

A. Instructions for Running the System

The graphical user interface for the system was implemented by connecting the Prolog knowledge base to a Java interface. While the data and logic are located in the knowledge base, the system can be built and run like a Java application.

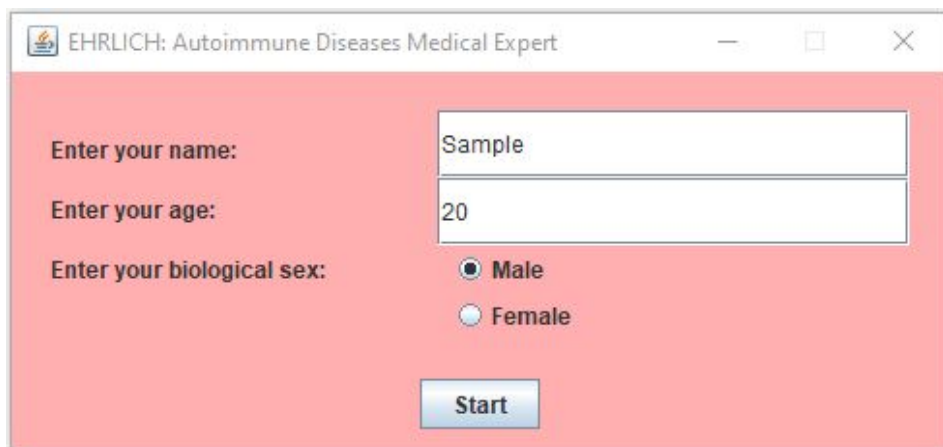
To run the system, open the following JAR file:

[Gonzales & Lee S13] Medical Expert System

B. Running System Screenshots

1. Initialization Screen

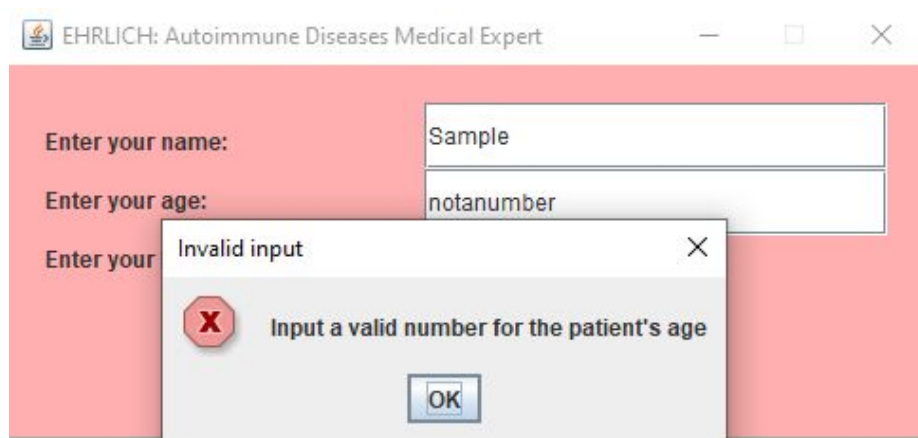
The diagnosis system begins with the initialization screen, where the patient is prompted to enter their name, age, and biological sex.



The screenshot shows a window titled "EHRlich: Autoimmune Diseases Medical Expert". The window has a pink background and contains the following fields and controls:

- Enter your name:** A text input field containing the text "Sample".
- Enter your age:** A text input field containing the text "20".
- Enter your biological sex:** Two radio buttons labeled "Male" (selected) and "Female".
- Start:** A blue button with the text "Start".

Basic error handling was also implemented to catch invalid inputs.



The screenshot shows the same window as the previous one, but with an error message displayed over the "Enter your age:" field. The error message is in a small dialog box with a red "X" icon and the text "Invalid input". The text "Input a valid number for the patient's age" is displayed below the icon. The "OK" button is at the bottom of the dialog box. The "Enter your age:" field now contains the text "notanumber".

2. Main Screen

The main screen is composed of the main panel, which displays the patient's details, the diagnosis system logo, the current inquiry, and the text field and buttons for the user input, and the side panel, which stores text areas detailing the current diagnosis status, the diagnosis log, and a RESTART button for conducting a new diagnosis process.

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 20.0
SEX: Male

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Have you experienced muscle weakness?
Nakararamdam ka ba ng panghihina ng kalamnan?

Submit

Yes No Restart

Prolog knowledge base has been loaded.
EHRlich is ready for diagnosis.

