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Surgical Complications for Oral Cavity Cancer: Evaluating Hospital Performance

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Objective: Complications of oral cavity cancer (OCC) surgery have an impact on the quality of life. Therefore, evaluating hospital performance on complication rates can help identify best practices for improving the quality of OCC care. As patient and tumor characteristics also impact hospital results, case-mix adjustment should be considered to provide a valid hospital comparison. This study investigated hospital variation in the quality indicator “a complicated postoperative course” after OCC surgery.

Methods: This population-based cohort included all first primary OCC patients diagnosed between 2018 and 2021 who were surgically treated with curative intent. A complicated postoperative course was defined as 30-day mortality, unplanned readmission, surgical complications requiring reintervention or prolonged hospital stay, or fistula formation. Hospital performance was analyzed using funnel plots with case-mix correction.

Results: A total of 2,266 OCC patients could be included. The distribution of case-mix variables varied significantly between hospital populations. Nationally, a complicated postoperative course occurred in 13.9% and uncorrected hospital rates ranged from 2.7% to 31.1%. A WHO performance score ≥2, cT3-T4 tumors, and floor-of-mouth tumors were associated with an increased risk of a complicated postoperative course, and non-squamous cell carcinoma with a decreased risk. Significant outliers remained after case-mix correction for patient, tumor, and treatment characteristics.

Conclusion: Complications after OCC surgery are prevalent, especially regarding extensive tumors and surgery. To identify best practices in OCC surgery, hospital performance on a complicated postoperative course should be adjusted for case-mix and treatment variables. Providing feedback on hospital performance for complications can instigate improvement plans for better outcomes.

Key Words: clinical auditing, head and neck cancer, hospital variation, oral cavity cancer surgical complications.

Level of Evidence: 3

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INTRODUCTION

Resections of oral cavity cancer (OCC) are often elaborate procedures and are associated with considerable morbidity and loss of function.[1] In addition, patients undergoing OCC surgery frequently experience postoperative complications.[2,3] In head and neck cancer (HNC) in general, it has been demonstrated that such postoperative complications can lead to a delay in adjuvant therapy and a worse survival.[4,5] This pattern likely applies to OCC, underscoring the need for strategies to reduce surgical complication rates. One emerging strategy in recent years is the implementation of clinical auditing.

Clinical auditing of postoperative outcomes has been an effective tool for improving complication rates in surgical oncology.[6] Quality of care is benchmarked using quality indicators (QIs) focused on structure, process, and outcome.[1,7,8] Clinical auditing for HNC has been performed in The Dutch Head and Neck Audit (DHNA) since 2014.[9,10] When the DHNA was established, QIs were defined from the perspectives of patients and health care professionals.[11] Evaluating hospital performance on QIs can identify best practices to instigate care improvement plans.[12] Because the transparency of hospital performance is increasingly demanded, the feasibility of QIs is imperative.[13] Patient and tumor characteristics, also known as case-mix variables, often impact QIs. Therefore, case-mix correction on QIs should be considered to provide a valid evaluation of hospital performance.[14–17] Case-mix correction models for complications after HNC surgery have previously been described but mainly focus on low-frequency outcomes such as mortality.[18,19]

Benchmarking low-incidence events should be handled cautiously, as it can lead to false complacency.[20] With approximately 1000 new patients in the Netherlands in 2023, OCC is the most common form of HNC in the Netherlands but relatively rare compared to other malignancies.[21] Yet, outlier detection in clinical auditing depends on hospital volume and event rates. When looking at mortality as a QI for rare cancers such as OCC, the discriminative value between statistical variation and a difference in quality is disputable.[22] To address the issue of low volumes, it has been recommended that QIs be assessed over several years or that composite outcome measures be focused on.[20] Therefore, this study aims to investigate the composite outcome measure "complicated postoperative course" after OCC surgery for clinical auditing. Moreover, a case-mix correction model will be established based on 4 years of data from a national database.

