Mobile Computing for Parkinson's Disease

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Specialty Care Lead - VISN 21

Disclosures

Presenter has nothing to disclose.

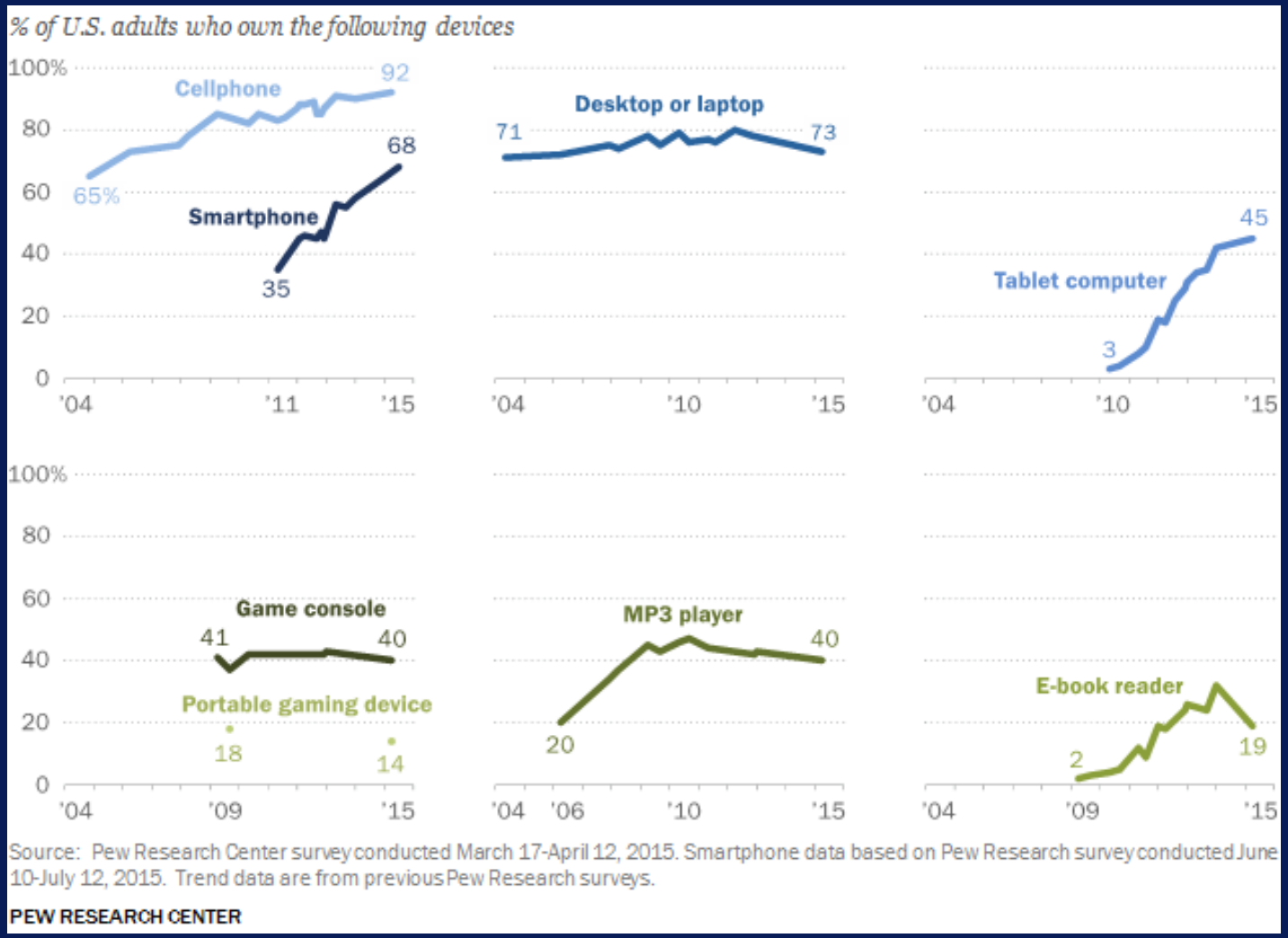
Outline

- Growth of mobile computing
- Point of care data entry
- Home monitoring for MS
- Monitoring in Parkinson’s Disease
- Medical education

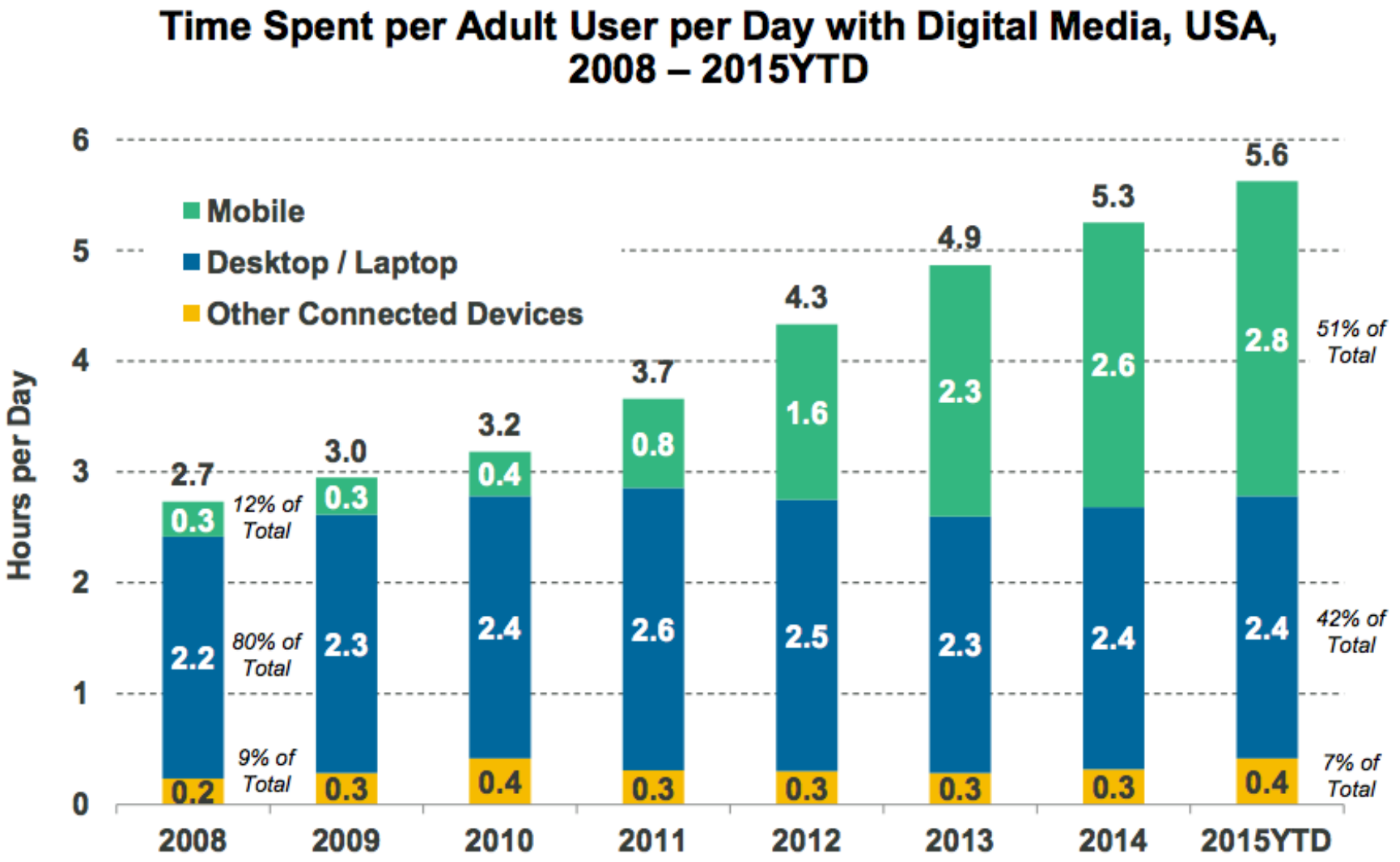
Tablets Have Surpassed PCs Worldwide

Worldwide Device Shipments by Segment (Thousands of Units)			
Device Type	**2013**	**2014**	**2015**
Traditonal PCs (Desk-Based and Notebook)	296,131	276,221	261,657
Ultramobiles, Premium	21,517	32,251	55,032
PC Market Total	**317,648**	**308,472**	**316,689**
Tablets	206,807	256,308	320,964
Mobile Phones	1,806,964	1,862,766	1,946,456
Other Ultramobiles (Hybrid and Clamshell)	2,981	5,381	7,645
Total	**2,334,400**	**2,432,927**	**2,591,753**

