Original Article

Rate and Causes of 30-day Unplanned Readmission/Return Following Head and Neck Surgery at a Tertiary Care Center in Saudi Arabia

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Abstract

Background: Identifying and targeting common preventable causes of 30-day hospital readmissions could help improve survival rates and reduce the healthcare burden.

Objective: To determine the rate and causes of unplanned hospital return/readmission to the Outpatient Department (OPD) or Emergency Department (ED) within 30 days after discharge following head and neck surgery (HNS) at a tertiary hospital in Western Saudi Arabia.

Methods: This retrospective study included all adult patients (aged ≥18 years) who had undergone HNS at King Abdulaziz University Hospital, Jeddah, Saudi Arabia, between January 2015 and December 2022 and returned to the OPD or ED within 30 days of being discharged.

Results: Of 1041 patients who had undergone HNS, 84 (8.1%) returned to the hospital within 30 days after discharge: 63 (6.1%) to the OPD and 21 (2.0%) to the ED. A total of 9 (0.9%) patients were readmitted as inpatients, most commonly for infections (33.3%) and neurological symptoms, including weakness and seizures (22.2%). For OPD visits, common causes were wound swelling (25.4%) and neurological symptoms (17.5%). For ED returns, frequent causes were neurological symptoms (23.8%) and surgical site bleeding (19.1%). Readmission was associated with intensive care unit (ICU) admission during the primary hospital stay ($P = 0.003$) and higher preoperative baseline health burdens when examined using the American Society of Anesthesiology score ($P = 0.022$), the Cumulative Illness Rating Scale ($P = 0.007$), and the Charlson Comorbidity Index (CCI) ($P = 0.006$).

Conclusion: The rate of 30-day unplanned hospital return following head and neck surgery was 6.1% and 2.0% through the OPD and the ED, respectively; 0.9% were readmitted as inpatients. Common causes of return included wound swelling, infections, bleeding, and neurological symptoms.

Keywords: 30-day readmission, causes, emergency department, head and neck surgery, infection rates, readmission, Saudi Arabia

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INTRODUCTION

Unplanned hospital returns post-surgery are frequent, costly, and avoidable with careful planning and patient education.[1-3] Such readmissions remain a significant contributor to healthcare spending: about one in seven patients are readmitted after a major surgery, of which 12.3% are preventable readmissions.[4,5] A 30-day unplanned hospital readmission is commonly considered an indicator of treatment quality.[6] Therefore, decreasing hospital revisits is vital for clinicians, hospitals, and policymakers.[7]

Readmissions in otolaryngology range from 2% to 8% depending on the procedure, and thus single readmission rates are not reflective of this specialty.[8,9] Head and neck surgeries (HNS), especially oncologic HNS, are complex and incorporate multiple-step procedures, including excisions, vascular reconstructions, and primary neck dissection, and use various techniques.[10] Unplanned readmissions expose these vulnerable patients to hospital-acquired complications, which may affect their survival rates.[7] The rates of revisits after HNS have been reported to range from 7.3% to 26.5%.[6,11-13] The most commonly reported reasons for hospital readmissions following HNS are infections[11] and wound complications.[7]

Identifying the common causes for revisits can help target preventable causes, which may lower the unplanned revisit rates, decrease the risk of hospital-acquired complications, improve survival rates and quality of life, and lower the healthcare burden. Nevertheless, the rate and causes for unplanned hospital returns following HNS are not clearly described in populations within Saudi Arabia. Therefore, this study aimed to identify the rate and causes of 30-day return/readmission to the Outpatient Department (OPD) or Emergency Department (ED) following HNS at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia, as this data may be utilized to produce rate-lowering interventions.

METHODS

Study design, setting, and participants

This retrospective study included all adult patients (aged ≥18 years) who had undergone HNS at KAUH between January 01, 2015, and December 31, 2022, and returned to the OPD or ED within 30 days of being discharged.

Data were collected from the electronic medical records using the International Classification of Diseases codes, Tenth Revision (ICD-10), after obtaining approval from the Institutional Review Board of KAUH. Patients with missing data for key variables, such as the reason for hospitalization, were excluded. During the 30-day period, if more than one episode of unplanned return/readmission was found, only the initial episode was considered.

Outcomes

The primary objective was to determine the causes of unplanned return through the ED or OPD, extracted as the final diagnosis from the medical record system. The secondary objective was to determine the readmission rate as inpatients among those who returned and well as compare the variables between admitted and non-readmitted patients.

