Improving Negation Processing in Triage Notes

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OBJECTIVE

The objective of this pilot study was to explore methods for addressing negation in triage notes.

BACKGROUND

Emergency Department (ED) triage notes are clinical notes that expand upon the chief complaint, and are included in the AHIC minimum dataset for biosurveillance.[1] Clinical notes can improve the accuracy of keyword-based syndromes but require processing that addresses negated terms.[2,3] The North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) syndrome classifier searches for keywords in free-text chief complaint and triage note data for the purpose of early event detection. Initial attempts to handle negation were included in the syndrome queries beginning in August 2005. Query statements were written to identify and ignore select symptoms immediately following negated terms, such as *denies fvr* or *no h/a*. Many negated terms, however, were not addressed and continue to create false positive syndrome hits. The purpose of this pilot was to address negation with NegEx (a negation tool)[4], supplemented by selected modules from the Emergency Medical Text Processor (EMT-P), a chief complaint pre-processor.[5]

METHODS

We first ran an unmodified version of NegEx on a sample of NC DETECT records that included the 4432 ED visits with triage notes for 11/22/2006 and 11/23/2006. Nineteen of 89 hospitals submitted triage notes, which comprised 30% of all visits for those dates. We then manually selected a sample of the 4432 records, stratifying by hospital and type of negation. The final sample included 177 visits containing negated terms, from 18 of the 19 NC DETECT hospitals that provide triage notes (one ED had no negated terms).The types of negation terms found in the triage notes are shown in Table 1.

Table 1- Examples- Negation in Triage Notes

Negation term & Frequency		Triage note example
Denies	87	Denies fever, other cough/cold symptoms
No	65	Pt tachypnic at present, no wheezes/stridor heard on ausc
(-)	15	Rectal bleeding. Onset 1 day ago. Nausea, (-) emesis, (-) abdominal pain.
Other	10	Severe h/a has not had seizure.

We manually reviewed the NegEx output for accuracy. After this initial evaluation, we made modifications to NegEx and its reference files to include the negation term (-) and the conjunction term (+). Next we processed the sample of triage notes with two EMT-P modules, replacing synonyms (e.g., *dec loc* with *consciousness decreased*) and misspellings (*nasaue* with *nausea*); and then with the modified NegEx. We then manually reviewed the output.

RESULTS

We compared the negation accuracy of the unmodified NegEx with the combined EMT-P and modified NegEx; the results are listed in Table 2.

Table 2: Negation Processing Results (N=177)

Negation Rating	Original NegEx # Visits	Modified NegEx & EMT-P # Visits
Inaccurate	21	15
Accurate	117	146
Partially accurate*	39	16

**Multiple negated concepts present and NegEx only identified some of them correctly*

CONCLUSION

The pilot results show that a combination of EMT-P and NegEx leads to more accurate negation processing. Future work will involve expansion to a larger sample and assessment of negation processing on syndromic classification accuracy. We also plan to evaluate additional modifications to the NegEx dictionary to fine-tune the synonyms and additional research is needed to determine additional terms that stop the negation scope, e.g. “states” or “now.”

REFERENCES

[1]http://www.hhs.gov/healthit/ahic/materials/meeting10/bio/BDSG_Minimum_DataSet.doc. Accessed July 16, 2007.

[2] Ising A, Travers DA, MacFarquhar J, Kipp A, Waller AE. Triage Note in Emergency Department-Based Syndromic Surveillance. *Advances in Disease Surveillance* 2006 1:34.

[3] Hripcsak G, Bamberger A, Friedman C. Fever Detection in Clinic Visit Notes Using a General Purpose Processor. *Advances in Disease Surveillance* 2006 2:14.

[4] Chapman WW, Bridewell W, Hanbury P, Cooper GF, Buchanan BG. A simple algorithm for identifying negated findings and diseases in discharge summaries. J Biomed Inform. 2001;34:301-10.

[5] Travers, D.A., Haas, S.W. (2004). Evaluation of Emergency Medical Text Processor, a system for cleaning chief complaint textual data. Academic Emergency Medicine, 11(11): 1170-1176.