Predicting Clinical Remission of Chronic Urticaria Using Random Survival Forests:

Machine Learning Applied to Real-World Data

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Table E1. Diagnosis codes for urticaria

| ICD-9  | ICD-10 | Description                                   |
|--------|--------|-----------------------------------------------|
| CSU    |        |                                               |
| 708.1  | L50.1  | Idiopathic urticaria                          |
| 708.8  | L50.8  | Other specified urticaria                     |
| 708.9  | L50.9  | Urticaria, unspecified                        |
| 995.1  | T783   | Angioneurotic edema (secondary)*              |
|        |        |                                               |
| CIndU  |        |                                               |
| 708.0  | L50.0  | Allergic urticaria (secondary)*               |
| 708.2  | L50.2  | Urticaria due to cold and heat                |
| 708.3  | L50.3  | Dermatographic urticaria                      |
| 708.4  | L50.4  | Vibratory urticaria                           |
| 708.5  | L50.5  | Cholinergic urticaria                         |
| –      | L50.6  | Contact urticaria                             |
| –      | L56.3  | Solar urticaria                               |

* Secondary code was considered only when a patient had ≥1 non-secondary diagnosis code

**Abbreviations:** CIndU = chronic inducible urticaria; CSU = chronic spontaneous urticaria; CU = chronic urticaria; ICD-9/10 = International Classification of Diseases, 9th/10th edition.
Table E2. Urticaria-related treatments

| Class                                | Treatment(s) included                                                                 |
|--------------------------------------|---------------------------------------------------------------------------------------|
| Antidepressants                      | Doxepin, Acrivastine, Astemizole, Azelastine, Bepotastine, Bilastine, Brompheniramine, |
|                                      | Carbinoxamine, Cetirizine, Chlorphenamin/chlorpheniramine, Cimetidine, Clemastine,     |
|                                      | Cyproheptadine, Desloratadine, Dextromethorphan, Dextromethorphan, Dexchlorpheniramine, |
| Antihistamines*                      | Diphenhydramine, Ebastine, Emastine, Fexofenadine, Hydroxyzine (atarax), Ketotifen,  |
|                                      | Levocetirizine, Loratadine, Mizolastine, Pramoxine, Promethazine, Pyrilamine, Quinidine, |
|                                      | Ranitidine, Rupatadine, Terfenadine, Triprolidine                                      |
| Colchicine                           | Colchicine                                                                           |
| Cyclosporine*                        | Cyclosporine                                                                           |
| Dapsone                              | Dapsone                                                                               |
| Hydroxychloroquine                   | Hydroxychloroquine                                                                    |
| Immunosuppressants                   | Azathioprine, Mycophenolate, Methotrexate, Tacrolimus                                  |
| Leukotriene receptor antagonists*    | Montelukast, Zafirlukast                                                               |
| Levamisole                           | Levamisole                                                                            |
| Narrowband                           | Narrowband                                                                            |
| Mesalazine                           | Mesalazine                                                                            |
| Nifedipine                           | Nifedipine                                                                            |
| Oral corticosteroids                 | Methylprednisone, Prednisolone, Prednisone                                            |
| Omalizumab*                          | Omalizumab                                                                            |
| Sulfasalazine                        | Sulfasalazine                                                                         |
| Stanozolol                           | Stanozolol                                                                            |
| Thyroid hormone                      | Levothyroxine                                                                         |
| Warfarin                             | Warfarin                                                                              |

* Indicates treatments specified for urticaria in the AAAAI and ACAAI guideline *The diagnosis and management of acute and chronic urticaria: 2014 update* [14]. Treatments that are not specified in the guidelines were required to be accompanied by a CU diagnosis on the same day as the treatment. All types of antihistamines are listed here independent of their subclass.
Figure E1. Partial dependence plot of time to clinical remission as a function of age

Abbreviation: CU = chronic urticaria.