AMPHETAMINE-ENHANCED STROKE RECOVERY
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I. PURPOSE

The purpose of this Pilot Grant is to collect data critical for the design of a subsequent full-scale clinical trial testing the efficacy of treatment with amphetamine combined with physical therapy to facilitate poststroke motor recovery. Using a multicenter, block-randomized, placebo-controlled design, this pilot study will:

a. Refine the intervention strategy which has been developed for this Pilot Grant based on the best available laboratory and preliminary clinical data.
b. Refine the target patient population.
c. Gain information to permit an accurate sample size calculation (estimated for this pilot study) for a subsequent trial.
d. Refine outcome measures, site monitoring techniques, data consistency protocols, and data management procedures.
e. Obtain data to further support the safety of the proposed intervention.

II. HYPOTHESES

1. Patients treated with d-amphetamine combined with physical therapy will have improved recovery of motor function as compared to similar patients treated with placebo combined with physical therapy measured 90 days after hemispheric ischemic stroke.
2. There will not be a clinically significant increase in the frequency of serious adverse events associated with treatment with d-amphetamine which would preclude further testing of these regimens.

III. OTHER GOALS

This is a Pilot Clinical Trial that has several additional goals as detailed in the grant proposal. These include:

1. Refinement of the target patient population.
2. Gain information to permit an accurate sample size calculation (estimated for this pilot study) for a subsequent trial.
3. Refinement of outcome measures, site monitoring techniques, data consistency protocols, and data management procedures.

IV. GENERAL RESEARCH DESIGN AND METHODS

Using a block-randomized, double-blind, placebo-controlled, multicenter (5 site) design, this study will provide data examining the potential clinical benefit and safety of d-amphetamine combined with physical therapy compared to physical therapy alone in patients with moderate or severe motor impairments following hemispheric ischemic stroke. It is hypothesized that the addition of treatment with d-amphetamine will result in at least a 12.6 point improvement in the Fugl-Meyer motor score at 3 months after stroke. Two treatment regimens will be evaluated sequentially:

Rehabilitation Admission (Hemispheric Ischemic Stroke)	**Assessment for Inclusion/Exclusion Criteria**	**Randomization (10-30 days after stroke)**
Baseline Data Collection	**Treatment Phase* d-Amphetamine or Placebo + Physical Therapy**	**Outcomes Assessment (90 days after stroke)**

***Regimen 1:** Treatment with a regimen of 10 mg of d-amphetamine or placebo combined with a one hour physical therapy session beginning one hour after drug/placebo administration every 4 days for a total of 6 sessions.

Depending on the results of Regimen 1, a second cohort of patients will then be randomized:

Regimen 2a (if Regimen 1 suggests benefit)**:** Treatment with a regimen of 10 mg of d-amphetamine or placebo combined with a one hour physical therapy session beginning one hour after drug/placebo

administration as in Regimen 1, but the interval between treatments will be decreased to every 2 days for a total of 6 sessions.

OR

Regimen 2b (if Regimen 1 does not suggest benefit)**:** Treatment with a regimen of 10 mg of d-amphetamine or placebo combined with a one hour physical therapy session beginning one hour after drug/placebo administration every 4 days as in Regimen 1, but treatment duration will be increased to a total of 10 sessions.

V. STUDY PROCEDURES

1. Schedule of Study Measures and Follow-Up. The following table summarizes the schedule of study assessments.

Assessment	Retro - spective	Baseline (Rehab. Admission)	Treatment Phase	Immediate Post-Treatment	3 Months Poststroke
a. Demographics		X			
b. Charlson Index		X			
c. Concomitant Medications†		X		X	X
d. CNS	X			X	X
e. Stroke Subtype/ Neuroimaging	X				
f. Fugl-Meyer		X		X	X
g. Ambulation Speed		X		X	X
h. Ambulation Endurance		X		X	X
i. Action Research Arm Test		X		X	X
j. FIM		X		X	X
k. NIH-SS		X		X	X
l. Rankin Index	X	X		X	X
m. Beck Depression		X		X	X
n. Mini-Mental State		X		X	X
o. Stroke Impact Scale		X			X
p. Location				X	X
Standard Rehab. Methods			X		
Rehab. Complications			X		
Adverse Events			X		X
Drug Levels+			X		

+Performed in 15 patients at two sites (total n=30). Immediate post-treatment assessment performed the day following the final treatment session.

2. Patients. All patients admitted for a course of inpatient rehabilitation following hemispheric ischemic stroke will be screened for the study:

a. Inclusion Criteria.

1. Documented (including neuroimaging) ischemic hemispheric stroke
2. Start treatment between 10-30 days after stroke
3. Independent prior to index stroke (Rankin 0 or 1)
4. Moderate or severe stroke-related motor impairment (Fugl-Meyer motor score <80)
5. Patient (or legal representative) capable of giving informed consent
6. Availability for follow-up evaluation
7. Physically able to receive study drug/ placebo

b. Exclusion Criteria.

1. Hypertension defined as systolic BP≥160, or diastolic BP≥100 mmHg at rest determined by 3 readings during the 24 hours prior to randomization. Patients with such elevations of blood

pressure on admission who respond to antihypertensive medication before medication phase of the study is to start will be eligible to participate
2. Index or remote intracerebral or subarachnoid hemorrhage
3. History of or active psychosis or bipolar disorder
4. Angina pectoris within the preceding 3 months
5. Myocardial infarction within the preceding year
6. Inducible myocardial ischemia based on exercise or pharmacological stress test if done within the prior year
7. Clinically significant congestive heart failure defined as New York Heart Class 3 or 4
8. Atrial or ventricular arrhythmias including atrial fibrillation, atrial flutter, ventricular tachycardia, ventricular fibrillation, and Wolff Parkinson White by history, electrocardiogram, or Holter monitor if done
9. History of seizures or seizures associated with index ischemic stroke
10. Allergy to amphetamine
11. Current treatment with L-dopa, other dopamine agonist, or MAO inhibitor
12. Glaucoma
13. Need for treatment with a drug/class thought to impair recovery based on laboratory and available clinical evidence (α1-adrenergic receptor antagonist, α2-adrenergic receptor agonist, benzodiazepine, dopamine receptor antagonist, phenobarbital, phenytoin)
14. Hyperthyroidism
15. Pregnancy
16. Expected rehabilitation stay less than 3 weeks for regimen 1
17. Mild stroke-related motor impairment (Fugl-Meyer motor score $\geq$80).[9]
18. Participation in another investigational protocol
19. Any condition which in the view of the investigator would put the patient at risk through their participation in the study.

3. Patient Screening and Randomization. On admission for acute stroke rehabilitation, all patients will be screened for study eligibility through the standard admission evaluation including comprehensive medical, neurological and psychiatric history; review of medical records; physical and neurological examinations; review of brain imaging reports; electrocardiogram; and pregnancy test results in premenopausal women. In addition, enrollment data will be collected for eligible patients (see table below). A log will be maintained of all patients excluded from the study documenting the reasons for exclusion. Screening logs will be submitted to the coordinating center monthly.

Eligible patients who consent to participate will be enrolled and begin treatment as soon as possible, but within 10-30 days after stroke. After baseline testing, patients will be block randomized within each center based on stroke severity at the beginning of rehabilitation (Fugl-Meyer Motor score 0-35, severe; 36-79 moderate) [9] and stroke subtype (subcortical vs. cortical hemispheric ischemic stroke using the Oxfordshire criteria and neuroimaging data). Thus, there will be 4 blocks with 1:1 randomization within each block:

Severe-Cortical*	**Severe-Subcortical**
Moderate-Cortical	**Moderate-Subcortical**

Cortical refers to Oxfordshire TACI or PACI and subcortical to LACI subtypes

Patients will be randomized in a 1:1 fashion to one of amphetamine or placebo. Randomization will be stratified by clinical site. The statistician will provide each site with a set of randomization envelopes. The site pharmacist will hold these envelopes. The envelopes will be assigned in the sequence specified by the statistician.

The patient will be assigned a 6 digit patient study number. The clinical site pharmacist will be unblinded to treatment. Placebo kits and kits for addition of study drug to be sent to the clinical site pharmacies.

4. Treatment. The first group of 65 enrolled patients will be randomized to treatment with a regimen of 10 mg of d-amphetamine or placebo combined with a one hour session of active physical therapy directed at a primary motor impairment beginning one hour after drug/placebo administration every 4 days for a total of 6 sessions (Regimen 1). Treatment will be double-blind. A target motor impairment for physical therapy intervention will be designated (usually gait, but in some cases arm function). An outline indicating a range and level of physical therapy interventions will be provided to the therapists, and the level and of therapy will be recorded. Throughout the rehabilitation hospitalization (and including the 3 week study treatment phase), all patients will receive standard, comprehensive rehabilitation services, including measurement of blood pressure every 8 hours.

5. Study Drug. Active and placebo capsules will be prepared by the hospital pharmacy on-site at each of the 5 participating institutions. These pharmacies will be given a randomization scheme generated by a statistician at the coordinating center who is not otherwise involved in the study. Each patient's study medications will be prepared as a unit-dose kit according to this predetermined randomization schedule. The site pharmacies will not reveal the randomization assignment to other personnel except in the extraordinary circumstance that the information is required for a patient's treatment.

Two 5 mg size d-amphetamine (Dexedrine) tablets obtained commercially from Smith-Klein-Beecham by each hospital pharmacy will be split and placed in one opaque blue colored gelatin capsule supplied by Gallipot Inc (purchased centrally by the coordinating center and distributed to each hospital pharmacy). The 5 mg tablets will be precisely cut with a pill splitter in order to allow them to fit conveniently into one size #0 capsule (any fragmented pills will be discarded). In order to prevent movement within the capsules, lactose monohydrate N.F. powder supplied by Amend Inc. will be used to act as a filler (purchased centrally). This will prevent "rattling" of the active capsules compared to identical capsules filled only with powdered lactose monohydrate N.F. The placebo capsules will contain 0.65 gm of lactose which will not represent a significant lactose load to patients with lactose intolerance, and will not preclude lactose intolerant patients from participating in the study. The colored gelatin capsules are known to dissolve within 1 to 3 minutes in the stomach and will not interfere significantly with the absorption of the Dexedrine tablets.

6. Drug Levels. Peak blood amphetamine levels occur at approximately 1-2 hrs following ingestion of Dexedrine tablets. To better determine whether a longer delay between the administration of amphetamine and the start of the physical therapy session than that being used in the present study might be possible, blood samples will be obtained at 1 hr, 2 hr, 3 hr, and 6 hr after dosing in 15 consenting patients at two sites (total n=30). The samples will be stored until completion of the study to avoid unblinding the investigators. Pharmacokinetics can then be determined from samples from patients who actually received the drug (n=15). Serum amphetamine levels will be determined at the same time in a commercial laboratory (Smith-Kline).

7. Safety Assessments and Study Withdrawal. **Patient's blood pressure and pulse will be measured prior to each treatment, one hour after drug/placebo administration, and at the end of the physical therapy session.** In addition, the patients will be assessed for any other potential adverse events. The PI or designee will be immediately notified of any possible adverse events by the study coordinator or therapist and will be available to assess the patient as needed. If during the Treatment Phase, a patient is found to have moderate or severe hypertension (defined below), management will conform to conventional treatment regimes, but will be standardized for the purposes of this study. Patients with moderate (systolic BP $\geq$180 and <210 mmHg or diastolic BP or $\geq$110 and <120 mmHg) or severe (systolic BP $\geq$210 or diastolic BP or

≥120 mmHg) will be put immediately in bed with BP checked every 15 min. Pharmacological treatment will be used if BP remains in the moderate range >60 min. or the severe range for >15 min.

Criteria for Withdrawal from Study

- Moderate or severe hypertension as defined above
- Resting systolic BP≥180 or diastolic BP ≥110 mmHg 1 hr after receiving study drug
- Angina pectoris
- Myocardial infarction
- Stroke or TIA
- Class 3 or 4 congestive heart failure
- Cardiac arrhythmia (listed in exclusion criteria 8)
- Psychosis
- Hallucinations
- Agitation requiring treatment
- Need for treatment with a drug thought to impair recovery (listed in exclusion criteria 13)
- Any other condition that the investigator feels may reasonably be related to treatment with amphetamine and which the investigator feels may present a risk to the patient

Adverse Event Reporting. . All adverse events will be recorded. **Serious adverse** events (defined as any leading to withdrawal from the treatment phase of the study) should be reported to the study coordinator within 48 hours. **FDA defined Serious Adverse Events** need to be reported to the study coordinator . The PI and an independent **Data Safety Monitoring Committee** consisting of a neurologist with expertise in neurorehabilitation, a cardiologist, and a statistician will be forwarded monthly reports from the coordinating center summarizing all serious adverse events. This committee will not be otherwise involved in the study. It will formally review the safety data after half the patients are randomized to each regimen and after the first regimen is completed to further assure that the patients are not being exposed to undue hazard. The Data Safety Monitoring Committee can break the blind should they deem it necessary, but will keep the information confidential. The Data Safety Monitoring Committee will have the authority to stop the study for safety concerns.