MATERIALS AND METHODS

Study Setting and Patient Selection

This population-based cohort study used data from the DHNA database. Fourteen hospitals in the Netherlands are licensed to perform HNC care, and DHNA participation is mandatory. The DHNA is housed at the Dutch Institute for Clinical Auditing, which ensures data quality through thorough verification processes.[12,23] The Institutional Research Review Board at Erasmus Medical Center (Rotterdam, the Netherlands) reviewed and confirmed this research proposal's exemption from the Medical Research Involving Human Subjects Act (MEC-2022-0816).

Patients were selected from the DHNA database when diagnosed with first primary HNC in the oral cavity which was surgically treated with curative intent between 2018 to 2021. ICD-O-3 codes for OCC included C00, C02-C04, C05.0, C5.8-9, and C06.0-8.[24] Patients with in situ carcinoma or T0 classification were excluded.

Variables and Definitions

The primary outcome was the composite short-term outcome QI "percentage of complicated postoperative course," including complications within 30 days after surgery. Included complications were (1) mortality, (2) unplanned readmission, (3) surgical complications of Clavien Dindo grade III or higher, (4) 30-day surgical complications associated with a prolonged length of hospital stay, or (5) fistula formation. A length of stay above the national 90th percentile was considered as prolonged (Supporting Information S1). Robust complication measures were included, focusing on data that were easily retrievable from hospital registries and not dependent on interpretation of registrars.

Variables included for case-mix analysis were selected based on expert opinion and DHNA availability.[11] Continuous variables were dichotomized based on the median. The following patient and tumor characteristics were identified and included for case-mix analysis: gender, age (<67 and ≥67 years), body mass index (BMI, (25 < and ≥25 kg/m^2)), smoking and alcohol history, World Health Organization (WHO) performance status (0-1 and 2-4), ASA score (I-II and III-IV), squamous cell carcinoma (SCC), clinical T-classification (T1-T2 vs. T3-T4), clinical N-classification (N0 vs. N1-N3), and sublocalization in the oral cavity (tongue, gum, floor-of-mouth, other subsites).

In additional analysis, treatment variables were included in the case-mix correction model. As elaborate resections are associated with higher complication rates, the variables neck dissection, free flap reconstructive surgery, and tracheostomy were assessed.[5,18,25]

Statistical Analyses

Statistical analyses were performed in R-studio version 4.3. No data on outcome variables were missing. Multiple imputation was performed for missing data on case-mix variables. Per case-mix variable, the mean percentage in total and per hospital was calculated. The minimum and maximum hospital percentages were determined to assess hospital variation in case-mix variables and plotted in violin graphs. The significance of this variation was determined using univariable logistic regression analysis with the case-mix variables as dependent variables and the hospitals as independent variables.

The association of case-mix variables and complicated postoperative course was investigated using univariable and multivariable logistic regression analyses, with the case-mix variables as dependent variables and the primary outcome as independent variables. The final case-mix correction model was a multivariable logistic regression with a complicated postoperative course as the outcome. All case-mix factors were included in the case-mix correction model when the number of events was sufficient after checking for multicollinearity. Multicollinearity was tested using the Variance Inflation Factor (VIF) and considered non-multicollinear when <3.0.

The benchmark percentage of a complicated postoperative course was calculated as a national weighted mean. The expected occurrence of a complicated postoperative course was calculated, based on the case-mix of all patients using the multivariable logistic regression model, both in total and at the hospital level. Hereafter, the observed/expected (O/E) ratio was calculated to illustrate the difference in complicated postoperative course per hospital. An O/E ratio above 1 indicates that a hospital performed worse than expected. Confidence intervals (CIs) of 95% were calculated to indicate whether a hospital's performance was significantly different from the others. Hospital performance on complicated postoperative course was visualized using funnel plots for the uncorrected and corrected indicator scores with 95% and 99% CIs.

RESULTS

Study Population

A total of 2,266 OCC patients who underwent surgical treatment between 2018 and 2021 were included (Supporting Information S2). Demographic characteristics are shown in Table I. A complicated postoperative course was observed in 13.9% ($n = 316$) of the patients. The distribution of surgical complications leading to a complicated postoperative course per hospital is specified in Supporting Information S3.

