**Data Set for the Reporting of Carcinomas of the Hypopharynx, Larynx, and Trachea**

**Explanations and Recommendations of the Guidelines From the International Collaboration on Cancer Reporting**

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The International Collaboration on Cancer Reporting is a nonprofit organization whose mission is to develop evidence-based, universally available surgical pathology reporting data sets. Standardized pathologic reporting for cancers facilitates improved communication for patient care and prognosis and the comparison of data between countries to progressively improve clinical outcomes. Laryngeal cancers are often accompanied by significant morbidity, although surgical advances (such as transoral endoscopic laser microsurgery and transoral robotic surgery) provide new alternatives. The anatomy of the larynx is complex, with an understanding of the exact anatomic landmarks, being crucial to classification and prognostication. This review outlines the data set developed for the histopathology reporting in *Carcinomas of the Hypopharynx, Larynx and Trachea* and discusses the main elements required and recommended for reporting.

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**CLINICAL BACKGROUND**

Squamous cell carcinomas (SCCs) of the hypopharynx and larynx are uncommon malignancies, usually arising from dysplastic surface epithelium in patients older than 60 years, with the risk factors of smoking and alcohol. A small proportion of carcinomas appears to be related to transcriptionally active human papillomavirus infection; the
The treatment of patients is modified according to patient factors (age, comorbidity) and tumor stage, and includes options for radiation therapy and chemotherapy. Preservation laryngeal surgery is an option with early disease (stage I/II) and can be used in highly selected advanced tumors. Transoral endoscopic laser microresection (TLM) and transoral robotic surgery are further treatment options. Open partial laryngeal surgery (laryngofissure cordectomy, vertical partial laryngectomy, supracricoid laryngectomy) is less frequently used owing to the availability of TLM. More advanced tumors (stage III/IV disease) treated by surgery are likely to need a total laryngectomy (Figure 1), usually with postoperative radiotherapy.

Initial biopsy will confirm the diagnosis and may determine the type of treatment. Resection reports inform the assessment of the accuracy of preoperative imaging and clinical examination. Pathologic staging provides the most accurate evaluation of prognosis and will influence the need for adjuvant treatment.

This article highlights selected data elements and provides additional explanation and discussion on their inclusion in the surgical pathology ICCR Carcinomas of the Hypopharynx, Larynx, and Trachea: Histopathology Reporting Guide. Elements for Carcinomas of the Hypopharynx, Larynx, and Trachea

**METHODS**

The Dataset Steering Committee of the ICCR invites each of the founding/sustaining organizations to nominate pathologists with a special interest in the specific topic area to serve on the Dataset Authoring Committee (DAC), chaired by a series champion. Nominees are usually pathologists who have contributed to national data sets and who ardently support synoptic cancer reporting. The DAC is facilitated by the ICCR staff and most work is done by teleconference. Initial review of the nationally commissioned data sets (Australasian, United Kingdom, and North America) seeks alignment of the data. The DAC considers the published evidence and determines whether the criteria are reporting core data (normally required for prognosis and prediction) or noncore data (recommended to be included in a comprehensive report but where impact on patient management is uncertain or lacks evidence). Evidentiary support for core elements was at level III-2 or above, but when such data were lacking, expert opinion was accepted and reasons were stated.

Each of the data elements is accompanied by an explanatory note, linked by hypertext to the published data sets. The data sets have had wide consultation, initially among the authors of all head and neck tumor data sets, and subsequently via open consultation through the ICCR Web site. Comments received through the consultation are reviewed by the DAC and each comment is accepted or rejected in a transparent, open process. The Dataset Steering Committee provides oversight of the responses to consultation and hosts publication on the ICCR Web site as an interactive form with linked notes.

Presentation of data items on the proforma as constrained lists provides the potential for structured data capture and coding. Where appropriate, options are provided for free-text comments and additional detail. A balance is reached between overspecifying the number of data elements in order to be comprehensive and providing a number of data points that is achievable and serves the needs of all users and cancer registries.

**DATA SET ELEMENTS AND EXPLANATORY NOTES**

The core and noncore data elements are summarized in Table 1.

**Information on Previous Treatment**

Information on the clinical background leading to receipt of a specimen will assist the pathologist in correctly interpreting the pathologic findings. This information, specifically the details of any neoadjuvant therapy, is regarded as noncore data, as they are not generated by the pathologist. The histologic extent of response to previous treatment (fibrosis and necrosis) is not currently an important guide to future management but may be recorded in a free-text report as an estimate of the percentage of tumor volume showing a particular feature.

