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Validating a search filter for diagnostic sensitivity and specificity

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Objective

To create and validate a search filter for diagnostic sensitivity and specificity (DSS) in PubMed for use in systematic reviews.
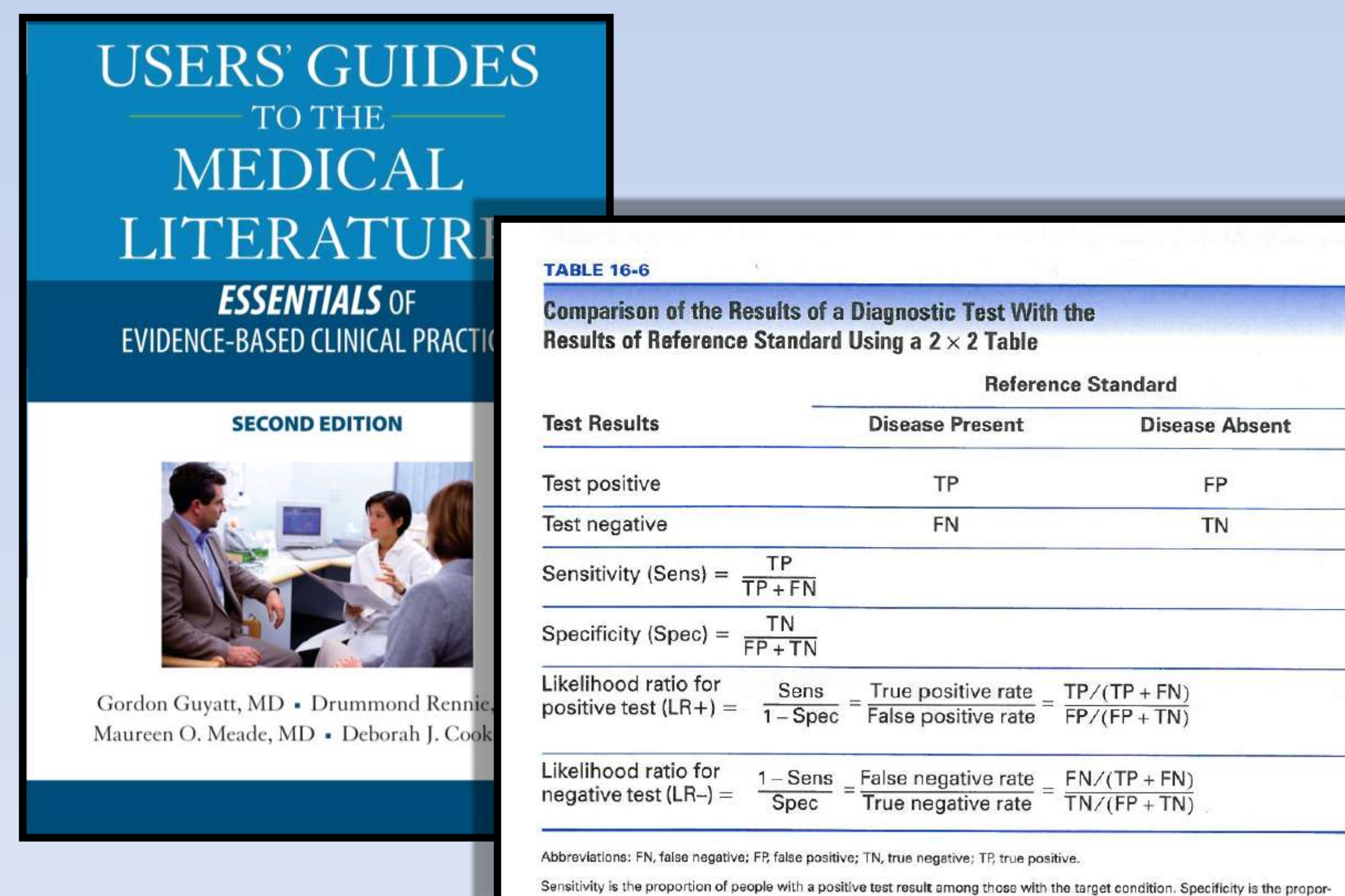
Methods

Based on work by Haynes and the Hedges Team to validate the PubMed Clinical Query for Diagnosis.

http://www.ncbi.nlm.nih.gov/books/NBK3827/#pubmedhelp.Clinical_Queries_Filters

Clinical Queries using Research Methodology Filters

Category	Optimized For	Sensitive/ Specific	PubMed Equivalent
diagnosis	sensitive/broad	98%/74%	(sensitiv*[Title/Abstract] OR sensitivity and specificity[MeSH Terms] OR diagnos* [Title/Abstract] OR diagnosis[MeSH:noexp] OR diagnostic * [MeSH:noexp] OR diagnosis,differential[MeSH:noexp] OR diagnosis[Subheading:noexp])

The Clinical Queries search filters are based on the work of Haynes RB et al.

TP = True Positive (DSS Filter search results that are truly about diagnostic sensitivity and specificity)

FP = False Positive (DSS Filter search results that are *not* about diagnostic sensitivity and specificity)

TN = True Negative (All search results that are *not* about diagnostic sensitivity and specificity)

FN = False Negative (All search results that are about diagnostic sensitivity and specificity)

1. **Create a pool.** We used a thorough search strategy for adult septic arthritis created for a systematic review and limited the pool to the last five years in PubMed.

2. **Create filter.** We created a filter for DSS by harvesting terms from standard indices and on-topic articles.

3. **Run filter within pool.** We ran our DSS filter within the Septic Arthritis pool in PubMed limited to the last five years.

4. **Review results** for filter and pool search results using the 2X2 table for DSS from…

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TABLE 16-6
Comparison of the Results of a Diagnostic Test With the Results of Reference Standard Using a 2 × 2 Table

Test Results	Reference Standard	
	Disease Present	Disease Absent
Test positive	TP	FP
Test negative	FN	TN

Sensitivity (Sens) = $\frac{TP}{TP + FN}$

Specificity (Spec) = $\frac{TN}{FP + TN}$

Likelihood ratio for positive test (LR+) = $\frac{Sens}{1 - Spec}$ = $\frac{True\ positive\ rate}{False\ positive\ rate}$ = $\frac{TP/(TP + FN)}{FP/(FP + TN)}$

Likelihood ratio for negative test (LR−) = $\frac{1 - Sens}{Spec}$ = $\frac{False\ negative\ rate}{True\ negative\ rate}$ = $\frac{FN/(TP + FN)}{TN/(FP + TN)}$

Abbreviations: FN, false negative; FP, false positive; TN, true negative; TP, true positive.
Sensitivity is the proportion of people with a positive test result among those with the target condition. Specificity is the propor-

Results

	About DSS	Not About DSS
DSS Search Results	TP = 49	FP = 11
Pool	FN = 123	TN = 642

Sensitivity (Recall) 49/49+123 = 79%

Specificity (Precision) 642/11+642 = 98%

Discussion

There are no clear step by step instructions on how to create or validate a search filter.

While we based our methods on Haynes, et al., we created our pool differently and it was much smaller. Haynes used articles in 160 journal titles for the year 2000 resulting in a pool of 49,028 articles. Our Septic Arthritis search was limited to the last 5 years and included 765 articles.

Our responsibilities represent the typical work load of an academic medical librarian and this project took three years, fitting it in where we could. Thus, it is not realistic to validate every search strategy created for systematic reviews.

Conclusion

The DSS filter achieved 79% sensitivity and 98% specificity therefore it is an effective filter for locating articles on diagnostic sensitivity and specificity in PubMed.