Hospital Variation in Case-Mix Variables

Variation in case-mix and treatment variables is displayed in Table II and Figure 1. The percentage of patients with a status of former or current drinker, WHO performance score of ≥2, and ASA III-IV varied significantly between hospitals. For tumor characteristics, significant variation was observed for the proportion of non-SCC, cT3-T4, cN1-N3, and gum tumors. All treatment characteristics indicated significant hospital variation. The WHO performance status was the only case-mix variable with >10% missing data.

Case-Mix Variables and Complicated Postoperative Course

Table III shows the association between case-mix and treatment variables and a complicated postoperative course in imputed multivariable logistic regression analyses. No patient characteristics were significantly associated with the primary outcome in the case-mix model. A significantly higher risk of complicated postoperative course was seen in cT3-T4 (OR 2.95) and floor-of-mouth tumors (OR 1.73). Non-SCC tumors were associated with a significantly lower risk of complicated postoperative course (OR 0.38). The case-mix correction model needed no restrictions due to sufficient events, and the VIF was <3.0 for all variables. Therefore, all case-mix variables were included in the model.

In additional analysis, treatment variables were added to the case-mix adjustment model. In multivariable imputed logistic regression analysis, patient and tumor variables with significant p-values were WHO performance status ≥2 (OR 1.62), cT3-T4 (OR 1.37), and floor-of-mouth tumors (OR 1.43). All treatment variables indicated a significantly increased risk for complicated postoperative course in this model. There were sufficient events to include all variables in the model, but free flap reconstruction and tracheostomy were multicollinear. After removing tracheostomy from the model, the VIF for all other variables was <3.0. Univariable imputed logistic regression analysis for case-mix and treatment variables and a complicated postoperative course are presented in Supporting Information S4.

Hospital Variation in Complicated Postoperative Course

Unadjusted hospital performance on the QI for a complicated postoperative course ranged from 2.7% to 31.1% (Figure 2A). Seven hospitals performed outside the 95% CI and were indicated as outlier hospitals on the unadjusted funnel plot. Three hospitals had a higher percentage of complicated postoperative course, and four hospitals had a lower percentage than the benchmark. After case-mix correction, all seven outlier hospitals performed outside the 95% CI (Figure 2B). When the treatment characteristics were added to the case-mix model, the outlier detection on observed/expected ratios indicated four initial outlier hospitals outside the 95% CI (Figure 2C). Three initial outlier hospitals did not perform significantly differently from the benchmark after correction for case-mix and treatment variables.

DISCUSSION

To benchmark hospital performance, this population-based cohort study investigated the composite outcome measure "complicated postoperative course" after OCC surgery. Based on 4 years of data from a national database, a case-mix correction model was developed. A complicated postoperative course occurred in 13.9% of the patients in the Netherlands who underwent surgery for primary OCC between 2018 and 2021. Hospital results for a complicated postoperative course varied significantly despite correction for case-mix and treatment variables.

This is the first nationwide case-mix adjustment study for complications after OCC surgery. Most previous research has focused on risk factors for mortality, unplanned reoperations, or complications after HNC surgery. However, these studies were either single-institutional, based on declaration data, or of retrospective design. None of these studies assessed benchmarking hospital performance on surgery outcomes.[5,25–28] These studies show that complication rates in OCC surgery vary between 6% and 51%, yet the heterogeneous definitions hinder a trustworthy comparison with our results.[2,25] Complication rates in literature can include surgical and nonsurgical complications or different grading of complications. Two extensive studies have assessed complication rates after HNC surgery in a regional and national cohort. Tighe et al. assessed case-mix adjustment for complications in a cohort of 1,075 HNC patients from four cancer networks in the United Kingdom. Any 30-day complications were observed in 43% with a nonsignificant hospital variation from 35% to 51%. In this study, both surgical and nonsurgical complications were included and the severity of complications was not specified. Their

TABLE I.
Characteristics of Patients Undergoing Oral Cavity Cancer Resection in 2018–2021 in the Netherlands.