8. Clinical Measures.

One of the goals of this project is to evaluate the utility of a series of outcome measures. Therefore, more than a minimal set of outcomes will be assessed. Training in these measures will be provided to Study Coordinators/ Therapists and PIs at an study initiation meeting. Coordinators/ Physical Therapists and/or PIs at each site should already be certified in the NIH-SS, Fugl-Meyer Assessment and FIM before the initiation meeting and supply documentation of certification to the Coordinating Center. Methods for the standard administration of these scales are not further detailed in the protocol. The following information/ ratings will be obtained:

a. Demographic data. Including age , gender , race etc.

b. Comorbid Conditions may affect progress in rehabilitation and eventual recovery. Although patients enrolled in this study will already be in sufficiently good health to have been admitted to a rehabilitation hospital, medical comorbidities will be ascertained with the Charlson Index, a reliable and validated scale. [6]

c. Concomitant medications. Recorded by class on a checklist (drug glossary attached).

d. The Canadian Neurological Scale (CNS). The CNS is a highly reliable and validated stroke scoring system. [7] Because it will not be logistically feasible to obtain initial severity data prospectively in the context of this study, initial severity will be assigneds retrospectively based on the CNS by the PIs at each site who have already been certified in its application.

e. Stroke Subtype/ Neuroimaging. Stroke subtype will be determined using the Oxfordshire criteria. [1,16] This simple classification scheme has been shown to be reliable and correlates with prognosis after stroke. Reports of imaging studies will be used to aid in the assignment of stroke subtype using these criteria. Site PIs have been certified in the application of the Oxfordshire criteria and in a simple scheme for recording relevant findings from neuroimaging based on summary reports. Whenever possible, the original films will be reviewed. These items should be completed by a study neurologist.

f. Fugl-Meyer Motor Score. The primary outcome measure for this Pilot Grant will be the change in Fugl-Meyer motor score (Exclusive of sensation and reflexes). The primary outcome measure will be determined at 90 days after stroke.

g. Ambulation speed.
h. Ambulation endurance. The poorer the gait quality the more effortful it is and the more easily patients fatigue. Ambulation endurance is easily assessed using the standardized 6 minute walk test. [14,17]

i. Arm function. Arm function will be assessed with the upper extremity portion of the Fugl-Meyer assessment. In addition, manual dexterity will be assessed with the Action Research Arm Test. [8] The assumption is that complex UE movements used in daily activities can be reduced to certain patterns of grasp, pinch and grip of the hand and extension and flexion of the elbow; and elevation of the arm. The test has 38 items (19) divided into 4 Subtests (grasp, grip, pinch, and gross movement). The subject is required to lift various sized objects to 14 inch height, move cylindrical shaped objects to a 14 inch distance, and perform 3 gross upper extremity movements.

j. Functional Independence Measure (FIM). [15] The entire FIM will be assessed at each of the individual evaluations. FIM subscores will be recorded separately.

k. NIH Stroke Scale has become the standard stroke impairment scale. It has established reliability and validity. [4,12,13] The scale can also be reliably performed by study coordinators after appropriate training. [13] Although the intervention is targeted at recovery of motor function, analysis of change scores for the various domains of the NIH Stroke Scale will permit the detection of possible carry-over effects.

l. Rankin Scale. The Rankin Scale provides a reliable, validated measure of stroke-related handicap. [2,5,19,20] The score can also be determined retrospectively as was done in our preliminary work and will provide a measure of functional ability prior to stroke to be used as part of the study selection criteria.

m. Beck Depression Index. A proportion of patients will also be depressed. As reviewed in the section on toxicity, psychostimulants such as amphetamine and methylphenidate have long been used to treat depressed rehabilitation patients. Adjusting analyses for depression may prove important. The Beck Depression score provides a reliable measure of mood and will be used for this purpose. [3,18]

n. Mini-Mental State Examination. This will be obtained to provide a more detailed assessment of stroke-related cognitive impairments. [11]

o. Stroke Impact Scale. A stroke-specific Health-Related Quality of Life (HRQOL) has not been available. The Stroke Impact Scale has recently been evaluated for this purpose. [10] It is reliable, valid and sensitive to

change. It assesses physical, cognitive, mood, communication, daily activities, mobility, hand function, and participation.

Other measures / covariates. Other covariates which will be considered in the analyses include patient age and time from stroke until the initiation of study treatment. Standard rehabilitation techniques will be catalogued as methods may vary among centers or therapists. Although of somewhat more questionable validity, length of rehabilitation stay will be used to impute costs based on average national daily charges. Discharge location and location at 90 days will also be recorded recognizing that this measure is strongly influenced by socioeconomic factors.

9. Complications During Rehabilitation. A variety of complications may occur during the course of rehabilitation. Approximately 24% of pateinst may need to be withdrawn because of these normally-occurring events. These complications include: pneumonia, sudden death, deep vein thrombosis, pulmonary embolism, seizure, myocardial infarction, stroke, TIA, angina, atrial fibrillation or other new cardiac arrhythmia requiring treatment, congestive heart failure requiring treatment, psychosis and agitation requiring treatment. Common, anticipated complications will be recorded in a Case Report Form checklist. Other complications will be recorded in text fields and compiled for analysis.

VI. Site Monitoring Techniques, Data Consistency Protocols, and Data Management Procedures.

Site monitoring, data retrieval, and data-basing will be performed by the Duke Clinical Research Institute (DCRI).

The DCRI will appoint a project leader responsible for study logistics and a Clinical Data Specialist responsible for capture of data from sites and incorporating it into a central database located at DCRI. Data will be collected on a Case Report Form (CRF) and 3 Month Follow-up Form for each patient. The CRF will be forwarded to DCRI directly from the study sites. The Follow-up Form will be submitted via fax.
The Clinical Data Services Group is responsible for establishing project specific systems and standard operating procedures for handling the data involved. The data forms will be tracked, data entered and checked for completeness and consistency. Potential discrepancies in data will be reported to the study site for confirmation or correction. DCRI will produce status reports and data listings used to monitor project timelines and data quality.

An investigators/ coordinators meeting will be organized and held during the first months of funding to provide an overview of the study design, training and certification in outcomes assessments as necessary, and instruction in the completion of data collection forms. On a regular basis each site will be contacted to verify timeliness of data flow, completeness of forms, and any data-related issues that might arise. For issues dealing with specific deliveries or corrections of data, the site will be contacted when such issues arise.

A Steering Committee consisting of the study PI, the DCRI project director, the study statistician and the site PIs will meet by teleconference during the course of the study as necessary. In addition, the Steering Committee will meet to review the data from Regimen 1 and to decide whether to proceed with Regimen 2a or 2b as indicated in the overall study plan below. The Steering Committee will again convene when final data collection has been completed to plan the design of the efficacy study.

VII. Data Analysis Plan

1. Descriptive statistics (e.g., frequencies for categorical variables; means and standard deviations for continuous variables) will be compiled for each time point.

2. For all continuous outcome variables recorded at baseline, at the end of treatment and 3 months after stroke (i.e., essentially all variables except quality of life and adverse events), the difference scores will

first be calculated (e.g., 3 months minus baseline), and descriptive statistics will be reported for these change scores by treatment group and by randomization block.

3. Using the intention-to-treat principle (i.e., assigning each patient to the group to which they are randomized, regardless of the treatment actually received), a 2-sample paired t-test will first be used to compare the intervention and placebo groups with respect to change in Fugl-Meyer motor scores. Here, and elsewhere as appropriate, parametric analyses (e.g., t-test) will be supplemented by their non-parametric analogs (e.g., Wilcoxon test). The frequencies of serious adverse events will be compared with Chi-square analysis.

4. The analyses in #3 will be repeated for the various secondary outcomes.

5. Using an analysis of covariance model, the analyses in #3 and #4 will be refined by accounting for various covariates (e.g., outcome = change in Fugl-Meyer; predictor = study group; covariates = baseline Fugl-Meyer motor score, stroke subtype). Because of the small-to-moderate sample size, the number of covariates must be limited (e.g., we have chosen not to include site, time since stroke onset, etc.). In order to assess whether the effect of amphetamine is consistent across clinically important subgroups, the above ANCOVA model will include 2 interaction terms: group X baseline Fugl-Meyer motor score and group X stroke subtype). A group main effect will only be analyzed if both interactions are statistically non-significant.

6. The analyses in #5 will be repeated for various secondary outcomes (e.g., change in FIM motor scale, QOL at 3 months).

7. To assess whether the Fugl-Meyer scale was in fact the statistically most powerful outcome measure (and should be the primary outcome in the future study), an effect size will be calculated (as defined in the sample size section) for each potential outcome measure. If another outcome measure has an effect size which markedly exceeds that of the Fugl-Meyer scale, then it will come into strong consideration as the primary outcome measure for the later study.

8. Given the goals of this pilot study, a variety of other secondary analyses including adjustment for time after stroke will be carried out to help in the design of subsequent trials.

VIII. STUDY TIMETABLE

Time	Activity
3 Months	Study initiation Investigators/ coordinators meeting
22 Months	Patient enrollment and treatment Regimen 1 (10 months) Regimen 1 data review (2 months) Regimen 2a OR Regimen 2b (10 months)
2 Months	Final follow-ups, data verification
3 Months	Data analysis, manuscripts, design of efficacy study
30 Months	TOTAL

IX. HUMAN SUBJECTS

1. **Gender and Minority Inclusion.** Patients of all racial/ethnic backgrounds and both genders are eligible for this study. Based on the preliminary data collected at the study sites, the source population will be composed of approximately 70% whites and 27% blacks. Over half will be women. Given the limited sample size for this pilot study, there will not be sufficient power to permit a subgroup analysis based on race/ethnicity or gender. It should be noted that there is no reason to expect significant gender or racial effects on the study results.

2. **Subjects.** One hundred thirty patients with ischemic stroke will be enrolled in this study. The source population, and therefore the study population, will be comprised predominantly of elderly persons (mean age in the source population is estimated to be 68$\pm$13 years based on our preliminary data). In addition to stroke, the source population will have the medical conditions commonly associated with stroke including hypertension, diabetes, ischemic heart disease, cardiac arrhythmias, hypercholesterolemia, depression, and pneumonia. The purpose of the inclusion and exclusion criteria (listed above) is to maximize potential for demonstrating the efficacy of d-amphetamine combined with physical therapy in enhancing stroke recovery while minimizing the potential for adverse effects of the drug.

3. **Measures.** Most data collected for the study will represent findings from chart review, patient interview concerning medical history and functional status before stroke, physical examination, testing of motor and cognitive function collected for purposes of the study as well as for standard stroke rehabilitation care, and safety assessments. A subset of patients (n=30) hospitalized at two of the participating centers, will have 4 blood tests (total quantity of blood 20 cc) performed on one study day at 1, 2, 3 and 6 hours after amphetamine dosing to measure serum drug levels.

4. **Screening and Consent.** All patients admitted to the participating stroke rehabilitation services will be screened for eligibility with the permission of the primary physician of patients not on the service of one of the investigators. Patients will receive an IRB approved written informed consent document that explains the study purpose, procedures, risks, benefits, and alternative treatments. Signed, written Informed consent will be obtained from all subjects, or if permitted by the local IRB, their legal representative. The study will also be explained verbally to further assure the patients/representatives understanding of the research to be conducted.

5. **Risks.** Dextroamphetamine has potential cardiovascular and psychiatric side effects and can cause insomnia, anorexia, and may lower seizure threshold. In preparation for this proposed clinical trial, the investigators did an extensive review of the literature on the use of amphetamine to delineate these potential risks (see Section b8). This review indicates that at the dose planned for this study, amphetamine will have a favorable anticipated safety profile in the study population. Conservatively, 10% had reported side effects that might be attributed to a psychostimulant. In 3 series reporting reversibility of side effects, all side effects reversed when the psychostimulant was stopped. Patients at higher risk for amphetamine-related toxicity will be carefully excluded (see Exclusion Criteria, section d3b). Close monitoring and documentation of possible amphetamine-related side effects is one of the important Specific Aims of this Pilot Grant proposal. Patients will be closely monitored following drug/placebo administration. The study protocol includes specific procedures for managing patients should they develop elevated blood pressure after receiving d-amphetamine. All centers are fully staffed with emergency consultation services available. The PIs have extensive experience in the clinical management of stroke patients. Criteria for withdrawing subjects who develop possible side effects are delineated in the protocol. In addition, an independent Data Safety Monitoring Committee will monitor adverse events throughout the study and will have the authority to stop the trial.

6. **Benefits.** At this time, there are no pharmacological treatments proven to enhance neurological recovery after stroke. All subjects will be receiving standard stroke rehabilitation services (i.e., physical,

occupational, and speech therapies) and participation in the study will not otherwise interfere with this rehabilitation treatment. The purpose of the study is to provide the data necessary to design a definitive trial testing the hypothesis that treatment with d-amphetamine when combined with physical therapy will improve poststroke motor recovery. This benefit is expected to translate into greater independence after stroke. Although the study subjects may or may not benefit directly from participation, the information obtained will be of benefit to the hundreds of thousands of people disabled by ischemic stroke in the United States each year.

7. **Confidentiality.** All hard copy data collected at individual centers will be stored in a locked file cabinet to which only study investigators have access. Data sent to the central database at the Duke Clinical Research Institute will identify individual study subjects only by study number to protect confidentiality. These methods were developed and tested as part of the preliminary work carried out in preparation for this proposal.

X. SCALES/ DATAFORMS

a. Demographic data. Self-explanatory

b. Comorbid Conditions. Self-explanatory

c. Concomitant medications. Recorded by class on a checklist (drug glossary attached, Appendix).

d. The Canadian Neurological Scale (CNS).

