

# Early Mobility Assessment Protocol for Stroke Patients after Thrombolysis is Safe and may Improve Outcomes

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# Phase I: Feasibility & Safety

# Background and Objective

- Early mobilization of general and critical medical patients benefits outcome, length of stay, and patient satisfaction.<sup>1,2</sup>
- Data regarding safety of early mobilization of stroke patients is limited and inconsistent .<sup>3, 4,5</sup>
- In 22/30 guidelines, early mobilization recommended, but timing and prescription of mobilization is not specified
- Concern for falls or neurologic deterioration due to perfusion changes has led to promoting bed rest during the acute phase of care.<sup>7</sup>
- Physical or Occupational Therapy (PT/OT) evaluation may not occur for more than 24 hours from admission, leaving patients on bed rest for that period.
- **Objective**: Determine whether nurses can safely evaluate and mobilize stroke patients at an appropriate level within 8 hours of admission, without increasing the fall rate or causing permanent neurologic deterioration.

# Methods: Assessment Development and Implementation

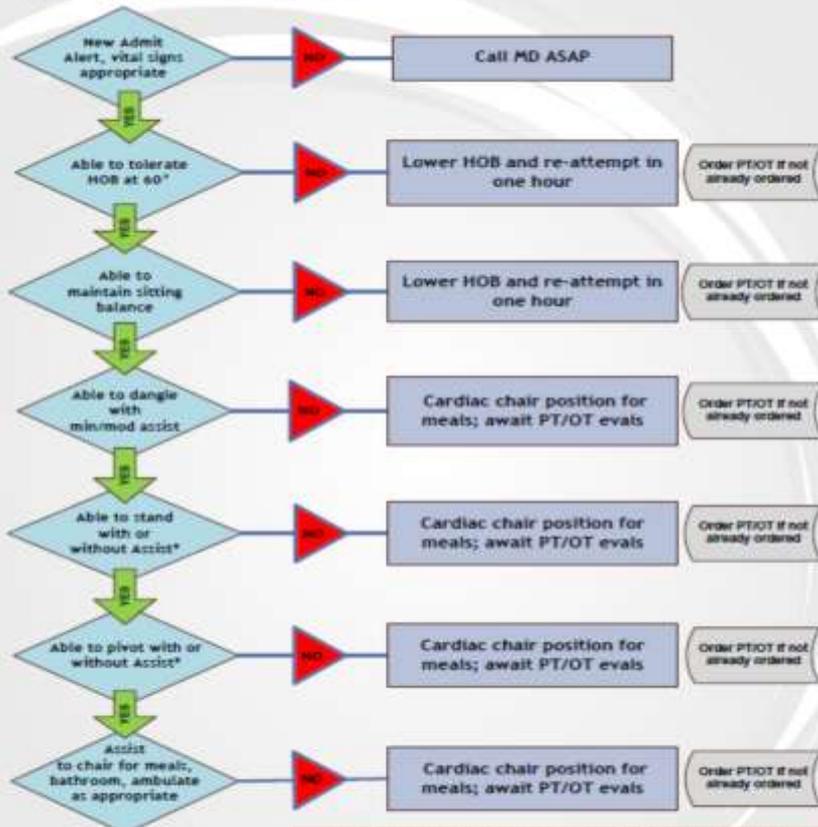


- Interdisciplinary Stroke mobility Team convened (Stroke MD, Stroke RN, PT, OT)
- Literature review
- Stroke Mobility Assessment Protocol developed
- Implemented January 2011 for all stroke/ICH/TIA patients in PSC ICU/Stroke unit
- Adherence to the protocol was audited by chart review.
- Nursing satisfaction was assessed by nursing feedback elicited by the Team

# StrokeMobility Assessment Tools

## NURSING STROKE MOBILITY ASSESSMENT TOOL

PROPERTY OF PPMC BS, PLEASE RETURN TO CHARGE RN



\* NOTE:  
Can include a 2 person assist, gait belt or sit

If patient or RN feels unsafe at anytime then STOP!  
Cardiac chair position for meals; await PT/OT evals  
*(Order PT/OT if not ordered)*

Refer/initiate tracking form at appropriate level

## PPMC/PSVMC Critical Care Mobility Assessment

### CRITERIA

#### Step 1. Review medical Background:

Able to follow commands? Emotional status? Previous level of mobility and exercise capacity, blood sugar level medications which may affect mobilization (i.e. sedatives, beta blockers)

#### Step 2: Sufficient Cardiovascular reserve?

Resting HR within normal limits? BP stable, EKG normal - no evidence of MI or arrhythmia?