Smartphone and Tablet Ownership is Growing in the US



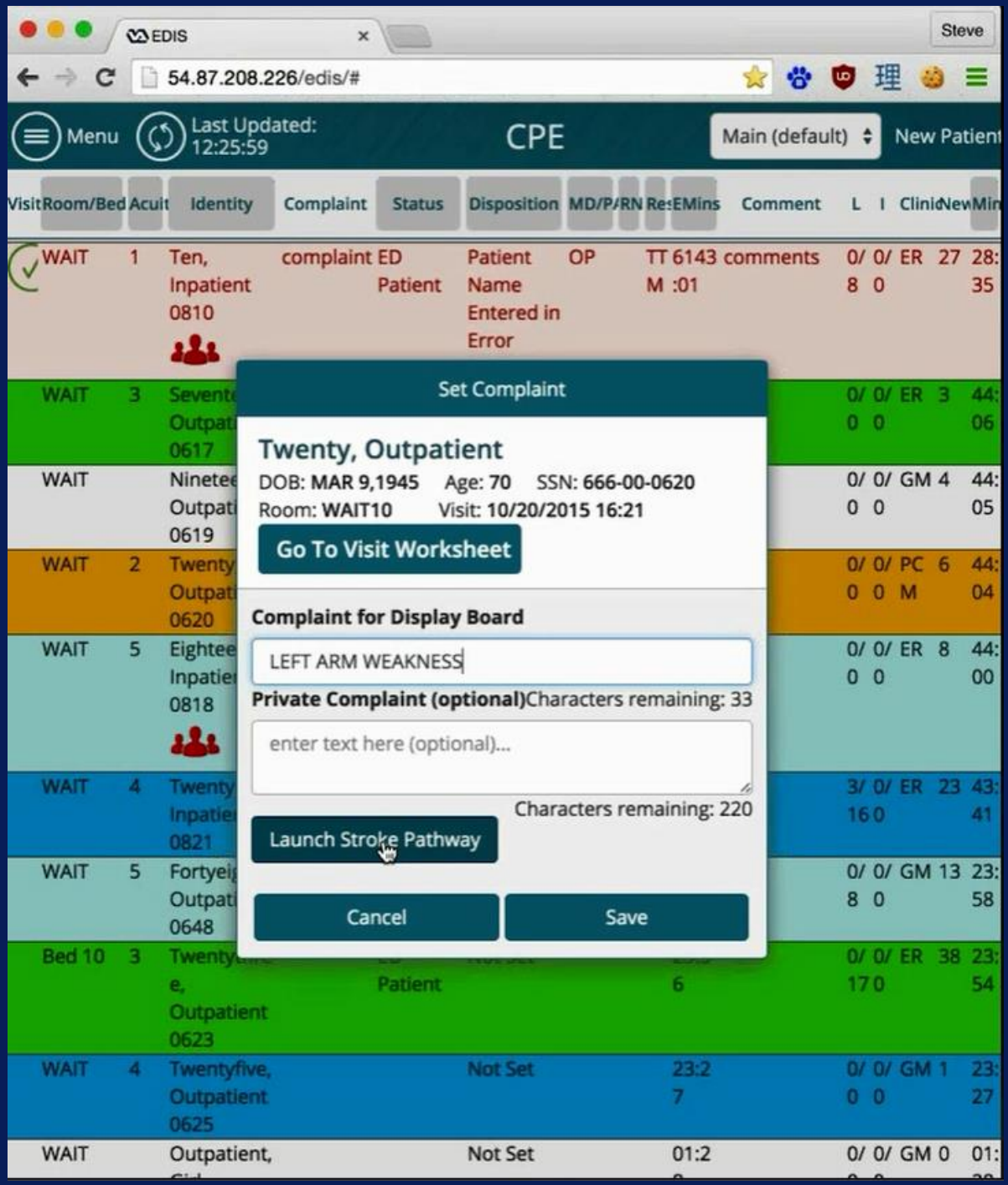
Internet *Usage* (Engagement) Growth Solid
+11% Y/Y = Mobile @ 3 Hours / Day per User vs. <1 Five Years Ago, USA

