Neck Imaging Reporting and Data System

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KEYWORDS

• NI-RADS • Contrast-enhanced computed tomography • Radiology • Head and neck cancer • CT • PET/CT • Cancer surveillance • Imaging • Squamous cell carcinoma

KEY POINTS

- NI-RADS is a practical and clinically useful imaging surveillance template.
- It is designed to guide appropriate imaging follow up and next management steps.
- The standardization of linked management recommendations and correlation with patient outcomes has the potential to validate performance of the template and highlight the radiologists' significant value in patient care.

INTRODUCTION

The Neck Imaging Reporting and Data System (NI-RADS) was originally developed for surveillance contrast-enhanced computed tomography (CECT) imaging with or without PET in patients with treated head and neck (H&N) cancer.[1] The template is easily adaptable to other modalities such as MR imaging. The standard nomenclature promotes shared databases across institutions and is critical to the American College of Radiology (ACR) charge to reengineer the radiology enterprise to be patient-centered, data- driven, and outcomes-based.[2] The Breast Imaging Reporting and Data System demonstrated the success of a standardized mammography report because it simplifies communication, clearly directs management, and facilitates radiologic-pathologic correlation to continually refine and improve cutpoints for desired sensitivity, specificity, and accuracy. Similarly, a standardized reporting template in H&N cancer surveillance serves several important purposes:

- Easily understandable with numerical scores for levels of suspicion to guide patient care
- Linked management recommendations, which reflect a multidisciplinary consensus to standardize approach
- Data-minable reports will pave the way to address optimal surveillance imaging algorithms and timing, imaging accuracy, reader performance, interobserver variability, and so forth
- Opens avenues for direct patient reporting and highlights the radiologist's added value in patient care.

This article is a practical guide for using NI-RADS to reduce report-generation time for radiologists and create useful reports for referring clinicians and patients. After a review of the report template and legend, a case-based and pictorial review instructs readers on the proper assignment of NI-RADS categories.

Neck Imaging Reporting and Data System Template and Legend

The body of the report template is brief and focuses on the primary site and cervical metastatic adenopathy, with a brief description of

Disclosure: Drs A.H. Aiken and P.A. Hudgins serve as co-chairs of ACR NI-RADS committee.

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Magn Reson Imaging Clin N Am ■ (2017) ■–■
https://doi.org/10.1016/j.mric.2017.08.004
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posttreatment change (**Box 1**). In a patient without suspicious findings, the radiologist can tab through these fields with little to no extra dictation to finalize a report. Changes related to chemotherapy or radiation therapy often include laryngeal mucosal edema, subcutaneous stranding, or intensely enhancing submandibular glands; and can generally be summed up in one sentence, which is built into the template. Radiologists can add a sentence to state the expected postsurgical changes from resection with or without a flap reconstruction. If there are suspicious findings, the templates are easily modifiable to add the specific finding both in the findings and impression sections.

Both the primary tumor site and neck are assessed for recurrence and assigned a category from 1 to 4 based on imaging suspicion. The categories of suspicion and management recommendations are based on current best practices, multidisciplinary consensus, and the ultrasound and computed tomography (CT)-guided biopsy experience of the NI-RADS originators,[1] and revised by the ACR NI-RADS committee:

- Category 1: no evidence of recurrence
- Category 2: low suspicion, defined as ill-defined areas of abnormality with only mild differential enhancement and/or mild fluorodeoxyglucose (FDG) uptake. The linked management recommendation is direct inspection for mucosal abnormalities or short-interval follow-up with CECT or an additional PET.
- Category 3: high suspicion, defined as a discrete, new or enlarging lesion with marked enhancement and/or intense focal FDG uptake. The linked recommendation is biopsy.
- Category 4: Definitive recurrence, defined as pathologically proven or definite radiologic or clinical progression.

Box 1
Report template for posttreatment neck

Indication: [ ]

Subsite and human papillomavirus status: [ ]

Surgery and chemoradiation: [ ]

Technique:

Comparison: [<None.>]

Findings:

[<No evidence of recurrent disease is demonstrated at the primary site.>]

[<No pathologically enlarged, necrotic, or otherwise abnormal lymph nodes.>]

Expected posttreatment changes are noted including [<supraglottic mucosal edema and thickening of the skin and subcutaneous soft tissues.>]

There are no findings to suggest a second primary in the imaged aerodigestive tract.

Evaluation of the visualized portions of brain, orbits, spine, and lungs show no aggressive lesions suspicious for metastatic involvement.

Impression:

Primary: [1]. [<Expected posttreatment changes in the neck without evidence of recurrent disease in the primary site.>]

Neck: [1]. [<No evidence of abnormal lymph nodes.>]

From ACR NI-RADS. Available at: https://www.acr.org/Quality-Safety/Resources/NIRADS. Accessed June 2017; with permission.

A reporting template must offer more than just efficiency. Early experience showed the NI-RADS reporting performance in a mixed cohort of both PET and PET-CECT surveillance for H&N squamous cell carcinoma (SCC) at different time points.[3] This study was performed to determine the accuracy of the NI-RADS system for predicting recurrent tumor. The initial performance was good with discrimination between the groups, with a NI-RADS 1 positive disease rate of 3.5%, a NI-RADS 2 positive disease rate of 17%, and a NI-RADS 3 positive disease rate of 59.4%.[3] As future studies look at the predictive value of these NI-RADS categories at specific time points, the positive predictive value will vary at different time points and each NI-RADS category will likely have a larger range of positive rate disease.

Notably, although the body of the template is the same for CECT alone and a CECT as part of a PET-CECT, the legend and specific management recommendations vary slightly (**Boxes 2** and **3**). The legends are included at the bottom of each report, although, after several months of use, referring clinicians become very comfortable and familiar with the 4 levels of suspicion and the linked management recommendations (**Table 1**). In fact, referring clinicians often ask for a NI-RADS level of suspicion for MR imaging surveillance (even though it was originally developed for CECT with or without PET). The authors have found anecdotally that NI-RADS can also be applied to MR imaging with the same 4 categories of suspicion but slightly different linked management recommendations (**Box 4**).

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