Using Signs and Symptoms to Improve Diagnostic Accuracy of Adenoviral Conjunctivitis for Primary Care Providers: Reducing Adenoviral Patient Infected Days (RAPID) Study

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Introduction and Purpose

Infectious conjunctivitis is a common ocular condition accounting for as many as 2% of all general medicine visits[1-3]. A meta-analysis reported non-eyecare clinicians cannot reliably differentiate between bacterial and viral conjunctivitis based on clinical signs and symptoms[10]. Unnecessary or inappropriate prescribing of antibiotics for conjunctivitis is common and is partly attributable to the difficulty of discriminating between viral and bacterial etiologies clinically[1-12]. This can be particularly challenging for primary care providers. The purpose of this report is to improve the diagnostic accuracy of adenoviral conjunctivitis using a multivariate model of presenting signs and symptoms of acute conjunctivitis for non-eye care providers.

Methods

Sample

Individuals ≥ 18 years old with acute red eye(s) ≤ 4 days were enrolled.'

Measures: Screening Visit

A conjunctival swab sample for quantitative polymerase chain reaction (qPCR) analysis. Current systemic symptoms: any cough, fever, sore throat or runny nose. Participants rated ten symptoms including eyelid swelling and overall discomfort from 0 (not bothersome) to 10 (very bothersome). Clinical signs: preauricular, retroauricular and submandibular lymph nodes were palpated.

Statistical Analysis

A univariate logistic regression model, followed by a multivariate logistic regression model, identified significant variables that a patient would be qPCR+ for adenoviral conjunctivitis. To determine the probability that an individual was qPCR+ at the initial visit for adenoviral conjunctivitis, a risk score was calculated for each participant ranging from low to high (0.0 to 1.0). A risk score of 0.20 was used to classify whether a participant was qPCR+ or qPCR- to report specificity, sensitvity, true positive rate and true negative rate.
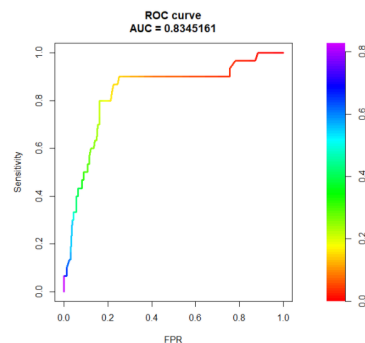
Results

Figure 1. Sensitivity versus false positive rate (FPR).

- Of 186 participants screened, 30 were confirmed to have adenoviral conjunctivitis with qPCR testing.
- Current systemic symptoms were present in 43% of qPCR+ individuals (n=13 of 30) and 66% of qPCR- individuals (n=103 of 156).
- A palpable lymph node was present in 57% of qPCR+ individuals (n=17 of 30) and 31% of qPCR- individuals (n=48 of 156).
- A multivariate logistic regression model using current systemic symptoms (presence/absence), palpable lymph node (presence/absence), patient reported eyelid swelling and overall discomfort had an area under the curve value (AUC) of 0.83 (Figure 1).

Table 1. Diagnostic accuracy of risk score.

	qPCR +	qPCR -	Total
Risk score ≥ 0.20	24	25	49
Risk score <0.20	6	130	136
Total	30	155	185

Results

Using this model:

- Sensitivity= 24/30= 80%
- Specificity= 130/155= 84%
- Positive predictive value= 24/49= 49%
  - 24 of 49 participants with risk score >0.20 were qPCR+
- Negative predictive value= 130/136= 96%
  - 130 of 136 with a risk score of <0.20 were negative

Conclusions and Acknowledgements

- Non-eye care providers are often the initial point of contact for patients with acute conjunctivitis.
- The presence of a combination of participant-reported eyelid swelling, ocular discomfort with a palpable lymph node (preauricular, retroauricular or submandibular) improved the accuracy of adenoviral conjunctivitis diagnosis.
- However, most of the participants reporting flu or cold symptoms did not have adenoviral conjunctivitis, confirmed by qPCR.

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