Poster Number

Identifying Lupus Flares from Electronic Clinical Notes in a Linked EMR-Claims Dataset

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OBJECTIVE

- Reducing the frequency and severity of flare is one of the top treatment goals for lupus patients[1].
- Understanding the role and effect flare events play on treatment choices in a complex treatment landscape is complicated by the lack of structured data that document flares in medical records or health claims data.
- Flare episodes are not reported as such in most medical records systems. Important diagnostic information may be incomplete, missing, or misleading due to lack of details in coding systems.
- Medical notes are an alternative source of information to identify flare episodes but their use in research is difficult due to their unstructured and unstandardized nature.
- The purpose of this research was to explore the feasibility of using written clinical notes to identify flare episodes in patients with SLE.

STUDY DESIGN

Data Source

- U.S. nation-wide electronic medical records system linked to insurance claims records

Key inclusion criteria

- Diagnosis of systemic lupus erythematosus (SLE) (ICD-10-CM M32.* or ICD-9-CM 710.0)
- Newly initiated immunosuppressant (azathioprine, methotrexate, or mycophenolate) or biologic (belimumab) therapy between 01 July 2015 and 30 June 2019 (index event)
- Age 18+ at index
- No diagnosis of rheumatoid arthritis at any time
- Medical records and insurance enrollment required for 6 months before and 12 months after index event

METHODOLOGY

- Identify flare-related words, text strings, or phrases from a sample of medical notes from SLE-related office visits to develop a flare vocabulary of inflammation, signs and symptoms, quantitative lab results, modifiers indicating change in condition or status
- Build rules for grouping and categorizing words and phrases
- Natural language processing (NLP) to apply rules highlighting areas of clinical interest in each note using Python 3.7 NLP modules
- Clinician review and classification of all clinician notes
  - Flag each reviewed note as indicating a flare, not a flare, or undetermined.
  - Establish flare status for each post-index office visit
- Determine inter-rater agreement among 3 clinicians evaluating a random sample of 75 notes.

RESULTS

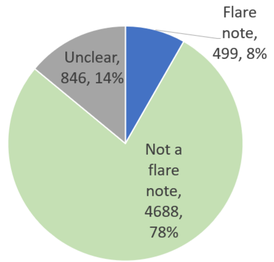
Patient Characteristics (n=801)		n	%
Age at Index	Mean, SD	47.18	(13.2)
	Age 18 – 25	42	5.2%
	26 – 45	320	40.0%
	46 – 54	181	22.6%
	55 – 64	189	23.6%
	65+	69	8.6%
Gender	Female	750	93.6%
	Male	51	6.4%
Health Care Provider Specialty	Primary Care	322	40.2%
	Rheumatology	236	29.5%
	SLE-Related (Cardiology, Dermatology, Gastro-enterology, Hematology, Infectious Disease, Nephrology, Neurology, Pulmonary Disease)	111	13.9%
	Other	127	15.9%
	Not Specified	5	0.6%
Index Therapy	Azathioprine	173	21.6%
	Belimumab	88	11.0%
	Methotrexate	282	35.2%
	Mycophenolate	258	32.2%

Results

Note processing

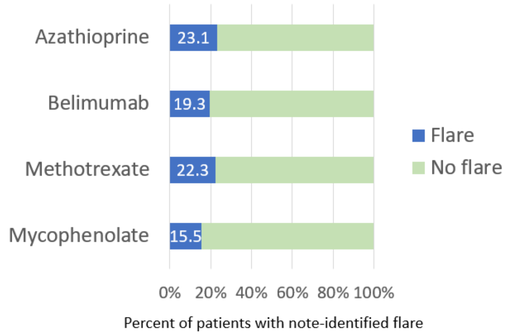
- 801 patients / 6,033 notes reviewed
- Natural language processing: based on SLE-specific keywords, phrases

Word cloud sample of SLE-specific keywords
Word size is proportional to frequency

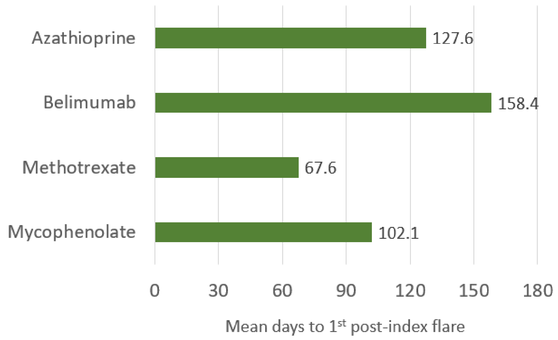


Inter-rater agreement (3 raters, 75 notes)
- Fleiss kappa 0.68, indicative of good or substantial inter-rater agreement [2]

Post-index flare incidence was lowest for patients using mycophenolate



Among patients who experienced a flare, the time to the first post index flare was greatest for users of belimumab



CONCLUSIONS

- NLP-assisted clinical review of unstructured notes was demonstrated to be a feasible approach to identifying SLE flares
- Flare rates were similar to previously reported results of 17-24% [3-5]
- Note-derived flare information can be combined with EMR clinical and insurance claims data to facilitate treatment and resource utilization studies

References

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