#### Step 3: Sufficient Respiratory reserve?

Sats >90% Respiratory pattern satisfactory, mechanical ventilation able to be maintained during mobilization?

If the patient meets the above criteria then attempt the Mobility Assessment below

### MOBILITY ASSESSMENT

Step 1: HOB elevated 45 degrees

Step 2: HOB elevated 45 degrees & legs in dependent position

Step 3: Full Cardiac Chair position, 60 °

Step 4: Dangle

Step 5: Initiate stand and pivot into chair

Advance to next step after 30 to 60 minutes TID as tolerated and PRN. Repeat each step until patient demonstrates hemodynamic stability and physical tolerance then advance to next steps at the next activity period.

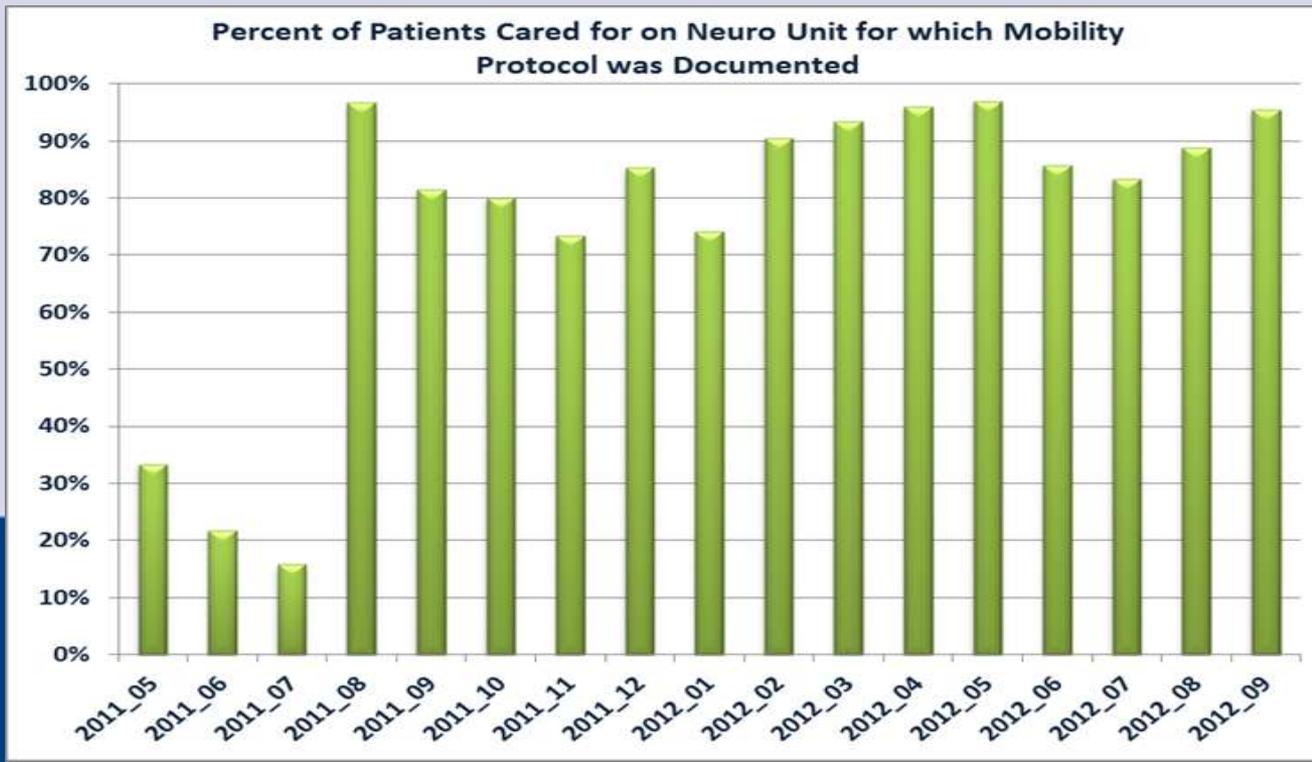
If cardiopulmonary intolerance or contraindications develop, use reverse Trendelenberg TID for orthostatic training until cardiopulmonary intolerance resolves