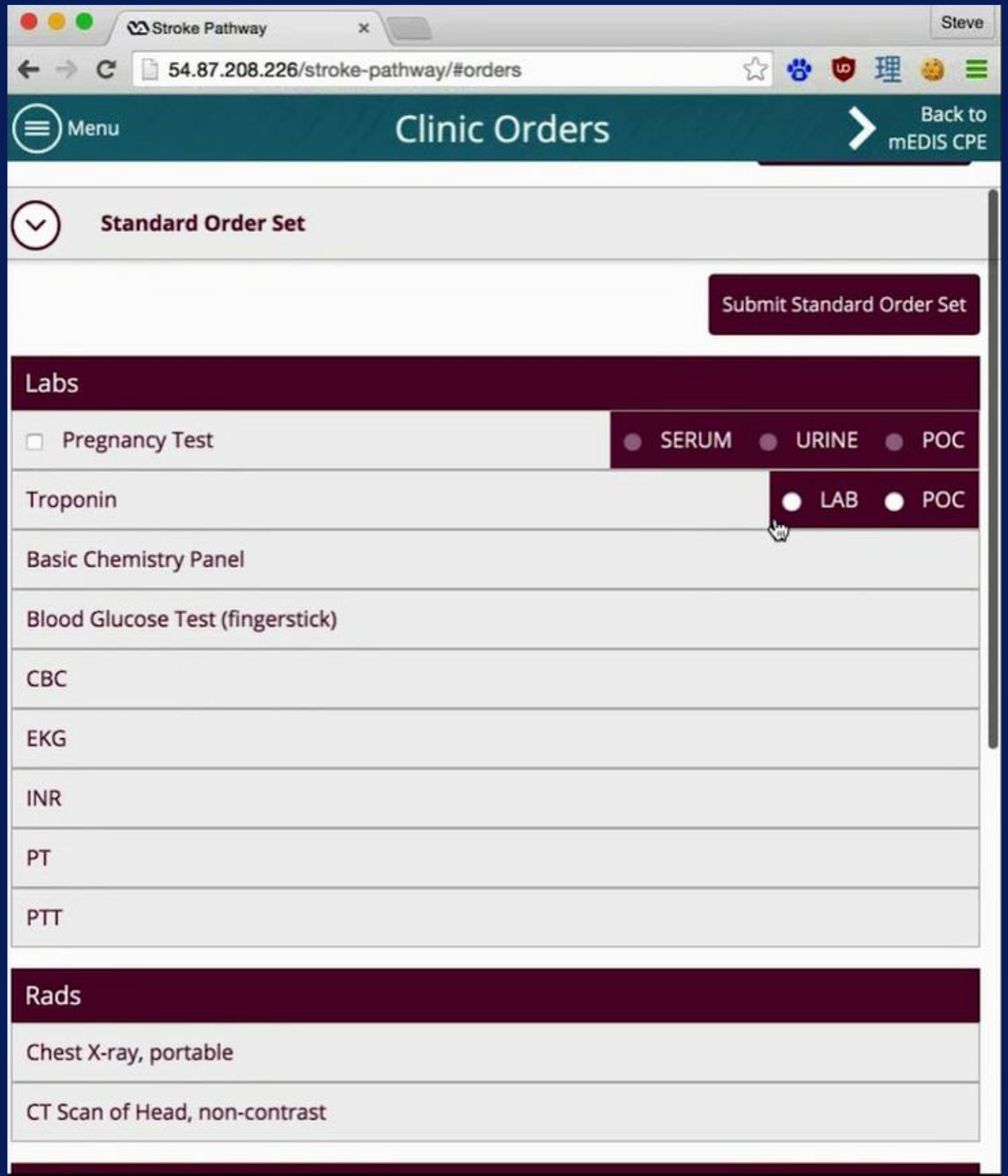


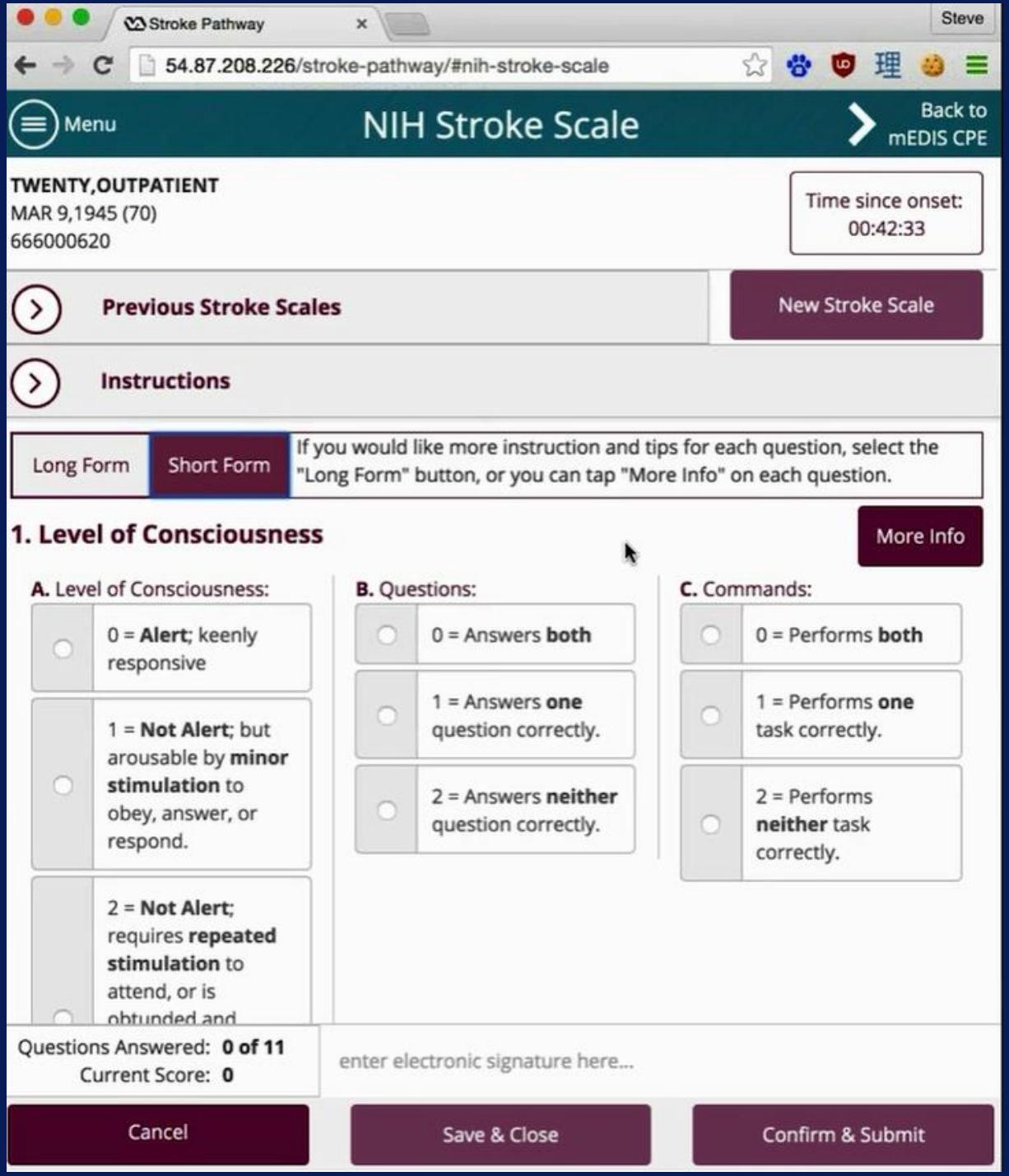
@KPCB Source: eMarketer 9/14 (2008-2010), eMarketer 4/15 (2011-2015). Note: Other connected devices include OTT and game consoles. Mobile includes smartphone and tablet. Usage includes both home and work. Ages 18+; time spent with each medium includes all time spent with that medium, regardless of multitasking.

