative follow-up visit. ED visits or 30-day admissions to outside hospitals are included here when possible (i.e., when these were discussed in the subsequent postoperative clinic visit or via phone call). The authors evaluated whether the patient's concern(s) prompting the phone call or ED visit was adequately addressed in the discharge instructions the patient received. The study had institutional review board approval at the University of California, Los Angeles, United States (IRB #13–000154).

Statistical Analysis

Data were collected using Microsoft Excel (2021) in a manner compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Analysis was conducted using Stata16 statistical software (StataCorp LLC, College Station, Texas, United States). Continuous and binary variables were compared using the Wald and Pearson χ^2 tests, respectively, and one-way analysis of variance testing was performed for categorical (>2) variables. Univariate and multivariate logistic regression analyses were performed to investigate independent risk factors associated with postdischarge phone calls, ER visits, and readmissions. Statistical significance was defined as an $\alpha < 0.05$.

Results

A total of 98 patients underwent eTNTS for management of a sellar/parasellar lesion between May 2020 and August 2021 and were included in our analysis. Patients ranged from 7 to 73 years of age, with an average age of 47 years (standard deviation: ± 16), and 58% of patients were female. In terms of tumor pathology, most patients (79%) had pituitary adenomas, 49% of which were functional. Functional pituitary adenomas included prolactinomas, adrenocorticotropic hormone–secreting tumors, and growth hormone–secreting tumors. Other tumor pathologies included Rathke's cleft cysts (6.1%), craniopharyngiomas (4.1%), and meningiomas (5.1%), as well as a single case each of a meningocele, encephalocele, cystic pituitary lesion, dermoid cyst, glioma, and mucocele.

In total, 45% of patients experienced an intraoperative CSF leak, 50% of which were grade 1, 43% of which were grade 2, and 7% of which were grade 3. The most common postoperative complication was hyponatremia (8.2%), followed by temporary diabetes insipidus (7.1%). Patient demographic and clinical characteristics, as well as operative and postoperative factors, are listed in ►**Table 1**.

Postdischarge outcomes for these patients are presented in ►**Table 2**. The median length of stay until discharge was 2 days (interquartile range [IQR]: 1–4 days), at which point most patients (82%) were provided discharge instruction (DCI) set 1 (Supplement). This set of instructions were nearly identical in content to DCI sets 2 and 6. It appeared that when patients happened to be discharged from different services such as the pediatric intensive care unit (ICU) or the head and neck surgery

Table 1 Patient characteristics and operative outcomes

Total cohort	$N = 98$	%
Mean age at treatment (y) $\pm$ SD	47 ± 16	
Female	57	58%
Pathology		
Nonfunctional pituitary adenoma	39	40%
Functional pituitary adenoma[a]	38	39%
Rathke's cleft cyst	6	6.1%
Craniopharyngioma	4	4.1%
Meningioma	5	5.1%
Other[b]	6	6.1%
Intraoperative CSF leak	44	45%
Grade I	22	22%
Grade II	19	19%
Grade III	3	3.1%
In-hospital postoperative complications		
Bleeding after intranasal Coude catheter removal	1	1%
Temporary diabetes insipidus	7	7.1%
Permanent diabetes insipidus	1	1%
Hyponatremia	11	11.2%
Postoperative fever	1	1%

Abbreviation: CSF, cerebrospinal fluid.
[a]Included prolactinomas, adrenocorticotropic hormone–producing tumors, and growth hormone–producing tumors.
[b]Included meningocele, encephalocele, cystic pituitary lesion, dermoid cyst, glioma, and mucocele.