**Operative Procedure and Specimen(s) Submitted**

The nature of the operative procedure affects the level of detail that can be provided in the histopathology report (Table 2). Diagnostic biopsies rarely allow consideration of more than the type of invasive carcinoma and the presence or absence of dysplasia.

The nature of the specimens submitted (site and type) assists the pathologist in the description of the specimen
and the selection of appropriate blocks of tissue to obtain information relevant to cancer staging.\textsuperscript{6,7} The complexity of the anatomy of the larynx may be better understood by references to figures produced for the ICCR data set (Figures 2 and 3). For classification purposes, the larynx is divided into 3 regions, each of which has several subsites.

The supraglottis (Figure 4) includes the epiglottis, aryepiglottic folds, arytenoids, ventricular bands (false cords), and laryngeal ventricles. The glottis extends from the ventricle to approximately 1 cm below the free level of the true vocal cord and includes the vocal cords and anterior and posterior commissures. The subglottis (Figure 5) extends from approximately 1 cm below the level of the true vocal cord to the inferior rim of the cricoid cartilage.

The hypopharynx includes the left and right piriform sinuses, which expand around the sides of the larynx and lie between the larynx and the thyroid cartilage; the lateral and posterior hypopharyngeal walls; and the postcricoid region extending from the level of the arytenoid cartilages to the inferior border of the cricoid cartilage.

The paraglottic and pre-epiglottic spaces are potential spaces filled with adipose and connective tissues. The paraglottic space lies anterolateral and deep to the ventricles and sacculles, and the pre-epiglottic space is anterior to the base of the epiglottis.

**Tumor Site and Focality**

The site (and/or subsite) of the primary tumor is the main determinant for the use of clinicopathologic staging systems and is recorded according to the nomenclature used by the Union for International Cancer Control (UICC) and American Joint Committee on Cancer (AJCC).\textsuperscript{8,9} For tumors that involve more than 1 site, the principal site of involvement is recorded, acknowledging that this may not be the site of origin (Table 3).

Tumor focality is described as unifocal or multifocal to allow the pathologist to describe the complexity of the disease in some patients.

**Specimen and Tumor Dimensions**

The macroscopic dimension (in millimeters) should be recorded unless the histologic extent of tumor is greater. As is common practice, this measurement pragmatically

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**Table 2. Data Elements for Operative Procedure and Type of Specimen**

| Operative procedure         | Type of specimen         |
|-----------------------------|--------------------------|
| Biopsy (excisional, incisional) | Trachea                  |
| Resection                   | Hypopharynx              |
| Other                       | Laryngopharyngectomy     |
| Endolaryngeal excision      | Other                    |
| Transoral laser resection   | Other                    |
| Supraglottic laryngectomy   | Other                    |
| Supracricoid laryngectomy   | Other                    |
| Total laryngectomy          | Other                    |
| Vertical hemilaryngectomy   | Other                    |
| Partial laryngectomy        | Other                    |

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**Figure 2.** Coronal section through the larynx to show the main anatomic structures, the subsites, and the paraglottic space. Reproduced with permission from International Collaboration on Cancer Reporting (ICCR).

**Figure 3.** Sagittal section through the larynx to show the main anatomic structures and the pre-epiglottic space. Reproduced with permission from International Collaboration on Cancer Reporting (ICCR).
acknowledges that the dimensions of tissues are affected by fixation and processing. The absolute tumor thickness is noncore for both larynx and hypopharynx, although considered differently in other head and neck subsites (ie, oral cavity).

The maximum dimension of a tumor is a key determinant for staging carcinomas of the hypopharynx, and tumor size is part of a good description for carcinomas of the larynx, allowing comparison with imaging studies, but is not a staging criterion.

**Histologic Tumor Type**

The histologic type of cancer (Table 4) is recorded by using the value list of the World Health Organization’s (WHO) Classification of Head and Neck Tumours. Histologic type is important for cancer registration and prognosis and may influence the need for adjuvant treatment. A good prognosis is associated with verrucous and papillary SCCs, while adenosquamous carcinomas tend to have a worse prognosis than conventional and spindle cell SCCs. For large cell neuroendocrine carcinomas, irradiation and chemotherapy may be considered in preference to surgery.

Salivary-type carcinomas are described in detail in the ICCR Carcinomas of the Major Salivary Glands: Histopathology Reporting Guide, but minor salivary gland carcinomas, as would arise in the hypopharynx, larynx, and trachea, are reported in this anatomic site data set.