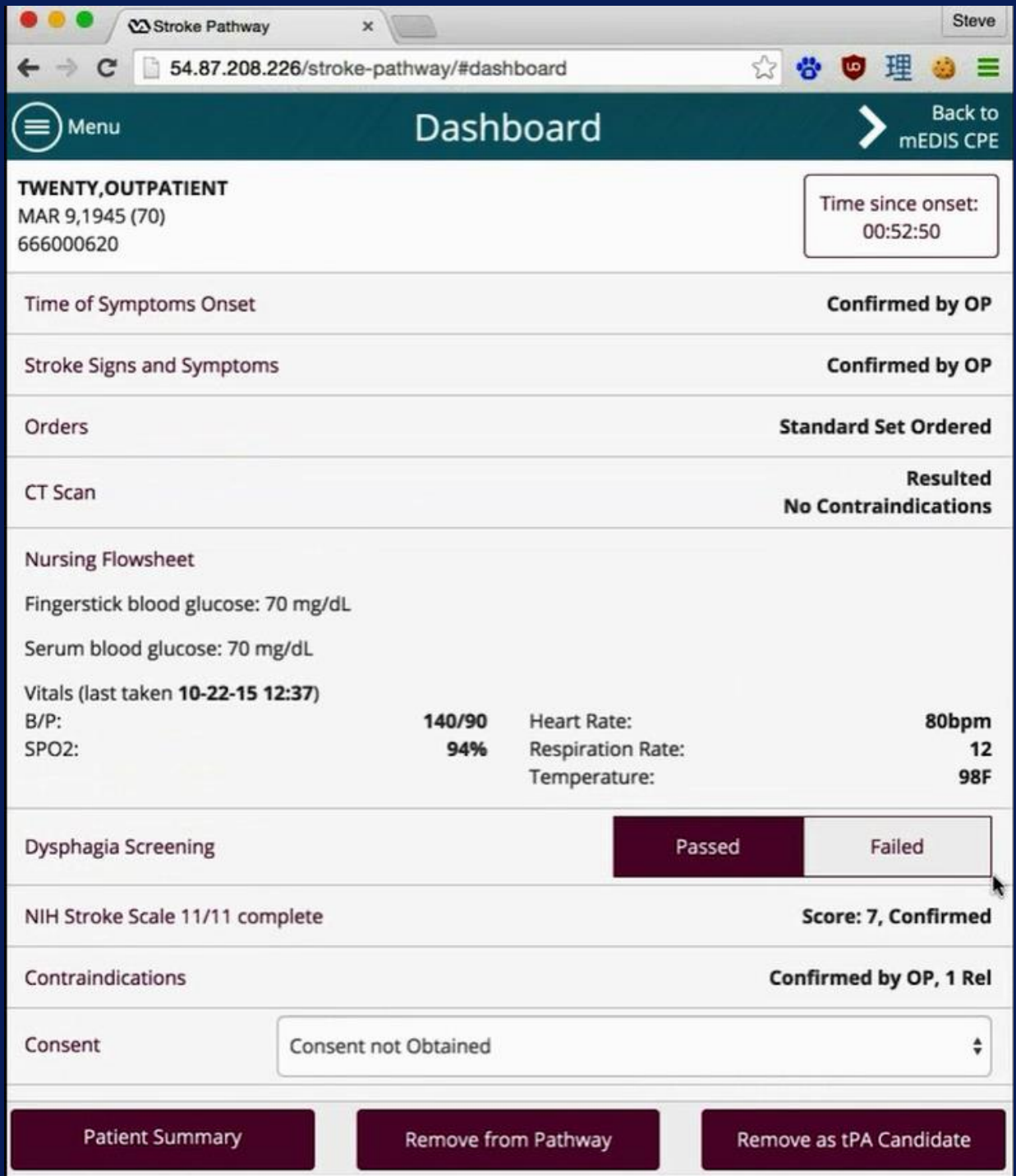
Multi-Device Use is Common

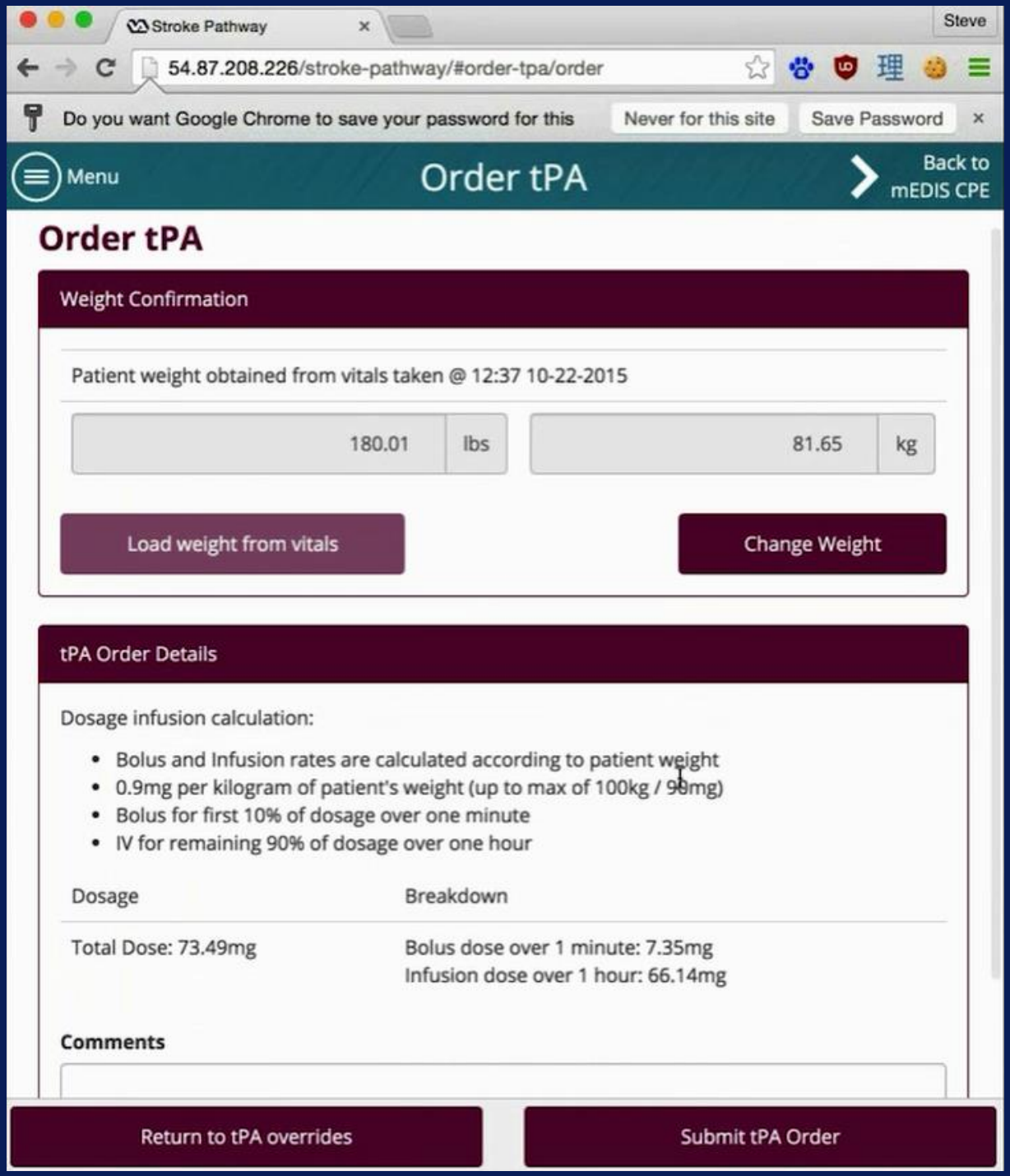
As of June 2015

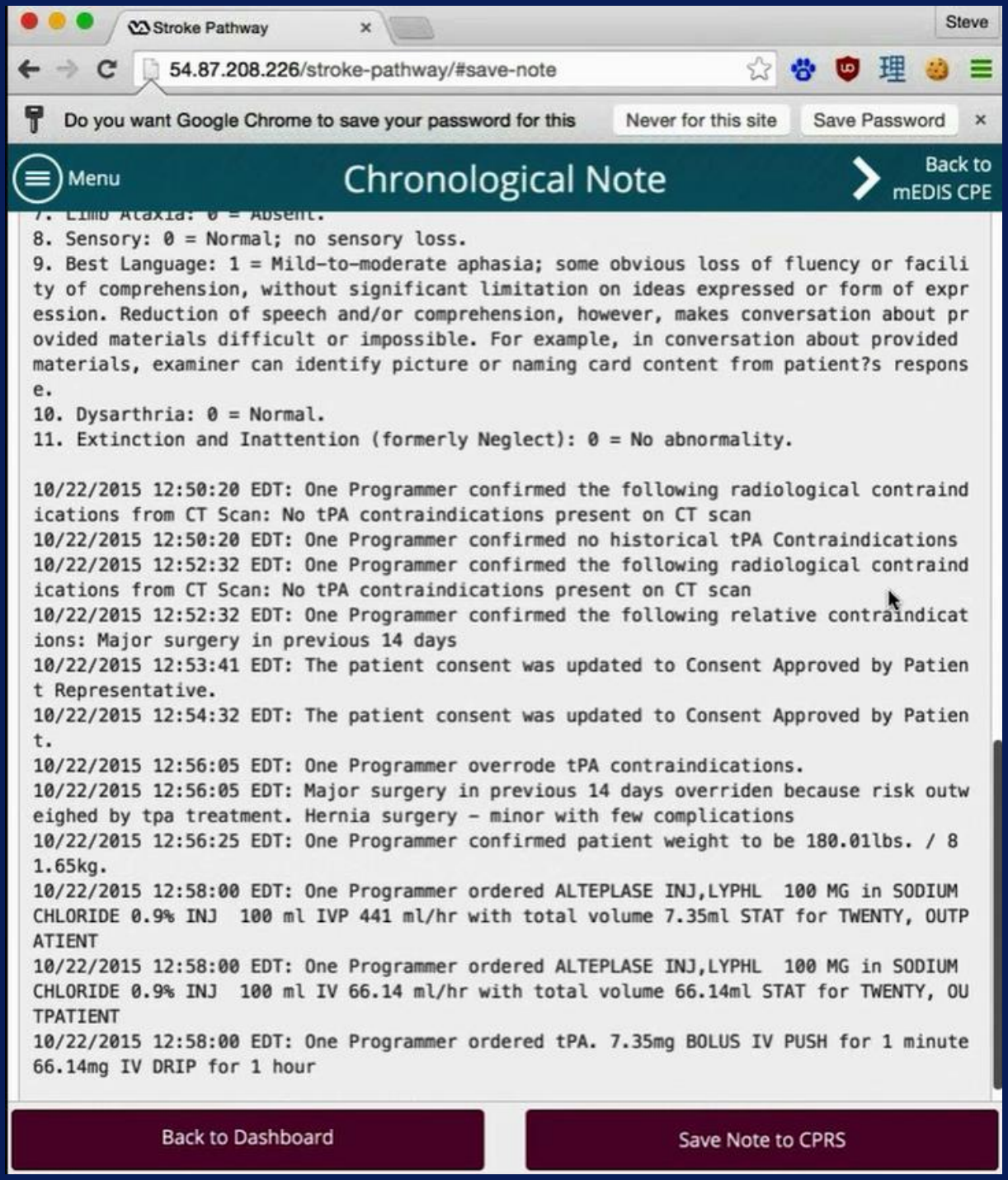

EDIS
Steve
54.87.208.226/edis/#
Menu
Last Updated: 12:25:59
CPE
Main (default)
New Patient
Visit
Room/Bed
Acuit
Identity
Complaint
Status
Disposition
MD/P/RN
Res
EMins
Comment
L
I
Clinic
New
Min
WAIT 1 Ten, Inpatient 0810 complaint ED Patient Patient Name Entered in Error OP TT 6143 M :01 comments 0/ 8 0/ 0 ER 27 28: 35
WAIT 3 Seventy Outpatient 0617 0/ 0 0/ 0 ER 3 44: 06
WAIT Nineteen Outpatient 0619 0/ 0 0/ 0 GM 4 44: 05
WAIT 2 Twenty Outpatient 0620 0/ 0 0/ 0 PC M 6 44: 04
WAIT 5 Eighteen Inpatient 0818 0/ 0 0/ 0 ER 8 44: 00
WAIT 4 Twenty Inpatient 0821 3/ 16 0/ 0 ER 23 43: 41
WAIT 5 Fortyeight Outpatient 0648 0/ 8 0/ 0 GM 13 23: 58
Bed 10 3 Twenty e, Outpatient 0623 Patient 6 0/ 17 0/ 0 ER 38 23: 54
WAIT 4 Twentyfive, Outpatient 0625 Not Set 23:2 7 0/ 0 0/ 0 GM 1 23: 27
WAIT Outpatient, Not Set 01:2 0/ 0 0/ 0 GM 0 01:
Set Complaint
Twenty, Outpatient
DOB: MAR 9,1945 Age: 70 SSN: 666-00-0620
Room: WAIT10 Visit: 10/20/2015 16:21
Go To Visit Worksheet
Complaint for Display Board
LEFT ARM WEAKNESS
Private Complaint (optional)Characters remaining: 33
enter text here (optional)...
Characters remaining: 220
Launch Stroke Pathway
Cancel
Save


Stroke Pathway
Steve
54.87.208.226/stroke-pathway/#orders
Menu
Clinic Orders
Back to mEDIS CPE
Standard Order Set
Submit Standard Order Set
Labs
Pregnancy Test
SERUM
URINE
POC
Troponin
LAB
POC
Basic Chemistry Panel
Blood Glucose Test (fingerstick)
CBC
EKG
INR
PT
PTT
Rads
Chest X-ray, portable
CT Scan of Head, non-contrast