Female-specific symptoms removed:
- Irregular menstruation
- Vaginal dryness

Pediatric symptom removed:
- Failure to thrive

When the user enters their input (either by choosing the YES or NO button or through the text field for some inquiries), the diagnosis log is updated and displays the latest symptom and the current confidence factors for each of the diseases calculated using the symptom's weight.

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 20.0
SEX: Male

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Do you experience fatigue?
Nakararanas ka ba ng labis na pagkapagod?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

Female-specific symptoms removed:
- Irregular menstruation
- Vaginal dryness

Pediatric symptom removed:
- Failure to thrive

Symptom: muscleWeakness
Certainty factors:
ADDISON DISEASE: 0.53
DERMATOMYOSITIS: 0.53
HASHIMOTO THYROIDITIS: 0.00
MULTIPLE SCLEROSIS: 0.53
LUPUS: 0.00

For some symptoms (fever and heart rate), the patient or healthcare worker is prompted to enter the measured vital sign through the input text field.

The screenshot shows the 'EHRlich: Autoimmune Diseases Medical Expert' window. On the left, patient information is displayed: NAME: Sample, AGE: 20.0, SEX: Male. Below this is a text input field for temperature with the prompt 'PATIENT: Input your temperature (in degrees Celsius). Ilagay ang iyong temperatura.' and a 'Submit' button. At the bottom are 'Yes', 'No', and 'Restart' buttons. On the right, a list of 15 autoimmune diseases with their associated scores is shown. The status text at the top right indicates 'Diagnosis is ongoing. Knowledge base has 15 autoimmune diseases.'

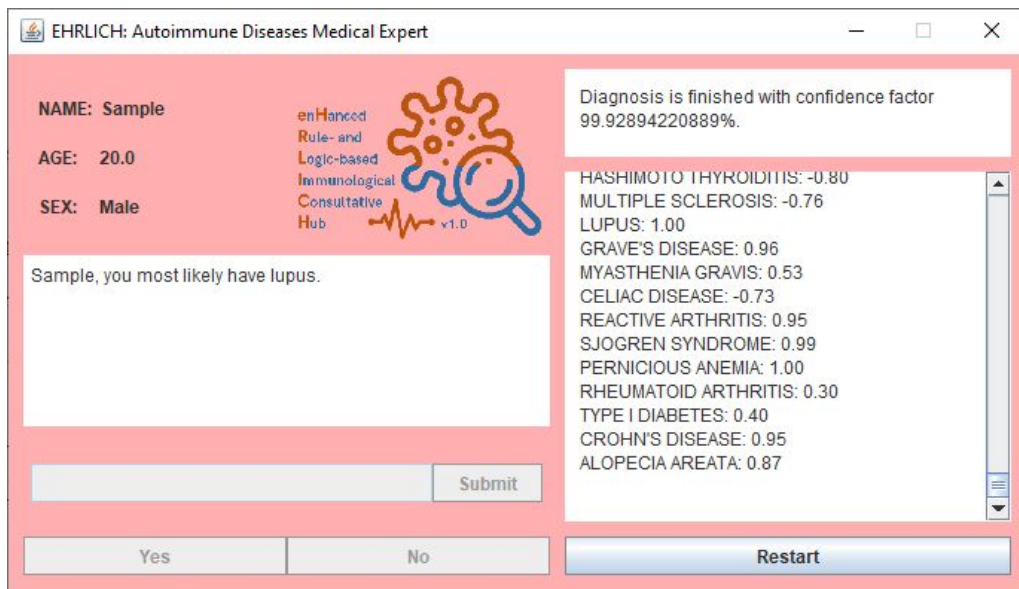
Disease	Score
HASHIMOTO THYROIDITIS	-0.80
MULTIPLE SCLEROSIS	-0.76
LUPUS	0.25
GRAVE'S DISEASE	0.96
MYASTHENIA GRAVIS	0.53
CELIAC DISEASE	-0.60
REACTIVE ARTHRITIS	-0.33
SJOGREN SYNDROME	0.90
PERNICIOUS ANEMIA	0.96
RHEUMATOID ARTHRITIS	-0.62
TYPE I DIABETES	0.40
CROHN'S DISEASE	0.00
ALOPECIA AREATA	0.00

When responses to some queries exceed certain thresholds (e.g., the patient has a temperature of more than 40 degrees Celsius), the system registers an emergency and displays a popup window; this is also reflected in the diagnosis status text area.