Variables

Demographic data, such as age and gender, and body mass index (BMI) were extracted. The primary surgical location, condition type (benign or malignant), and dates of primary admission and hospital course, including history of intensive care unit (ICU) admission, or intubation, procedure, discharge, and return, were also collected. Procedures involving skin, ears, adenoids, and tonsils were not included in the study. Table 1 shows examples of the included procedures classified into procedural categories.

Furthermore, details of patients' comorbidities were collected and examined using the preoperative American Society of Anesthesiology score of physical well-being (ASA), the Charlson Comorbidity Index (CCI), and the Cumulative Illness Rating Scale (CIRS). The CCI is a validated scale that is used to predict long-term prognosis and survival, depending on the individual's comorbidities.[14] The CIRS is a comorbidity scale that assesses the overall burden of disease through 13 generally different body systems.[15]

Data analysis

The data was submitted into Google Forms and then exported to Excel version 16.0. SPSS version 21.0 for Windows was used to analyze the data, and statistical significance was set at $P < 0.05$. Continuous variables are expressed as means and standard deviation (SD) or median with interquartile ranges (IQR) depending on the distribution. Number and frequency are used to summarize categorical variables. To compare means, medians, and frequencies, Student's *t*-test, Mann-Whitney *U* test, and Chi-square test were used, respectively. Variables with significant associations were used in the multivariate regression analysis.

RESULTS

During the study period, 1041 patients underwent HNS. Within 30 days of discharge, 84 (8.1%) patients returned

to the hospital, with 9 (0.9%) admitted as inpatients. Of these, 63 (6.1%) patients had returned to the OPD; 3 (0.3%) were readmitted as inpatients. On the other hand, 21 (2.0%) patients returned to the ED, of which 6 (0.6%) were readmitted. Table 2 provides the demographic data and baseline characteristics of patients included in the study. The rate of hospital returns between 2015 and 2022 ranged from 5.8% to 10.4%. Because of the lockdown during the peak of the COVID-19 pandemic, the number of surgeries performed decreased during 2020–21, yet the rates were similar to those during the rest of the study period [Figure 1].

As demonstrated in Table 3, the most common reason for OPD visits was wound swelling (25.4%). Table 4 outlines the reasons for ED visits, with neurological symptoms (23.8%), such as seizures, paralysis, and numbness, being the most common. Infections such as surgical site infection, urinary tract infection, pneumonia, and sepsis were the most common reasons for readmission as an inpatient (26.3%) [Table 5].

The ED and OPD groups are compared in Table 6. Male patients were found to be more likely to return to the ED than female patients (66.7% vs. 33.3%; $P = 0.003$). Further, ED patients had a significantly higher mean age than OPD patients (56.2 years vs. 45.6 years; $P = 0.005$). In addition, malignancy as a reason for surgery was linked to ED visits ($P = 0.006$). Patients who returned to the ED had a greater rate of readmission as inpatients ($P = 0.008$), and also significantly higher ASA ($P = 0.012$), CCI ($P = 0.001$), and CIRS ($P = 0.001$) values than those who visited the OPD.

The mean age of readmitted patients was considerably higher (57.78 ± 18.73 years) than that of non-readmitted patients (47.07 ± 14.67 years) ($P = 0.048$). Patients who were readmitted (2.44 ± 0.73) had higher ASA scores than those who were not (1.95 ± 0.59) ($P = 0.022$). Furthermore, readmitted patients had higher CIRS scores (7.22 ± 3.11) than those who were not readmitted (3.47 ± 2.57) ($P = 0.007$). Similarly, readmitted patients had significantly higher CCI values (4.67 vs. 2.21, $P = 0.006$). Those who were

Table 1: Procedure-based categories included in the study

Category	Example
Salivary gland	Parotidectomy
Thyroid/parathyroid	Thyroidectomy
Sinonasal/skull base	Endoscopic resection of sinonasal tumor
Limited neck	Sistrunk procedure
Neck dissection only	Cervical lymph node dissection
Major head and neck surgery with no flap	Laryngectomy
Major head and neck surgery with pedicled flap	Resection of the oropharynx with pectoralis myocutaneous rotation flap reconstruction
Major head and neck surgery with free flap	Oropharyngeal resection with forearm free flap reconstruction
Open airway	Tracheostomy
Limited oral cavity	Hemiglossectomy

Table 2: Baseline characteristics and demographic data of the patients (*N*=84)