Table 2 Postdischarge outcomes

Total cohort	$N = 98$	%
Length of stay until discharge (d), median (IQR)	2 (1–4)	
Days until first follow-up, median (IQR)	9 (7–10)	
Number of phone calls and EMR messages		
None	45	46%
One	30	31%
Two	10	10%
Three	5	5.1%
Four	3	3.1%
Five	2	2%
Six	3	3.1%
Number of emergency department visits		
None	81	83%
One	15	15%
Two	2	2%
Readmission	9	9.2%

Abbreviations: EMR, electronic medical record; IQR, interquartile range.

service rather than neurosurgery, they would receive different DCI sets (3, 4, and 5). There are several key differences between DCI sets 1, 2, and 6 and DCI sets 3, 4, and 5. DCI set 3 includes only postoperative sinus instructions and does not provide any postoperative instructions or follow-up regarding neurosurgical precautions or endocrinology follow-up. DCI set 4 includes diet, activity restrictions, a prepopulated medication list, and nonspecific ED return precautions (i.e., signs of infection, fevers, chills, etc.). There were no specific neurosurgical, sinus, or endocrinology instructions. DCI set 5 included contact information for the liver ICU team, neurosurgical team, and pediatric endocrinology team. A medication list was also provided but the instructions did not include any specific postoperative care related to eTNTS surgery. Two patients (2%) did not receive any discharge instructions per chart review, while only one patient each received DCI sets 3, 4, and 5.

Patients had a virtual or in-person follow-up visit a median of 9 days (IQR: 7–10 days) after discharge. However, prior to that visit, 53 patients (54%) made at least one phone call or sent one message via the EMR to either of their surgeon's offices with at least one specific inquiry. The majority of these inquiries were categorized as either concerning logistical details (42%) or about new symptoms (34%). Logistical questions included whether a COVID test was required prior to the follow-up appointment, how to reschedule an appointment, and queries about obtaining disability paperwork. Symptoms included headaches, urinary retention, constipation, fever, dizziness, and nausea/vomiting. Seven patients (7.1%) asked specifically about nasal rinses and nasal care, and seven others (7.1%) asked about medication refills, doses, reactions, and alternatives, but only two patients (2%) asked about continued fluid restriction. Patients' questions were addressed via return EMR message or phone call when possible, and the remainder were advised to present to the ED for evaluation when appropriate.

Notably, 15 patients (15%) went to the ED within 30 days of surgery, and 2 patients (2%) visited the ED twice during this time period (►**Table 3**). Six of these patients (7%) were readmitted to the hospital, most commonly for CSF leak (4.1%), epistaxis (3.1%), or hyponatremia (2%).

On evaluation of the unique inquiries made via phone call, EMR message, or ED visit (47 in total), 53% were found to have already been answered within the discharge instructions provided to the patients. However, information addressing 22 inquiries (47%) was not found in the discharge instructions provided to patients. Of these inquiries, 55% concerned logistical questions, 27% concerned symptoms, 14% were medication inquiries, and 5% asked about nasal care.

On univariate and multivariate regression analysis, there were no significant differences in the likelihood of phone/message inquiries, ED visits, or readmissions among patients who received different sets of discharge instructions. Specifically, on univariate analysis comparing patients who received DCI 1 versus patients who received DCI 2–6 or no discharge instructions, the rates of phone/message inquiries (83 vs 88%, $p = 0.94$), ED visits (54 vs 75%, $p = 0.12$), and readmissions (10 vs 6%, $p = 0.26$) were not statistically significantly different. Since only a small number of patients received DCI 2–6 or no discharge instructions, further statistical analysis by individual DCI category was not feasible or clinically significant.

Furthermore, age, including age greater than 65 years, primary pathology and functional status, and length of hospital stay were not significantly associated with postdischarge phone/message inquiries, ED visits, or readmissions ($p > 0.05$).

Table 3 Phone calls, EMR messages, ED visits, and readmissions

Total instances	
Reasons for phone calls and EMR messages	
Nasal care[a]	7
Fluid restriction	2
Symptoms[b]	18
Medications[c]	7
Other[d]	22
Reasons for ED visits	
Epistaxis	4
CSF leak	4
Hyponatremia	3
Other[e]	6
Days to readmission, median (IQR)	8 (5–10)
Reasons for readmission	
Epistaxis	3
CSF leak	4
Hyponatremia	2

Abbreviations: CSF, cerebrospinal fluid; ED, emergency department; EMR, electronic medical record.
Note: If a patient called/messaged with more than one concern (i.e., "nasal care" and "medication"), then they are represented under both those categories.
[a]Included questions about rinses, sprays, blowing nose, etc., postoperatively.
[b]Included questions about headaches, visual disturbances, fluid leak per nares, fatigue, and salty taste.
[c]Included questions about medication refills, doses, frequency, reactions, and alternatives.
[d]Included questions about appointments, COVID swab prior to clinic visit, ability to walk upstairs, disability paperwork, etc.
[e]Included nausea/vomiting, fever, headache, urinary retention, constipation, and dizziness.