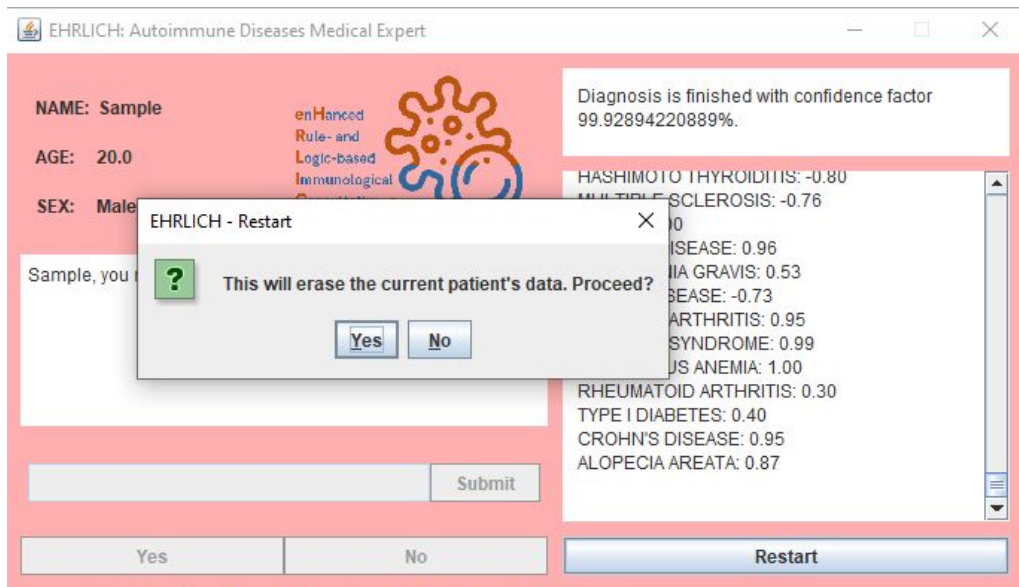
This screenshot shows the same interface as the previous one, but with an emergency alert. A yellow warning icon and the text 'EMERGENCY! Immediate medical attention is required.' are displayed in a popup window. The status text at the top right has changed to 'EMERGENCY! Medical attention required. Knowledge base has 15 autoimmune diseases.'

Disease	Score
HASHIMOTO THYROIDITIS	-0.80
MULTIPLE SCLEROSIS	-0.76
LUPUS	0.25
GRAVE'S DISEASE	0.96
MYASTHENIA GRAVIS	0.53
CELIAC DISEASE	-0.60
REACTIVE ARTHRITIS	-0.33
SJOGREN SYNDROME	0.90
PERNICIOUS ANEMIA	0.96
RHEUMATOID ARTHRITIS	-0.62
TYPE I DIABETES	0.40
CROHN'S DISEASE	0.00
ALOPECIA AREATA	0.00

When the diagnosis process is finished, the system chooses the most likely diagnosis and displays the final diagnosis message on the inquiry text area.

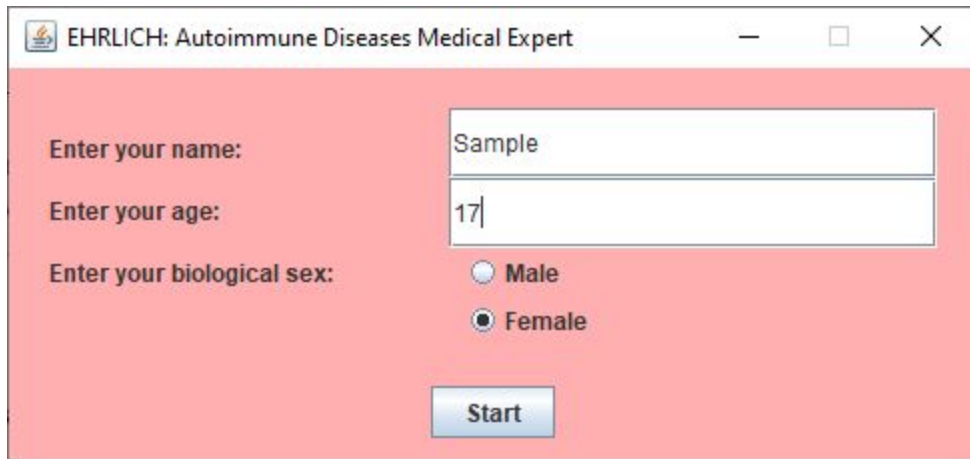


Lastly, the RESTART button allows users to begin a new diagnosis process, discarding the current patient's data.