Item	Score	Prospective	Retrospective#
MENTATION			
Consciousness			
Alert	3.0	Awake	Same
Drowsy	1.5	Remains awake for a short period, tends to doze even when examined	Same
Coma	0	Does not alert to verbal stimuli, but may respond to deep pain	Same
Orientation			
Oriented	1.0	Knows place and time	Same
Disoriented	0		If receptive deficit is present and orientation is not reported, code as disoriented.
Speech			
Normal	1.0		
Expressive deficit	0.5	Asked to name pen, key and watch. Expressive deficit scored if unable to name more than one object. If the patient is able to name objects, then ask "What do you do with...(each object in succession). Expressive deficit scored if more than one error. Severe dysarthria also scored as expressive deficit	Notation of expressive language deficit or dysarthria.
Receptive deficit	0	The patient is asked: 1. "Close your eyes" 2. "Does a stone sink in water?" 3. "Point to the ceiling" Receptive deficit scored if more than one error	Notation of a receptive language deficit.
MOTOR FUNCTIONS			
A. Weakness (if no comprehension deficit)			
Face			Same
Normal	0.5	Normal strength	
Weakness	0	Asymmetry on smile or weakness	
Limb weakness*,†	1.5	None	Same or MRC 5
	1.0	Mild. Able to move against gravity, but incomplete resistance to force.	Same or MRC 4 or 3
	0.5	Significant. Can not completely overcome gravity in range of motion.	Same or MRC 2
	0	Total paralysis. Absence of motion or contraction of muscle without joint	Same or MRC 1 or 0

		movement.	
B. Motor Responses (Comprehension deficit or impaired consciousness)			
Face		Test by grimace to pain	
Symmetrical	0.5	Symmetrical response	Same
Asymmetrical	0	Asymmetry noted	Same
Limbs**			
	1.5	Equal	Same
	0	Unequal	Same

Retrospectice CNS Footnotes

#General: If an item is not recorded in the discharge summary, it is coded as normal. Strength is not scored in amputated limbs.

*Prospective Scoring of Limb Weakness

Proximal arm: Tested at 90° sitting, 45° to 90° recumbent. Strength of both arms tested simultaneously with resistance applied at the midpoint between the shoulder and elbow.

Distal arm: The patient makes a fist and extends the wrist.

Proximal Leg: Hip flexion tested recumbent (flex thigh to trunk with knees flexed at 90°, each thigh tested separately)

Distal Leg: Foot dorsiflexion tested recumbent with leg extended.

† If the MRC motor score is given for only distal or proximal groups in one extremity, then that score is given to the other muscle group.

**Prospective scoring of limb motor responses.

Arms & Legs: Each limb is sequentially placed in a fixed posture which must be held by the patient against gravity for at least 3 seconds. Alternatively, test for an unequal motor response to noxious stimuli applied to the nail beds.

e. Stroke Subtype/ Neuroimaging.

1. Oxfordshire Subtype

Lacunar infarcts (LACI) – These patients presented with a pure motor stroke, pure sensory stroke, sensori-motor stroke, or ataxic hemiparesis. Although patients with faciobrachial and brachiocrural involvement were included, those with more restricted deficits were not. There were no cases of acute focal movement disorders due to cerebral infarction in our study although there is some evidence that such cases should be considered in this group. [10]

Total anterior circulation infarcts (TACI) – Patients with TACI presented with the combination of new higher cerebral dysfunction (e.g., dysphasia, dyscalculia, visuospatial disorder); homonymous visual field defect; and ipsilateral motor and/or sensory deficit of at least two areas of the face, arm, and leg. If the conscious level was impaired and formal testing of higher cerebral function or the visual fields was not possible, a deficit was assumed.

Partial anterior circulation infarcts (PACI) – Patients presented with only two of the three components of the TACI syndrome, with higher cerebral dysfunction alone, or with a motor/sensory deficit more restricted than those classified as LACI
(e.g., confined to one limb, or to face and hand but not to the whole arm).

Posterior circulation infarcts (POCI) – These patients presented with any of the following: ipsilateral cranial nerve palsy with contralateral motor and/or sensory deficit; bilateral motor and/or sensory deficit; disorder of conjugate eye movement; cerebellar dysfunction without ipsilateral long-tract deficit (i.e., ataxic hemiparesis); or isolated homonymous visual field defect.

2. Neuroimaging. - Self-explanatory

f. Fugl-Meyer Motor Score.

Upper Extremities

I. Upper Extremity Reflexes
Biceps
Finger flexors
Triceps

0: No reflex activity can be elicited
2: Reflex activity can be elicited

II. Movements
Shoulder elevation
Shoulder retraction
Abduction (≥ 90°)
External rotation
Elbow flexion
Forearm supination
Shoulder adduction/internal rotation
Elbow extension
Forearm pronation

0: Cannot be performed at all
1: Performed partly
2: Performed faultlessly

a. Hand to lumbar spine

a. 0: No specific action performed
1: Hand must pass anterosuperior iliac spine
2: Action is performed faultlessly

b. Shoulder flexion to 90°

b. 0: Arm is immediately abducted or elbow flexes at start of motion
1: Abduction or elbow flexion occurs in later phase of motion

c. Pronation/supination of forearm with elbow at 90° and shoulder at 0°

c. 0: Correct position of shoulder and elbow cannot be attained, and/or pronation or supination cannot be performed at all
1: Active pronation or supination can be performed even within a limited range of motion, and at the same time the shoulder and elbow are correctly positioned
2: Complete pronation and supination with correct positions at elbow and shoulder

d. Shoulder abduction to 90°, elbow at

d. 0: Initial elbow flexion occurs, or any deviation from 0°, and forearm pronated pronated forearm occurs
1: Motion can be performed partly, or if during motion, elbow is flexed or forearm cannot be kept in pronation
2: Faultless in motion

e. Shoulder flexion 90°-180°, elbow at 0°,

e. 0: Initial flexion of elbow or shoulder abduction occurs and forearm in middle position
1: Elbow flexion or shoulder abduction occurs during shoulder flexion
2: Faultless motion

f.	Pronation/supination of forearm elbow	f.	0: Supination and pronation cannot be performed at all, at 0° and shoulder flexion 30°-90° or elbow and shoulder positions cannot be attained 1: Elbow and shoulder properly positions, and pronation and supination performed in a limited range 2: Faultless motion

III. Normal Reflex Activity

(This stage, which can render the score of 2, is included only if the patient has a score of 6 in Stage I).

Biceps
Finger flexors
Triceps

0: At least 2 of the 3 phasic reflexes are markedly hyperactive
1: One reflex markedly hyperactive, or at least 2 reflexes are lively
2: No more than 2 reflex is lively, and none are hyper

IV. Wrist Control

a. Stability, elbow at 90°, shoulder at 0°

a. 0: Patient cannot dorsiflex wrist to required 15°
1: Dorsiflexion is accomplished, but no resistance is taken
2: Position can be maintained with some (slight) resistance

b. Flexion/extension, elbow at 90°, shoulder at 0°

b. 0: Volitional movement does not occur
1: Patient cannot actively move the wrist joint throughout the total range of motion
2: Faultless, smooth movement

c. Stability, elbow at 0°, shoulder at 0°

c. Scoring is the same as for item a

d. Flexion/extension, elbow at 0°, shoulder at 0°

d. Scoring is the same as for item b

e. Circumduction

e. 0: Cannot be performed
1: Jerky motion or incomplete circumduction
2: Complete motion with smoothness

V. Hand Function

a. Finger m ass flexion

a. 0: No flexion occurs
1: Some flexion but not full motion
2: Complete active flexion (Vs. unaffected hand)

b. Finger mass extension

b. 0: No extension occurs
1: Patient can release an active mass flexion grip
2: Full active extention

c. Grasp No. 1: MP joints extended, PIPs and DIPs flexed; grasp is tested against resistance

c. 0: Required position cannot be acquired
1: Grasp is weak
2: Grasp can be maintained against relatively great resistance

d. Grasp No. 2: Patient is instructed to adduct thumb, all other joints at 0°

d. 0: Function cannot be performed
1: Scrap of paper interposed between thumb and index finger can be kept in place but not against a slight tug
2: Paper is held firmly against a tug

e. Grasp No. 3: Patient opposes thumb pad of index finger; a pencil is interposed

e. Scoring procedures are the same as for No. 2

f. Grasp No. 4: Patients grasps a cylinder-shaped object (small can), with the volar surfaces of the first and second fingers against each other

f. Scoring procedures are the same as for grasp Nos. 2 and 3

g. Grasp No. 5: A spherical grasp; patient grasps a tennis ball

g. Scoring procedures are the same as for grasp Nos. 2, 3 and 4

VI. Coordination/Speed: Finger to nose (five repetitions)

a. Tremor

a. 0: Marked tremor
1: Slight tremor
2: No tremor

b. Dysmetria

b. 0: Pronounced or unsystematic dysmetria
1: Slight or systematic dysmetria
2: No dysmetria

d. Speed hand

c. 0: Activity is > 6 seconds longer than unaffected hand
1: 2-5 seconds longer than unaffected hand
2: < 2 seconds' difference

Lower Extremities

I. Reflex Activity: Tested in Supine Position Achilles Patellar		0: No reflex activity 2: Reflex activity
II. Movements		
a. Supine position a1. Hip flexion a2. Knee flexion a3: Ankle dorsiflexion	a.	0: Cannot be performed 1: Partial motion 2: Full motion
b. Supine: motion is resisted b1: Hip extension b2: Adduction b3: Knee extension b4: Ankle plantar flexion	b.	0: No motion 1: Weak motion 2: Almost full strength compared with normal
c. Knee flexion beyond 90°	c.	0: No active motion 1: From slightly extended position knee can be flexed, but not beyond 90° 2: Knee flexion beyond 90°
d. Ankle dorsiflexion	d.	0: No active flexion 1: Incomplete active flexion 2: Normal dorsiflexion
e. Hip at 0° e1: Knee flexion	e1.	0: Knee cannot flex without hip flexion 1: Knee begins flexion without hip flexion but does not get to 90°, or hip flexes during motion 2: Full motion as described
e2: Ankle dorsiflexion	e2.	0: No active motion 1: Partial motion 2: Full motion
III. Normal Reflexes Knee flexors Patellar lively Achilles		0: Two of the 3 are markedly hyperactive 1: One reflex is hyperactive, or 2 reflexes are 2: No more than 2 reflex is lively
IV. Coordination/Speed: Heel to Opposite Knee (five repetitions)		
a. Tremor	a.	0: Mraked tremor 1: Slight tremor 2: No tremor
b. Dysmetria	b.	0: Pronounced or unsystematic 1: Slight or systematic 2: No dysmetria
c. Speed	c.	0: > 5 seconds slower than unaffected side 1: 2-5 seconds slower 2: < 2 seconds' difference

g. Ambulation speed.
h. Ambulation endurance. The six minute walk test scores both speed and endurance and allows the patient to sit down for rest breaks then resume their walk. The first two minutes of the test is used to calculate walking speed. If the patient walked 2 feet in one minute then sat down, the speed is 2 feet/2 minutes, or 1 foot / minute. If the patient can walk only 5 feet in six minutes, then their endurance is 5 feet.

i. Arm function. Action Research Arm Test (ARAT).

The test has 38 items (19) divided into 4 Subtests (grasp, grip, pinch, and gross movement). The subject is required to lift various sized objects to 14-inch height, move cylindrical shaped objects to a 14-inch distance, and perform 3 gross upper extremity movements (as per scoring form). The ARA is graded on a 4-point scale (57 possible points for each UE):

3 Performs test normally
2 Completes test, takes abnormally long time or has great difficulty, or does not apply smooth coordinated movement
1 Performs test partially
0 Cannot perform at all

A Guttman scale is utilized with this test. The 1st item in each subtest is the most difficult and the 2nd item is the easiest. If the subject scores a 3 on the 1st (most difficult) item a 3 is given for the remaining items in that subtest. If the subject scores a 0 on the 1st (most difficult) item and a 0 on the 2nd (easiest) item, zeros are given for the remaining items in that subtest. Any other combination of scores requires administration of the remaining items in the subtest. Each upper extremity is scored separately.

Whatever instruction is necessary to get patient to perform the designated movement is acceptable. This is because the test is designed to assess UE movement NOT cognition, perception, language. The test may be placed in the patient's visual field. The tester may demonstrate repeatedly or guide the patient through the movement before asking him / her to perform the movement.

j. Functional Independence Measure (FIM). The entire FIM will be assessed at each of the individual evaluations. FIM subscores will be recorded separately.

k. NIH Stroke Scale

1.a. Level of Consciousness
This global measure of responsiveness is assessed by the patient's interactions with the physician at the bedside when the patient is first examined. The physician should stimulate the patient (by patting or tapping the patient) to determine the best level of consciousness. On occasion, more noxious stimuli, such as pinching, may be required to check the level of consciousness.

0 = Alert - Patient is fully alert and keenly responsive
1 = Drowsy - Patient is drowsy but can be aroused with minor stimulation. The patient obeys, answers, and responds to commands
2 = Stuporous - Patient is lethargic but requires repeated stimulation to attend. The patient may need painful or strong stimuli to respond to or follow commands.
3 = Coma - Patient is comatose and responds only with reflexive motor or automatic responses. Otherwise, the patient is unresponsive.

1.b. LOC - Questions
Level of Consciousness - Questions is checked by asking the patient to respond to two questions. The patient is asked the month of the year and his/her age. The answer must be correct - there is no partial credit for being close (for example, being off by one year in age). If the patient gives the wrong initial answer but then corrects it, the answer should still be scored as incorrect. Other measures of orientation such as time of day, location, etc. are not asked as part of this examination. If the patient has aphasia, the physician should judge the responses to questions in light of the language impairment.

0 = Answers BOTH correctly.
1 = Answers ONE correctly.
2 = BOTH incorrect.

1.c. LOC - Commands
The Level of Consciousness - Commands is checked by asking the patient to follow two commands. The patient is asked to open and close his/her eyes and then is asked to make a grip (close and open his/her hand). Only the initial response is scored. If a patient is aphasic and unable to follow verbal commands, the patient may imitate these movements (pantomime). For a patient who has hemiparesis, the response in the unaffected limb should be measured. For example, if the patient has a left hemiparesis, making a fist with the right hand is a normal response to the command. If a paralyzed patient does try to move the limb in response to a command but is unable to form a fist, it is counted as a normal response.

