

Predicting Fall Risk in Acute Rehabilitation Facilities


Stephanie E. Kaplan, PT, DPT, ATP

Emily R. Rosario, PhD



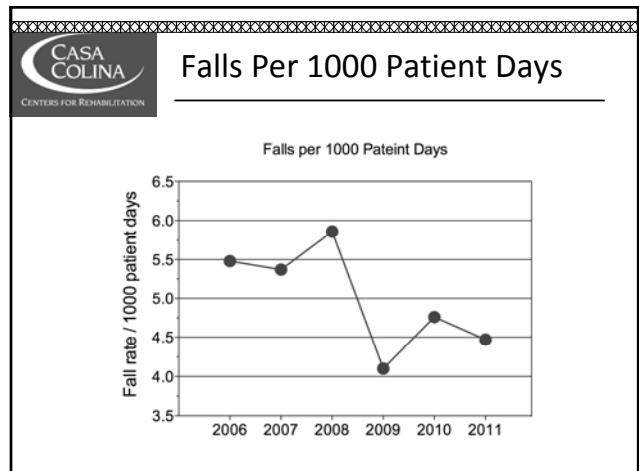
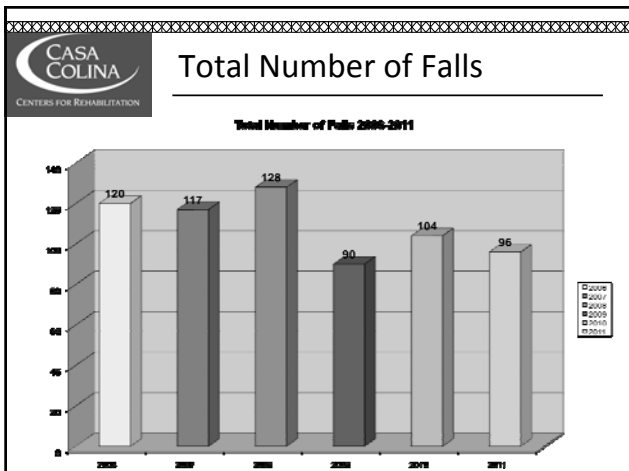
Predicting Fall Risk in Acute Inpatient Rehabilitation Facilities

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Objectives


- Current Falls Assessment Program for an IRF setting.
- Comparison of the Morse Falls Assessment Scale with 4 other fall assessment scales in an IRF setting.
- Casa Colina Falls Assessment Scale
- Effective fall prevention programs for IRF's.



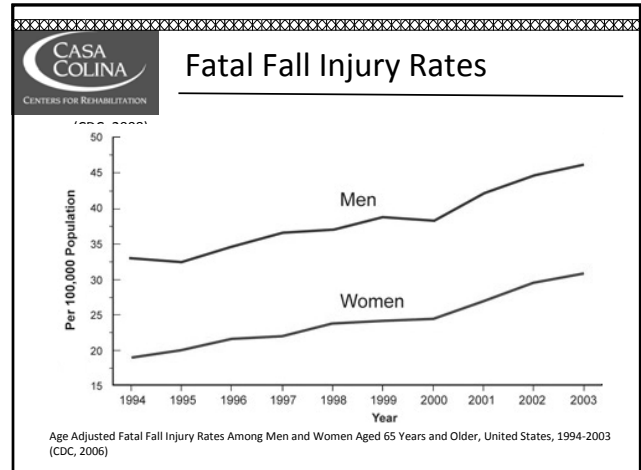
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**Why the concern?**

- Unintentional falls continue to be the leading cause of injury deaths and non-fatal injuries in older adults (CDC, 2006)
- 33% of adults age 65 and over fall each year (CDC, 2008)
- Of those who fall, 20% to 30% suffer moderate to severe injuries (2008)



**Hospital Falls**

- Falls are responsible for 70% of hospital accidents
- 30% of these lead to injury (Krauss et al, 2005)
- Risk of hip fracture is 11 times higher in the hospital setting compared to the community (Papaioannou et al, 2004)


**The Cost of Falling**

- \$19,440 = Average health care cost for 1 fall for person over 72 yrs of age
 - CMS no longer pays for injuries sustained during acute hospital admission
- Annual direct medical costs related to falls (CDC, 2012)
 - 2000: \$19 billion
 - 2010: \$28.2 billion

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IRF Challenges

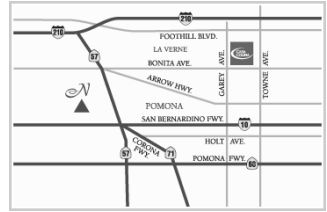

- Goal is to increase mobility through an interdisciplinary team
- Majority of patients admitted have significant cognitive and mobility deficits
- 3 hours per day may not be adequate for skill acquisition considering length of stays 17- 28
- Falls Assessment needs to be quick and easy


How can we safely increase mobility?