	Total	No Complicated Course	Complicated Course
$N =$	2,266	1,950	316
Patient and tumor characteristics			
Sex			
Male	1,213 (54%)	1,027 (53%)	186 (59%)
Female	1,053 (46%)	923 (47%)	130 (41%)
Age, years			
Median (IQR)	67 (59, 75)	67 (58, 75)	68 (60, 76)
<67	1,107 (49%)	965 (49%)	142 (45%)
≥67	1,159 (51%)	985 (51%)	174 (55%)
Body mass index, kg/m^2			
Median (IQR)	25 (23, 28)	25 (23, 29)	25 (22, 27)
<25	1,049 (46%)	878 (45%)	171 (54%)
≥25	1,159 (51%)	1,016 (52%)	143 (45%)
Unknown	58 (3%)	56 (3%)	2 (1%)
Smoking			
No history of smoking	586 (26%)	522 (27%)	64 (20%)
Former or current smoker	1,590 (70%)	1,347 (69%)	243 (77%)
Unknown	90 (4%)	81 (4%)	9 (3%)
Alcohol			
No history of drinking	373 (16%)	335 (17%)	38 (12%)
Former or current drinker	1,701 (75%)	1,443 (74%)	258 (82%)
Unknown	192 (8%)	172 (9%)	20 (6%)
WHO performance status			
WHO 0–1	1,574 (69%)	1,365 (70%)	209 (66%)
WHO 2–4	171 (8%)	138 (7%)	33 (10%)
Unknown	521 (23%)	447 (23%)	74 (23%)
ASA score			
ASA 1–2	1,445 (64%)	1,253 (64%)	192 (61%)
ASA 3–4	693 (31%)	576 (30%)	117 (37%)
Unknown	128 (6%)	121 (6%)	7 (2%)
Histology			
SCC	2,077 (92%)	1,771 (91%)	306 (97%)
Non-SCC	188 (8%)	178 (9%)	10 (3%)
Unknown	1 (0.0%)	1 (0.0%)	NA
cT-classification			
T1	796 (35%)	756 (39%)	40 (13%)
T2	741 (33%)	640 (33%)	101 (32%)
T3	289 (13%)	220 (11%)	69 (22%)
T4	440 (19%)	334 (17%)	106 (34%)
cN-classification			
Nx	12 (1%)	9 (0%)	3 (1%)
N0	1,827 (81%)	1,605 (82%)	222 (70%)
N1-N2a	182 (8%)	142 (7%)	40 (13%)
N2b-N3	245 (11%)	194 (10%)	51 (16%)
Subsite oral cavity			
Tongue	1,009 (45%)	895 (46%)	114 (36%)
Gum	409 (18%)	336 (17%)	73 (23%)
Floor of mouth	386 (17%)	310 (16%)	76 (24%)
Other parts of oral cavity	462 (20%)	409 (21%)	53 (17%)

(Continues)

TABLE I.
Continued

	Total	No Complicated Course	Complicated Course
N =	2,266	1,950	316
Treatment characteristics			
Type of surgery*			
Neck dissection	1,198 (53%)	933 (48%)	265 (84%)
Free flap reconstruction	762 (34%)	555 (28%)	207 (66%)
Tracheostomy	728 (32%)	526 (27%)	202 (64%)

IQR = interquartile range; SCC = squamous cell carcinoma; WHO = World Health Organization.
*Sum of percentages can exceed 100% as more than one surgery type can be applicable.

TABLE II.
Mean Distribution With Minimum and Maximum of Case-Mix and Treatment Variables.

	Mean, %	Missing, %	Min-Max, %	*p*-Value*
Patient characteristics				
Female	47.4	NA	39.3–51.7	0.526
Age ≥67 years	51.6	NA	42.7–60.0	0.526
Body mass index ≥25 kg/m^2	53.0	2.6	47.2–61.3	0.646
Former or current smoker	72.9	4.0	65.9–81.0	0.191
Former or current drinker	82.1	8.5	69.6–93.2	**0.001**
WHO performance status ≥2	9.7	23.0	0.0–27.6	**<0.001**
ASA III-IV	29.9	5.6	10.7–41.3	**<0.001**
Tumor characteristics				
Non-SCC	9.0	NA	4.3–16.1	**0.001**
cT-classification T3-T4	31.3	NA	10.4–44.4	**<0.001**
cN-classification N1-N3	18.3	NA	8.3–24.8	**<0.001**
Tongue	45.1	NA	38.9–61.7	0.577
Gum	19.4	NA	10.0–29.6	**0.006**
Floor of mouth	16.7	NA	11.7–20.4	0.836
Treatment characteristics				
Neck dissection	53.44	NA	27.2–72.02	**<0.001**
Free flap reconstruction	33.8	NA	0.0–56.6	**<0.001**
Tracheostomy	33.3	NA	0.0–56.6	**<0.001**