0 = Obeys BOTH correctly
1 = Obeys ONE correctly
2 = BOTH incorrect

2. Gaze
The position of the eyes at rest and movement of the eyes to command are tested. First look at the position of the eyes at rest. Spontaneous eye movements to the left are right should be noted. The patient is then asked to look to the left or right. Only horizontal eye movements are tested. Disorders of vertical gaze, nystagmus, or skew deviation are not measured. Reflexive eye movements (oculocephalic or oculovestibular) should be tested in patients who are unable to respond to commands. If a patient has ocular rotatory problems, such as a strabismus, but leaves the midline and attempts to look both right and left, he/she should be considered to have a normal response. If a patient has an isolated oculorotatory problem, such as an oculomotor (CN III) or abducens (CN IV) palsy, the score should be 1. If the patient has a conjugate deviation

of the eyes that can be overcome by voluntary or reflexive activity, the score should be 1. If there is a conjugate lateral deviation that is NOT overcome with reflexive movements, the score should be 2.

0 = Normal - The patient has normal lateral eye movements
1 = Partial Gaze Palsy - Patient is unable to move one or both eyes completely to both directions.
2 = Forced Deviation - The patient has conjugate deviation of the eyes to the right or left, even with reflexive movements.

3. Visual Fields
Visual fields of both eyes are examined. In most cases, the physician asks the patient to count fingers in all four quadrants. Each eye is independently tested. If a patient is unable to respond verbally, the physician should check responses (attending) to visual stimuli in the quadrants or have the patient hold up the number of fingers seen. A quadrantic field cut should be scored 1. The entire half field (both upper and lower quadrants) should be involved with a dense field loss to be scored 2. If a patient has severe monocular visual loss due to intrinsic eye disease and the visual fields in the other eye are normal, the physician should score the visual fields are normal. If the patient has monocular blindness due to primary eye disease and the visual fields in the other, "normal" eye demonstrate a partial or dense visual field defect, the visual loss should be scored as 1, 2, or 3 as appropriate.

0 = No visual loss
1 = Partial hemianopia - There is a partial visual field defect in both eyes. Included is a quadrantic field defect or sector field defect.
2 = Complete hemianopia - There is dense visual field defect in both eyes. A homonymous hemianopia is included.
3 = Bilateral hemianopia - There are bilateral visual field defects in both eyes. Cortical blindness is included.

4. Facial Movement (Facial Paresis)
The patient is examined by looking at the patient's face and noting any spontaneous facial movements. The facial movements in response to commands are also tested. Such commands may include asking the patient to grimace or smile, to puff out his/her cheeks, to pucker, and to close his/her eyes forcefully. If the patient is aphasic and is unable to follow commands, the physician should have the patient attempt imitative (pantomime) responses. The facial responses to painful stimuli (grimace) may substitute for responses to commands in a patient who has decreased levels of alertness.

0 = Normal facial movements No asymmetry.
1 = Minor paresis Asymmetrical facial movements or facial asymmetry at rest. This response may be noted with a spontaneous smile but not with forced facial movements.
2 = Partial paresis Unilateral "central" facial paresis. Decreased spontaneous and forced facial movements with changes most prominent at the mouth. Orbital and forehead musculature movements are normal.
3 = Complete palsy Dysfunction involves forehead, orbital, and circumoral muscles (the entire distribution of the facial nerve). Deficits may be unilateral or bilateral (facial diplegia) complete facial paresis.

5. Motor Function - Arms (Left and Right)
The patient is asked to extend his arm outstretched in front of the body at 90 degrees (if sitting) or at 45 degrees (if supine). The effort is for a full 10 seconds. the physician should count to ten aloud to encourage the patient to maintain the limb's position. If a limb is paralyzed, the physician may wish to test any "normal" limb first. If a patient is aphasic, directions may be achieved by non-verbal cues or pantomime. Patients may be "helped" by the physician by placing the limb in the desired position. If the patient has restricted limb function due to arthritis or non-stroke related limitations, the physician should attempt to judge the "best" motor response. If the patient has decreased level of consciousness, an estimate of response to noxious

stimuli should be measured. Volitional motor responses that are performed well should be graded as 0. If the patient has reflexive responses, such as flexor or extensor posturing, the response should be scored as 4. The only indication for scoring this item as 9 - untestable, is if the limb is missing or amputated, or if the shoulder joint is fused. A patient with a partial limb amputation should be tested.

0 = No drift The patient is able to hold the outstretched limb for 10 seconds.
1 = Drift The patient is able to hold the outstretched limb for 10 seconds but there is some fluttering or drift of the limb. If the limb falls to an intermediate position, the score is 1.
2 = Some effort against gravity The patient is not able to hold the outstretched limb for 10 seconds but there is some effort against gravity.
3 = No effort against gravity The patient is not able to bring the limb off the bed but there is some effort against gravity. If the limb is raised in the correct position by the examiner, the patient is unable to sustain the position.
4 = No movement The patient is unable to move the limb. There is no effort against gravity.
9 = Untestable May be used only if the limb is missing or amputated, or if the shoulder joint is fused.

6. Motor Function - Leg (Right and Left)
The supine patient is asked to hold the outstretched leg 30 degrees above the bed. The limb should be held in this position for 5 seconds. The physician should count to 5 aloud to encourage the patient to maintain the limb's position. If the right leg is paralyzed, the examiner may wish to examine the "normal" left leg first. If a patient is unable to follow verbal commands, nonverbal cues may be used, or the limb may be placed in the desired position. If the patient has a decreased level of consciousness, an estimate of response to noxious stimuli should be measured. Volitional motor responses that are performed well should be scored 0. If the patient has reflexive responses, such as flexor or extensor posturing, the response should be scored 4. The only indication for scoring this item as 9 - untestable is if the limb is missing or if the hip joint is fused. Patients with artificial joints or partial limb amputations should be tested.

0 = No drift The patient is able to hold the outstretched limb for 5 seconds.
1 = Drift The patient is able to hold the outstretched limb for 5 seconds but there is unsteadiness, fluttering, or drift of the limb.
2 = Some effort against gravity The patient is unable to hold the outstretched limb for 5 seconds but there is some effort against gravity.
3 = No effort against gravity The patient is not able to bring the limb off the bed but there is effort against gravity. If the limb is placed in the correct position, the patient is unable to sustain the position.
4 = No movement The patient is unable to move the limb. There is no effort against gravity.
9 = Untestable May be used only if limb is missing or hip joint is fused.

7. Limb Ataxia
This item is aimed at examining the patient for evidence of a unilateral cerebellar lesion. It will also detect limb movement abnormalities related to sensory or motor dysfunction. Limb ataxia is checked by the finger-to-nose and heel-to-shin tests. The physician should test the "normal" side first. The movements should be well performed, smooth, accurate, and non-clumsy. There should not be any dysmetria or dyssynergia. Non-verbal cues may be given to the patient. If a patient has dysmetria or dyssynergia in one limb, the score should be 1. If a patient has dysmetria or dyssynergia in both the arm and leg on one side, or if there are bilateral signs, the score should be 2. If limb ataxia is present, the ataxia should be rated as present regardless of the possible etiology. This item may be scored 9 - untestable only if there is complete paralysis of the limbs (All Motor Function scores = 4), if the limb is missing, amputated, or fused, or if the patient is comatose (item 1.a., LOC = 3).

0 = Absent The patient is able to perform both the finger-to nose and heel-to-shin tasks well. The movements are smooth and accurate.
1 = Present unilaterally in either arm or leg The patient is able to perform one of the two required tasks well.
2 = Present unilaterally in both arm and leg or bilaterally The patient is unable to perform either task well. Movements are inaccurate, clumsy, or poorly done.
9 = Untestable May be used only if all Motor Function Scores = 4, limb is missing, amputated, or fused, or if item 1.a., LOC = 3.

8. Sensory
The patient is examined with a pin in the proximal portions of all four limbs and asked how the stimulus feels. The patient's eyes do not need to be closed. The patient is asked if the stimulus is sharp or dull and if there is any asymmetry between the right and left sides. Only sensory loss that can be attributed to stroke should be counted as abnormal - usually this will be a hemisensory loss. Sensory loss due to a non-stroke related condition, such as a neuropathy, should not be graded as abnormal. If a patient has depressed level of consciousness, neglect, aphasia or is unable to describe the sensory perception, the patient's non-verbal responses, such as a grimace or withdrawal, should be graded. If the patient responds to the stimulus, it should be scored 0. The response to the stimulus on the right and left sides should be compared. If the patient does not respond to a noxious stimulus on one side, the score should be 2. Patients with severe depression of consciousness should be examined.

0 = Normal No sensory loss to pin is detected.
1 = Partial loss Mild to moderate diminution in perception to pin stimulation is recognized. This may involve more than one limb.
2 = Dense loss Severe sensory loss so that the patient is not aware of being touched. Patient does not respond to noxious stimuli applied to that side of the body.

9. Best Language
The patient's language will be tested by having the patient identify standard groups of objects and by reading a series of sentences. Comprehension of language should be judged as the physician performs the entire neurologic examination. The physician should give the patient adequate time to identify the objects on the sheet of paper. Only the first response is measured. If the patient misidentifies the object and later corrects himself, the response is still considered abnormal. The physician should then give the patient a sheet of paper with the series of sentences. The examiner should ask the patient to read at least three sentences. The first attempt to read the sentence is measured. If the patient misreads the sentence and later corrects himself, the response is still considered abnormal. If the patient's visual loss precludes visual identification of objects or reading, the examiner should ask the patient to identify objects placed in his/her hand and the examiner should judge the patient's spontaneous speech and ability to repeat sentences. If the examiner judges these responses as normal, the score should be 0. If the patient is intubated or is unable to speak, the examiner should check the patient's writing.

0 = No aphasia The patient is able to read the sentences well and is able to correctly name the objects on the sheet of paper.
1 = Mild to moderate aphasia The patient has mild to moderate naming errors, word finding errors, paraphasias, or mild impairment in comprehension or expression.
2 = Severe aphasia The patient has severe aphasia with difficulty in reading as well as naming objects. Patient with either Broca's or Wernicke's aphasia is included here.
3 = Mute

10. Dysarthria
The primary method of examination is to ask the patient to read and pronounce a standard list of words from a sheet of paper. If the patient is unable to read the words because of visual loss, the physician may say the word and ask the patient to repeat it. If the patient has severe aphasia, the clarity of articulation of spontaneous speech should be rated. If the patient is mute or comatose (item 9, Best Language = 3) or has an endotracheal tube, this item can be rated as 9 - untestable.

0 = Normal articulation Patient is able to pronounce the words clearly and without any problem in articulation.
1 = Mild to moderate dysarthria Patient has problems in articulation. Mild to moderate slurring of words is noted. The patient can be understood but with some difficulty.
2 = Near unintelligible or worse Patient's speech is so slurred that it is unintelligible
9 = Untestable May be used only if item 9, Best Language = 3, or if the patient has an endotracheal tube.

11. Neglect (Extinction and Inattention)
The presence of neglect is examined by the patient's ability to recognize simultaneous cutaneous sensory and visual stimuli from the right and left sides. The visual stimulus is a standard picture. The picture is shown to the patient and s/he is asked to describe it. The physician should encourage the patient to scan the picture and identify features on both the right and left sides of the picture. The physician should encourage the patient to compensate for any visual loss. If the patient does not identify parts of the picture on one side, the result should be considered abnormal. The physician then assesses the ability to recognize bilateral simultaneous touch to upper or lower limbs. The test is done by touching the patient with the patient's eyes closed. The test should be considered abnormal if the patient ignores sensory stimuli from one side of the body. If the patient has a severe visual loss and the cutaneous stimuli are normal, the score should be 0. If the patient has aphasia and is unable to describe the picture, but does attend to both sides, the score should be 0.

0 = No neglect The patient is able to recognize bilateral simultaneous cutaneous stimuli on the right and left sides of the body and is able to identify images on the right and left sides of the picture.
1 = Partial neglect The patient is able to recognize either cutaneous or visual stimuli on both the left and right, but is unable to do both successfully (unless severe visual loss or aphasia is present).
2 = Complete neglect The patient is unable to recognize either bilateral cutaneous sensory or visual stimuli.

12. Distal Arm
The patient’s hand is held up at the forearm by the examiner, and patient is asked to extend his or her fingers as much as possible. If the patient can’t or doesn’t extend the fingers, the examiner places the fingers in full extension and observes for any flexion movements for 5 seconds. The patient’s first attempts only are scored. Repetition of the instructions or of the testing is prohibited.

0 = Normal (no flexion after 5 seconds).
1 = At least some extension after 5 seconds, but not fully extended.
2 = No voluntary extension after 5 seconds; movement of the fingers at another time is not scored.

I. Rankin Scale.

0 No symptoms at all
1 No significant disability despite symptoms; able to carry out all usual duties and activities.
2 Slight disability; unable to carry out all previous activities but able to look after own affairs without assistance.
3 Moderate disability requiring some help, but able to walk without assistance
4 Moderate severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance.
5 Severe disability; bedridden, incontinent, and requiring constant nursing care and attention.

m. Beck Depression Index.

Inventory Item 1
0 I do not feet sad.
1 I feel sad.
2 I am sad all the time and I can't snap out of it.
3 I am so sad or unhappy that I can't stand it.

Inventory Item 2
0 I am not particularly discouraged about the future.
1 I feel discourage about the future
2 I feel I have nothing to look forward to
3 I feel that the future is hopeless and that things cannot improve.

Inventory Item 3
0 I do not feel like a failure.
1 I feel I have failed more than the average person.
2 As I look back on my life, all I can see are a lot of failures.
3 I feel I am a complete failure as a person.

Inventory Item 4
0 I get as much satisfaction out of things-as I used to.
1 I don't enjoy things the way I used to.
2 I don't get real satisfaction out of anything anymore.
3 I am dissatisfied or bored with everything.

Inventory Item 5
0 I don't feel particularly guilty.
1 I feel guilty a good part of the time-
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

Inventory Item 6
0 I don't feel I am being punished.
1 I feel I may be punished
2 I expect to be punished.
3 I feel I am being punished.

