Cost Effectiveness of a Point-of-Care Test for Adenoviral Conjunctivitis

EXECUTIVE SUMMARY
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* The Health Economics Consulting Group LLC is group of academic health economists and health services researchers providing research consulting services in a number of subject areas in health economics, including cost impact and cost-effectiveness analyses, patterns of care and estimates of treatment effects using claims data, and economic impact of health sector regulation, including antitrust, managed care regulation, licensure and capacity regulation, and administered pricing. For more information, visit www.hecg-llc.com. This project was funded in part by an unrestricted educational grant from Rapid Pathogen Screening, Inc. to Health Economics Consulting Group LLC.
INTRODUCTION

Conjunctivitis is a relatively common condition of the eye that occurs worldwide and affects all ages and social strata. More than 6 million US residents suffer from conjunctivitis each year. Approximately 3% of all emergency department visits are ocular related, and of these, conjunctivitis is indicated in 30% of cases. Among patients visiting primary care physicians, 2% of all visits are for eye complaints with 54% of these cases being diagnosed as conjunctivitis or corneal abrasion. Several studies have reported that the majority of these cases—as much as 2% of all general practice consultations—are cases of acute infective conjunctivitis. A meta-analysis of six US studies indicates a prevalence of adenovirus in approximately 36% of all cases of acute conjunctivitis. The main objective of this research is to examine the cost effectiveness of a point-of-service test for adenoviral conjunctivitis. The model adopts an insurer (or payer) perspective.

BACKGROUND

Due to its common occurrence, contagiousness, and potentially debilitating symptoms, conjunctivitis is an economic burden worldwide. The bulk of conjunctivitis-related costs include physician consults, supportive care, diagnostic tests, and lost productivity associated with time away from work or school. Misdiagnosed cases (approximately 50% of all cases) may have substantially higher costs, including repeat physician visits, additional diagnostic testing, referrals to specialists, and other medical costs associated with inappropriate treatment. Misdiagnosis may also imply that precautions were not taken to prevent the spread of infection (especially in the case of viral conjunctivitis), thereby adding additional cases and costs. Prescription antibiotic utilization constitutes a large proportion of conjunctivitis costs. Unnecessary or inappropriate prescription of antibiotics is in part attributable to physician difficulties accurately discriminating between viral and bacterial conjunctivitis. Consequently, the standard of care for conjunctivitis, regardless of causative agent, continues to be antibiotics prescribed empirically. Over-utilization of prescription drugs is likely to result in substantial unnecessary costs, contribute to antibiotic resistance, and expose patients to drug-related topical allergies and toxicity.

METHODS

We performed a cost-effectiveness analysis following conventional methodology. The interventions evaluated include the use of a rapid point-of-care test (RPS Adeno Detector™, hereafter referred to as AVD) for cases of acute conjunctivitis (viral and bacterial) as compared to no point of care test (NAVD). Baseline estimates of testing, costs of treatment, condition and treatment morbidities and disease event costs were based on primary data sets, published literature and expert opinion. Prevalence data are considered for the entire US. Positive costs include: the unit costs of the AVD; the additional costs of conservative therapy with correct diagnosis; and the additional costs of an incorrect diagnosis using the AVD when its sensitivity is considered. Negative costs include: the costs of unnecessary antibiotic therapy with correct diagnosis; the costs of unnecessary re-consults; the costs of unnecessary referrals; the costs of secondary transmitted infection; the costs of unnecessary antibiotic morbidities; and the costs of avoidable morbidity attributable to misdiagnosis.

† Rapid Pathogen Screening, Inc., www.rps-tests.com, 877-921-0080
‡ The main primary data set was Medstat MarketScan® data, which represents 223,218 cases of conjunctivitis in the commercially insured market.
§ The average cost of antibiotics prescribed was determined by analyzing Verispan and Medstat data from more than 223,218 insured lives.

* Moreover, misdiagnosis of the causative agent of conjunctivitis may lead to misdiagnoses of associated morbidities or underlying systemic diseases.
RESULTS

The results of the cost effectiveness analysis are presented in Table 1. From the insurer perspective, NAVD results in a cost per case of acute conjunctivitis to society of $56.73. If the AVD is used, there would be a cost of $34.22 per case of acute conjunctivitis.

**TABLE 1**

<table>
<thead>
<tr>
<th></th>
<th>Cost per case ($)</th>
<th>Aggregate Cost ($) (a)</th>
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</thead>
<tbody>
<tr>
<td>NAVD</td>
<td>$56.73</td>
<td>$341,658,411</td>
</tr>
<tr>
<td>AVD</td>
<td>$34.22</td>
<td>$206,091,148</td>
</tr>
<tr>
<td>Difference (b)</td>
<td>$22.51</td>
<td>$135,567,263</td>
</tr>
<tr>
<td>% AVD Savings</td>
<td>39.68%</td>
<td>39.68%</td>
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</tbody>
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Notes: (a) Based on a prevalence of acute conjunctivitis of 6,022,535 nationally
(2, 22, 26-28), (b) incremental cost savings based on CEA model.

The NAVD-AVD difference represents a net savings of $22.51 per case, or about 40%. Based on the prevalence of acute conjunctivitis nationally, this savings translates to $136 million annually. In addition, Medstat MarketScan data show an average cost per episode of conjunctivitis care to be $194 in the commercially insured market. This level is considerably larger than our CEA estimate because it is based on actual claims data for a 60-day period following an initial diagnosis of conjunctivitis.

Thus, the Medstat episode cost of $194 is a more accurate estimate of true costs in the commercially insured market. At the 40% savings rate, insurers could expect to save approximately $39 per case and a total of $467 million annually.

The cost-saving properties of the AVD result in relatively high price neutrality levels. Based on the baseline estimate of prevalence of acute conjunctivitis (91%; 6 million cases), price neutrality is achieved at $47 per unit, dropping to $36 per unit under the conservative 70% assumption (Figure 1). Even under the conservative prevalence assumption, the neutrality point exceeds the current AVD unit price by $12 per unit, or 50%.

**CONCLUSIONS**

Our findings strongly support the positive economic benefits of the RPS Adeno Detector™. Using the well-supported baseline assumptions, we find appropriate use of the RPS Adeno Detector™ can reduce the costs of acute conjunctivitis by 40%, mainly by reducing levels of inappropriate antibiotic use and reducing further local spread of the disease. These savings translate to health insurer savings of as much as $467 million annually. These results are robust to changes in key baseline parameters and extensive sensitivity analyses.
REFERENCES