SCC = squamous cell carcinoma, WHO = World Health Organization. Bold indicates statistically significant *p* values < 0.05.
**p* values were calculated using univariable logistic regression analysis, with the case-mix variables (and treatment variables) as dependent variables and the hospitals as an independent variable.

model included the scale of surgery, tumor size, and high-risk surgery.[18] A national analysis of perioperative outcomes after HNC surgery in the United Kingdom was performed by Nouraei et al. The authors used hospital administrative data of 10,589 patients who underwent surgery in six hospitals in England and aimed to assess surgeon-level outcomes. Surgical complications occurred in 20.8% and complication severity was not specified. Medical complications were present in 17.5% of the patients. Other complications, such as delirium, medication errors, and alcohol withdrawal occurred in 10.4%. However, the authors had difficulties benchmarking their results according to surgery type, subsite, and surgeon.[29]

The primary outcome in this study only included surgical complications. Two primary considerations inform this design choice. First, the QIs are specifically reported to the operating surgeon, who has a specific interest in surgical complications. Second, the documentation of medical complications can be inconsistent across hospitals, especially regarding complications of CD grade I-II. The primary outcome included a prolonged length of stay (LOS) combined with the presence of surgical complications. This approach was chosen because, in the absence of surgical complications, a prolonged LOS could also result from challenges in transferring the patient to a post-hospital care facility or arranging home care services.

The case-mix variables significantly impacting a complicated postoperative course have previously been identified as risk factors for postoperative complications.[5,18] Patients with a higher WHO performance score were at risk for postoperative complications, emphasizing the vulnerability of this population group. A complicated postoperative course was more common in patients with cT3-T4 tumors. These tumors frequently infiltrate critical

