

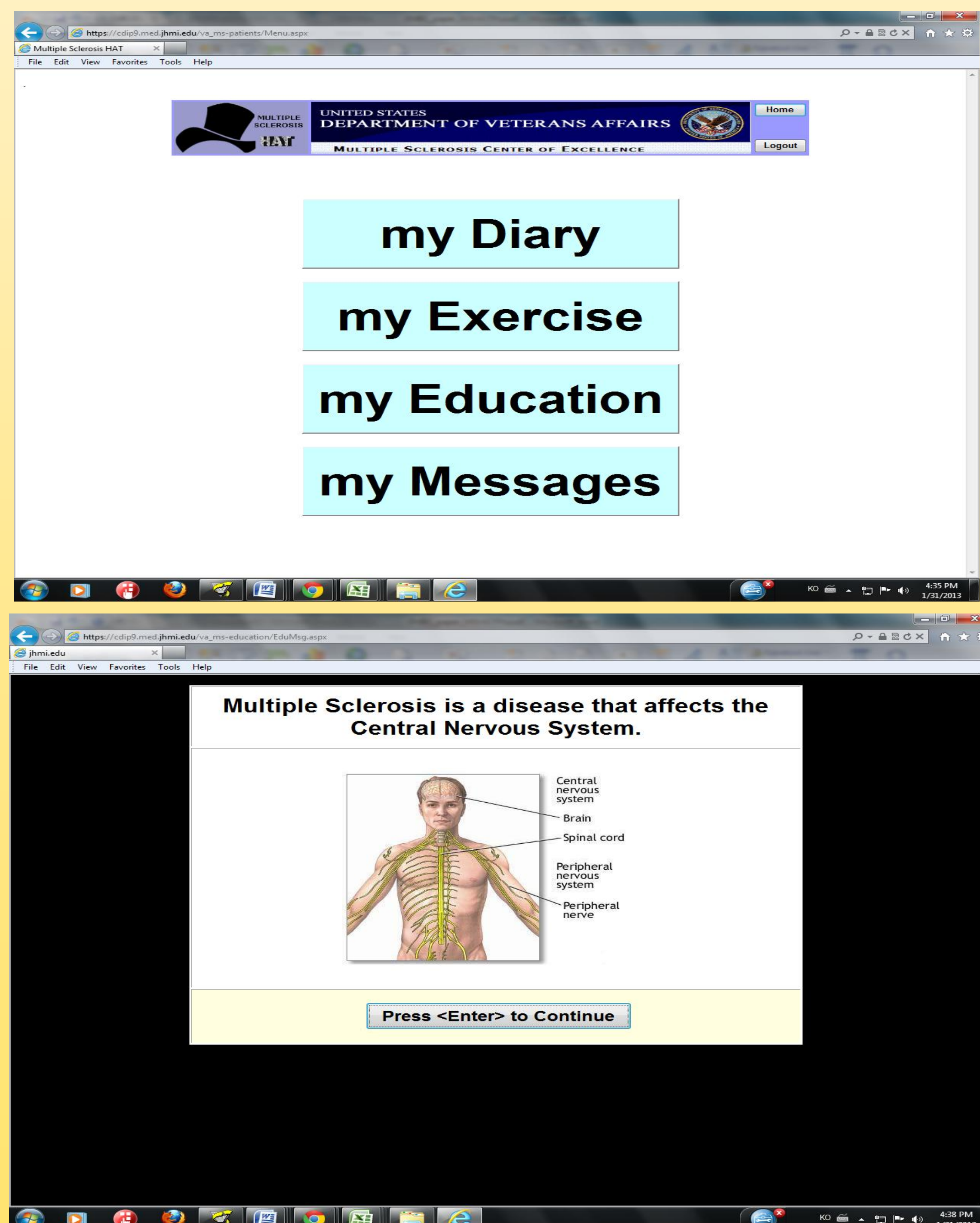
Background

Multiple Sclerosis (MS) is a chronic debilitating disease of the central nervous system which may result in a significant damage of the neuromuscular system, vision and cognitive functions. Modern telehealth technologies may be instrumental in overcoming the barriers of optimal care delivery for patients with MS. To ensure successful implementation of telemedicine technologies at patient homes, particular attention should be given to patient needs, preferences and expectations regarding telemedicine intervention. The goal of this project was to explore MS patient attitudes toward home telemanagement and to identify predictors of patient acceptance of a home telecare system aimed at providing comprehensive patient-centered support for MS self-care.