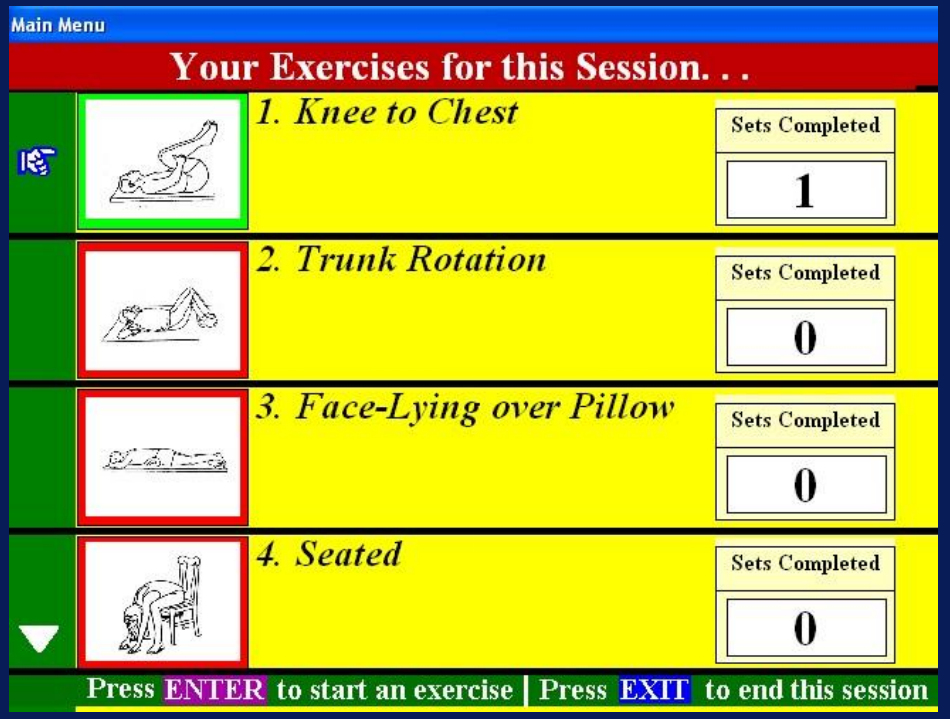

Stroke Pathway
Steve
54.87.208.226/stroke-pathway/#nih-stroke-scale
Menu
NIH Stroke Scale
Back to mEDIS CPE
TWENTY,OUTPATIENT
MAR 9,1945 (70)
666000620
Time since onset: 00:42:33
Previous Stroke Scales
New Stroke Scale
Instructions
Long Form
Short Form
If you would like more instruction and tips for each question, select the "Long Form" button, or you can tap "More Info" on each question.
1. Level of Consciousness
More Info
A. Level of Consciousness:
0 = Alert; keenly responsive
1 = Not Alert; but arousable by minor stimulation to obey, answer, or respond.
2 = Not Alert; requires repeated stimulation to attend, or is obtunded and
B. Questions:
0 = Answers both
1 = Answers one question correctly.
2 = Answers neither question correctly.
C. Commands:
0 = Performs both
1 = Performs one task correctly.
2 = Performs neither task correctly.
Questions Answered: 0 of 11
Current Score: 0
enter electronic signature here...
Cancel
Save & Close
Confirm & Submit


Stroke Pathway
Steve
54.87.208.226/stroke-pathway/#dashboard
Menu
Dashboard
Back to mEDIS CPE
TWENTY,OUTPATIENT
MAR 9,1945 (70)
666000620
Time since onset: 00:52:50
Time of Symptoms Onset
Confirmed by OP
Stroke Signs and Symptoms
Confirmed by OP
Orders
Standard Set Ordered
CT Scan
Resulted
No Contraindications
Nursing Flowsheet
Fingerstick blood glucose: 70 mg/dL
Serum blood glucose: 70 mg/dL
Vitals (last taken 10-22-15 12:37)
B/P: 140/90
SPO2: 94%
Heart Rate: 80bpm
Respiration Rate: 12
Temperature: 98F
Dysphagia Screening
Passed
Failed
NIH Stroke Scale 11/11 complete
Score: 7, Confirmed
Contraindications
Confirmed by OP, 1 Rel
Consent
Consent not Obtained
Patient Summary
Remove from Pathway
Remove as tPA Candidate


Stroke Pathway
Steve
54.87.208.226/stroke-pathway/#order-tpa/order
Do you want Google Chrome to save your password for this
Never for this site
Save Password
Menu
Order tPA
Back to mEDIS CPE
Order tPA
Weight Confirmation
Patient weight obtained from vitals taken @ 12:37 10-22-2015
180.01
lbs
81.65
kg
Load weight from vitals
Change Weight
tPA Order Details
Dosage infusion calculation:
Bolus and Infusion rates are calculated according to patient weight
0.9mg per kilogram of patient's weight (up to max of 100kg / 90mg)
Bolus for first 10% of dosage over one minute
IV for remaining 90% of dosage over one hour
Dosage
Breakdown
Total Dose: 73.49mg
Bolus dose over 1 minute: 7.35mg
Infusion dose over 1 hour: 66.14mg
Comments
Return to tPA overrides
Submit tPA Order


Stroke Pathway
Steve
54.87.208.226/stroke-pathway/#save-note
Do you want Google Chrome to save your password for this
Never for this site
Save Password
Menu
Chronological Note
Back to mEDIS CPE
7. Limb Ataxia: 0 = Absent.
8. Sensory: 0 = Normal; no sensory loss.
9. Best Language: 1 = Mild-to-moderate aphasia; some obvious loss of fluency or facili ty of comprehension, without significant limitation on ideas expressed or form of expr ession. Reduction of speech and/or comprehension, however, makes conversation about pr ovided materials difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card content from patient?s respons e.
10. Dysarthria: 0 = Normal.
11. Extinction and Inattention (formerly Neglect): 0 = No abnormality.
10/22/2015 12:50:20 EDT: One Programmer confirmed the following radiological contraind ications from CT Scan: No tPA contraindications present on CT scan
10/22/2015 12:50:20 EDT: One Programmer confirmed no historical tPA Contraindications
10/22/2015 12:52:32 EDT: One Programmer confirmed the following radiological contraind ications from CT Scan: No tPA contraindications present on CT scan
10/22/2015 12:52:32 EDT: One Programmer confirmed the following relative contraindicat ions: Major surgery in previous 14 days
10/22/2015 12:53:41 EDT: The patient consent was updated to Consent Approved by Patien t Representative.
10/22/2015 12:54:32 EDT: The patient consent was updated to Consent Approved by Patien t.
10/22/2015 12:56:05 EDT: One Programmer overrode tPA contraindications.
10/22/2015 12:56:05 EDT: Major surgery in previous 14 days overriden because risk outw eighed by tpa treatment. Hernia surgery - minor with few complications
10/22/2015 12:56:25 EDT: One Programmer confirmed patient weight to be 180.01lbs. / 8 1.65kg.
10/22/2015 12:58:00 EDT: One Programmer ordered ALTEPLASE INJ,LYPHL 100 MG in SODIUM CHLORIDE 0.9% INJ 100 ml IVP 441 ml/hr with total volume 7.35ml STAT for TWENTY, OUTP ATIENT
10/22/2015 12:58:00 EDT: One Programmer ordered ALTEPLASE INJ,LYPHL 100 MG in SODIUM CHLORIDE 0.9% INJ 100 ml IV 66.14 ml/hr with total volume 66.14ml STAT for TWENTY, OU TPATIENT
10/22/2015 12:58:00 EDT: One Programmer ordered tPA. 7.35mg BOLUS IV PUSH for 1 minute 66.14mg IV DRIP for 1 hour
Back to Dashboard
Save Note to CPRS

Multiple Sclerosis Home Automated Telemonitoring (MS-HAT)



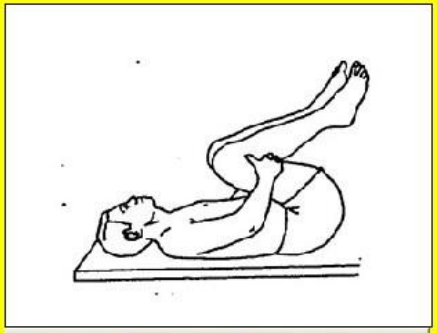
Home Station: Exercise Directions

Exercise

Stretching Exercises

Knee to Chest

1.Lie on back with knees bent
2.Slowly pull both knees toward the chest, gently stretching the low back muscles just enough to flatten the low back on floor.
3.Hold for three breaths.
4.Return to starting position.