# Methods: Protocol Safety Data and Analysis

- Protocol safety concerns:
  - Neurologic or hemodynamic deterioration: monitored per protocol during the Nursing assessment, report any changes.
  - Falls: tracked using unusual occurrence reports. Fall rates calculated as number of falls per 1,000 patient days.
- Analysis:
  - Detected neurologic deterioration was monitored for persistence
  - Compared pre-implementation to post-implementation fall rate in study hospital
  - Compared post-implementation study hospital to partner PSC fall rate (study period, similar population and shared stroke care processes)
  - Fall rates were compared using the Wilcoxon Rank Sum Test for non-parametric distributions.

# Protocol Compliance and Practice Observations

- Compliance with paper charting was 18%, improved to 85-95% with computer charting.
- Appropriate reclining chairs were purchased with grant money received from the Providence Health and Services Innovation Challenge.
- Based on RN/PT/OT feedback elicited by team:
  - Nursing participation in protocol development enhanced ownership of the protocol.
  - Nursing efficiency and skill in mobility assessments improved with practice/mentoring.
  - Therapist efficiency improved by building on nursing assessments.



# Demographics of Patients in Neurosciences Units of Study and Comparison Hospitals by Years



Demographics	Mobility Protocol Hospital		Comparison Hospital
	2010 % (n=446)	2011 - 2012 % (n=949)	2011 - 2012 % (n=1159)
<b>Stroke Type</b>			
Ischemic	68.8	68.7	70.0
TIA	18.4	18.8	13.8
SAH	1.6	1.4	5.5
ICH	11.0	11.2	10.6
<b>Age (mean)</b>	72.1	71.8	70.9
18 -49	8.3	8.7	9.5
50 - 74	42.6	42.7	45.0
75 - 84	24.2	24.8	23.6
85 or older	24.9	23.8	22.0
<b>Female</b>	54.3	51.5	49.2
<b>Insurance</b>			
Public	52.5	53.6	49.3
Private	40.6	38.5	44.3
Self-Pay/no insurance	7.0	7.9	6.5
<b>Race/Ethnicity</b>			
Hispanic or Latino	1.3	1.6	3.3
White	70.6	73.4	76.4
African American	7.2	5.2	1.4
Asian	6.1	5.9	6.4
Other	1.3	1.5	0.4
Unable to determine (UTD)	13.5	12.4	12.2
<b>NIHSS at Admit</b>			
Mean (n)	6.8	6.3	5.8

Patients' demographics were similar across years and hospitals.

# Safety Results

- There were no persistent neurologic deterioration related to protocol use.
- No falls occurred as a result of the protocol.

## Falls Per 1,000 Patient Days Among Patients in Neuroscience Units, Study and Comparison Hospitals, by Year

Hospital Group	N	Number of Falls	Falls/1,000 Patient Days
2010 Study Hospital Pre-Implementation	376	8	6.3
2011 & 2012 Study Hospital Post-Implementation	819	8	1.2
2011 & 2012 Comparison Hospital	1015	29	5.6

## Comparison of Fall Rates: Wilcoxon Rank Sum Test Results

Comparison	N	Mean Rank	Standardized Test-Statistic	P-Value
2010 Pre-Implementation 2011 & 2012 Post-Implementation	376 819	600.8 596.8	-.937	NS
2011 & 2012 Mobility Protocol Hospital 2011 & 2012 Comparison Hospital	819 1015	910.4 923.2	2.27	.02

Note: NS=Not Significant,  $\alpha=.05$

# Conclusions & Limitations

- Our Nursing Early Mobilization assessment for Stroke Patients
  - did not lead to persistent neurologic deterioration
  - appears to reduce falls in stroke patients
  - enhanced interdisciplinary communication and cooperation in mobilizing stroke patients
- Other factors may have impacted the fall rate other than effect of time period and hospital (study vs. comparative).
- We did not detect effect on LOS or discharge destination over a wide range of stroke severity.
- We have not analyzed for stroke severity, “dose effect” or timing effect related to discharge/LOS.