Methods I – Home Automated Telemanagement (HAT) Design

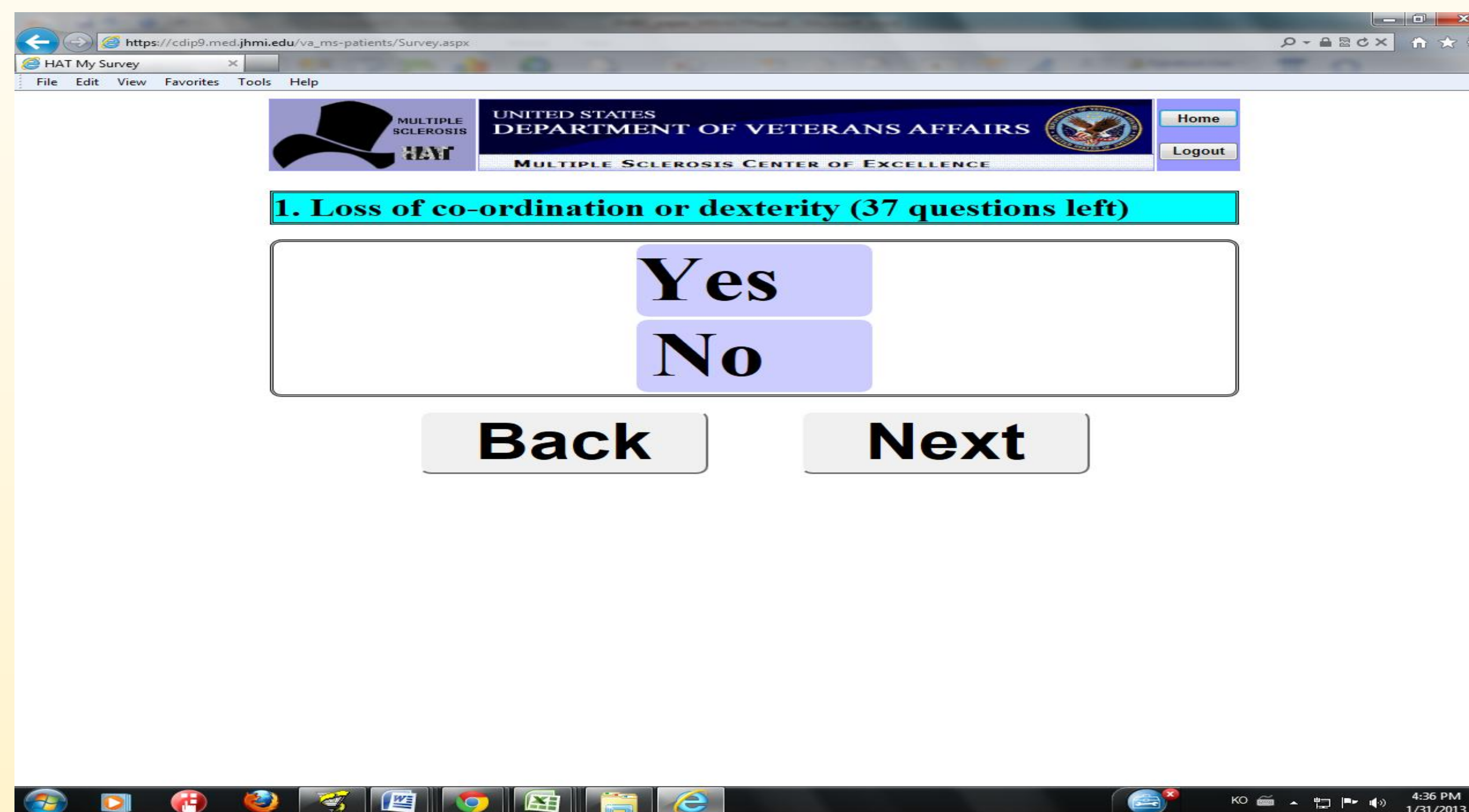
The HAT system for MS patients (MS HAT) consists of three components:

1. Web-based patient unit for guided self-care
 - Symptom diary
 - Medication adherence
 - Interactive patient education
 - Healthy lifestyle monitoring and counseling
 - Secure patient-provider communication
2. Clinician web portal for care coordination
3. Decision support server and data repository connected to EMR



Methods II – HAT System Design: Patient Self-Care Portal

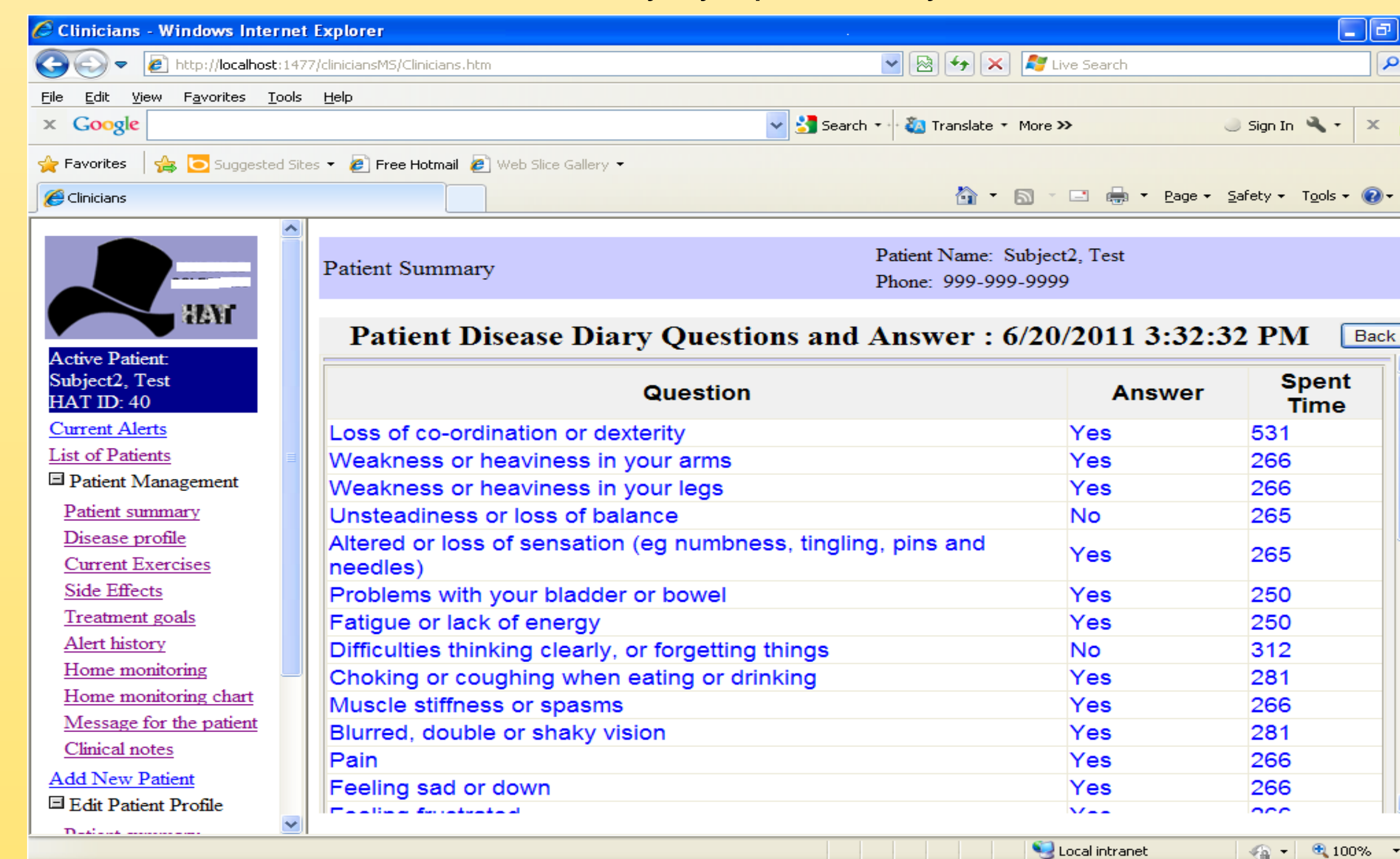
- Web-based guided self-care supports the following components of patient-centered care: symptom diary, medication adherence, interactive patient education, healthy lifestyle monitoring and counseling, and secure patient-provider communication
- The interface for the website is designed with minimal requirements for its users.
- The website supports mouse- or keyboard-driven interfaces allowing veterans with disabilities to fully use the site.