Discussion

The treatment and care of patients with sellar and parasellar lesions by eTNTS require a multidisciplinary approach involving neurosurgeons, rhinologists and endocrinologists.

Accordingly, postoperative care, expected symptomatology, and possible complications span multiple disciplines. In this single-center study, we looked at all patients who underwent eTNTS at a tertiary care academic center during a 15-month period and aimed to identify common reasons for patient phone calls and electronic messages, as well as ED visits, prior to the first postoperative clinic visit. Our cohort is representative of eTNTS practice more globally, with pituitary adenomas being the most commonly addressed pathology. The most common in-hospital postoperative complications included temporary diabetes insipidus, hyponatremia, and epistaxis. An intraoperative CSF leak was identified in 45% of patients. As previously demonstrated, these complications are the most common reasons for readmission.[1,10–12] Our overall readmission rate of 9% falls within the commonly identified range of 5.6 to 9% seen in other studies.[1,3]

With regard to postdischarge patient communication (call or message), we found that over half of the patients had at least one postdischarge communication prior to the first postoperative visit. The majority of communications were related to logistical questions (42%) or new symptoms (34%). The rate of return to ED in our patient cohort was 9.2%, the most common causes for which were CSF leak, hyponatremia, and epistaxis. Of 17 separate visits to ED (notably multiple patients had multiple visits to the ED, so this includes multiple visits by the same patients), 9 led to readmission. Notably, we also found that there were several versions of discharge instructions that patients received; however, the instructions were similar in all of them.

One finding of interest was that 53% of all phone or messaging inquiries were addressed in the discharge instructions. This suggests an opportunity for improvement with regard to clarity of the discharge instructions and the predischarge teaching. One confounding factor is that the discharge instructions state that patients should first call the emergency on call number provided prior to coming into the ED for readmission. Accordingly, 13 of these phone calls appropriately preceded an ED visit. Importantly, the ED presentations were clinically appropriate and in line with the instructions provided, suggesting that while the DCI may have room for improvement in addressing low-acuity questions, the DCI and predischarge patient education were successful in ensuring patients seek guidance and care for urgent needs (e.g., epistaxis, CSF leak). Another important contributor is the fact that these instructions were created prior to the onset of COVID. We found that several patients called to inquire about the need for COVID testing prior to their first appointment, something that should be incorporated into future instructions. About 45% of calls or messages related to questions answered in the discharge instructions were medication or symptom inquiries.

Patients' understanding of their diagnosis, new medications, and posthospital care instructions is essential for a smooth and safe transition home.[13] Alongside the incentive to improve patient satisfaction and avoid readmissions, there has been significant inquiry in the medical literature on strategies to improve predischarge patient education, postdischarge adherence to instructions, and follow up.[13–17] Lo et al described the implementation of diagnosis-specific DCI in a >1,000-patient cohort of same-day surgery patients; they found that the use of these DCIs improved patient satisfaction with regard to measures such as clarity of instruction and discharge procedures, but also patients' perception regarding the care and attention by nursing and other staff.[18] While the DCIs in our study are specific to patients undergoing eTNTS, they do include information that may not be relevant to all patients (e.g., regarding care of abdominal fat graft site, use of hormone supplementation), which can be a source of confusion for some patients, and may obscure more useful information by making the DCI longer. In a randomized study looking at patients discharged from a medical service, Jack et al demonstrated that a discharge service package significantly decreased 30-day postdischarge hospital utilization and increased patients' understanding of their diagnosis, feeling of preparedness for discharge, and likelihood to follow up with their primary care physician after discharge.[14] Alongside a detailed DCI, the discharge services provided in this study included in-hospital education regarding their diagnosis, new/changed medications, review of warning signs, and predischarge scheduling of all follow-up appointments. Given the fact that 16 and 13% of postdischarge communications in our cohort related to appointment scheduling and medication-related questions, respectively, adopting a purposeful predischarge review of these may be particularly beneficial.