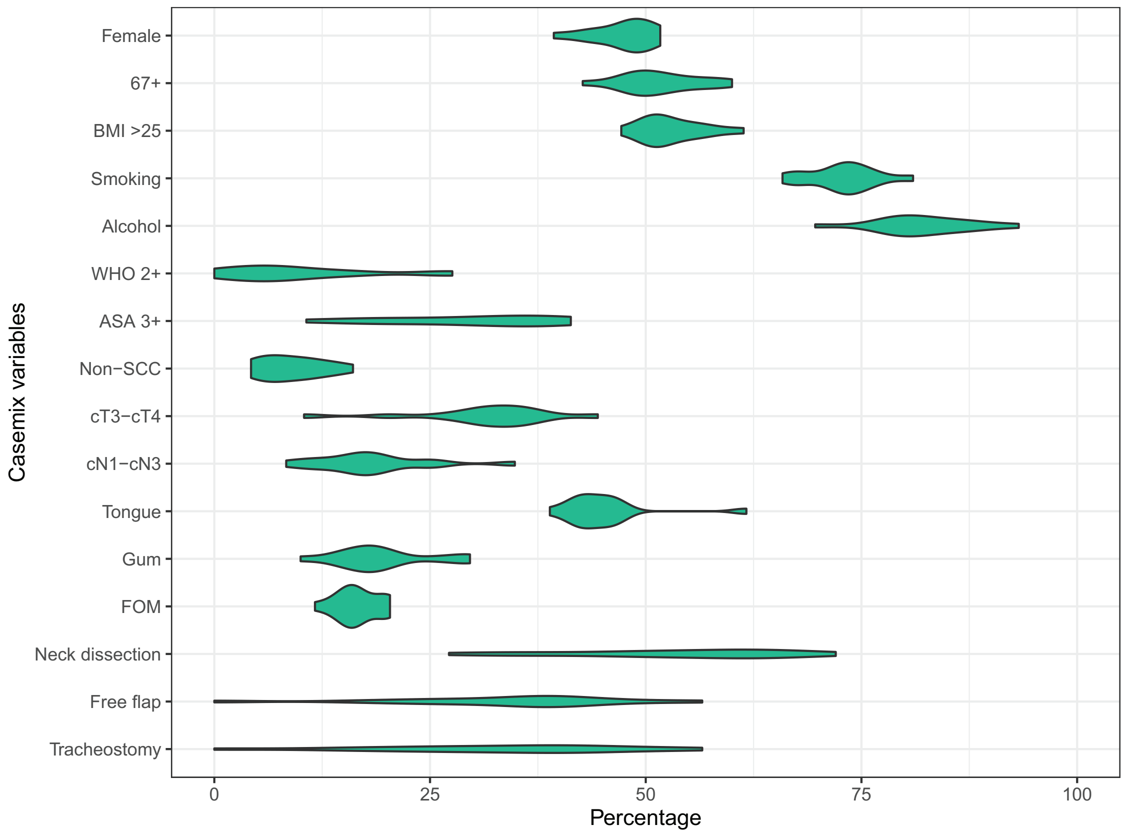

Fig. 1. Violin graph showing the distribution of mean percentages (range) of case-mix variables per hospital. BMI = body mass index; FOM = floor of mouth; SCC = squamous cell carcinoma; WHO = World Health Organization. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

TABLE III.
Imputed Multivariable Logistic Regression Analysis: Association of Case-Mix and Treatment Variables With Complicated Course.

	Case-Mix Model			Case-Mix and Treatment Model		
	OR	95% CI	*p*-Value*	OR	95% CI	*p*-Value*
Case-Mix Variables						
Female	0.96	0.74, 1.25	0.76	0.94	0.72, 1.23	0.63
Age ≥67 years	1.18	0.91, 1.53	0.21	1.30	1.00, 1.70	0.052
Body mass index ≥25 kg/m^2	0.84	0.66, 1.09	0.19	0.88	0.68, 1.14	0.33
Former or current smoker	1.13	0.81, 1.57	0.48	1.02	0.72, 1.43	0.91
Former or current drinker	1.33	0.89, 1.99	0.16	1.21	0.80, 1.81	0.36
WHO performance status ≥2	1.55	0.99, 2.44	0.056	1.62	1.01, 2.58	**0.045**
ASA III-IV	1.06	0.80, 1.40	0.71	1.05	0.79, 1.41	0.73
Non-SCC	0.38	0.19, 0.75	**0.005**	0.54	0.27, 1.08	0.083
cT-classification T3-T4	2.95	2.23, 3.90	**<0.001**	1.37	1.01, 1.86	**0.046**
cN-classification N1-N3	1.22	0.91, 1.64	0.19	0.89	0.66, 1.19	0.43
Subsite oral cavity						
Tongue	Ref			Ref		
Gum	1.04	0.73, 1.48	0.82	1.16	0.81, 1.65	0.43
Floor of mouth	1.73	1.23, 2.42	**0.002**	1.43	1.01, 2.03	**0.042**
Other subsites	1.01	0.70, 1.46	0.96	0.98	0.67, 1.43	0.91
Treatment variables						
Neck dissection	NA	NA	NA	2.43	1.61, 3.67	**<0.001**
Free flap reconstruction	NA	NA	NA	1.61	1.00, 2.58	**0.049**
Tracheostomy	NA	NA	NA	1.66	1.05, 2.62	**0.031**

SCC = squamous cell carcinoma, WHO = World Health Organization. Bold indicates statistically significant *p* values < 0.05.

**p*-values were calculated using univariable and multivariable logistic regression analyses, with the case-mix variables as dependent variables and the complicated course as an independent variable.