Methods III – HAT System Design: Clinical Team Portal

- The clinician web portal can be run on any web-enabled device and was developed using the Microsoft .NET framework.
- It is able to run on any HTML enabled browser.
- The HAT server uses Internet Information Service to host the clinician web portal and stores patient data in a SQL Server database.

- The clinician portal can be securely accessed by care providers and contains all information from symptom diary.
- Clinicians can view patient symptom diary, make clinical notes, and send messages to the patient.
- The decision support server can be setup to generate individualized alerts to the medical team based on daily symptom diary.



Methods IV – HAT System Design: Decision Support Server

- The decision support server can be setup to generate tailored alerts to the medical team based on daily symptom diary and patient adherence to individualized multi-component treatment plan.

Methods V: Pilot Testing

- A total of 20 patients with MS were recruited from Washington DC VA Medical Center
- The research staff visited the patient's home and provided a training session on how to access MSHAT from their home computer
- The link to website, user ID and password was given to each patient
- During the home visit, a set of questionnaires were collected regarding demographics and self-care strategies
- Patients were asked to use the MSHAT for at least one month preferably on a daily basis
- At the end of one month, an exit interview was conducted

Results I: Demographics

N=20	N	%
Age (years)	53.9 ± 10.0	Range: 36-76
How long have you had the illness? (years)	14.5 ± 8.3	Range: 0.25-30
Race		
White	8	40.0
African American	12	60.0
Your MS symptom severity in the last month:		
None/Mild	7	35.0
Moderate	10	50.0
Severe	3	15.0
Interne use		
Once a day	16	80.0
Once a week	3	15.0
Once a month or less	1	5.0
Never	0	0.0
English skills		
Excellent	14	70.0
Good	6	30.0
Computer use at home		
Once a day	17	85.0
Once a week	3	15.0