**Histologic Tumor Grade**

Some of the variants of SCC (basaloid, adenosquamous, and spindle cell) are considered to have intrinsic biological potential and are not graded. Unlike oropharyngeal carcinomas, human papillomavirus status is not a determinant of tumor type or grade, and all conventional SCCs are graded according to the WHO classification as well,

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**Table 3. Data Items for Tumor Sites and Subsites**

| Tumor Site          | Left, right, midline                                                                 |
|---------------------|--------------------------------------------------------------------------------------|
| Trachea             | Left, right, midline                                                                 |
| Hypopharynx         | Left, right, midline                                                                 |
|                     | Piriform sinus                                                                      |
|                     | Postcricoid                                                                          |
|                     | Pharyngeal wall (lateral and/or posterior)                                           |
|                     | Other                                                                                |
| Supraglottis        | Left, right, midline                                                                 |
|                     | Epiglottis                                                                           |
|                     | Aryepiglottic fold(s)                                                                |
|                     | Arytenoid(s)                                                                         |
|                     | False vocal cord(s)/fold(s)                                                          |
|                     | Ventricles(s)                                                                        |
| Glottis             | Left, right, midline                                                                 |
|                     | True vocal cord/fold                                                                 |
|                     | Anterior commissure                                                                  |
|                     | Posterior commissure                                                                 |
| Subglottis          | Left, right, midline                                                                 |

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Figure 4. A total laryngectomy has been performed for a supraglottic (arrow) squamous cell carcinoma (Courtesy of Jason C. Fowler, PA-C).

Figure 5. A gross view of a tumor, which is confined to the subglottic region (Courtesy of Jason C. Fowler, PA-C).

Figure 6. A basaloid squamous cell carcinoma of the larynx is shown to have extension to the adjacent cartilage rings (hematoxylin-eosin, original magnification ×10).
moderately, or poorly differentiated. Although there is interobserver variation, this system is prognostically useful. Pathologists should record the highest grade (poorest differentiation) as a core element.

**Extent of Invasion and Pattern of Invasive Front**

Pathologists should note that neither the absolute depth of invasion nor the pattern of the invasive front are core data items for carcinomas of the hypopharynx or larynx (Table 5), as there is insufficient evidence of prognostic value. The extent of invasion into the tissue compartments of the larynx (Figure 6) or wall of the hypopharynx is an important criterion for staging.

**Perineural and Lymphovascular Invasion**

Perineural invasion is defined as extension of tumor into the perineural plane between nerve bundles and the perineurium. For this data set, either intratumoral or extratumoral perineural invasion is regarded as a positive finding. The presence of perineural invasion is a predictor of local recurrence and nodal metastasis and may prompt consideration of adjuvant therapy.

The presence of carcinoma within an endothelial-lined space is required to identify lymphovascular invasion. For carcinomas of the larynx and hypopharynx, vascular invasion is a weak predictor of nodal metastasis.

**Margin Status**

For surgically treated carcinomas, the status of the margins is a predictor of local recurrence and may require consideration of adjuvant therapy. For completeness of description, the margin status should include the distance in millimeters from both invasive and in situ carcinoma (if present) to the closest margin. Pathologists should note that comment on the deep resection margin of a laryngectomy specimen may be nonapplicable unless the tumor extends close to the base of tongue or into the soft tissues of the neck.

A positive margin is one where carcinoma is present at the margin. The definition of a “close margin” varies between published series, typically being regarded as between 3 and 5 mm. The clinical implications of a positive or close margin should be discussed with the surgical team, preferably in a multidisciplinary meeting. For laser resections of glottic carcinomas, even 1 mm may be adequate owing to the thermal damage to tissue at the in situ margin.

**Coexistent Pathology and Ancillary Studies**

These are noncore data, included to allow pathologists the flexibility to include additional findings, including the results of molecular testing, where the prognostic or predictive significance is presently uncertain.

**Pathologic Staging**

Pathologic staging is usually performed after surgical resection of the primary tumor and depends on the pathologic documentation of the anatomic extent of disease, whether or not the primary tumor has been completely removed. If a biopsied tumor is not resected for any reason (eg, when technically unfeasible) and if the highest T and N categories or the M category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.

Staging criteria are provided in Table 6. By preference for ICCR data sets, cancer staging uses the most recent UICC TNM staging (currently 8th version), which reflects the AJCC cancer staging for all criteria except for T3/T4a subglottic carcinomas. In the AJCC system, T3 carcinomas include those limited to larynx with vocal cord fixation and/or invasion of paraglottic space and/or inner cortex of the thyroid cartilage. Normal (T1) or impaired (T2) vocal cord mobility and vocal cord fixation (T3) may only be determined clinically.