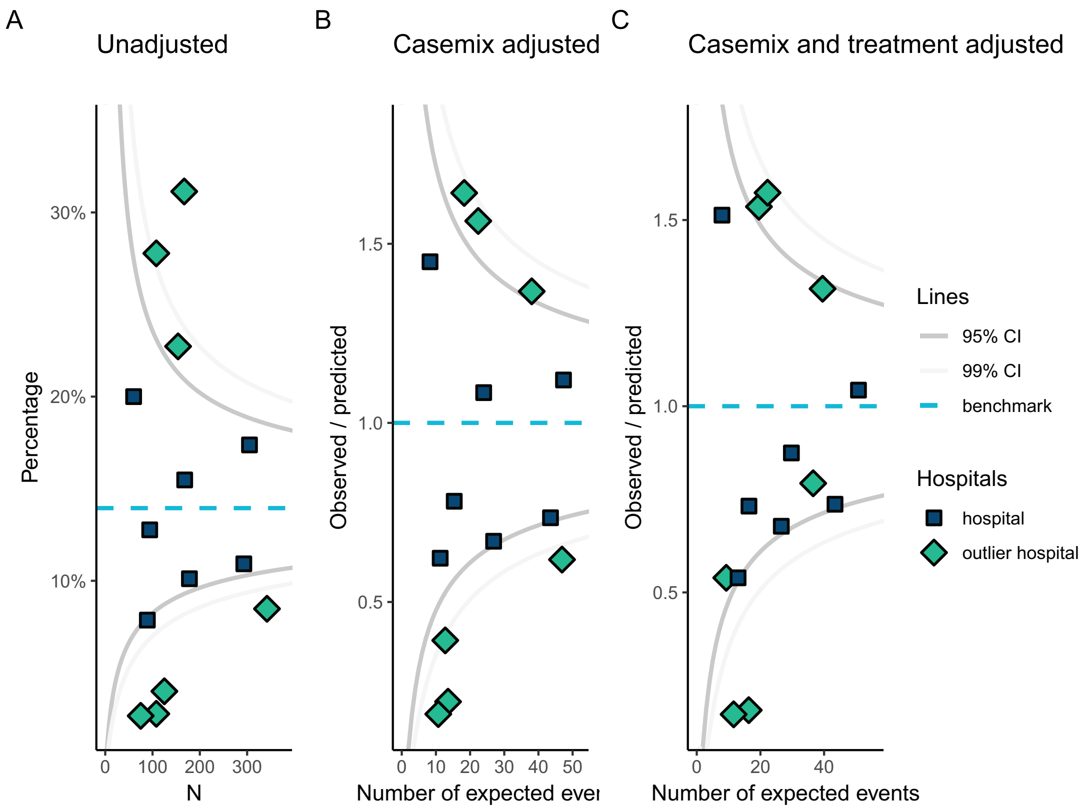

Fig. 2. Funnel plots for hospital variation in complicated course after oral cavity cancer resection. The uncorrected funnel plot is displayed (A) with hospitals outside the 95% confidence interval indicated as outlier hospitals. Funnel plots are adjusted for case-mix variables (B) and for both case-mix and treatment variables (C). [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

anatomical structures in the oral cavity, such as the cortical bone, maxillary sinus, skull base, pterygoid plates, and carotid artery. Therefore, these tumors often require more extensive surgery and reconstruction. Tumors in the floor of the mouth were also associated with a higher incidence of surgical complications due to their proximity to vital structures. When combined with a neck dissection, the risk to these essential structures increases further. This highlights the crucial importance of meticulous preoperative planning and the involvement of highly skilled personnel in OCC surgery. Beside case-mix factors, treatment variables were included in the extended model. The scale of resection, including neck dissection, free flap reconstruction, or tracheostomy, has previously been recognized as high-risk surgery.[5,25,26,29] The highly increased risk of a complicated postoperative course in extensive OCC surgery is reaffirmed by the results of this study.