Press <Replay> to Start/Stop Video

Do 4 times

Press Enter to continue

Exercise

Stretching Exercises

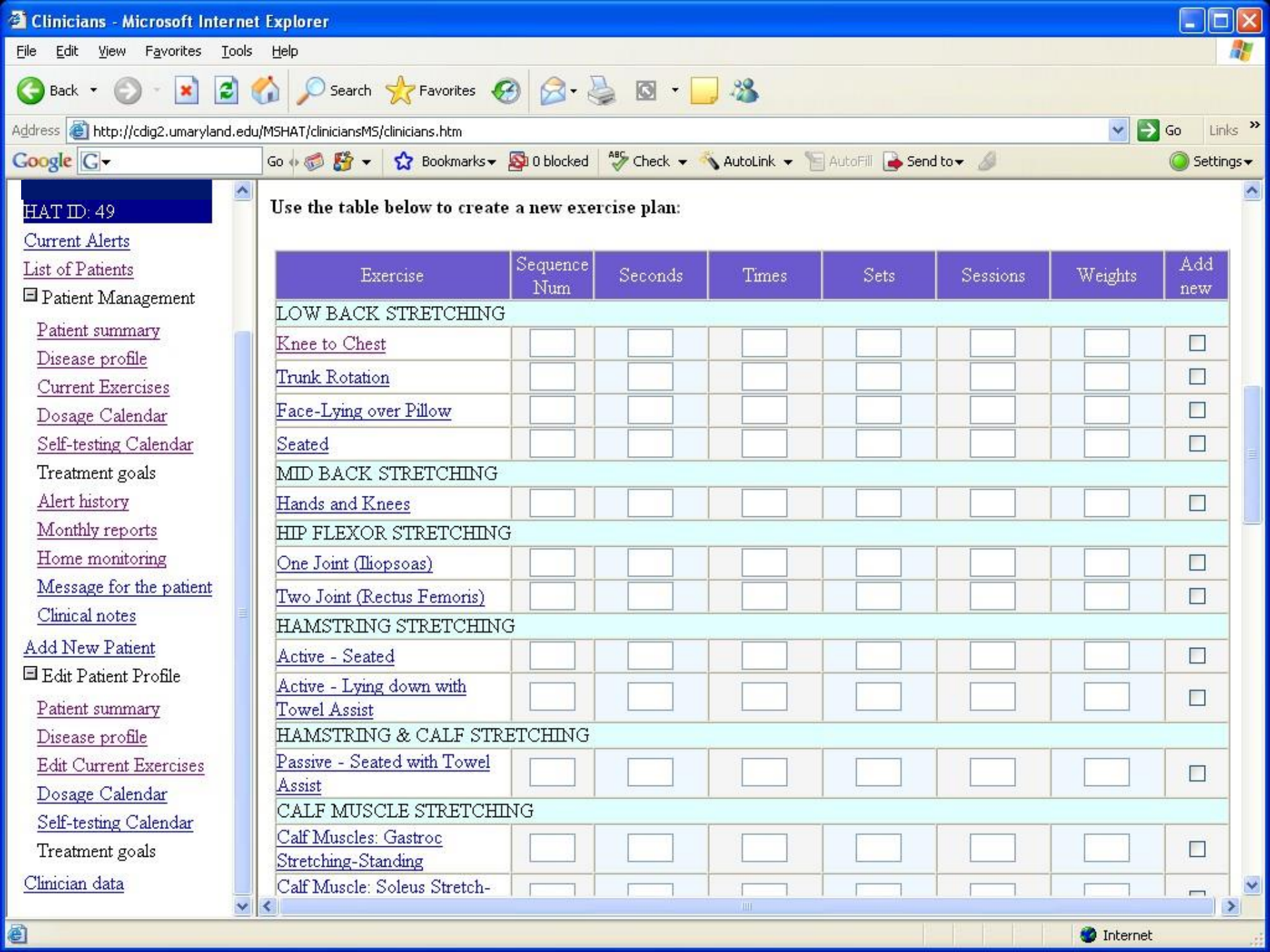
Knee to Chest

1.Lie on back with knees bent
2.Slowly pull both knees toward the chest, gently stretching the low back muscles just enough to flatten the low back on floor.
3.Hold for three breaths.
4.Return to starting position.