Variable	Included
Age (years), mean±SD	48.2±15.4
Female, *n* (%)	53 (63.1)
Length of primary stay in days, median (IQR)	3 (2–7)
CIRS, mean±SD	3.9±2.9
CCI, mean±SD	2.5±1.9
ASA, mean±SD	2±0.6
Previous radiotherapy, *n* (%)	23 (27.4)
Previous chemotherapy, *n* (%)	2 (2.4)
Previous chemoradiation therapy, *n* (%)	3 (3.6)

CIRS – Cumulative Illness Rating Scale; CCI – Charlson Comorbidity Index; ASA – American Society of Anesthesiologists; SD – Standard deviation; IQR – Interquartile range

Table 3: Rates and causes of outpatient department visits (*N*=63)

Causes	*n* (%)
Wound swelling: Hematoma, seroma	16 (25.4)
Neurological: Seizure, weakness, peripheral numbness	11 (17.5)
Infections: Surgical site, UTI, sepsis, pneumonia	9 (14.3)
Hoarseness	6 (9.5)
Respiratory: Dyspnea, wheezing	6 (9.5)
Pain in the surgical site	4 (6.4)
Fatigue	4 (6.4)
Equipment issues: Tracheostomy, surgical drain	3 (4.8)
Facial nerve paralysis	1 (1.6)
Gastrointestinal: Nausea, vomiting	1 (1.6)
Cardiac: Chest pain, palpitation	1 (1.6)
Fistula	1 (1.6)

UTI – Urinary tract infection

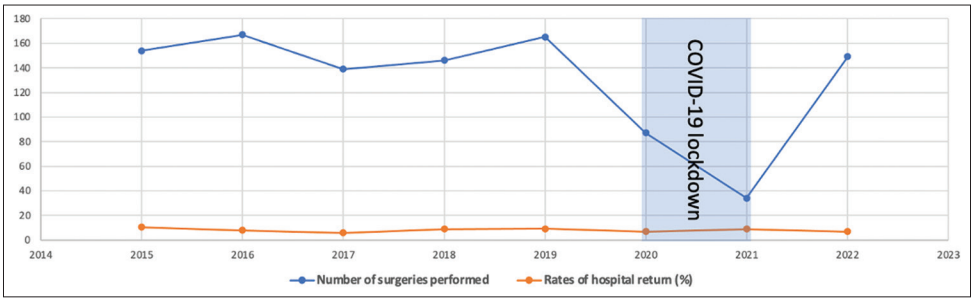

Figure 1: Rates of hospital returns for each year during the study period

Table 4: Rates and causes of emergency department visits (*N*=21)

Causes	*n* (%)
Neurological: Seizure, weakness, peripheral numbness	5 (23.8)
Surgical site bleeding	4 (19.1)
Hematoma	3 (14.3)
Infections: Surgical site, UTI, sepsis, pneumonia	3 (14.3)
Equipment issues: Tracheostomy, surgical drain	2 (9.5)
Cardiac: Chest pain, palpitation	2 (9.5)
Gastrointestinal: Nausea, vomiting	1 (4.8)
Respiratory: Dyspnea, wheezing	1 (4.8)

UTI – Urinary tract infection

Table 5: Rate and causes of readmission as an inpatient (*N*=9)

Causes	*n* (%)
Infections: Surgical site	3 (33.3)
Neurological: Seizure, weakness, peripheral numbness	2 (22.2)
Gastrointestinal: Nausea, vomiting	1 (11.1)
Equipment issues: Tracheostomy, surgical drain	1 (11.1)
Wound swelling: Hematoma, seroma	1 (11.1)
Wound dehiscence	1 (11.1)

admitted to the ICU during the primary hospital course had a higher chance of having an unplanned hospital readmission ($P = 0.008$). A weak positive correlation was found between the length of primary hospital admission and being readmitted ($r = 0.111$, $P = 0.313$). Table 7 shows a comparison between readmitted and non-readmitted patients. In addition, the multivariate regression analysis found multiple independent risk factors for hospital readmission, including the ASA [odds ratio (OR) =0.125; 95% confidence interval (CI): 0.018–0.232; $P = 0.022$], CIRS (OR = 0.044; 95% CI: 0.023–0.066; $P < 0.001$), and CCI (OR = 0.068; 95% CI: 0.034–0.101; $P < 0.001$) scores as well as ICU admission (OR = 0.524; 95% CI: 0.261–0.787; $P < 0.001$) and older age (OR = 0.04; 95% CI: 0.001–0.009; $P = 0.048$).