Inventory Item 7
0 I don't feel disappointed in myself.
1 I am disappointed in myself.
2 I am disgusted with myself.
3 I hate myself worse than anybody else.

Inventory Item 8
0 I don't feel I am any worse than anybody else.
1 I am critical of myself for my weaknesses and mistakes.
2 I blame myself all the time for my faults.
3 I blame myself for everything bad that happens.

Inventory Item 9
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

Inventory Item 10
0 I don't cry any more than usual.
1 I cry more now than I used to.
2 I cry all the time
3 I used to be able to cry, but now I can't cry even though I want to.

Inventory Item 11
0 I am no more irritated by things than I ever am.
1 I am slightly more irritated now than usual.
2 I am quite annoyed or irritated a good deal of the time.
3 I feel irritated all the time now.

Inventory Item 12
0 I have not lost interest in other people.
1 I am less interested in other people than I used to be.
2 I have lost most of my interest in other people.
3 I have lost all of my interest in other people.

Inventory Item 13
0 I make decisions about as well as I ever could.
1 I put off making decisions more than I used to.
2 I have greater difficulty in making decisions than before.
3 I can't make decisions at all anymore.

Inventory Item 14
0 I don't feel that I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel that there are permanent changes in my appearance that make me look unattractive.
3 I believe that I look ugly.

Inventory Item 15
0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.

Inventory Item 16
0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up one or two hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.

Inventory Item 17
0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.

Inventory Item 18
0 My appetite is no worse than usual.

1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.

Inventory Item 19
0 I haven't lost much weight, if any, lately.
1 I have lost more than five pounds.
2 I have lost more than ten pounds.
3 I have lost more than fifteen pounds.

Inventory Item 20
0 I am no more worried about my health than usual.
1 I am worried about physical problems such as aches and pains or upset stomach, or constipation.
2 I am very worried about physical problems and it's hard to think of much else.
3 I am so worried about my physical problems that I cannot think about anything else.

Inventory Item 21
0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

The higher the score the more severe the depression. The lower the score the better the patient is feeling.

To interpret the score refer to the table below:

Score Range	Depression Level
1 to 10	Normal
11 to 16	Mild Mood Disturbance
17 to 20	Borderline Clinical Depression
21 to 30	Moderate Depression
31 to 40	Severe Depression
Over 40	Extreme Depression

n. Mini-Mental State Examination.

Orientation

5 What is the (year) (season) (date) (day) (month)?

5 Where are we (state) (county) (town) (hospital) (floor)?

Registration

3 Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he learns all 3. Count trials and record.

Attention and Calculation

5 Serial 7's. 1 point for each correct. Stop after 5 answers. Alternatively, spell "world" backwards.

Recall

3 Ask for the 3 objects repeated above. Give 1 point for each one correct.

Language

9 Name a pencil and watch (2 points)
Repeat the following: "No ifs ands or buts." (1 point)
Follow a 3-stage command: "Take a paper in your hand, fold it in half, and put it on the floor." (3 points)
Read and obey the following: CLOSE YOUR EYES (1 point)
Write a sentence (1 point)
Copy design (1 point)

Item Clarifications

Orientation

1. Ask for the date. Then ask specifically for parts omitted, e.g., "Can you also tell me what season it is?" One point for each correct.
2. Ask in turn "Can you tell me the name of this hospital?" (town, county, etc). One point for each correct answer.

Registration

Ask the patient if you may test his memory. Say the names of 3 unrelated objects, clearly and slowly, about one second for each. After you have said all 3, ask him to repeat them. This first repetition determines his score (0-3), but keep saying them until he can repeat all 3, up to 6 trials. If he does not eventually learn all 3, recall cannot be meaningfully tested.

Attention and Calculation

Ask the patient to begin with 100 and count backwards by 7. Stop after 5 subtractions (93, 86, 79, 72, 65).

If the patient cannot or will not perform this task, ask him to spell the word "world" backwards. The score is the number of letters in correct order. E.g. dlrow = 5, dlrwo = 3.

Recall

Ask the patient if he can recall the 3 words you previously asked him to remember. Score 0-3.

Language

Naming:	Show the patient a wrist watch and ask him what it is. Repeat for pencil. Score 0-2.
Repetition:	Ask the patient to repeat the sentence after you. Allow only one trial. Score 0 or 1.
3-Stage Command:	Give the patient a piece of plain blank paper and repeat the command. Score 1 point for each part correctly executed.

Reading: On a blank piece of paper, print the sentence “Close your eyes” in letters large enough for the patient to see clearly. Ask him to read it and do what it says. Score 1 point only if he actually closes his eyes.

Writing: Give the patient a blank piece of paper and ask him to write a sentence for you. Do not dictate a sentence – it is to be written spontaneously. It must contain a subject and a verb and be sensible. Correct grammar and punctuation are not necessary.

Copying: On a clean piece of paper, draw intersecting polygons, each side about 1 in., and ask him to copy it exactly as it is. All 10 angles must be present and 2 must intersect to score 1 point. Tremor and rotation are ignored.

o. Stroke Impact Scale - 16.

The Stroke Impact Scale (SIS) is an interviewer-administered measure of Quality of Life. The version being used in this study is an abbreviated version of the entire scale.

The respondent must be able to follow a 3-step command. Analysis is underway to determine an appropriate cutoff in Mini-Mental score below which the SIS should not be administered. Although there is no specific cutoff presently, a score of less than 16 may be used. The value of Proxy response when patient response is inappropriate is currently being evaluated, but will be used in place of patient responses where necessary.

The purpose statement must be read prior to administration. It is important to tell the respondent that the information is to based on his/her point of view. Response sheets in large print should be provided with the instrument, so that the respondent may see, as well as hear, the choice of responses for each question. The respondent may either answer with the number or the text associated with the number (eg. “5” or “Not difficult at all”) for an individual question. If the respondent uses the number, it is important for the interviewer to verify the answer by stating the corresponding text response. The interviewer should display the sheet appropriate for that particular set of questions, and after each question must read all five choices.

Item Clarifications

(Item b) Bathing oneself does not include getting into the tub.
(Item c) This question is associated with movement. Does the person have the physical ability to get to the bathroom quickly enough?
(Item d) Losing a little urine/dribbling is considered an accident. If person has intermittent catheter and is having no leaking problems code them as per report. If person has an in-dwelling Foley catheter, code as *Cannot do at all*.
(Item e) Constipation is not counted here, person has to have an accident.
(Items f, h) If patient hasn’t done any of the items in the past two weeks code as *Cannot do at all*.
(Item m) If patient hasn’t “climbed several flights of stairs” in two weeks, they may be prompted by saying “have you gone up and down one flight of stairs a couple of times in a row.” If they still say they have not done it then they must be coded as *Cannot do at all*.
(Item g) “Shopping” means any type of shopping and does not include driving.
(Item o) If the patient wants to know what kind of car say “your car” or “the car you ride in most.”
(Item p) If patient says “I don’t have an affected side”, then instruct them to score using their perceived weaker side. If they still insist there is no affected, or weaker, side instruct them to score using their dominant side. If the patient says s/he has not been to the grocery store say “have you carried anything heavy with that hand.”

Stroke Impact Scale - 16

SIS-16 Patient

In the past 2 weeks, how difficult was it to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Could not do at all
a. Dress the top part of your body?	5	4	3	2	1
b. Bathe yourself?	5	4	3	2	1
c. Get to the toilet on time?	5	4	3	2	1
d. Control your bladder (not have an accident)?	5	4	3	2	1
e. Control your bowels (not have an accident)?	5	4	3	2	1
f. Do light household tasks/chores (e.g. dust, make a bed, take out garbage, do the dishes)?	5	4	3	2	1
g. Go shopping?	5	4	3	2	1
h. Do heavy household chores (e.g. vacuum, laundry or yard work)?	5	4	3	2	1
i. Stay sitting without losing your balance?	5	4	3	2	1
j. Walk without losing your balance?	5	4	3	2	1
k. Move from a bed to a chair?	5	4	3	2	1
l. Walk fast?	5	4	3	2	1
m. Climb one flight of stairs?	5	4	3	2	1
n. Climb several flights of stairs?	5	4	3	2	1
o. Get in and out of a car?	5	4	3	2	1
p. Carry heavy objects (e.g. bag of groceries) with your affected hand?	5	4	3	2	1

SIS-16 Proxy

In the past 2 weeks, how difficult was it for him/her to...	Not difficult at all	A little difficult	Somewhat difficult	Very difficult	Could not do at all
a. Dress the top part of his/her body?	5	4	3	2	1
b. Bathe him/herself?	5	4	3	2	1
c. Get to the toilet on time?	5	4	3	2	1
d. Control his/her bladder (not have an accident)?	5	4	3	2	1
e. Control his/her bowels (not have an accident)?	5	4	3	2	1
f. Do light household tasks/chores (e.g. dust, make a bed, take out garbage, do the dishes)?	5	4	3	2	1
g. Go shopping?	5	4	3	2	1
h. Do heavy household chores (e.g. vacuum, laundry or yard work)?	5	4	3	2	1
i. Stay sitting without losing his/her balance?	5	4	3	2	1
j. Walk without losing his/her balance?	5	4	3	2	1
k. Move from a bed to a chair?	5	4	3	2	1
l. Walk fast?	5	4	3	2	1
m. Climb one flight of stairs?	5	4	3	2	1
n. Climb several flights of stairs?	5	4	3	2	1
o. Get in and out of a car?	5	4	3	2	1
p. Carry heavy objects (e.g. bag of groceries) with his/her affected hand?	5	4	3	2	1

p. NYHA (New York Heart Association) Classification

I No limitation: Ordinary physical activity does not cause undue fatigue, dyspnea, or palpitation.
II Slight limitation of physical activity: Such patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea, or angina.
III Marked limitation of physical activity: Although patients are comfortable at rest, less than ordinary activity will lead to symptoms.
IV Inability to carry on any physical activity without discomfort: Symptoms of congestive failure are present even at rest. With any physical activity, increased discomfort is experienced.

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APPENDICIES

I. DRUG GLOSSARY

II. CONTRAINDICATED DRUGS

III. PHYSICAL THERAPY INTERVENTIONS

I. DRUG CLASS GLOSSARY

BRAND LISTING

BRAND	GENERIC	CLASS
ACCUPRIL	QUINAPRIL	ACE INHIBITOR
ADALAT	NIFEDIPINE	CA CHANNEL ANTAGONIST
ADALAT CC	NIFEDIPINE SUSTAINED RELEASE	CA CHANNEL ANTAGONIST
ALDACTAZIDE	SPIRONOLACTONE/HYDROCHLOROTHIAZIDE	DIURETIC
ALDACTONE	SPIRONOLACTONE	DIURETIC
ALDOMET	METHYLDOPA	ALPHA1 BLOCKER
ALLEGRA	FEXOFENADINE	2ND GENERATION ANTIHISTAMINES
ALLEGRA D	FEXOFENADINE/PSEUDOEPHEDRINE	2ND GENERATION ANTIHISTAMINES
ALTACE	RAMIPRIL	ACE INHIBITOR
ALUPENT	METAPROTERENOL	B2 AGONIST INHALERS
AMARYL	GLIMEPIRIDE	ORAL HYPOGLYCEMIC
AMBIEN	ZOLPIDEM	NON-BENZODIAZIPINE SEDATIVE
ANAFRANIL	CLOMIPRAMINE	TCA
ANAPROX	NAPOXEN SODIUM	NSAID
ANAPROX	NAPROXEN SODIUM	NSAID
ANSAID	FLURBIPROFEN	NSAID
ARTHROTEC	DICLOFENAC	NSAID
ATIVAN	LORAZEPAM	BENZODIAZEPINE
AVENTYL	NORTRIPTYLINE	TCA
AXID	NIZATIDINE	INHALER
BAYCOL	CERIVASTATIN	HMG COA REDUCTASE INHIBITOR
BETAPACE	SOTALOL	BETA-BLOCKER
BRETHAIRE	TERBUTALINE	B2 AGONIST INHALERS
BUMEX	BUMETANIDE	THYROID SUPPLEMENT
BUSPAR	BUSPIRONE	BENZODIAZEPINE
CALAN	VERAPAMIL HCL	CA CHANNEL ANTAGONIST
CALAN SR	VERAPAMIL HCL EXTENDED RELEASE	CA CHANNEL ANTAGONIST
CAPOTEN	CAPTOPRIL	ACE INHIBITOR
CARDENE	NICARDIPINE	CA CHANNEL ANTAGONIST
CARDIZEM	DILTIAZEM	CA CHANNEL ANTAGONIST
CARDIZEM CD	DILTIAZEM	CA CHANNEL ANTAGONIST
CARDIZEM SR	DILTIAZEM SUSTAINED RELEASE	CA CHANNEL ANTAGONIST
CARDURA	DOXAZOSIN	ALPHA1 BLOCKER
CARTROL	CARTEOLOL	BETA-BLOCKER
CATAFLAM	DICLOFENAC	NSAID
CATAPRES	CLONIDINE	ALPHA -2 AGONIST
CELONTIN	METHSUXIMIDE	ANTICONVULSANT
CEREBEX	FOSPHENYTOIN	ANTICONVULSANT
CLARITIN	LORATIDINE	2ND GENERATION ANTIHISTAMINES
CLARITIN D	LORATIDINE/PSEUDOEPHEDRINE	2ND GENERATION ANTIHISTAMINES
CLINORIL	SULINDAC	NSAID
CLOZARIL	CLOZAPINE	ATYPICAL ANTIPSYCHOTIC
COMPAZINE	PROCHLORPERAZINE	ANTIPSYCHOTIC
COREG	CARVEDIOL	BETA-BLOCKER
CORGARD	NADOLOL	BETA-BLOCKER
COUMADIN	WARFARIN	ANTICOAGULANT