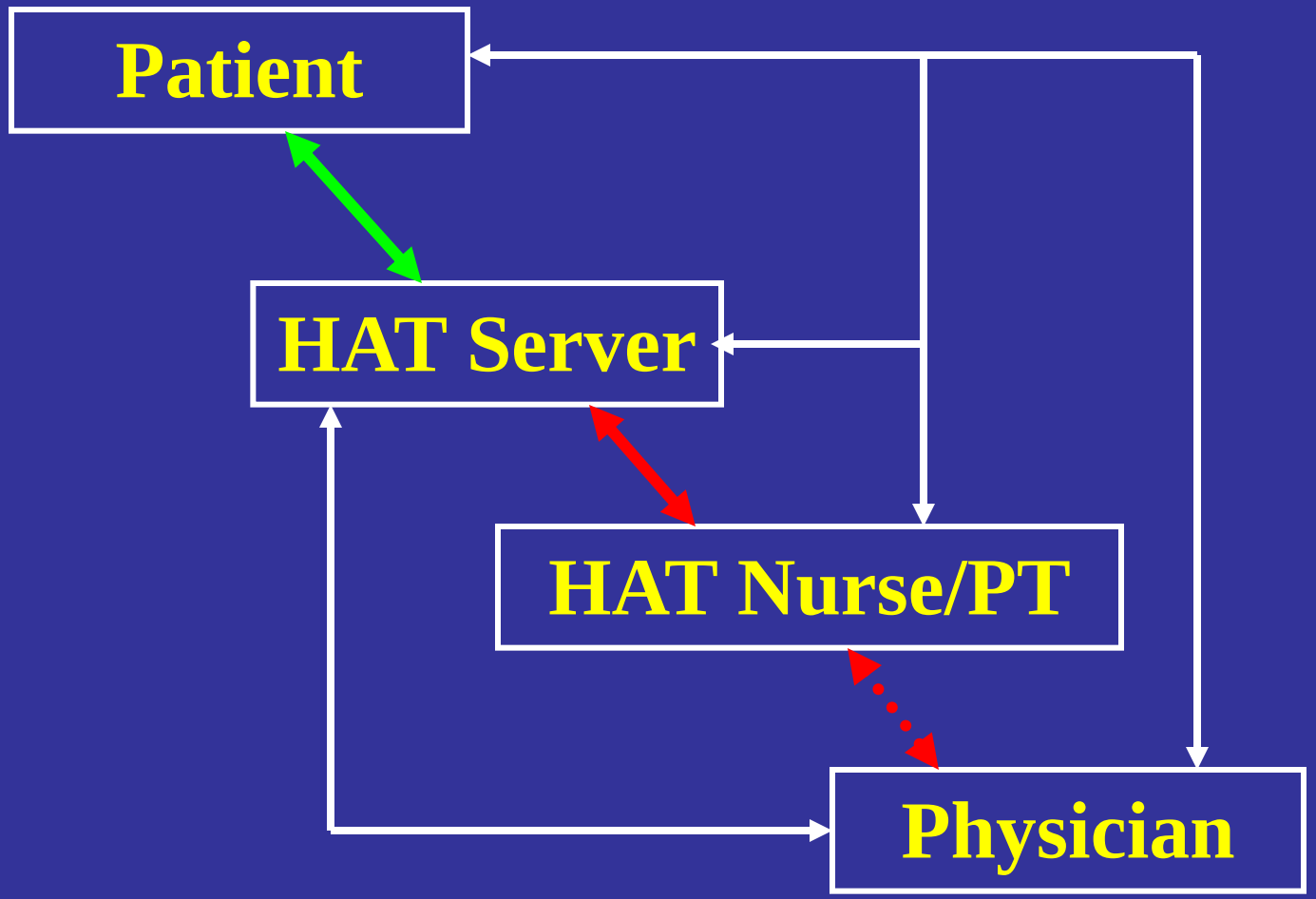
Press <Replay> to Start/Stop Video

Do 4 times

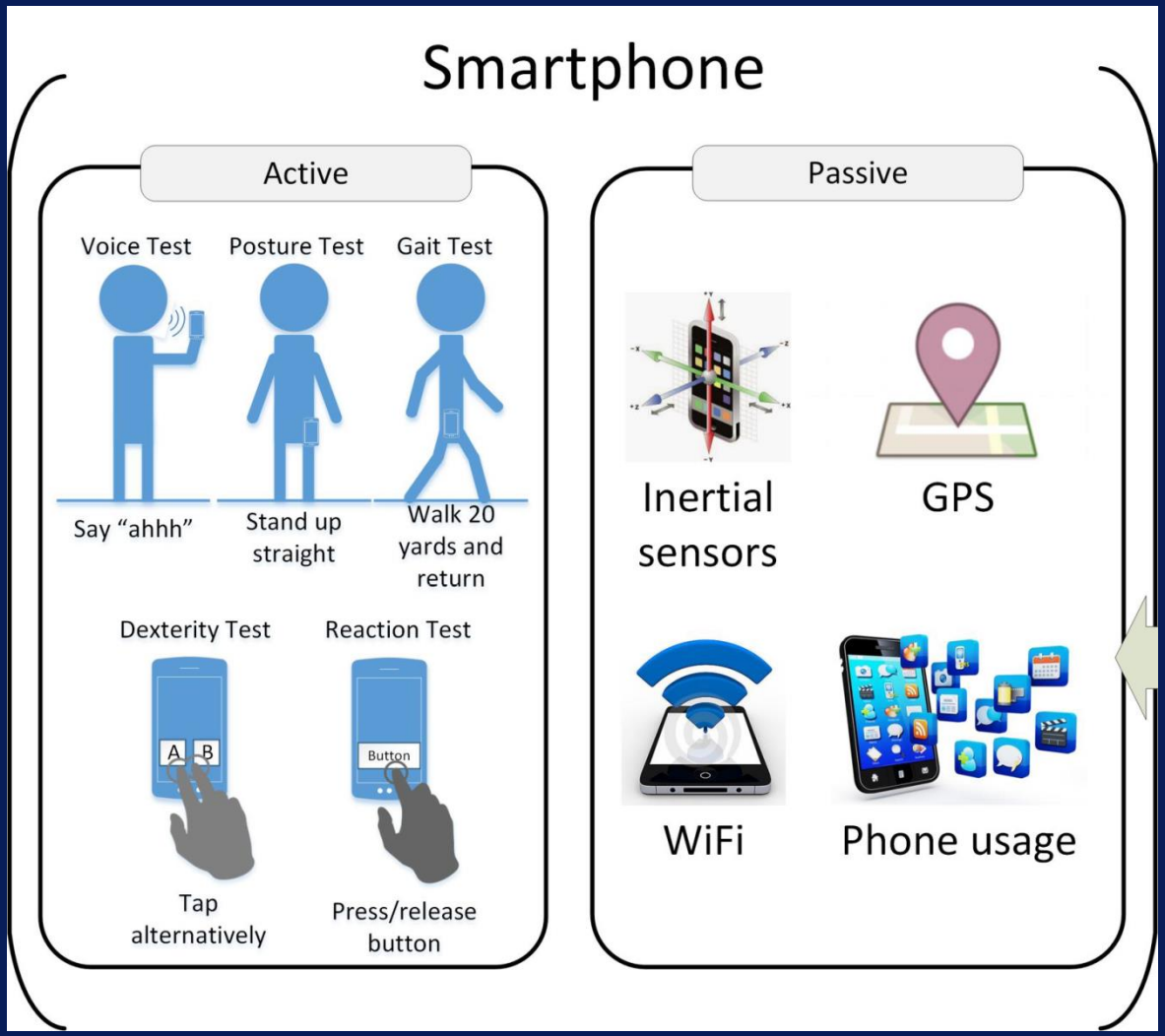
Press Enter to continue


Clinicians - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cdig2.umaryland.edu/MSHAT/cliniciansMS/clinicians.htm
Go Links
Google Go Bookmarks 0 blocked Check AutoLink AutoFill Send to Settings
HAT ID: 49
Current Alerts
List of Patients
Patient Management
Patient summary
Disease profile
Current Exercises
Dosage Calendar
Self-testing Calendar
Treatment goals
Alert history
Monthly reports
Home monitoring
Message for the patient
Clinical notes
Add New Patient
Edit Patient Profile
Patient summary
Disease profile
Edit Current Exercises
Dosage Calendar
Self-testing Calendar
Treatment goals
Clinician data
Use the table below to create a new exercise plan:
Exercise
Sequence Num
Seconds
Times
Sets
Sessions
Weights
Add new
LOW BACK STRETCHING
Knee to Chest
Trunk Rotation
Face-Lying over Pillow
Seated
MID BACK STRETCHING
Hands and Knees
HIP FLEXOR STRETCHING
One Joint (Iliopsoas)
Two Joint (Rectus Femoris)
HAMSTRING STRETCHING
Active - Seated
Active - Lying down with Towel Assist
HAMSTRING & CALF STRETCHING
Passive - Seated with Towel Assist
CALF MUSCLE STRETCHING
Calf Muscles: Gastroc Stretching-Standing
Calf Muscle: Soleus Stretch-
Internet

Information Flow in HAT

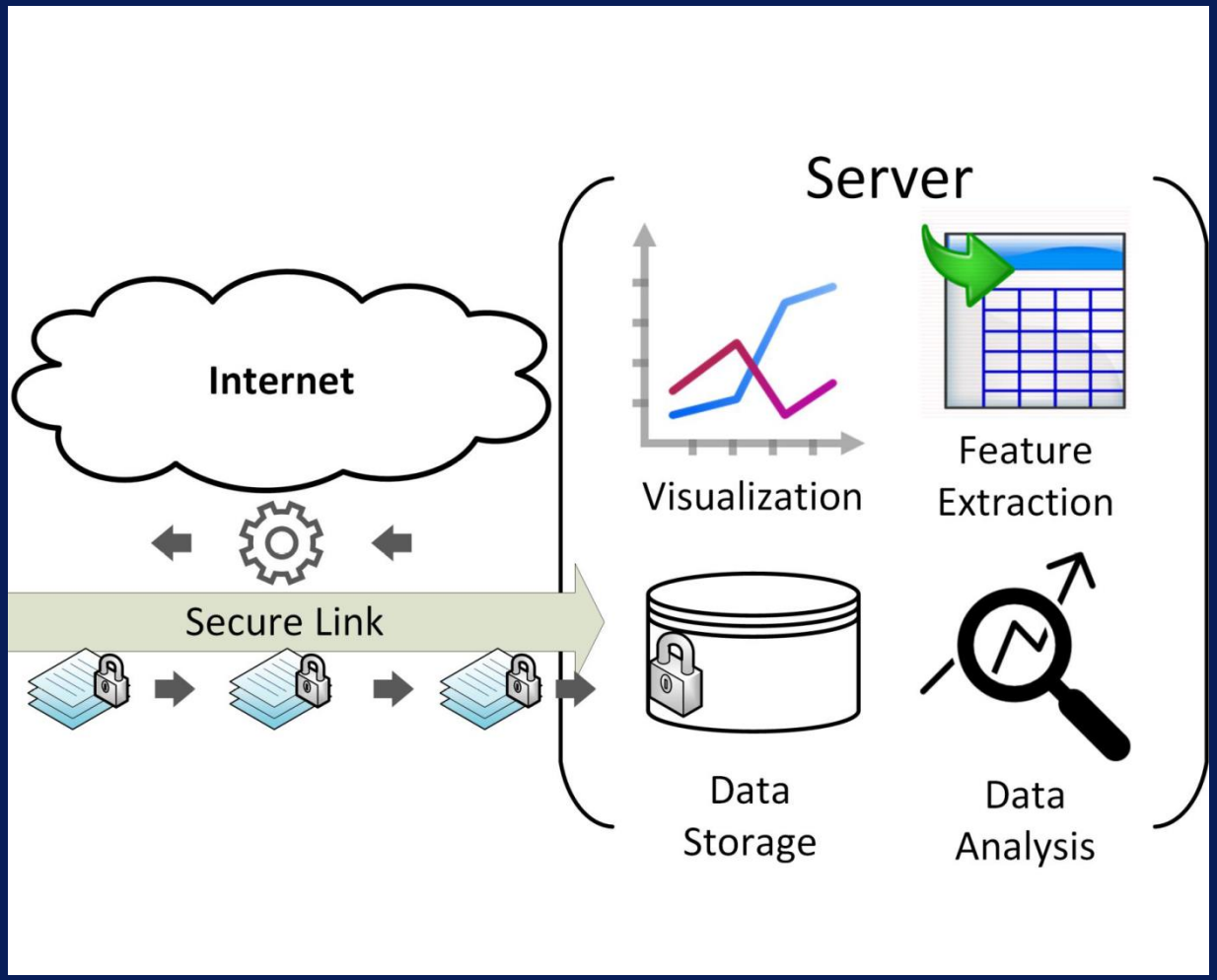


PD Monitoring via Smart Phone and Tasks



http://www.cs.jhu.edu/~andong/ Accessed 9/9/2016.