**Carcinomas of the Trachea**

Carcinomas of the trachea are uncommon and are mostly SCCs or carcinomas of salivary type arising from mucosal glands. The literature on these malignancies is confined to case reports and small series of cases. There is insufficient evidence from which to derive robust guidance on the management of these malignancies and neither UICC nor AJCC provide a separate TNM classification. The authors suggest, pragmatically, that pathologists encountering primary tracheal malignancies should report them by using the data set for hypopharyngeal carcinomas. In particular, greatest tumor dimension and depth of invasion should be reported.

**CONCLUSIONS**

The publication of this data set and explanatory notes should aid pathologists in providing consistent histopathology reports on cancers of the hypopharynx, larynx, and trachea. A syncratic approach will facilitate communication.
with clinicians for patient management and with cancer registries so that outcomes of treatment can be compared equitably within and between countries. The ICCR is supporting initiatives to translate the data sets into languages other than English and for data elements to be included in SNOMED-CT (see www.iccr-cancer.org), enhancing their global application.

There is a commitment to regularly review the ICCR data sets in line with revisions of the WHO Classification of Tumours and updates to staging manuals.

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References
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2. Torrente MC, Rodrigo JP, Haigentz M Jr, et al. Human papillomavirus infections in laryngeal cancer. Head Neck. 2011;33(4):581–586.

Table 6. Union for International Cancer Control TNM 8th Edition Staging of Carcinomas of the Hypopharynx and Larynx

| Stage | Description |
|-------|-------------|
| pT1x  | Primary tumor cannot be assessed |
| pT0   | No evidence of primary tumor    |
| pTis  | Carcinoma in situ              |

Hypopharynx
- pT1: Tumor limited to 1 subsite of hypopharynx and/or 2 cm or less in greatest dimension
- pT2: Tumor invades more than 1 subsite of hypopharynx or an adjacent site, or measures more than 2 cm but not more than 4 cm in greatest dimension without fixation of hemilarynx
- pT3: Tumor measures more than 4 cm in greatest dimension or with fixation of hemilarynx or extension to esophagus mucosa
- pT4: Moderately advanced or very advanced local disease
  - pT4a: Tumor invades thyroid/cricoid cartilage, hyoid bone, thyroid gland, esophagus, or central compartment soft tissue (strap muscles, subcutis)
  - pT4b: Tumor invades prevertebral fascia, encases carotid artery, or invades mediastinal structures

Supraglottis
- pT1: Tumor limited to 1 subsite of supraglottis with normal vocal cord mobility
- pT2: Tumor invades mucosa of more than 1 adjacent subsite of supraglottis or glottis or region outside the supraglottis (eg, mucosa of base of tongue, vallecula, medial wall of piriform sinus) without fixation of the larynx
- pT3: Tumor limited to larynx with vocal cord fixation and/or invades any of the following: postcricoid area, pre-epiglottic space, paraglottic space, and/or inner cortex of thyroid cartilage
- pT4: Moderately advanced or very advanced local disease
  - pT4a: Tumor invades through the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscle of tongue, strap muscles, thyroid, or esophagus)
  - pT4b: Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Glottis
- pT1: Tumor limited to vocal cord(s) (may involve anterior or posterior commissure) with normal mobility
  - pT1a: Tumor limited to 1 vocal cord
  - pT1b: Tumor involves both vocal cords
- pT2: Tumor extends to supraglottis and/or subglottis and/or with impaired vocal cord mobility
- pT3: Tumor limited to the larynx with vocal cord fixation and/or invasion of paraglottic space, and/or inner cortex of thyroid cartilage
- pT4: Moderately advanced or very advanced local disease
  - pT4a: Tumor invades through the outer cortex of the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)
  - pT4b: Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Subglottis
- pT1: Tumor limited to subglottis
- pT2: Tumor extends to vocal cord(s) with normal or impaired mobility
- pT3: Tumor limited to larynx with vocal cord fixation
- pT4: Moderately advanced or very advanced local disease
  - pT4a: Tumor invades cricoid or thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscles of the tongue, strap muscles, thyroid, or esophagus)
  - pT4b: Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Note: For carcinoma of the larynx, normal (T1) or impaired (T2) vocal cord mobility and vocal cord fixation (T3) may only be determined clinically. Pathologic staging is therefore provisional unless the clinical information is available at the time of staging.

a Reproduced with permission from Union for International Cancer Control (UICC). b In: James D. Brierley, Mary K. Gospodarowicz, Christian Wittekind, eds. UICC TNM Classification of Malignant Tumours. 8th ed. New York: Wiley-Blackwell; 2017.

b The results of lymph node/neck dissection are derived from a separate data set.