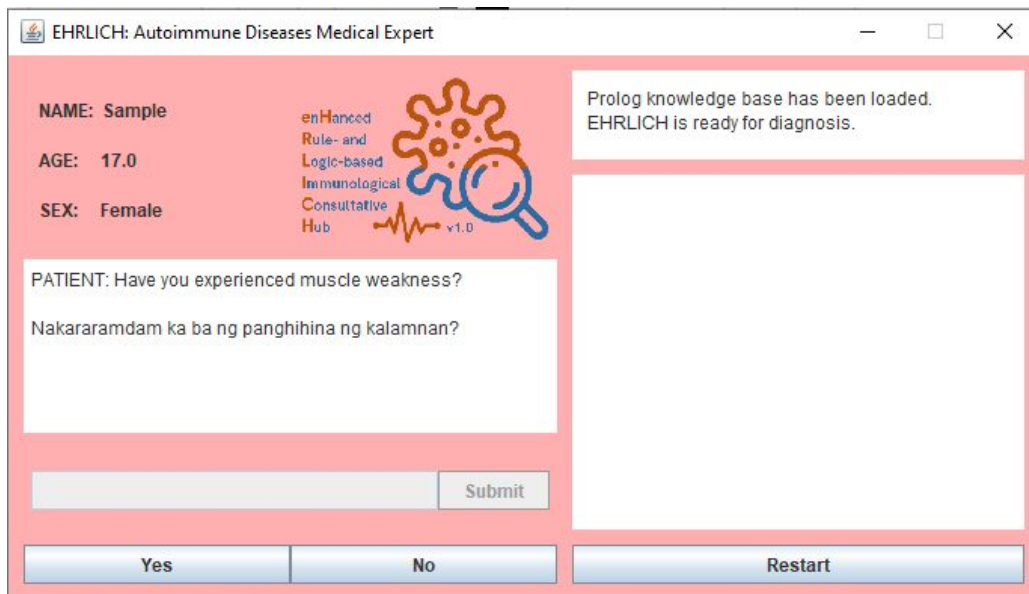


3. Sample Run

This section contains a sequence of screenshots of a sample run of the diagnosis system. User responses were chosen using a random number picker and are listed below each of their corresponding images.



The screenshot shows the initial input window of the EHRlich application. The title bar reads "EHRlich: Autoimmune Diseases Medical Expert". The form has a pink background and contains three input fields: "Enter your name:" with the text "Sample", "Enter your age:" with the text "17", and "Enter your biological sex:" with radio buttons for "Male" and "Female" (the "Female" option is selected). A "Start" button is located at the bottom center.



The screenshot shows the main interface of the EHRlich application after the "Start" button is clicked. The title bar remains the same. On the left, the user's input is displayed: "NAME: Sample", "AGE: 17.0", and "SEX: Female". In the center, there is a logo for "enHanced Rule- and Logic-based Immunological Consultative Hub v1.0" featuring a magnifying glass over a gear. On the right, a message box states: "Prolog knowledge base has been loaded. EHRlich is ready for diagnosis." Below the logo, a text area contains the question: "PATIENT: Have you experienced muscle weakness? Nakararamdam ka ba ng panghihina ng kalamnan?". A "Submit" button is to the right of the text area. At the bottom, there are three buttons: "Yes", "No", and "Restart".

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Do you have a reddish-purple rash around your eyelids?
 Mayroon bang mapula o lilang pagpapantal sa palibot ng takipmata?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: 0.00
 MULTIPLE SCLEROSIS: -0.53
 LUPUS: 0.00
 GRAVE'S DISEASE: -0.53
 MYASTHENIA GRAVIS: -0.53
 CELIAC DISEASE: 0.00
 REACTIVE ARTHRITIS: 0.00
 SJOGREN SYNDROME: 0.00
 PERNICIOUS ANEMIA: -0.53
 RHEUMATOID ARTHRITIS: -0.53
 TYPE I DIABETES: 0.00
 CROHN'S DISEASE: 0.00
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Do you have red or violet lumps on your knees or elbows?
 Mayroon ka bang napapansing mga pula o lilang bukol sa iyong tuhod o siko?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: 0.00
 MULTIPLE SCLEROSIS: -0.53
 LUPUS: 0.00
 GRAVE'S DISEASE: -0.53
 MYASTHENIA GRAVIS: -0.53
 CELIAC DISEASE: 0.00
 REACTIVE ARTHRITIS: 0.00
 SJOGREN SYNDROME: 0.93
 PERNICIOUS ANEMIA: -0.53
 RHEUMATOID ARTHRITIS: -0.53
 TYPE I DIABETES: 0.00
 CROHN'S DISEASE: 0.00
 ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Have you experienced a tingling sensation or numbness on your limbs, trunk, or the side of your face?