# Phase II: Post-tPA Safety and Outcome

# Background/Objective

- Bed rest for 24 hours after IV tPA for stroke is the national standard of care<sup>6</sup>, though there are no data to support this practice. There is a perceived risk of increased complications or falls.<sup>7</sup>
- Studies to date among IV tPA-treated patients suggest favorable outcomes with early mobilization, but with small clinical trial data.
- Objective: evaluate safety and outcome of mobilizing patients to their functional ability within 24 hours of receiving thrombolytic (IV tPA) therapy for stroke at two Primary Stroke Centers.

# Methods

- Stroke Early Mobility Assessment Protocol implemented within 24 hours\* in all patients receiving IV tPA, mobilizing them to their highest functional level
- Data from pre- (1/09-6/12) and post- (7/12-10/14) implementation were compared for safety (complications, falls) and outcome (discharge destination, LOS)
- Patients placed on comfort care by day 1, and for whom the protocol was not documented were excluded (n=11).
- Chi square and t-tests were used to determine significant differences in outcomes.

\*>90% were <8hrs

# Results: Patient Outcomes

	Total % (n)	Pre Implementation % (n)	Post Implementation % (n)	<i>p</i>
	360	49.2 (177)	50.8 (183)	
<b>Length of Stay (mean, SD)</b>	4.8 (±4.7)	5.4 (±4.3)	4.3 (±5.1)	.03
<b>Discharge Disposition</b>				
Home	51.7 (186)	40.1 (71)	62.8 (115)	<.01
Skilled Nursing Facility	14.4 (52)	15.3 (27)	13.7 (25)	
Inpatient Rehab Facility	21.9 (79)	29.4 (52)	14.8 (27)	
Expired/Hospice	7.2 (26)	9.6 (17)	4.9 (9)	
Other	4.7 (17)	5.6 (10)	3.8 (7)	
<b>Symptomatic Hemorrhagic Complications</b>	1.1 (4)	1.1 (2)	1.1 (2)	1.0

Post-implementation, total 194 treated, 11 excluded

# Results

Comparing pre- to post-implementation patients:

- Groups were demographically comparable.
- There were no falls related to the protocol.
- More patients were discharged home, 40.1% vs. 62.8%
- Fewer expired or discharged to hospice, 9.6% vs 4.9% ( $p < .01$ )
- Average LOS was shorter 5.4( $\pm 4.3$ ) vs. 4.3( $\pm 5.1$ ) ( $p = .03$ )
- There was no difference in hemorrhagic complications.

# Conclusions & Limitations

- Using a validated protocol, early mobilization of patients after IV tPA does not increase falls or complications (hemorrhagic, or other).
- Early mobilization may improve the likelihood of discharge to home, reduce in-hospital mortality, and shorten LOS.
- Future analyses will include multivariate models to determine any direct relationship between early mobilization and outcomes among ICU patients receiving IV tPA.

# But, What about AVERT???

(A Very Early Rehab Trial for stroke)

The Lancet. Volume 386, No. 9988, p46–55, 4 July 2015

- SBRCT of 2014 patients with AIS or ICH across 5 countries
- Usual Stroke Care vs Very Early Mobilization (VEM) + Usual Stroke Care
- VEM included:
  - (1) begin within 24 h of stroke onset
  - (2) focus on sitting, standing, and walking (i.e., OOB activity)
  - (3) at least 3 additional out-of-bed sessions vs usual care
- Primary outcome measure was favorable outcome at 3mo (mRS)
- VEM group mobilized at median 18.5 h, about 5h earlier than usual care
- Median LOS was 16 days for VEM group vs 18 days for usual care group
- VEM associated with significant reduction in odds of little or no disability at 3mo, (adjusted odds ratio [OR] 0.73, 95% CI 0.59–0.90;  $p=0.004$ ) with no evidence of accelerated walking recovery
- Death/serious adverse events at 3mo, similar between groups.
- Early, lower dose out-of-bed activity regimen preferable to very early, frequent, higher dose intervention

# Our Study vs AVERT

## Providence

- Before/After Design
- AIS/ICH/TIA
- <8hr from admit
- Highest safe activity level
- Safety
- LOS
- Discharge Destination

## AVERT

- SBRCT
- AIS/ICH only
- <24hr from onset
- OOB activity
- Walking recovery
- LOS
- 3 month mRS

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# Providence

## Stroke Early Mobility Team



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# Questions?