In clinical auditing, the primary focus is on assessing the differences in the quality of care between hospitals. A conceptual framework for evaluating these between-hospital differences has been outlined by van Dishoeck et al. According to the authors, the observed differences can initially be attributed to case-mix characteristics, statistical uncertainty or chance, registration bias, and residual confounding. The remaining variation, after accounting for these elements, represents the true differences in the quality of care between hospitals.[30] In line with the proposed framework, case-mix correction has been applied in this study. In addition, the QI has been evaluated over a four-year period to increase statistical power and limit the influence of yearly within-hospital uncertainty. To limit registration bias, data of a national prospective database were used. Data curation for the DHNA is performed by trained staff. Definitions for complex postoperative outcomes are grounded in consistently documented and robust variables within electronic patient records, such as reoperation instances and discharge dates, thereby ensuring data reliability. However, it is essential to acknowledge that the registration of complications, particularly regarding CD grade, may still vary due to individual physicians' responsibility for interpretation and reporting at each hospital. Lastly, residual confounding due to unmeasured variables could influence the observed hospital differences, which is a limitation of this study. Education level, ethnicity, living situation, and socioeconomic status could not be included as case-mix variables, because these are not included in the DHNA dataset. These variables are registered at the Dutch Central Statistics Bureau. This database currently cannot be linked with the DHNA due to strict privacy legislation in the Netherlands. Although the DHNA includes a comorbidity score, the extent of missing data, which was not random, precluded its inclusion in the model. Missing data on included case-mix variables were addressed using multiple imputation.

By thoroughly considering all components of the conceptual framework, this study aimed to assess differences in quality of care across hospitals. Observed hospital differences were impacted by case-mix and treatment variables. However, most initial outlier hospitals remained outside the 95% CI in both correction models. The impact of case-mix correction on the uncorrected model was less than expected. No outlier hospitals moved from outside to inside the 95% CI. This could be explained by the fact that HNC care has been centralized in the Netherlands for many years, limiting the influence of population characteristics. Moreover, medical complications that have a strong correlation with WHO- or ASA classification and smoking were not included in the primary outcome. In the additional analysis, treatment characteristics were also included in the model. This addition is not traditionally applied in case-mix correction. In our study, grouping low- and high-risk surgeries was applied to meet a substantial sample size over 4 years. As our results demonstrated, all treatment characteristics were significantly associated with a complicated postoperative course. Therefore, correction for treatment variables is imperative when low- and high-risk surgeries are grouped for quality of care evaluation. Three hospitals were identified as outlier hospital on the case-mix adjusted funnel plot, but performed inside the 95% CIs on the case-mix and treatment corrected plot. The deviation from the benchmark these hospitals demonstrated in the first model could therefore be related to the rate of low- or high-risk surgery instead of differences in quality of care. For transparent benchmarking of OCC surgery in smaller countries or cancer networks, correcting for treatment characteristics is crucial when grouping. In countries or networks with a higher OCC incidence, reporting outcomes per surgery type would be preferred. For our cohort, stratification for treatment characteristics still identified outlier hospitals (Supplement 5). Overall, by reviewing patients with a complicated postoperative course, surgeons can identify patterns and opportunities for quality improvement.

In the DHNA, the QI on a complicated postoperative course is presently evaluated exclusively between hospitals. Due to the absence of case-mix correction, hospital results on the QI are currently not suitable for transparent publication. The findings of this study can be directly integrated into the DHNA dashboards to provide a more accurate hospital comparison of a complicated postoperative course. Also, a future DHNA cohort can serve as temporal validation of the proposed correction model. Hospital results will be reviewed in round table meetings with all participating centers. Before the QI evaluated in this study can be considered for transparent reporting, the rankability and feasibility should be assessed. The national scope of the DHNA enhances the generalizability of the findings to other countries or healthcare networks aiming to assess QIs in OCC.

Future studies should focus on initiatives to decrease postoperative complications. The impact of extensive OCC surgery should preoperatively be discussed with patients, especially in vulnerable patient groups. Fit for surgery programs show great potential to improve postoperative outcomes and decrease complication rates.[31] Moreover, the effect of this short-term outcome QI on long-term outcomes such as survival and quality of life measurements should be investigated.

CONCLUSION

Complications after OCC surgery are prevalent, especially regarding extensive tumors and surgery. Careful patient selection, meticulous preoperative planning, and highly skilled personnel are crucial in OCC surgery. Adjustment for case-mix and treatment variables is necessary to provide an accurate evaluation of hospital performance on a complicated postoperative course. By providing feedback on hospital performance for complications within the DHNA, contributors aim to improve outcomes for OCC patients nationwide.

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CONFLICT OF INTEREST STATEMENT

Data from this article were presented as a poster at the 7th Congress of the Confederation of European Otorhinolaryngology - Head and Neck Surgery, June 15–19, 2024, Dublin, Ireland.

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