May nararamdaman ka bang sensasyong parang tinutusok o pagkamanhid sa iyong braso, binti, katawan, o sa bandang gilid ng iyong mukha?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.53
LUPUS: 0.00
GRAVE'S DISEASE: -0.94
MYASTHENIA GRAVIS: -0.53
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.00
SJOGREN SYNDROME: 0.93
PERNICIOUS ANEMIA: -0.53
RHEUMATOID ARTHRITIS: -0.53
TYPE I DIABETES: 0.00
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Do you experience fatigue?

Nakararanas ka ba ng labis na pagkapagod?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.97
LUPUS: 0.00
GRAVE'S DISEASE: -0.94
MYASTHENIA GRAVIS: -0.53
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.00
SJOGREN SYNDROME: 0.93
PERNICIOUS ANEMIA: -0.53
RHEUMATOID ARTHRITIS: -0.53
TYPE I DIABETES: 0.00
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Have you noticed swelling on your joints?
Nakararanas ka ba ng pamamaga sa iyong mga kasukasuan?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.95
LUPUS: 0.40
GRAVE'S DISEASE: -0.90
MYASTHENIA GRAVIS: -0.53
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: -0.22
RHEUMATOID ARTHRITIS: -0.22
TYPE I DIABETES: 0.40
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

HCW: Does the patient have an irregular heartbeat?
Irregular ba ang pagtibok ng puso ng pasyente?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.95
LUPUS: -0.56
GRAVE'S DISEASE: -0.90
MYASTHENIA GRAVIS: -0.53
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: -0.22
RHEUMATOID ARTHRITIS: -0.79
TYPE I DIABETES: 0.40
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.95
LUPUS: -0.56
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.53
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: -0.22
RHEUMATOID ARTHRITIS: -0.79
TYPE I DIABETES: 0.40
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

HCW: Does the patient have drooping eyelids?
Lumalawlaw ba ang takipmata ng pasyente?

Submit

Yes No Restart

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.95
LUPUS: -0.56
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: 0.86
CELIAC DISEASE: 0.00
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: -0.22
RHEUMATOID ARTHRITIS: -0.79
TYPE I DIABETES: 0.40
CROHN'S DISEASE: 0.00
ALOPECIA AREATA: 0.00

PATIENT: Do you experience double vision?
Nakararanas ka ba ng pagdoble ng paningin?

Submit

Yes No Restart

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Do you experience abdominal bloating?
 Nakararanas ka ba ng pamamaga sa bandang tiyan?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
 MULTIPLE SCLEROSIS: -0.95
 LUPUS: -0.56
 GRAVE'S DISEASE: -1.00
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 0.00
 REACTIVE ARTHRITIS: 0.40
 SJOGREN SYNDROME: 0.96
 PERNICIOUS ANEMIA: -0.22
 RHEUMATOID ARTHRITIS: -0.79
 TYPE I DIABETES: 0.40
 CROHN'S DISEASE: 0.00
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Do you experience abdominal pain?
 Nakararanas ka ba ng pananakit sa bandang tiyan?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

MULTIPLE SCLEROSIS: -0.95
 LUPUS: -0.56
 GRAVE'S DISEASE: -1.00
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 0.93
 REACTIVE ARTHRITIS: 0.40
 SJOGREN SYNDROME: 0.96
 PERNICIOUS ANEMIA: -0.22
 RHEUMATOID ARTHRITIS: -0.79
 TYPE I DIABETES: 0.40
 CROHN'S DISEASE: 0.00
 ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

PATIENT: Do you experience constipation?
Nakararanas ka ba ng pagtitibi?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.87
MULTIPLE SCLEROSIS: -0.95
LUPUS: -0.91
GRAVE'S DISEASE: -1.00
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 0.67
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: -0.22
RHEUMATOID ARTHRITIS: -0.79
TYPE I DIABETES: 0.40
CROHN'S DISEASE: -0.80
ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