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# Early Mobility after Thrombolysis for Stroke is Safe and Improves Outcomes

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## Background / Objective

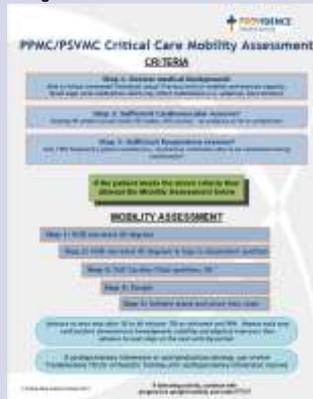
The objective of this study was to evaluate safety and outcome of mobilizing patients to their functional ability within 24 hours of receiving thrombolytic (IV tPA) therapy for stroke at two Primary Stroke Centers.

Bed rest for 24 hours after tPA for stroke is the national standard of care, though there are no data to support this practice. Additionally, tPA patients are not typically mobilized early due to a perceived risk of increased complication or falls. However, data show that early mobility in other critical care populations improves outcomes and shortens length of stay (LOS). Studies to date among tPA-treated patients suggest favorable outcomes but with small clinical trial sizes.

## Methods

- A validated Stroke Early Mobility Assessment Protocol was implemented within 24 hours in all patients receiving tPA treatment for stroke and mobilizing them to their highest functionally safe level (Fig. 1).
- Data from pre (Jan 2009-June 2012) and post (July 2012-October 2014) implementation were compared for safety and outcome, including complications, falls, discharge destination, and LOS.
- Patients placed on comfort care day 0 or 1 of admission, and those for which the protocol was not documented were excluded from the analysis.
- Chi square and t-tests were used to determine significant differences in outcomes before and after implementation.

Figure 1.



## Results

Table 1. Patient Demographics

	Total % (n)	Pre Implementation % (n)	Post Implementation % (n)	p
	360	49.2 (177)	50.8 (183)	
Age (mean, SD)	70.1 (±15.4)	69.1 (±16.0)	71.1 (±14.9)	.22
Female	46.8 (168)	48.0 (85)	45.6 (83)	.72
Race/Ethnicity				
White, non-Hispanic	85.4 (273)	82.8 (125)	87.6 (148)	.54
Black, non-Hispanic	4.1 (13)	5.3 (8)	3.0 (5)	
Asian, non-Hispanic	5.9 (19)	7.3 (11)	4.7 (8)	
Other, Hispanic-Latino	4.7 (15)	4.6 (7)	4.7 (8)	

Table 2. Patient Outcomes

	Total % (n)	Pre Implementation % (n)	Post Implementation % (n)	p
	360	49.2 (177)	50.8 (183)	
Length of Stay (mean, SD)	4.8 (±4.7)	5.4 (±4.3)	4.3 (±5.1)	.03
Discharge Disposition				
Home	51.7 (186)	40.1 (71)	62.8 (115)	<.01
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Other	4.7 (17)	5.6 (10)	3.8 (7)	
Symptomatic Hemorrhagic Complications	1.1 (4)	1.1 (2)	1.1 (2)	1.0

- Between 2009 and 2014, 408 stroke patients received tPA (177 pre-and 194 post-implementation).
- In patients receiving tPA after implementation, 183 were mobilized per protocol, 11 were excluded from the analysis.
- Comparing pre- to post-implementation patients:
  - Groups were demographically comparable (Table 1).
  - There were no falls related to the protocol.
  - More patients were discharged home, 40.1% vs. 62.8%, and fewer expired or discharged to hospice, 9.6% vs 4.9% (p<0.01) (Table 2).
  - Average LOS was shorter 5.4(±4.3) vs. 4.3(±5.1) (p=.03).
  - There was no difference in hemorrhagic complications (1.1%)

## Conclusions

- Using a validated protocol, early mobilization of patients after tPA does not cause an increase in falls or neurologic, hemorrhagic, or other complications.
- Early mobilization may improve the likelihood of discharge to home and reduce in-hospital mortality, and may shorten LOS.
- Future analyses will include multivariate models to determine any direct relationship between early mobilization and outcomes among ICH patients receiving tPA.

## References

Bailey P, Thomsen GE, Spuhler VJ, Blair R, Jewkes J, Bazdjian L, Vesale K, Rodriguez L, and Hopkins RO. Early activity is feasible and safe in respiratory failure patients. Crit Care Med. 2007 Jan; 35(1):139-45.