COVERA HS	VERAPAMIL	CA CHANNEL ANTAGONIST
CYTOMEL	LIOTHYRONINE	THYROID SUPPLEMENT
DALMANE	FLURAZEPAM	BENZODIAZEPINE
DAYPRO	OXAPROZIN	NSAID
DEPAKENE	VALPROIC ACID	ANTICONVULSANT
DEPAKOTE	DIVALPROEX SODIUM	ANTICONVULSANT
DIABETA	GLYBURIDE	ORAL HYPOGLYCEMIC
DIABINESE	CHLORPROPAMIDE	ORAL HYPOGLYCEMIC
DIBENZYLINE	PHENOXYBENZAMINE	ALPHA1 BLOCKER
DILACOR XR	DILTIAZEM EXTENDED RELEASE	CA CHANNEL ANTAGONIST
BRAND	**GENERIC**	**CLASS**
DILANTIN	PHENYTOIN	ANTICONVULSANT
DILATRATE SR	ISOSORBIDE DINITRATE	NITRATE
DISALCID	SALSALATE	NSAID
DOLOBID	DIFLUNISAL	NSAID
DORAL	QUAZEPAM	BENZODIAZEPINE
DYAZIDE	TRIAMTERENE/HYDROCHLOROTHIAZIDE	DIURETIC
DYMELOR	ACETOHEXAMIDE	ORAL HYPOGLYCEMIC
DYNACIRC	ISRADIPINE	CA CHANNEL ANTAGONIST
DYRENIUM	TRIAMTERENE	DIURETIC
ELAVIL	AMITRIPTYLINE HCL	TCA
ETRAFON	PERPENAZINE	ANTIPSYCHOTIC
EUTHROID	LIOTRIX	THYROID SUPPLEMENT
FELBATOL	FELBAMATE	ANTICONVULSANT
FELDENE	PIROXICAM	NSAID
FLOMAX	TAMSULOSIN	ALPHA1 BLOCKER
FRAGMIN	DALTEPARIN	ANTICOAGULANT
GLUCOPHAGE	METFORMIN HCL	ORAL HYPOGLYCEMIC
GLUCOTROL	GLIPIZIDE	ORAL HYPOGLYCEMIC
GLUCOTROL XL	GLIPIZIDE EXTENDED RELEASE	ORAL HYPOGLYCEMIC
GLYNASE	GLYBURIDE	ORAL HYPOGLYCEMIC
HALCION	TRIAZOLAM	BENZODIAZEPINE
HALDOL	HALOPERIDOL	ANTIPSYCHOTIC
HALDOL DECANOATE	HALOPERIDOL	ANTIPSYCHOTIC
HUMALOG	LISPRO INSULIN	INSULIN
HUMULIN	HUMAN INSULIN	INSULIN
HYDRODIURIL	HYDROCHLOROTHIAZIDE	DIURETIC
HYGROTON	CHLORTHALIDONE	DIURETIC
HYTRIN	TERAZOSIN	ALPHA1 BLOCKER
ILETIN, NOVOLIN	INSULIN	ORAL HYPOGLYCEMIC
INDERAL	PROPRANOLOL HCL	BETA-BLOCKER
INDERAL LA	PROPRANOLOL HCL LA	BETA-BLOCKER
INDOCIN	INDOMETHACIN	NSAID
ISOPTIN SR	VERAPAMIL	CA CHANNEL ANTAGONIST
ISORDIL	ISOSORBIDE DINITRATE	NITRATE
ISORDIL TEMBIDS	ISOSORBIDE DINITRATE SUSTAINED RELEAASE	NITRATE
ISORDIL, SORBITRATE	ISOSORBIDE DINITRATE SUBLINGUAL	NITRATE
KEPPRA	LEVETIRACETAM	ANTICONVULSANT
KERLONE	BETAXOLOL	BETA-BLOCKER
KLONOPIN	CLONAZEPAM	BENZODIAZEPINE

LAMICTAL	LAMOTRIGINE	ANTICONVULSANT
LASIX	FUROSEMIDE	DIURETIC
LESCOL	FLUVASTATIN	HMG COA REDUCTASE INHIBITOR
LEVATOL	PENBUTOLOL	BETA-BLOCKER
LEVOXYL	LEVOTHYROXINE	THYROID SUPPLEMENT
LIBRIUM	CHLORDIAZEPOXIDE	BENZODIAZEPINE
LIPITOR	ATORVASTATIN	HMG COA REDUCTASE INHIBITOR
LODINE	ETODOLAC	NSAID
LODINE XL	ETODOLAC EXTENDED RELEASE	NSAID
LOPRESSOR	METOPROLOL	BETA-BLOCKER
LOTENSIN	BENAZEPRIL	ACE INHIBITOR
LOVENOX	ENOXAPARIN	ANTICOAGULANT
LOXITANE	LOXAPINE	ANTIPSYCHOTIC
LUVOX	FLUVOXAMINE	SSRI
MAVIK	TRANDOLAPRIL	ACE INHIBITOR
MAXAIR	PIRBUTEROL	B2 AGONIST INHALERS
MAXZIDE	TRIAMTERENE/HYDROCHLOROTHIAZIDE	DIURETIC
MAZICON	FLUMAZENIL	BENZODIAZEPINE
MELLARIL	THIORIDAZINE	ANTIPSYCHOTIC
MEVACOR	LOVASTATIN	HMG COA REDUCTASE INHIBITOR
BRAND	**GENERIC**	**CLASS**
MICRONASE	GLYBURIDE	ORAL HYPOGLYCEMIC
MINIPRESS	PRAZOSIN	ALPHA1 BLOCKER
MOBAN	MOLINDONE	ANTIPSYCHOTIC
MONOPRIL	FOSINOPRIL	ACE INHIBITOR
MOTRIN	IBUPROFEN	NSAID
MYSOLINE	PRIMONIDINE	ANTICONVULSANT
NALFON	FENOPROFEN	NSAID
NAPRELAN	NAPOXEN SODIUM	NSAID
NAPRELAN	NAPROXEN SODIUM	NSAID
NAPROSYN	NAPROXEN	NSAID
NAVANE	THIOTHIXENE	ANTIPSYCHOTIC
NEURONTIN	GABAPENTIN	ANTICONVULSANT
NITRO-DUR	NITROGLYCERIN TRANSDERMAL	NITRATE
NITROL	NITROGLYCERIN OINTMENT	NITRATE
NITROLINGUAL	NITROGLYCERIN TRANSLINGUAL	NITRATE
NITROSTAT	NITROGLYCERIN SUBLINGUAL	NITRATE
NORMIFLO	ARDEPARIN	ANTICOAGULANT
NORMODYNE	LABETOLOL	BETA-BLOCKER
NORPRAMINE	DESIPRAMINE	TCA
NORVASC	AMLODIPINE	CA CHANNEL ANTAGONIST
ORGARAN	DANAPAROID	ANTICOAGULANT
ORINASE	TOLBUTAMIDE	ORAL HYPOGLYCEMIC
ORUDIS	KETOPROFEN	NSAID
ORUVAIL	KETOPROFEN	NSAID
PAMELOR	NORTRIPTYLINE	TCA
PAXIL	PAROXETINE	SSRI
PAXIPAM	HALAZEPAM	BENZODIAZEPINE
PEPCID	FAMOTIDINE	H2 ANTAGONIST
PERSANTINE	DIPYRIDAMOLE	ANTIPLATELET

PLAVIX	CLOPIDOGREL	ANTIPLATELET
PLENDIL	FELODIPINE	CA CHANNEL ANTAGONIST
PONSTEL	MEFENAMIC ACID	NSAID
PRAVACHOL	PRAVASTATIN	HMG COA REDUCTASE INHIBITOR
PRINIVIL	LISINOPRIL	ACE INHIBITOR
PROCARDIA, PROCARDIA XL		NIFEDIPINE CA CHANNEL ANTAGONIST
PROLIXIN	FLUPHENAZINE	ANTIPSYCHOTIC
PROLIXIN DECANOATE	FLUPHENAZINE	ANTIPSYCHOTIC
PROSOM	ESTAZOLAM	BENZODIAZEPINE
PROVENTIL	ALBUTEROL	B2 AGONIST INHALERS
PROVENTIL HFA	ALBUTEROL	B2 AGONIST INHALERS
PROZAC	FLUOXETINE	SSRI
REFLUDAN	LEPIRUDIN	ANTICOAGULANT
REGITINE	PHENTOLAMINE	ALPHA1 BLOCKER
RELAFEN	NABUMETONE	NSAID
RESTORIL	TEMAZEPAM	BENZODIAZEPINE
RISPERDOL	RISPERIDONE	ANTIPSYCHOTIC
SECTRAL	ACEBUTOLOL	BETA-BLOCKER
SERAX	OXAZEPAM	BENZODIAZEPINE
SERENTIL	MESORIDAZINE	ANTIPSYCHOTIC
SEREVENT	SALMETEROL	B2 AGONIST INHALERS
SEROQUEL	QUETIAPINE	ATYPICAL ANTIPSYCHOTIC
SINEQUAN	DOXEPIN	TCA
SLO-BID, ,	THEOPHYLLINE	B2 AGONIST INHALERS
SORBITRATE	ISOSORBIDE DINITRATE	NITRATE
SPARINE	PROMAZINE	ANTIPSYCHOTIC
STELAZINE	TRIFLUOPERAZINE	ANTIPSYCHOTIC
SULAR	NISOLDIPINE	CA CHANNEL ANTAGONIST
SYNTHROID	LEVOTHYROXINE	THYROID SUPPLEMENT
BRAND	**GENERIC**	**CLASS**
TAGAMET	CIMETIDINE	H2 ANTAGONIST
TEGRETOL	CARBAMAZEPINE	ANTICONVULSANT
TENEX	GUANFACINE	ALPHA -2 AGONIST
TENORMIN	ATENOLOL	BETA-BLOCKER
THEO-24	THEOPHYLLINE	INHALER
THEO-DUR	THEOPHYLLINE	INHALER
THORAZINE	CHLORPROMAZINE	ANTIPSYCHOTIC
THYROLAR	LIOTRIX	THYROID SUPPLEMENT
TIAZAC	DILTIAZEM	CA CHANNEL ANTAGONIST
TICLID	TICLOPIDINE	ANTIPLATELET
TOFRANIL	IMIPRAMINE	TCA
TOLECTIN	TOLMETIN	NSAID
TOLINASE	TOLAZAMIDE	ORAL HYPOGLYCEMIC
TOPAMAX	TOPRAMATE	ANTICONVULSANT
TOPROL XL	METOPROLOL SUCCINATE	BETA-BLOCKER
TORADOL	KETOROLAC	NSAID
TORNALATE	BITOLTEROL	B2 AGONIST INHALERS
TRANDATE	LABETOLOL	BETA-BLOCKER
TRANSDERM-NITRO	NITROGLYCERIN TRANSDERMAL	NITRATE

TRANXENE	CLORAZEPATE	BENZODIAZEPINE
TRIAVIL	PERPENAZINE	ANTIPSYCHOTIC
TRILAFON	PERPHENAZINE	ANTIPSYCHOTIC
UNIVASC	MOEXIPRIL	ACE INHIBITOR
VALIUM	DIAZEPAM	BENZODIAZEPINE
VASOTEC	ENALAPRIL	ACE INHIBITOR
VELOSULIN R	INSULIN HUMAN SEMI-SYNTHETIC	ORAL HYPOGLYCEMIC
VENTOLIN	ALBUTEROL	B2 AGONIST INHALERS
VERELAN	VERAPAMIL	CA CHANNEL ANTAGONIST
VISKEN	PINDOLOL	BETA-BLOCKER
VOLTAREN	DICLOFENAC	NSAID
WYTENSIN	GUANABENZ	ALPHA -2 AGONIST
XANAX	ALPRAZOLAM	BENZODIAZEPINE
ZANTAC	RANITIDINE	H2 ANTAGONIST
ZARONTIN	ETHOSUXIMIDE	ANTICONVULSANT
ZAROXOLYN	METOLAZONE	DIURETIC
ZEBETA	BISOPROLOL	BETA-BLOCKER
ZESTRIL	LISINOPRIL	ACE INHIBITOR
ZOCOR	SIMVASTATIN	HMG COA REDUCTASE INHIBITOR
ZOLOFT	SERTRALINE	SSRI
ZYPREXA	OLANZAPINE	ATYPICAL ANTIPSYCHOTIC
ZYRTEC	CETIRIZINE	2ND GENERATION ANTIHISTAMINES