PD Monitoring via Smart Phone and Tasks



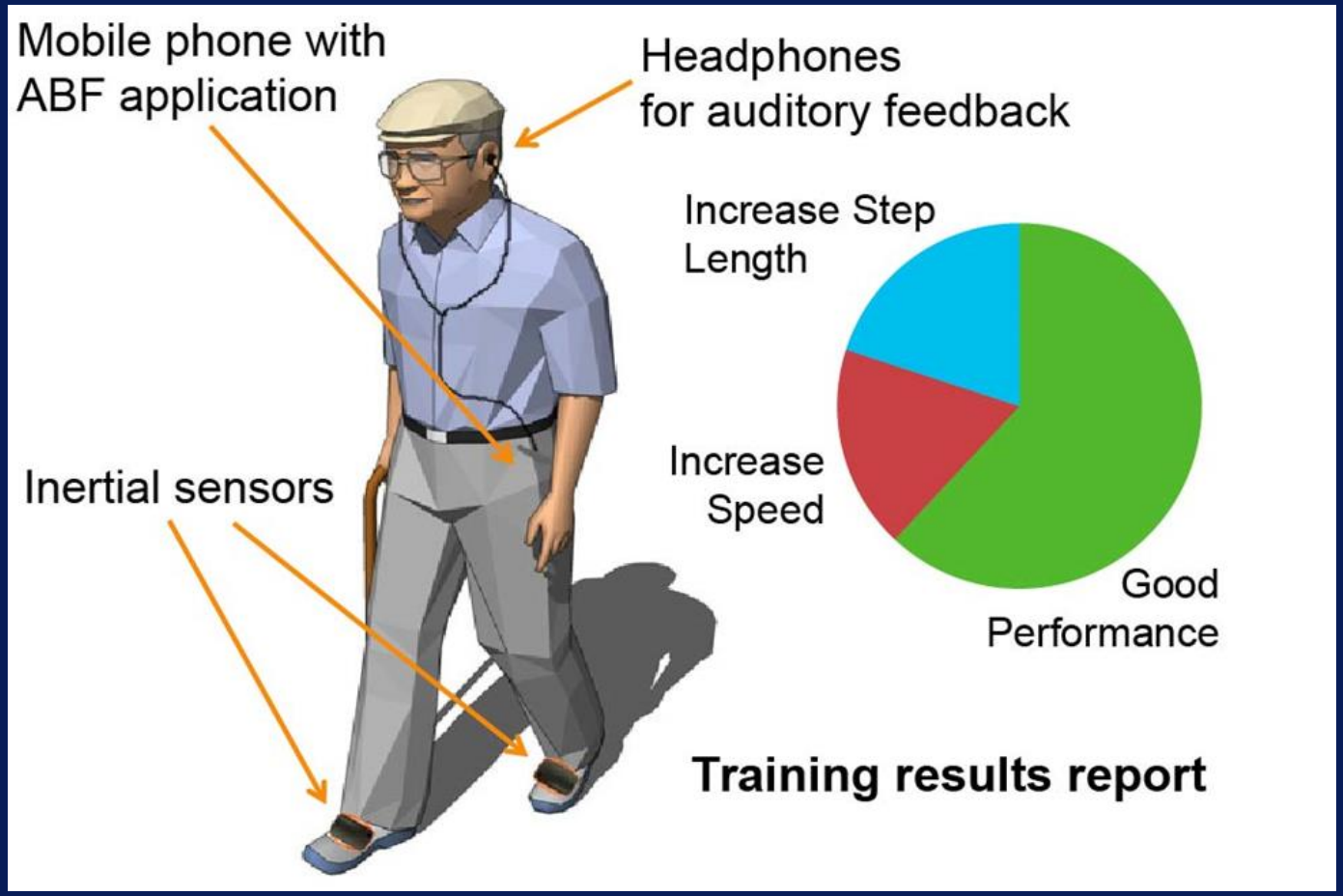
http://www.cs.jhu.edu/~andong/ Accessed 9/9/2016.

Project Goals

- **Assess the feasibility of remote, online recruitment and app installation**
- **Objectively measure and quantify five factors of PD (voice, balance, dexterity, gait, and reaction time)**
- **Measure daily variability of these and other factors including mobility and socialization**
- **Correlate app sensor data and clinical assessments from the UPDRS in a subset of participants**

http://www.cs.jhu.edu/~andong/ Accessed 9/9/2016.

Wearable Gait Training

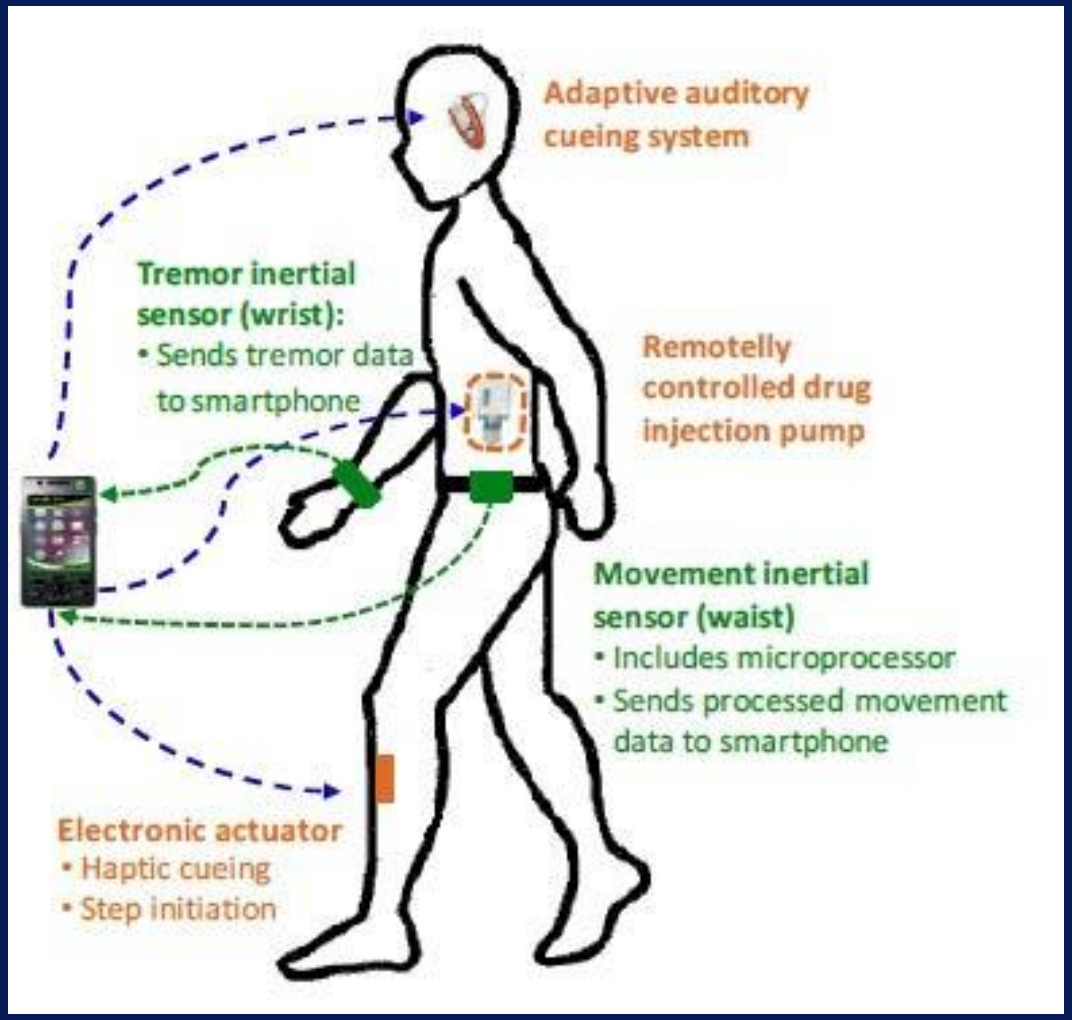


http://www.cupid-project.eu/biofeedback Accessed 9/9/2016.

Wearable Gait Training

http://www.cupid-project.eu/biofeedback Accessed 9/9/2016.

Comprehensive Monitoring / Treatment



http://rempark.cetpd.upc.edu/project Accessed 9/9/2016.

Surgical Guidance via iPad

http://www.proximie.com/Augmented-Reality/

“Live” Viewing of Surgery for Trainees

Summary

- Mobile devices – tablets and smart phones – have grown to become a major platform for computing and internet access
- Their small size, low cost, consumer familiarity, and built-in audio, video, sensors, and high resolution displays make them attractive for development and implementation of new health care applications