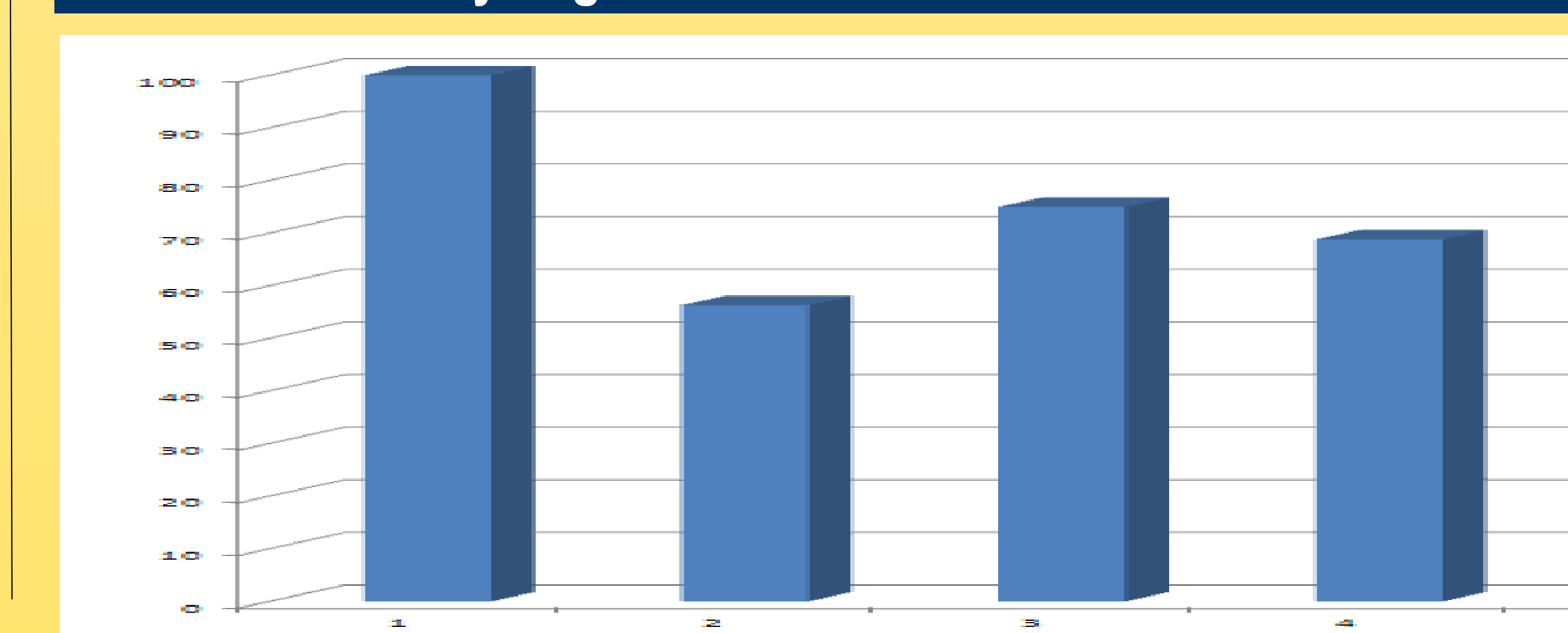
Results II: MS Subtype

Subtype	N	%
Primary Progressive	3	15.0
Relapsing Remitting	6	30.0
Secondary Progressive	11	55.0

Results III: Attitudinal Survey Score

Mean	SD	Minimum	Maximum
75.5	9.5	56.0	92.0*

Results IV: Weekly Log-in Rate



Results V: Linear Regression to predict acceptance

Attitudinal survey score	Parameter estimates	T value	P value
How long have you had MS? (years)	-0.9	-2.9	0.02*
Age	0.2	0.5	0.6
Computer use at home	-20.1	-3.5	0.007*
Never/Once a month or less/Once a week (0)			
Once a day (1)			
English proficiency	16.3	4.0	0.003*
Excellent (1)			
Good/Poor/None (0)			
Education (years)	-0.7	-0.9	0.4
Race	-5.1	-0.9	0.4
White (0)			
African American (1)			

Results VI: Qualitative Interview Results I

Symptom Diary	Content	Interface	Process
Benefits	•It makes you to think about what you are into and track your symptoms •Being able to report to doctor right away is good	•I liked the colors used. •Size of the text was good.	•I would feel more confident managing MS with computer
Concerns	•The symptom diary was very redundant •Overall MSHAT was too long	•Sometimes the site was slow	•I never received any feedback on what's going on
Suggestions	•Individualize the diary questions •Add more comments section •Revise the questions •Revise the answer options	•Add a webcam •Add a 'bookmark' button •Add other internet links •Add more images, music and videos	•Add medication reminder •Add support group chat room •Add exercise modules

Results VII : Qualitative Interview Results II

Education	Content	Interface
Benefits	•Education was outstanding •It refreshed my memory •It would be good for care givers and newly diagnosed patients •It has a benefit of making sure patients understand what they have and how to live with it •Quiz is a good way to reinforce the knowledge	•Being able to print a pamphlet version was helpful •The overall format was good
Concerns	•Length was too long •Information was very elemental •It was redundant •The right answers were too obvious	•The way right/wrong answers were notified was irritating
Suggestions	•Categorize the education and allow the users to choose specific chapter •The information needs to be well balance •Add more current information •Treatment •Medication and side effects •Personalize the education	•Add a percentage of correct answers at the end of education •Allow patients to take the quiz as an option

Conclusions

The MS HAT system supports patient-centered care delivery in MS patients and facilitates patient-provider communication. Tailoring this technology to patient needs and preferences may improve its acceptance by veterans with MS.