DISCUSSION

This retrospective study described the rate and causes of unplanned hospital readmission within 30 days after HNS in a Saudi tertiary academic center. The 30-day readmission rates have been used as a quality measure for hospital care, as it is more related to the surgical complications and quality of life post-surgery rather than the longer follow-up periods.[6] However, its use may be limited. While there are possibly preventable reasons for readmission, non-modifiable factors that can contribute to patient readmission and ED utilization exist. Patient's gender, race, socioeconomic level, and comorbidities are among these characteristics.[16] The reasons for readmission vary depending on the patient demographics. As a result, by evaluating a specialty population, such as HNS patients, the specialized needs of that group can be determined.

Table 6: Comparison between emergency department and outpatient department groups

Variable	ED	OPD	*P*
Age, mean±SD	56.19±19.82	45.56±12.74	0.005
Gender, *n* (%)			
Male	14 (66.7)	17 (27)	0.003
Female	7 (33.3)	46 (73)	
BMI, *n* (%)			
<18.5	4 (19)	4 (6.3)	0.236
18.5–24.9	3 (14.3)	12 (19)	
25–29.9	8 (38.1)	19 (30.2)	
30–34.9	5 (23.8)	13 (20.6)	
35–39.9	0	10 (15.9)	
>40	1 (4.8)	5 (7.9)	
Type of condition, *n* (%)			
Benign	1 (4.8)	25 (39.7)	0.006
Malignant	20 (95.2)	38 (60.3)	
Readmission as inpatient, *n* (%)			
Yes	6 (28.6)	3 (4.8)	0.008
No	15 (71.4)	60 (95.2)	
ASA, mean±SD	2.29±0.56	1.91±0.62	0.012
CCI, mean±SD	3.86±2.03	2.02±1.58	0.001
CIRS, mean±SD	5.95±3.15	3.18±2.41	0.001

CIRS – Cumulative Illness Rating Scale; CCI – Charlson Comorbidity Index; ASA – American Society of Anesthesiologists; SD – Standard deviation; BMI – Body mass index; ED – Emergency department; OPD – Outpatient department

Table 7: Comparison between readmitted and nonreadmitted patients

Variable	Readmitted	Nonreadmitted	*P*
Age, mean±SD	57.78±18.73	47.07±14.67	0.048
Gender, *n* (%)			
Male	4 (44.4)	27 (36)	0.720
Female	5 (55.6)	48 (64)	
BMI, *n* (%)			
<18.5	1 (11.1)	7 (9.3)	0.653
18.5–24.9	3 (33.3)	12 (16)	
25–29.9	3 (33.3)	24 (32)	
30–34.9	1 (11.1)	17 (22.2)	
35–39.9	0	10 (13.3)	
>40	1 (11.1)	5 (6.7)	
Type of condition, *n* (%)			
Benign	0	26 (34.7)	0.081
Malignant	9 (100)	49 (65.3)	
ASA, mean±SD	2.44±0.73	1.95±0.59	0.022
CCI, mean±SD	4.67±2	2.21±1.69	0.006
CIRS, mean±SD	7.22±3.11	3.47±2.57	0.007
ICU admission, *n* (%)			
Yes	3 (33.33)	2 (2.67)	0.003
No	6 (66.67)	73 (97.33)	
History of intubation during hospital course, *n* (%)			
Yes	1 (11.11)	5 (6.67)	0.505
No	8 (88.89)	70 (93.33)	

CIRS – Cumulative Illness Rating Scale; CCI – Charlson Comorbidity Index; ASA – American Society of Anesthesiologists; SD – Standard deviation; BMI – Body mass index; ICU – Intensive care unit

Although the preventable causes of 30-day readmission are low due to various non-modifiable factors, this study revealed common reasons for hospital returns, such as infection and wound complications, which may be avoidable with modifications to discharge planning and enhanced patient education.

In our study, the rate of hospital revisits after HNS was 8.07%, of which 0.87% were readmitted as inpatients; this is below the 3.2%–16.1% readmission rates reported in other studies.[7,11,13,17-19] In the United States, a nationwide study on the rate and causes of readmission after HNS in head and neck cancer patients found that the rate of readmissions was 16.1%, with infections and wound complications being the most common causes.[13] In our study, all readmitted patients were malignant cases. However, including benign and malignant causes of HNS in our study may have resulted in the lower return rates. Nonetheless, our findings regarding the causes of readmission were consistent, with infections and wound complications being the most common causes.[13] Such etiologies may be preventable with proper patient and caregiver education. Patients with head and neck cancer are likelier to have a higher rate of unplanned readmissions than patients treated in other subspecialties of otolaryngology. Readmissions are especially critical in this patient population, as it not only exposes them to hospital-acquired complications but can also delay adjuvant therapy, potentially leading to a decrease in survival rates.[20] Cancer patients are highly prone to infections, and vigorous preventative treatment for head and neck cancer patients should receive more attention. Because most returning patients in our study had malignancies as an indication of HNS, planned interventions around this may reduce the risk of unnecessary hospital returns.

