**eMERGE Network Proposal for Analysis**

Manuscript Concept Sheet

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| **Submission Date** | 2/15/2017 |
| **Reference** | NT215 |
| **Project Title** | EHR Phenotyping of Atopic Dermatitis in Adults using more detailed data including from NLP |
| **Tentative Lead Investigator (first author)** | Erin Gustafson |
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| **Sites Involved** | Northwestern, other interested eMERGE sites |
| **Background / Significance** | Atopic dermatitis (AD) is an autosomal dominant disorder that leads to intense itch and diffuse rash. The US prevalence of AD is 7-10% in adults and 10-20% in children. AD is associated with higher rates of allergic disease, including asthma, hay fever and food allergy, as well as multiple non-allergic comorbidities, including sleep disturbances, infections, depression, attention-deficit hyperactivity disorder, obesity, cardiovascular disease, osteoporosis and fractures, etc. AD typically starts in early childhood and disease activity persists into adulthood in >80% of patients. There is also a subset of patients who first develop clinical AD during adulthood.  The diagnosis of AD in adults is often very challenging. First, the distribution of AD lesions tends to differ from that of children.  Second, it can be difficult to distinguish AD from other disorders, such as allergic contact dermatitis and cutaneous T cell lymphoma. Third, conventional histopathologic evaluation of AD lesions is often imprecise and cannot distinguish between AD and other types of eczema. Moreover, there is a subset of AD patients are higher risk for cardiovascular and cerebrovascular disease and a variety of other comorbidities.  In eMERGE phase II an AD EHR algorithm based on 1 ICD-9 diagnosis code (691.8) and medications was developed using a pediatric population and used by most sites, but did not result in many adult subjects (n=384 across all adult sites) being selected. This is partly due to the low sensitivity of that 1 code and the under-utilization of systemic agents, in adults with AD. Thus, we will conduct further investigation using more detailed clinical data from the EHR, including NLP of clinical notes, to potentially improve the identification of AD in adults. |
| **Outline of Project** | 1. Identify potential A.D. patients by using ICD diagnosis codes (ICD-9-CM codes: 691.8, 692.9 and ICD-10-CM codes: L20, L20.0, L20.8, L20.81- L20.84, L20.89, L20.9, L30.9 2. Create a training & testing data sets of the AD signs and symptoms of those patients by chart review (completed at NU for ~500 pts) 3. Use 1 or more existing published criteria (such as those by Hanifin & Rajka, the U.K. Working Party, etc.) to mark the reviewed patients as definitely, probably, or likely not having AD 4. Use NLP of encounter notes, and possibly geocoding, to extract clinical and environmental factors related to AD, and to extract AD signs, symptoms and sub-types. |
| **Desired**  **Variables (essential for analysis**  **indicated by \*)** | 1. \*AD signs, symptoms, and severity 2. Comorbidities (by ICD diagnosis codes) 3. \*Treatments including moisturizers, topical anti-inflammatories and then UVB, cyclosporine and methotrexate |
| **Desired data** | 1. \*demographics 2. \*AD severity & sub-type 3. comorbidities 4. \*Treatments including moisturizers, topical anti-inflammatories and then UVB, cyclosporine and methotrexate 5. \*AD signs/symptoms, medical history, & other relevant data extracted via NLP (a portable program will be developed by NU) 6. Geocoded data |
| **Planned Statistical Analyses** | Precision/recall/F-measure for overall algorithm performance, NLP for signs and symptoms (precision/recall/F-measure) |
| **Ethical considerations** | None. |
| **Target Journal** | JAMIA, or specialty dermatology clinical journal |
| **Milestones\*\*** | 1. 9/2017 : ready for secondary validation 2. 10/2017: secondary validation complete 3. 1/2018: run at all participating sites 4. 1/30/2018: 1st draft sent 5. 2/28/2018: 2nd draft sent 6. 3/9/2018: submit to journal |

**References**

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3. Bannister MJ, Freeman S. Adult-onset atopic dermatitis. Australas J Dermatol. 2000, 41, 225–232.
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