GENERIC LISTING

GENERIC	CLASS
ACEBUTOLOL	BETA-BLOCKER
ACETOHEXAMIDE	ORAL HYPOGLYCEMIC
ALBUTEROL	B2 AGONIST INHALERS
ALPRAZOLAM	BENZODIAZEPINE
AMITRIPTYLINE HCL	TCA
AMLODIPINE	CA CHANNEL ANTAGONIST
ARDEPARIN	ANTICOAGULANT
ASPIRIN	ANTIPLATELET
ATENOLOL	BETA-BLOCKER
ATORVASTATIN	HMG COA REDUCTASE INHIBITOR
BENAZEPRIL	ACE INHIBITOR
BETAXOLOL	BETA-BLOCKER
BISOPROLOL	BETA-BLOCKER
BITOLTEROL	B2 AGONIST INHALERS
BUMETANIDE	THYROID SUPPLEMENT
BUSPIRONE	BENZODIAZEPINE
CAPTOPRIL	ACE INHIBITOR
CARBAMAZEPINE	ANTICONVULSANT
CARTEOLOL	BETA-BLOCKER
CARVEDIOL	BETA-BLOCKER
CERIVASTATIN	HMG COA REDUCTASE INHIBITOR
CETIRIZINE	2ND GENERATION ANTIHISTAMINES
CHLORAL HYDRATE	NON-BENZODIAZIPINE SEDATIVE
CHLORDIAZEPOXIDE	BENZODIAZEPINE
CHLORPROMAZINE	ANTIPSYCHOTIC
CHLORPROPAMIDE	ORAL HYPOGLYCEMIC
CHLORTHALIDONE	DIURETIC
CIMETIDINE	H2 ANTAGONIST
CLOMIPRAMINE	TCA
CLONAZEPAM	BENZODIAZEPINE
CLONIDINE	ALPHA -2 AGONIST
CLOPIDOGREL	ANTIPLATELET
CLORAZEPATE	BENZODIAZEPINE
CLOZAPINE	ATYPICAL ANTIPSYCHOTIC
DALTEPARIN	ANTICOAGULANT
DANAPAROID	ANTICOAGULANT
DESIPRAMINE	TCA
DIAZEPAM	BENZODIAZEPINE
DICLOFENAC	NSAID
DIFLUNISAL	NSAID
DILATRATE SR)	NITRATE
DILTIAZEM	CA CHANNEL ANTAGONIST
DILTIAZEM SUSTAINED RELEASE	CA CHANNEL ANTAGONIST
DIPYRIDAMOLE	ANTIPLATELET
DIVALPROEX SODIUM	ANTICONVULSANT
DOXAZOSIN	ALPHA1 BLOCKER
DOXEPIN	TCA
ENALAPRIL	ACE INHIBITOR

ENOXAPARIN	ANTICOAGULANT
ESTAZOLAM	BENZODIAZEPINE
ETHOSUXIMIDE	ANTICONVULSANT
ETODOLAC	NSAID
ETODOLAC EXTENDED RELEASE	NSAID
FAMOTIDINE	H2 ANTAGONIST
FELBAMATE	ANTICONVULSANT
FELODIPINE	CA CHANNEL ANTAGONIST
FENOPROFEN	NSAID
FEXOFENADINE	2ND GENERATION ANTIHISTAMINES
GENERIC	**CLASS**
FEXOFENADINE/PSEUDOEPHEDRINE	2ND GENERATION ANTIHISTAMINES
FLUMAZENIL	BENZODIAZEPINE
FLUOXETINE	SSRI
FLUPHENAZINE	ANTIPSYCHOTIC
FLUPHENAZINE	ANTIPSYCHOTIC
FLURAZEPAM	BENZODIAZEPINE
FLURBIPROFEN	NSAID
FLUVASTATIN	HMG COA REDUCTASE INHIBITOR
FLUVOXAMINE	SSRI
FOSINOPRIL	ACE INHIBITOR
FOSPHENYTOIN	ANTICONVULSANT
FUROSEMIDE	DIURETIC
GABAPENTIN	ANTICONVULSANT
GLIMEPIRIDE	ORAL HYPOGLYCEMIC
GLIPIZIDE	ORAL HYPOGLYCEMIC
GLIPIZIDE EXTENDED RELEASE	ORAL HYPOGLYCEMIC
GLYBURIDE	ORAL HYPOGLYCEMIC
GUANABENZ	ALPHA -2 AGONIST
GUANFACINE	ALPHA -2 AGONIST
HALAZEPAM	BENZODIAZEPINE
HALOPERIDOL	ANTIPSYCHOTIC
HEPARIN	ANTICOAGULANT
HUMAN INSULIN	INSULIN
HYDROCHLOROTHIAZIDE	DIURETIC
IBUPROFEN	NSAID
IMIPRAMINE	TCA
INDOMETHACIN	NSAID
INSULIN	ORAL HYPOGLYCEMIC
INSULIN HUMAN SEMI-SYNTHETIC	ORAL HYPOGLYCEMIC
ISOSORBIDE DINITRATE	NITRATE
ISOSORBIDE DINITRATE SUBLINGUAL	NITRATE
ISOSORBIDE DINITRATE SUSTAINED RELEASE	NITRATE
ISRADIPINE	CA CHANNEL ANTAGONIST
KETOPROFEN	NSAID
KETOPROFEN	NSAID
KETOROLAC	NSAID
LABETOLOL	BETA-BLOCKER
LAMOTRIGINE	ANTICONVULSANT
LEPIRUDIN	ANTICOAGULANT

LEVETIRACETAM	ANTICONVULSANT
LEVOTHYROXINE	THYROID SUPPLEMENT
LIOTHYRONINE	THYROID SUPPLEMENT
LIOTRIX	THYROID SUPPLEMENT
LISINOPRIL	ACE INHIBITOR
LISPRO INSULIN	INSULIN
LORATIDINE	2ND GENERATION ANTIHISTAMINES
LORATIDINE/PSEUDOEPHEDRINE	2ND GENERATION ANTIHISTAMINES
LORAZEPAM	BENZODIAZEPINE
LOVASTATIN	HMG COA REDUCTASE INHIBITOR
LOXAPINE	ANTIPSYCHOTIC
MEFENAMIC ACID	NSAID
MESORIDAZINE	ANTIPSYCHOTIC
METAPROTERENOL	B2 AGONIST INHALERS
METFORMIN HCL	ORAL HYPOGLYCEMIC
METHSUXIMIDE	ANTICONVULSANT
METHYLDOPA	ALPHA1 BLOCKER
METOLAZONE	DIURETIC
METOPROLOL	BETA-BLOCKER
METOPROLOL SUCCINATE	BETA-BLOCKER
GENERIC	**CLASS**
MOEXIPRIL	ACE INHIBITOR
MOLINDONE	ANTIPSYCHOTIC
NABUMETONE	NSAID
NADOLOL	BETA-BLOCKER
NAPOXEN SODIUM	NSAID
NAPROXEN	NSAID
NICARDIPINE	CA CHANNEL ANTAGONIST
NIFEDIPINE	CA CHANNEL ANTAGONIST
NIFEDIPINE SUSTAINED RELEASE	CA CHANNEL ANTAGONIST
NISOLDIPINE	CA CHANNEL ANTAGONIST
NITROGLYCERIN OINTMENT	NITRATE
NITROGLYCERIN SUBLINGUAL	NITRATE
NITROGLYCERIN TRANSDERMAL	NITRATE
NIZATIDINE	INHALER
NORTRIPTYLINE	TCA
NORTRIPTYLINE	TCA
OLANZAPINE	ATYPICAL ANTIPSYCHOTIC
OXAPROZIN	NSAID
OXAZEPAM	BENZODIAZEPINE
PAROXETINE	SSRI
PENBUTOLOL	BETA-BLOCKER
PERPENAZINE	ANTIPSYCHOTIC
PERPENAZINE	ANTIPSYCHOTIC
PERPHENAZINE	ANTIPSYCHOTIC
PHENOBARBITAL	ANTICONVULSANT
PHENOXYBENZAMINE	ALPHA1 BLOCKER
PHENTOLAMINE	ALPHA1 BLOCKER
PHENYTOIN	ANTICONVULSANT
PINDOLOL	BETA-BLOCKER

PIRBUTEROL	B2 AGONIST INHALERS
PIROXICAM	NSAID
PRAVASTATIN	HMG COA REDUCTASE INHIBITOR
PRAZOSIN	ALPHA1 BLOCKER
PRIMONIDINE	ANTICONVULSANT
PROCHLORPERAZINE	ANTIPSYCHOTIC
PROMAZINE	ANTIPSYCHOTIC
PROPRANOLOL HCL	BETA-BLOCKER
PROPRANOLOL HCL LA	BETA-BLOCKER
QUAZEPAM	BENZODIAZEPINE
QUETIAPINE	ATYPICAL ANTIPSYCHOTIC
QUINAPRIL	ACE INHIBITOR
RAMIPRIL	ACE INHIBITOR
RANITIDINE	H2 ANTAGONIST
RISPERIDONE	ANTIPSYCHOTIC
SALMETEROL	B2 AGONIST INHALERS
SALSALATE	NSAID
SERTRALINE	SSRI
SIMVASTATIN	HMG COA REDUCTASE INHIBITOR
SOTALOL	BETA-BLOCKER
SPIRONOLACTONE	DIURETIC
SPIRONOLACTONE/HYDROCHLOROTHIAZIDE	DIURETIC
SULINDAC	NSAID
TAMSULOSIN	ALPHA1 BLOCKER
TEMAZEPAM	BENZODIAZEPINE
TERAZOSIN	ALPHA1 BLOCKER
TERBUTALINE	B2 AGONIST INHALERS
THEOPHYLLINE	B2 AGONIST INHALERS
THIORIDAZINE	ANTIPSYCHOTIC
THIOTHIXENE	ANTIPSYCHOTIC
GENERIC	**CLASS**
TICLOPIDINE	ANTIPLATELET
TOLAZAMIDE	ORAL HYPOGLYCEMIC
TOLBUTAMIDE	ORAL HYPOGLYCEMIC
TOLMETIN	NSAID
TOPRAMATE	ANTICONVULSANT
TRANDOLAPRIL	ACE INHIBITOR
TRIAMTERENE	DIURETIC
TRIAMTERENE/HYDROCHLOROTHIAZIDE	DIURETIC
TRIAZOLAM	BENZODIAZEPINE
TRIFLUOPERAZINE	ANTIPSYCHOTIC
VALPROIC ACID	ANTICONVULSANT
VERAPAMIL	CA CHANNEL ANTAGONIST
VERAPAMIL HCL	CA CHANNEL ANTAGONIST
VERAPAMIL HCL EXTENDED RELEASE	CA CHANNEL ANTAGONIST
WARFARIN	ANTICOAGULANT
ZOLPIDEM	NON-BENZODIAZIPINE SEDATIVE

II. Contraindicated Drugs

The following provides a listing of common drugs that are relatively contraindicated during the course of the study because of possible detrimental effects on recovery. Any drug not listed should be checked in the PDR or similar reference to determine whether it may belong to a contraindicated class (unless otherwise indicated below). As per usual medical practive, other drugs that may have adverse reactions when given in combination with amphetamine (e.g., **sympathomimetics, L-DOPA, dopamine receptor agonists, MAO inhibitors**, etc.) should not be given.

ALPHA 2 AGONIST

ALDOMET	METHYLDOPA
CATAPRES	CLONIDINE
TENEX	GUANFACINE
WYTENSIN	GUANABENZ

ALPHA 1 ANTAGONIST

CARDURA	DOXAZOSIN
DIBENZYLINE	PHENOXYBENZAMINE
FLOMAX	TAMSULOSIN
HYTRIN	TERAZOSIN
MINIPRESS	PRAZOSIN
REGITINE	PHENTOLAMINE

ANTICONVULSANT (ONLY THOSE LISTED)

CEREBEX	FOSPHENYTOIN
DILANTIN	PHENYTOIN

ANTIPSYCHOTIC

COMPAZINE	PROCHLORPERAZINE
ETRAFON	PERPENAZINE
HALDOL	HALOPERIDOL
HALDOL DECANOATE	HALOPERIDOL
LOXITANE	LOXAPINE
MELLARIL	THIORIDAZINE
MOBAN	MOLINDONE
NAVANE	THIOTHIXENE
PROLIXIN	FLUPHENAZINE
PROLIXIN DECANOATE	FLUPHENAZINE
RISPERDOL	RISPERIDONE
SERENTIL	MESORIDAZINE
SPARINE	PROMAZINE
STELAZINE	TRIFLUOPERAZINE
THORAZINE	CHLORPROMAZINE
TRIAVIL	PERPENAZINE
TRILAFON	PERPHENAZINE

BENZODIAZEPINE

ATIVAN	LORAZEPAM
BUSPAR	BUSPIRONE
DALMANE	FLURAZEPAM
DORAL	QUAZEPAM
HALCION	TRIAZOLAM

KLONOPIN	CLONAZEPAM
LIBRIUM	CHLORDIAZEPOXIDE
MAZICON	FLUMAZENIL
PAXIPAM	HALAZEPAM
PROSOM	ESTAZOLAM
RESTORIL	TEMAZEPAM
SERAX	OXAZEPAM
TRANXENE	CLORAZEPATE
VALIUM	DIAZEPAM
XANAX	ALPRAZOLAM

III. Physical Therapy Intervention

Select the target impairment to focus therapy during 60 min. experimental sessions. In patients with gait impairment, therapy sessions should be focused on gait. Select the highest appropriate level depending on patient progress and record on datasheet.

LEVEL I – No or Minimal Movement

I.1.A. Lower Extremity - No movement

1. Passive range of motion
2. Open chain motor control exercises:
   a. Facilitate initiation of hip abduction/adduction supine on mat
   b. Facilitate hip flexion/extension in sidelying on mat/powderboard
   c. Facilitate knee flexion/extension in sidelying on mat/powderboard
3. Closed chain motor control exercises:
   a. Bridging on mat
   b. Scooting up and down or side to side in bed
   c. Sit to stand (proprioception, increase weightbearing of the involved lower extremity) from high surfaces
4. Standing Balance -- may attempt to incorporate hemiplegic upper extremity through weightbearing or a bilateral task
5. Transfers (i.e. bed to/from wheelchair to/from toilet, wheelchair to/from tub, wheelchair to/from car) with emphasis on transfers to the involved side to encourage weightbearing of the hemiplegic side
6. Gait Training – patients typically require maximal assistance to advance the hemiplegic side and control the knee

I.1.B. Only proximal control of the hemiplegic lower extremity:

1. Passive range of motion
2. Open chain motor control exercises with progression to antigravity positions:
   a. Heel slides
   b. Marching
   c. Knee extension seated in wheelchair
3. Closed chain motor control exercises:
   a. Bridging on mat with progression to single leg bridging
   b. High Kneeling – trunk and hip control
   c. Sit to stand with progression to lower surfaces and split stance or uninvolved side on small stepstool to further increase weightbearing of hemiplegic side
   d. Step-ups with hemiplegic lower extremity
   e. Squats
4. Standing Balance with progression to split stance or stepping during more dynamic activities; eventually progress to sidestepping, cross-stepping and then braiding
5. Transfers, with addition of floor transfers to those previously listed
6. Gait Training – progressing to reciprocal stair climbing
7. Endurance Training (i.e. Scifit bike, Kinetron)

I.2.A. Upper extremity - No movement

1. PROM
2. Self-ROM exercises
3. Intermittent joint compression for facilitation followed by any bilateral activity
   e.g. Cones, batting a balloon, beanbags, putting clothes is a basket, cleaning the table
4. Weight bearing through extremity followed by any bilateral activity
5. Vibrator or tapping for facilitation as your asking patient to perform a movement

I.2.B. UPPER EXTREMITY - MINIMAL MOVEMENT (assuming no grasp/release)

1. 1-5 as stated above
2. E-stim for facilitation as your asking patient to hold position during off cycle
3. Have patient supine with full arm air splint on extremity and work on place and hold at shoulder.
4. Have patient supine with air splint over elbow, utilize flexor mitt and perform dowel

LEVEL II – Higher functioning

All patients- Assistive/Resistive Exercises- 20 minutes (Upper and Lower Extremities)

II.1.A. PNF patterns (if patient cannot independently use progressive resistive theraband exercise); 2 sets of 10 repetitions with manual resistance of the upper and lower extremities PNF patterns

When subjects can complete 2 sets of 10 repetitions through the available range of motion, resistance will be increased either manually in PNF exercises or by progression of theraband colors.