The rate of ED revisits post-HNS in our study was 2.0%, with frequent causes being neurological symptoms, such as weakness and seizures, and surgical site bleeding. In a similar study, Wu and Hall observed a return rate of 8.4% to the ED, with pain being the most common cause.[11] Young *et al*. studied patients undergoing thyroidectomy and parathyroidectomy, and found that the rate of ED utilization following discharge after surgery was 11.2%, with the most frequent causes being wound complications and paresthesia.[21]

Medication review with personalized caregiver and patient education about the significance of proper hydration and red flags for electrolyte problems may all help prevent ED visits.[22,23] Several studies have shown the effectiveness of various coordinated programs.[24-26] Project Better Outcomes by Optimizing Safe Transitions (BOOST) focuses on approaches such as enhanced patient education, polypharmacy reduction, and outpatient follow-up verification.[26] The Re-Engineered Discharge (RED) project facilitates phone calls between pharmacists and patients 2–4 days after discharge to answer queries and avoid medication-related complications.[25] These projects have been associated with lower readmission rates and lower emergency department returns. The findings highlight the significance of extensive pre-discharge planning and maintaining contact between physician and patient.

In this study, we used three different validated comorbidity scores to evaluate patients' comorbidities and their predictive value for readmission after HNS. All three scores showed a significant association with readmission and ED utilization within 30 days of discharge. Previous reports confirmed that the ASA score is closely linked with predicting readmissions and is positively associated with increased readmission rates.[11,27,28] In addition, the CIRS comorbidity score has been used in HNS patients, with larger scores suggesting worsening baseline health.[11,15,29] Moreover, the CCI score has been used in patients undergoing HNS as a predictor for ED revisits, with higher scores being a risk factor for ED return within 30 days after surgery.[30] Hence, returned patients in our study had a higher baseline health burden, which exposed them to more significant complications and led to them returning to the hospital. Furthermore, it is well recognized that patients with head and neck cancer have higher comorbidities, which are generally the consequence of long-term exposure to risk factors such as alcohol and tobacco use.[31-33] Nonetheless, more extensive and close post-surgery follow-ups for individuals with high baseline health burdens may reduce unplanned hospital readmissions.

Strengths and limitations

To the best of the authors' knowledge, this is the first such study from western Saudi Arabia. However, our findings are to be interpreted with several limitations. Owing to the retrospective study design, the authors could not conclusively report the specific cause and the exact time of returning to the hospital post-discharge. Moreover, because of poor documentation, valuable variables that can potentially affect the results, such as the tumor subtype and stage in malignant cases, were not discussed in the study. This study was conducted at a referral center in western Saudi Arabia, and many patients in the studied population live in peripheral areas. The process of referral and transportation may make it difficult to achieve consistent follow-up during the first 30 days after surgery. Furthermore, the fact that our study was limited to a single area may limit the generalizability of findings. Another factor that can affect the accuracy of the results is the relatively small sample size. Therefore, further multicentric prospective studies with extended follow-up periods on larger populations are required.

CONCLUSION

The 30-day unplanned hospital return rate after HNS was 6.1% and 2.0% through the OPD and the ED respectively,

and 0.9% were readmitted as inpatients. The most common causes for readmission were wound swelling, infections, neurological symptoms, and surgical site bleeding. Using the current study findings, strategies can be developed to reduce the burden by addressing the common causes of hospital readmission and return rates.

Ethical considerations

The study was approved by the Unit of Biomedical Ethics, Research Ethics Committee of the Faculty of Medicine, King Abdulaziz University and King Abdulaziz University Hospital (Ref. No: 561-22; date: November 22, 2022). The requirement for written consent was waived owing to the study design. The study adhered to the principles of the Declaration of Helsinki, 2013.

Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author contributions

Conceptualization: M.M. and A.A.; Methodology: O.A. and M.A.; Data analysis: A.S.A., O.A., and M.M.; Writing–original draft preparation: A.A. and A.A.A.; Writing – review and editing: M.M. and A.A.; Supervision: M.M.

All authors have read and agreed to the published version of the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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