PATIENT: Do you experience diarrhea?
Nakararanas ka ba ng pagtatae?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
MULTIPLE SCLEROSIS: -0.81
LUPUS: -0.91
GRAVE'S DISEASE: -1.00
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 0.91
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: 0.66
RHEUMATOID ARTHRITIS: -0.79
TYPE I DIABETES: 0.40
CROHN'S DISEASE: -0.80
ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Have you noticed undergoing a sudden weight loss?
 Mayroon ka bang napapansing biglang pagbaba sa iyong timbang?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
 MULTIPLE SCLEROSIS: -0.81
 LUPUS: -0.91
 GRAVE'S DISEASE: -1.00
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 0.97
 REACTIVE ARTHRITIS: 0.40
 SJOGREN SYNDROME: 0.96
 PERNICIOUS ANEMIA: 0.89
 RHEUMATOID ARTHRITIS: -0.79
 TYPE I DIABETES: 0.40
 CROHN'S DISEASE: -0.40
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Have you noticed excreting pale stools?
 Maputla ba ang iyong dumi?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
 MULTIPLE SCLEROSIS: -0.81
 LUPUS: -0.91
 GRAVE'S DISEASE: -0.99
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 0.98
 REACTIVE ARTHRITIS: 0.40
 SJOGREN SYNDROME: 0.96
 PERNICIOUS ANEMIA: 0.94
 RHEUMATOID ARTHRITIS: -0.61
 TYPE I DIABETES: 0.68
 CROHN'S DISEASE: 0.11
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Do you have a skin rash that causes blisters?
Mayroon ka bang mga pantal sa balat na maaaring magpalitos?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
MULTIPLE SCLEROSIS: -0.81
LUPUS: -0.91
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 1.00
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: 0.94
RHEUMATOID ARTHRITIS: -0.61
TYPE I DIABETES: 0.68
CROHN'S DISEASE: 0.11
ALOPECIA AREATA: 0.00

Response: No

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced Rule- and Logic-based Immunological Consultative Hub v1.0

PATIENT: Do you have mouth sores?
Mayroon ka bang mga singaw sa bibig?

Submit

Yes No Restart

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
MULTIPLE SCLEROSIS: -0.81
LUPUS: -0.91
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 0.98
REACTIVE ARTHRITIS: 0.40
SJOGREN SYNDROME: 0.96
PERNICIOUS ANEMIA: 0.94
RHEUMATOID ARTHRITIS: -0.61
TYPE I DIABETES: 0.68
CROHN'S DISEASE: 0.11
ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

PATIENT: Do you experience joint pain?
 Nakararanas ka ba ng pananakit sa iyong mga kasukasuan?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: -0.50
 MULTIPLE SCLEROSIS: -0.81
 LUPUS: -0.33
 GRAVE'S DISEASE: -0.99
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 1.00
 REACTIVE ARTHRITIS: 0.40
 SJOGREN SYNDROME: 0.96
 PERNICIOUS ANEMIA: 0.94
 RHEUMATOID ARTHRITIS: -0.61
 TYPE I DIABETES: 0.68
 CROHN'S DISEASE: 0.11
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
 Rule- and
 Logic-based
 Immunological
 Consultative
 Hub v1.0

HCW: Does the patient exhibit a failure to thrive
 (undernourishment, stunted growth, etc.)?
 Nakararanas ba ang pasyente ng pagkabigo sa paglaki
 (mababang antas ng nutrisyon, pagkabansot, atbp.)?

Diagnosis is ongoing.
 Knowledge base has 15 autoimmune diseases.

HASHIMOTO THYROIDITIS: 0.20
 MULTIPLE SCLEROSIS: -0.81
 LUPUS: 0.40
 GRAVE'S DISEASE: -0.99
 MYASTHENIA GRAVIS: -0.07
 CELIAC DISEASE: 1.00
 REACTIVE ARTHRITIS: 0.76
 SJOGREN SYNDROME: 0.98
 PERNICIOUS ANEMIA: 0.94
 RHEUMATOID ARTHRITIS: -0.03
 TYPE I DIABETES: 0.68
 CROHN'S DISEASE: 0.11
 ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

PATIENT: Have you experienced a tingling sensation in your legs?
Nakararamdam ka ba ng sensasyong parang tinutusok sa iyong mga binti?