Another consideration for why these queries resulted in phone calls despite being included in the written instructions could be related to the timing of instructions provided. One study by Hovsepian et al suggested that patients and caregivers benefit from a combination of verbal and written discharge instructions.[19,20] However, when these instructions are provided in the immediate postoperative period, patients may be less likely to retain this information than when it is presented prior to surgery, such as during a preoperative clinic visit.[19] Discharge instructions provided preoperatively by the surgery team may also help ensure that the proper set of DCI is given, further standardizing the process. Lastly, some additional well-known factors associated with patient difficulty to follow DCI include health literacy and language barriers.[17,21] While we did not specifically evaluate these factors in our cohort, assessment of the reading level of our DCI is another possible area of investigation that may improve clarity and comprehension.

On the basis of the results of this study, our center has started a quality improvement effort targeting patient satisfaction and resource utilization after eTNTS. Our plan is to survey eTNTS patients about areas of confusion in the expectations of postoperative care. The results of this study, alongside the survey, would provide framework to reformat, rewrite, and standardize the discharge instructions for clarity and to ensure they include the

information that patients often call about. We plan to ensure appointments with neurosurgery, head and neck surgery, and endocrinology are scheduled at the time of discharge as questions regarding appointments were a common cause of patient communication. Additionally, we intend to start providing the discharge instructions to the patient prior to surgery so they and their caregivers are able to review, ask questions, and have better understanding of postoperative care expectations.[19] Lastly, we are putting together a video version of abbreviated discharge instructions as there is some evidence to suggest that this improves patient understanding of instructions and may be a tool to help mitigate impact of variable patient/caregiver literacy.[22]

Our study has several limitations, including those inherent to a study of a single-institution retrospective database. Another limitation and opportunity for improvement is the variability in discharge paperwork provided to patients. As noted elsewhere, some patients who were not admitted to a primary neurosurgical service did not receive standard postoperative care instructions. The findings reported here aim to capture the typical eTNTS patient and therefore do not apply to those patients we excluded on account of prolonged hospital stays (>2 weeks) as these represent patients with complex postoperative course who would likely require specific DCI. Nonetheless, this study serves as an important starting point to assess the role of discharge instructions in affecting postdischarge patient inquiries and hospital utilization. Furthermore, it establishes a baseline that can be used as comparison in a second cohort of patients to evaluate the effectiveness of a standard preoperative discussion or unified and updated discharge booklet.

Conclusion

eTNTS has become an increasingly popular technique for the resection of tumors in the sellar region. This technique has led to a reduction in length of hospital stays compared with open approaches, and improved discharge planning can reduce 30-day readmission rates. Patient phone calls and electronic messages following discharge may be reduced by optimizing communication of discharge instructions and expectations, preferably at a preoperative visit. The importance of standardized comprehensive discharge instructions has the potential to reduce the number of patient phone calls, messages, and ED visits during the postoperative time period, improving both patient satisfaction and utilization of resources.

Authors' Contributions

M. H., K. K. B., M. N. N., and N. K. performed planning, data collection, statistical analysis, interpretation of results, literature survey, writing the manuscript, and submission. M. B. W. supervised the study and supported in interpretation of results and manuscript preparation. A. P. H., W. K., J. T. L., J. D. S., and M. B. contributed to data collection and review of the manuscript.

Conflict of Interest

None declared.