Patient Profile

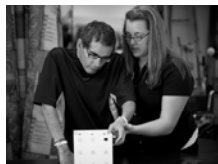

- 68-bed inpatient rehabilitation center
- Average Daily Census= 60
 - 30% CVA
 - 20% Brain Injury
 - 15% SCI






Fall Prevention

- Fall prevention program
 - Nursing completes Morse Fall Scale within 8 hours of admission
 - Patients place in high or low risk category





Fall Prevention

LOW RISK INTERVENTIONS

- Check (✓) Standard Fall Risk on patient safety sheet
- Ensure Patient has all necessary items within reach
- Set bed at lowest level, except when providing care
- Assess environment/room for fall risk (clutter/cords)
- Encourage regular toileting
- Stow curtains in center of room for clear visibility
- Patient supervised in bathroom at all times


HIGH RISK INTERVENTIONS

- Check (✓) High Fall Risk on patient safety sheet
- Place yellow fall risk leaf on door (red leaf if the patient has fallen), tag on wheelchair, sticker on kardex
- Regularly orient confused patient
- 3 side rails up
- Verbally review safety and fall precautions sheet with patient and or family
- High Fall Risk - Optional Interventions
 - Use of bed sensor at all times
 - One to one supervision
 - Implement use of enclosure bed
 - Implement restraint use (4 side rails up, posey, etc.)


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**Review of Current Literature**

- Focused on
 - acute care
 - skilled nursing facilities
 - stroke-specific rehabilitation settings
 - community-dwelling older adults
- Systematic review of fall-risk assessment tools
(Scott et al, 2007)
 - Thirty-eight tools identified
 - No single tool could be recommended for all settings or subpopulations within each setting

**Risk factors for falls across rehabilitation settings**


- Risk factors in all settings (IP, OP, Home)
 - Cognitive status (MMSE)
 - History of previous falls
- Risk factors that varied by setting
 - Balance performance
 - Diagnosis
 - Functional ability
 - Gender

(Morrison et al, 2011)

**Risk Factor for Falls During Inpatient Rehabilitation**

- High risk fallers
 - Stroke
 - Amputation
 - Age 41-50
 - Lower cognitive FIM scores
 - ≥9 co-morbidities
 - Early fallers (<5 days) had FIM motor >25
 - Average FIM motor of those who fell = 31 (mod to min assist)
- Characteristics of falls
 - 85% during the daytime
 - 90% in a patient room
 - 74% unobserved.
 - 50% occurred during the first week of the
 - 6.7 falls per 1000 patient days

(Lee et. al. 2008)


**Limitations to current assessment tools**

- 90% – 100% of patients are high risk, but not all patients fall
- Very few assessment tools have been validated in an IRF
- Few studies identify what a fall prevention program should include based on assessment tool findings

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Retrospective study

Study objective: To retrospectively compare characteristics between patients who did and did not fall while admitted to a 68-bed IRF in 2007

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Definition of a Fall

“Unintentionally coming to rest on the ground, floor, or other lower level”
(Gilewski et al, 2007)

Including attended and unattended falls

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Morse Fall Scale

Variables	Numeric Values
1. History of falling	No 0 Yes 25
2. Secondary diagnosis	No 0 Yes 15
3. Ambulatory aid None/bed rest/nurse assist Crutches/cane/walker Furniture	0 15 30
4. Intravenous therapy/ heparin lock	No 0 Yes 20
5. Gait Normal/bed rest/wheelchair Weak Impaired	0 10 20
6. Mental status Oriented to own ability Overestimates/forgets limitations	0 15

Total = 0-125

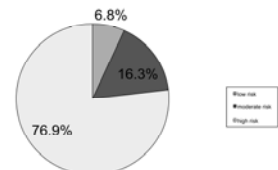
High Risk ≥ 45
Medium Risk 25-40
Low Risk < 25

High Risk ≥ 25
Low Risk < 25



Morse Fall Scale

- Prospective analysis of 147 falls
- Validated in combination of acute care, long-term care and IRF settings
- Interrater reliability, $r = 0.96$




(Morse, 1989)

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Methods: Subjects

Fallers


- 108 patients who fell during 2007 stay
- ↓
- 35 subjects (18 males, 17 females)

Non-fallers

- 1194 patients who did not fall
- ↓
- 35 subjects (17 males, 18 females)

Randomly selected


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Methods: Data collected

- Age at admission
- Gender
- Diagnosis
- Morse Fall Scale score at Admission
 - High fall risk ≥ 25
- 3 Functional Independence Measure (FIM) scores at admission
 - Motor
 - Cognitive
 - Total (Motor + Cognitive)