Submit

Yes No Restart

HASHIMOTO THYROIDITIS: 0.20
MULTIPLE SCLEROSIS: -0.81
LUPUS: 0.40
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 1.00
REACTIVE ARTHRITIS: 0.76
SJOGREN SYNDROME: 0.98
PERNICIOUS ANEMIA: 0.94
RHEUMATOID ARTHRITIS: -0.03
TYPE I DIABETES: 0.68
CROHN'S DISEASE: 0.11
ALOPECIA AREATA: 0.00

Response: Yes

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

enHanced
Rule- and
Logic-based
Immunological
Consultative
Hub v1.0

Diagnosis is ongoing.
Knowledge base has 15 autoimmune diseases.

PATIENT: Have you noticed irregularities in your menstrual cycle?
Mayroon ka bang napapansing irregularidad sa iyong regla?

Submit

Yes No Restart

HASHIMOTO THYROIDITIS: 0.20
MULTIPLE SCLEROSIS: -0.81
LUPUS: 0.40
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 1.00
REACTIVE ARTHRITIS: 0.76
SJOGREN SYNDROME: 0.98
PERNICIOUS ANEMIA: 0.99
RHEUMATOID ARTHRITIS: -0.03
TYPE I DIABETES: 0.68
CROHN'S DISEASE: 0.11
ALOPECIA AREATA: 0.00

Response: Yes

As the confidence factor associated with one of the diseases exceeded a set threshold after all of its unique associated symptoms have been inquired about (celiac disease registered a confidence factor of 99.99%), the diagnosis process was terminated and a final diagnosis was made.

EHRlich: Autoimmune Diseases Medical Expert

NAME: Sample
AGE: 17.0
SEX: Female

Sample, you most likely have celiac disease.

Submit

Yes No Restart

Diagnosis is finished with confidence factor 99.99990009159521%.

HASHIMOTO THYROIDITIS: 0.89
MULTIPLE SCLEROSIS: -0.81
LUPUS: 0.40
GRAVE'S DISEASE: -0.99
MYASTHENIA GRAVIS: -0.07
CELIAC DISEASE: 1.00
REACTIVE ARTHRITIS: 0.76
SJOGREN SYNDROME: 0.98
PERNICIOUS ANEMIA: 0.99
RHEUMATOID ARTHRITIS: -0.03
TYPE I DIABETES: 0.68
CROHN'S DISEASE: 0.11
ALOPECIA AREATA: 0.00

C. List of Diseases and Symptoms

Listed below are the symptoms and corresponding weights of each of the fifteen (15) diseases the system is able to diagnose:

Disease	Symptoms	Weight
Addison Disease	Muscle weakness	0.5333
	Fatigue	0.4
	Orthostatic hypotension	0.9333
	Hyperpigmentation near scars, skin folds, or joints	0.9333
	Black freckles on the forehead, neck, face, or shoulders	0.9333
	Bluish-black discolorations around the lips, mouth, or rectum	0.9333
	Nausea	0.8667
	Vomiting	0.8667

	Diarrhea	0.6667
	Increased sensitivity to cold	0.8667
	Unexplained weight loss	0.4667
	Dehydration	0.9333
Dermato-myositis	Reddish-purple rash around the eyelids	0.9333
	Red or violet bumps on the knees or elbows	0.9333
	Gotttron papules (red or violet bumps on the joints of the hand)	0.9333
	Muscle weakness	0.5333
	Joint pain	0.6
	Joint swelling	0.7333
	Discolored skin around the shoulders, neck, or upper back	0.9333
	Thickened skin on the bases and sides of fingernails	0.9333
Hashimoto thyroiditis	Presence of a goiter (swelling of the neck caused by an enlarged thyroid)	0.8667
	Tiredness	0.9333
	Unexplained weight gain	0.9333
	Increased sensitivity to cold	0.8667
	Joint pain	0.6
	Muscle pain	0.9333
	Constipation	0.7333
	Thinning hair	0.9333
	Memory problems	0.9333
	Slow heart rate	0.9333
	Irregular menstrual periods	0.8667

Multiple sclerosis	Paresthesia (tingling sensation or numbness on the limbs, trunk, or side of the face)	0.9333
	Clumsiness of a hand or leg	0.9333
	Partial loss of vision	0.8667
	Muscle weakness	0.5333
	Vertigo	0.9333
	Fatigue	0.4
	Decreased bladder control	0.9333
	Shortened attention span	0.9333
	Difficulty processing new information	0.9333
	Increased anxiety	0.9333
	Constipation	0.7333
	Difficulty chewing (dysphagia)	0.8
Lupus	Fatigue	0.4
	Joint swelling	0.7333
	Joint pain	0.6
	Headaches	0.8667
	Fever	0.7333
	Increased sensitivity to sunlight or fluorescent light	0.9333
	Chest pain	0.8667
	Butterfly-shaped rash on the cheeks or nose	0.9333
	Hair loss	0.8667
	Mouth sores	0.8667