The PNF with resistance will continue if patient is unable to complete theraband exercises as described below without substituting.

II.2. Lower Extremity Activities - Level selected by therapist

1. Chair Rise. Do 2 sets of 10 repetitions before progressing to next level.
   - Level 1- move to edge of chair, lean forward, push up with arms, stand up.
   - Level 2- move to edge of chair, lean forward, put arms out to side for balance, stand up.
   - Level 3- move to edge of chair, lean forward, fold arms across chest, stand up.
   - Level 4- sit back in the chair, push up with arms, stand up.
   - Level 5- sit back in the chair, put arms out so side for balance, standup.
   - Level 6- sit back in the chair, fold arms across chest, stand up.
   - Level 7-12- with a platform (6 inches) in front of the chair, begin at level 1 and progress through level 6.

2. Up on Toes. Do 2 sets of 10 repetitions before progressing to next level.
   - Level 1- hold onto back of chair, come up on toes of both feet, hold position for 3 seconds.
   - Level 2- hold onto back of chair, stand on right foot, come up on toes of right foot, hold for 3 seconds. Repeat with left foot.
   - Level 3- without holding onto anything, come up on toes of both feet, hold for 3 seconds.
   - Level 4- without holding onto anything, come on toes of right foot, hold for 3 seconds. Repeat with left foot.

3. Step Ups. Do 2 sets of 10 repetitions before progressing to next level.
   - Level 1- hold onto wall or railing, place right foot on step, slowly step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 6 inch step.
   - Level 2- without holding on to anything, place right foot on step, step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 6 inch step.
   - Level 3- hold onto wall or railing, place right foot on step, slowly step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 8 inch step.
   - Level 4- without holding on to anything, place right foot on step, step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 8 inch step.
   - Level 5- hold onto wall or railing, place right foot on step, slowly step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 10 inch step.

Level 6- without holding on to anything, place right foot on step, step up bringing left foot up even with right, slowly lower right foot back down. Repeat with left foot up. Using 10 inch step.

4. Marching. Do 20 repetitions with each leg before progressing to next level.
   Level 1- hold onto counter, raise right leg up bending hip 90 degrees. Repeat with left leg.
   Level 2- without holding onto anything, raise right leg up bending hip 90 degree. Repeat with left leg.

5. Wall Exercise
   Level 1- Standing: facing away from a wall with feet approximately 1 foot away. With weight evenly distributed on both feet, sway backward and then recover by quickly coming forward.
   Level 2- Standing: facing away from a wall with feet 12 –2 4 inches away. With weight evenly distributed on both feet, sway backward and then recover quickly coming forward.

6. Gait Challenges: Level selected by therapist. Must get patient up for continuous walking - work up to 10 min
   a. Level 1- walk as quickly as possible and on instruction abruptly stop.
      Level 2- walk as quickly as possible and on instruction turn (180 degrees) to the uninvolved side and keep walking.
      Level 3a- walk as quickly as possible and on instruction turn to the involved side (180 degrees).
      Level 3b- walk as quickly as possible, spontaneous posterior displacement.
      Level 4- walk as quickly as possible, spontaneous lateral displacement.
   b. Level 1- walk and carry objects with both hands – light weight objects.
      Level 2- walk and carry objects with both hands – moderate weight objects
      Level 3- walk and carry objects with both hands – heavy weight objects. (5-10 pounds).
   c. Level 1- walk on uneven surfaces – grass, sidewalk.
      Level 2- walk down a slight incline (hill or ramp).

II.3. Upper Extremity Activities

II.3.1. Push ups. Do 20 repetitions before progressing to next level.
   Level 1- push up with both arms from sofa.
   Level 2- push up with both arms from chair (armrests approx. 8-10 inches)

II.3.2. Hand Grips. Work up to 20 repetitions.
   Level 1- have patient grip with unaffected hand.

II.3.3. Functional use; Upper Extremity. Level of activity selected by therapist (20 min)
   Level 1- Using the affected arm as a stabilizer without using grasp
      1. Stabilizing paper: have the person write a (letter, grocery list, recipe, etc.) on an 8 x 11" sheet of paper with his/her unaffected hand. Place the affected arm on the top or side of the paper to stabilize the paper.
      2. Stabilizing clothes – 1. have the person don a (coat, shirt, sweater) with the unaffected arm. Place the affected arm in the sleeve and pull the garment up on the shoulder. Have the person adduct his affected arm against his/her body to hold the garment in place while he/she puts the other arm in the sleeve. 2. Have the person don pants with the unaffected arm while seated. Put both feet in the legs and pull the pants up to mid-thigh. Before standing, place affected hand in the ipsilateral pocket and have him/her adduct the arm against his/her body to hold the pants in

place. Have the person stand and pull up the pants with his/her unaffected hand. Have the person sit down and remove his affected hand from the pocket.

3. Stabilizing ironing board: Either place a garment on an ironing board or have the person place a garment on the ironing with his/her unaffected arm. Place the affected arm on the ironing board towards one of the ends. Have the person push down on the ironing board with his affected arm with enough pressure to stabilize the ironing board while he/she irons with the unaffected arm.

Level 2- Affected arm used as a gross grasper

1. Sweeping: Have the person sweep increasing areas of the floors of the house. Place the affected hand at the top of the broom and the unaffected hand in the middle of the broom handle. Use the unaffected hand to do the majority of the sweeping and the affected hand to stabilize the top of the broom. Start with 1 minute of sweeping and increase to 5.
2. Holding a bowl while mixing: Have the person mix (cookie, brownie, etc.) dough in a bowl with his/her unaffected arm. 1. Hold the bowl against the body with the affected arm cradling the bowl and stabilizing it against his/her body. The affected hand should be grasping the lip of the bowl – thumb over the lip, fingers on side of the bowl, remainder of arm around side of the bowl. 2. Hold the bowl on the table with a piece of dycem under the bowl, stabilizing it with the affected arm. The thumb should be over the lip of the bowl and the fingers on the side of the bowl. 3. Hold the bowl on the table (no dycem), stabilizing it with the affected arm. The hand placement is the same as in #2.
3. Holding cans while opening with an electric can opener: 1. Have the person hold a can between both hands under an electric can opener. Can should be between thumbs and the index finger resting against the web space. 2. Increase the weight of the can 16 ounces to 32 ounces.
4. Holding manual can opener while opening cans: 1. Place a manual can opener on a can or have the person place it on a can with his/her unaffected hand (affected hand should stabilize the can in this case). Make the initial cut by squeezing the levers or have the person do this with his/her unaffected hand. Then have the person squeeze the levers with his/her affected hand while the unaffected hand turns the crank.
5. Holding containers while opening them: 1. Stabilize the containers in the affected hand. Container should be between the thumb and the index finger in the web spaces. Remove the lid with the affected hand. 2. Start with stick deodorant, twist top condiments, flip top dressings. 3. Aerosol cans or pump containers (hair spray, Pledge, PAM). 4. Small containers (>=2" diameter) with screw on lids (deodorant, pimento jars, baby food jars, olive jar). 5. Medium containers (>2"<5" diameter) with screw on or Tupperware lids (pickle jars, spaghetti jars, apple juice jars which have this size neck, etc.). These may also be stabilized on a table.
6. Holding fruits and vegetables: 1. Stabilize food against table with affected hand while cutting or peeling with unaffected hand. Food should be held between the thumb and the index finger against the web space. a. Begin with relatively soft foods (cucumber, tomato, apple). b. Progress to hard foods (carrot, potato) 4. Hold the food in the affected hand while cutting or peeling with the unaffected hand. A. Begin with relatively soft foods (cucumber, tomato, apple). B. progress to hard foods (carrot, potato).
7. Holding the phone receiver while dialing: 1. Hold the receiver in the affected hand while dialing with the unaffected hand. The receiver should be between the thumb and the index finger against the web space.

8. Holding dishes/glasses while washing them: 1. Hold the dishes with the affected hand. Dish/glass should be against web space between thumb and index finger. Wash with unaffected hand. a. Begin with plastic dishes – glasses, luncheon plates, bowls. b. Progress to plastic dinner plates. c. Glass or ceramic glasses, luncheon plates d. ceramic dinner plates, bowls.

Level 3- Using the affected extremity as a gross manipulator:

1. Catching a ball: 1. Have the person catch balls tossed from approximately 3 feet away. The ball should be caught with both hands. Level of catch difficulty: a. catch is made by trapping ball between arms and body. b. catch is made by hands in front of body. Level of ball difficulty: a. Nerf ball – approx. 12" diameter. b. child's bounce ball. c. soccer ball/volleyball. d. basketball e. softball f. whiffle ball g. Nerf – approx. 5" diameter h. tennis ball.
2. Throwing a ball: 1. Have the person toss a ball from approximately 3 feet away. Level of throw: a. underhand b. basketball pass c. overhead pass. Level of aiming: a. throw to a person b. throw into a garbage can (approx. 24" diameter) c. throw into a wastebasket (approx. 12" diameter) Level of Ball: a. Nerf ball – approx. 12" diameter ball b. child's bounce ball c. soccer ball/volleyball d. basketball.
3. Kneed bread dough: 1. Use both hands. Alternate which hand folds over the dough. Duration levels: a. 10 folds b. 15 folds c. 1 minute d. 2 minutes e. 3 minutes f. 4 minutes g. 5 minutes.
4. Donning clothes: 1. Shirt – grasp shirt with affected hand. Slide it over unaffected arm first. Follow with the affected arm. 2 Pants – a. use unaffected arm to place pants over feet and calves. Use both arms to pull up pants. B. use both arms to place pants over feet. Use both arms to pull up pants.
5. Handwashing clothes: Have the person wash out small clothing in sink. Use both hands to scrub parts of the clothes together. Use both hands to wring out the clothes after washing.
6. Dishwashing: Have the unaffected hand hold the dishes while the affected hand washes them. Levels of dishes: a. luncheon plate b. dinner plate c. bowl d. glass.
7. Blow drying hair: 1. Have the person hold the blow dryer in his/her affected hand and the brush in the unaffected hand. 2. Hold the blow dryer in his/her unaffected hand and the brush in the affected hand.
8. Opening drawers: Have the person open and close the drawers of his/her dresser while putting away clothes. Both hands should be used to open these drawers – one hand on each handle of drawer. You may assist the person to achieve initial grasp on the handle with affected hand.
9. Folding laundry; All folding should be done with 2 hands. Level of folding: a. both towel/pillow case b. beach towel c. sheet/tablecloth d. blanket e. comforter.

Level 4- Using affected arm as a fine motor manipulator.

1. Donning socks: Have the person manipulate the socks over the toes with both hands.
2. Tying: Level of cord: a. _ inch cord b. _ inch cord c. shoelace d. house string e. baby yarn Level of Tying: a. _ square knot b. bunny ears bow.
3. Putting clothes on a hanger: 1. Holding hanger with affected arm. Place clothes on with unaffected arm. 2. Hold hanger with unaffected arm. Place clothes on with affected arm.. Level of clothes: a. tee shirt b. turtleneck c. button down shirt.
4. Opening Containers: 1. Hold the container in the unaffected hand. Open the caps with the affected arm. Level of Container: a. stick deodorant b. aerosol cans or

pump containers (hair spray, Pledge, PAM) c. small containers (<=2" diameter with screw on lids (deodorant, pimento jars, baby food jars, olive jars) d. medium containers (>2"<5" diameter) with screw on lids (pickle jars, spaghetti jars, apple juice jars which have this size neck, etc.). These may also be stabilized on a table. e. containers with lids requiring pincer prehension: twist top condiments, flip top dressings, Tupperware lids.

5. Putting socks together and folding over ends: Align a pair of socks. Fold the top of one sock over the other sock.
6. Stuffing envelopes: 1. Use the affected hand to hold the envelope and the unaffected hand to stuff the paper. 2. Use the unaffected hand to hold the envelope and the affected hand to stuff the paper. Level of Paper: a. stiff cardboard b. flexible cardboard c. 1 sheet of copier paper d. 5 sheets of copier paper. Level of envelope: a. 8 x 11 " manila envelope b. 5 x 10 inch manila envelope. c. business envelope.
7. Picking up coins – pick up coins beginning with quarters and progressing to dimes.
8. Writing- write with affected hand.
9. Buttoning- button blouses using affected hand.
10. Typing- utilizing both hands.
11. Calculator- manipulate numbers with affected hand.