References

1 Vengerovich G, Park KW, Antoury L, et al. Readmissions after endoscopic skull base surgery: associated risk factors and prevention. Int Forum Allergy Rhinol 2020;10(01): 110–113

2 Silva NA, Taylor BES, Herendeen JS, Reddy R, Eloy JA, Liu JK. Return to the emergency room with or without readmission after endoscopic transsphenoidal surgery in socioeconomically disadvantaged patients at an urban medical center. World Neurosurg 2018;124:e131–e138

3 Rizvi ZH, Ferrandino R, Luu Q, Suh JD, Wang MB. Nationwide analysis of unplanned 30-day readmissions after transsphenoidal pituitary surgery. Int Forum Allergy Rhinol 2019;9(03): 322–329

4 Barker FG II, Klibanski A, Swearingen B. Transsphenoidal surgery for pituitary tumors in the United States, 1996-2000: mortality, morbidity, and the effects of hospital and surgeon volume. J Clin Endocrinol Metab 2003;88(10):4709–4719

5 Prete A, Corsello SM, Salvatori R. Current best practice in the management of patients after pituitary surgery. Ther Adv Endocrinol Metab 2017;8(03):33–48

6 Cote DJ, Dasenbrock HH, Muskens IS, et al. Readmission and other adverse events after transsphenoidal surgery: prevalence, timing, and predictive factors. J Am Coll Surg 2017;224(05): 971–979

7 Bohl MA, Ahmad S, Jahnke H, et al. Delayed hyponatremia is the most common cause of 30-day unplanned readmission after transsphenoidal surgery for pituitary tumors. Neurosurgery 2016;78(01):84–90

8 Ramaseshan AS, LaSala C, O'Sullivan DM, Steinberg AC. Patient-initiated telephone calls in the postoperative period after female pelvic reconstructive surgery. Female Pelvic Med Reconstr Surg 2020;26(10):626–629

9 Esposito F, Dusick JR, Fatemi N, Kelly DF. Graded repair of cranial base defects and cerebrospinal fluid leaks in transsphenoidal surgery. Oper Neurosurg (Hagerstown) 2007;60(04, Suppl 2):295–303, discussion 303–304

10 Hendricks BL, Shikary TA, Zimmer LA. Causes for 30-day readmission following transsphenoidal surgery. Otolaryngol Head Neck Surg 2016;154(02):359–365

11 Chowdhury T, Prabhakar H, Bithal PK, Schaller B, Dash HH. Immediate postoperative complications in transsphenoidal pituitary surgery: a prospective study. Saudi J Anaesth 2014;8(03): 335–341

12 Younus I, Gerges MM, Dobri GA, Ramakrishna R, Schwartz TH. Readmission after endoscopic transsphenoidal pituitary surgery: analysis of 584 consecutive cases. J Neurosurg. 2019;133(04): 1242–1247

13 Horstman MJ, Mills WL, Herman LI, et al. Patient experience with discharge instructions in postdischarge recovery: a qualitative study. BMJ Open 2017;7(02):e014842

14 Jack BW, Chetty VK, Anthony D, et al. A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. Ann Intern Med 2009;150(03):178–187

15 Olson DP, Windish DM. Communication discrepancies between physicians and hospitalized patients. Arch Intern Med 2010;170 (15):1302–1307

16 Makaryus AN, Friedman EA. Patients' understanding of their treatment plans and diagnosis at discharge. Mayo Clin Proc 2005;80(08):991–994
17 Coleman EA, Chugh A, Williams MV, et al. Understanding and execution of discharge instructions. Am J Med Qual 2013;28(05):383–391
18 Lo S, Stuenkel DL, Rodriguez L. The impact of diagnosis-specific discharge instructions on patient satisfaction. J Perianesth Nurs 2009;24(03):156–162
19 Hovsepian J, McGah C, O'Brien C. Postoperative instructions preoperatively-evaluating the effectiveness of a teaching model on patient satisfaction regarding instructions for home care. J Perianesth Nurs 2017;32(03):231–237
20 Strong S, Bettin A. An initiative to improve patient discharge satisfaction. Rehabil Nurs 2015;40(01):52–59
21 Baker DW, Gazmararian JA, Williams MV, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. Am J Public Health 2002;92(08):1278–1283
22 Wilkin ZL. Effects of video discharge instructions on patient understanding: a prospective, randomized trial. Adv Emerg Nurs J 2020;42(01):71–78