	Raynaud's disease (fingers and toes turn white or blue and feel numb)	0.8667
	Abdominal pain	0.8
Grave's disease	Irregular heartbeat	0.9333
	Diarrhea	0.6667
	Presence of a goiter	0.8667
	Increased sensitivity to heat	0.9333
	Increased irritability	0.9333
	Muscle weakness	0.5333
	Fatigue	0.4
	Trembling hands	0.9333
	Difficulty sleeping	0.9333
	Unexplained weight loss	0.4667
	Bulging eyes	0.9333
	Double vision	0.8667
	Swelling around the eyes	0.9333
Myasthenia gravis	Drooping eyelids	0.9333
	Double vision	0.8667
	Difficulty making facial expressions	0.9333
	Difficulty chewing	0.8
	Difficulty swallowing	0.9333
	Slurred speech	0.9333
	Muscle weakness	0.5333
	Difficulty breathing	0.9333

Celiac disease	Abdominal bloating	0.9333
	Abdominal pain	0.8
	Constipation	0.7333
	Diarrhea	0.6667
	Unexplained weight loss	0.4667
	Pale stools	0.9333
	Skin rash that causes blisters	0.9333
	Mouth sores	0.8667
	Unexplained weight loss	0.4667
	Failure to thrive (in children)	0.9333
	Tingling sensation in the legs	0.8667
	Irregular menstrual periods	0.8667
Reactive arthritis	Joint pain	0.6
	Heel pain	0.9333
	Back pain	0.9333
	Conjunctivitis (redness of the eyes)	0.9333
	Eye pain	0.9333
	Blurred vision	0.8667
	Painful urination	0.9333
	Frequent urination	0.8667
	Fever	0.7333
	Fatigue	0.4
	Hair loss	0.8667

	Mucocutaneous lesions (small ulcers) inside the mouth or tongue	0.9333
	Keratoderma blennorrhagicum (reddish crusts on the palms, soles, or around the nails)	0.9333
Sjögren syndrome	Dry eyes	0.9333
	Dry mouth	0.9333
	Difficulty chewing	0.8
	Difficulty swallowing	0.9333
	Raynaud's syndrome	0.8667
	Fatigue	0.4
	Vaginal dryness	0.6667
	Muscle pain	0.9333
	Joint pain	0.6
	Swollen salivary glands (swelling between the jaw and ears)	0.9333
	Rashes after exposure to sunlight	0.9333
Pernicious anemia	Fatigue	0.4
	Shortness of breath	0.9333
	Dizziness	0.9333
	Headaches	0.8667
	Chest pain	0.8667
	Tingling sensation in the legs	0.8667
	Muscle weakness	0.5333
	Loss of balance	0.9333
	Nausea	0.8667

	Vomiting	0.9333
	Constipation	0.7333
	Diarrhea	0.6667
	Loss of appetite	0.9333
	Unexplained weight loss	0.4667
	Tongue appears smooth, thick, or red	0.9333
Rheumatoid arthritis	Joint pain	0.6
	Joint stiffness	0.9333
	Joint swelling	0.7333
	Pain, stiffness, or swelling of joints on both sides of the body simultaneously	0.9333
	Unexplained weight loss	0.4667
	Fever	0.7333
	Fatigue	0.4
	Muscle weakness	0.5333
Type I diabetes	Extreme thirst	0.9333
	Frequent urination	0.8667
	Fatigue	0.4
	Unexplained weight loss	0.4667
	Recurrent oral thrush (patches in the mouth accompanied by soreness or mouth pain)	0.8667
	Blurred vision	0.8667
	Cuts or grazes that do not heal	0.9333

Crohn's disease	Abdominal pain	0.8
	Diarrhea	0.6667
	Fever	0.7333
	Loss of appetite	0.9333
	Unexplained weight loss	0.4667
	Skin tags	0.9333
	Rectal bleeding	0.9333
	Anal fissures	0.9333
Alopecia areata	Round or oval patches of baldness of the spot	0.9333
	Itching on bald areas	0.9333
	Pits, dents, grooves, or redness on the fingernails	0.9333
	Hair loss	0.8667