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FIM Scores

	ADMISSION	DISCHARGE	GOAL
SELF-CARE			
A. Eating			
B. Grooming			
C. Bathing			
D. Dressing - Upper			
E. Dressing - Lower			
F. Toileting			
SPHINCTER CONTROL			
G. Bladder			
H. Bowel			
TRANSFERS			
I. Bed, Chair, Wheelchair			
J. Toilet			
K. Tub, Shower			
LOCOMOTION			
L. Walk/Wheelchair			
M. Stairs			

W - Walk
C - Wheelchair
B - Both

FIM Motor

COMMUNICATION

N. Comprehension

O. Expression

SOCIAL COGNITION

P. Social Interaction

Q. Problem Solving


R. Memory

A - Auditory
V - Visual
B - Both

V - Vocal
N - Nonvocal
B - Both

FIM Cognitive

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Results: Falls

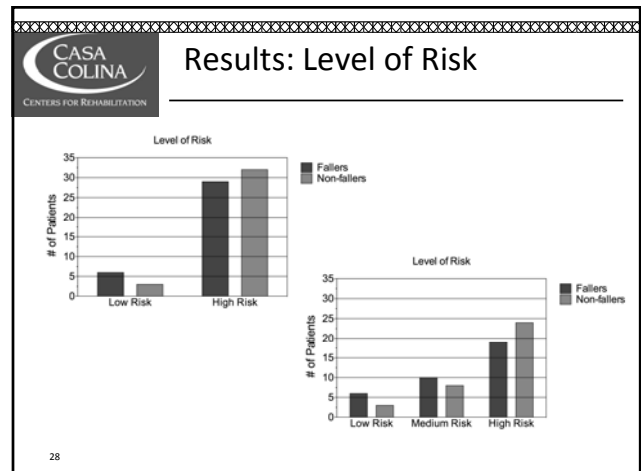
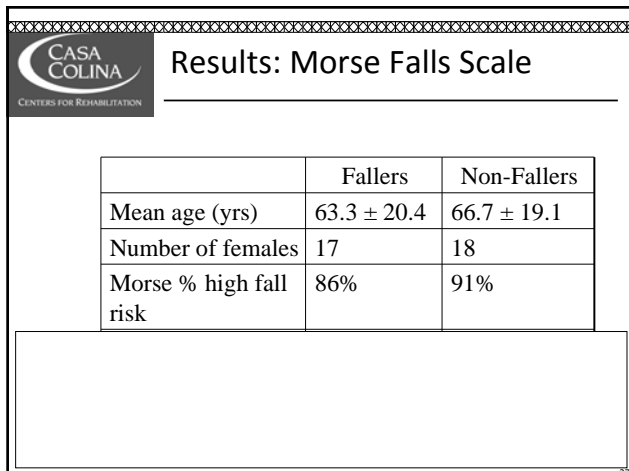
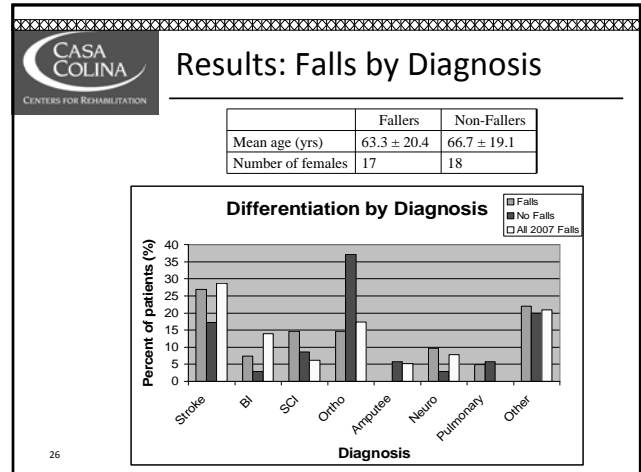
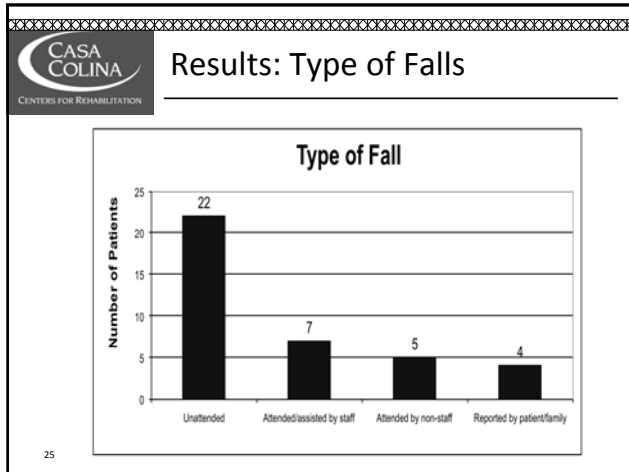
- 35 fallers
 - 41 falls
- Patients with 2 falls: 4
- Patients with 3 falls: 1
- Negative consequences: 9 (26%)

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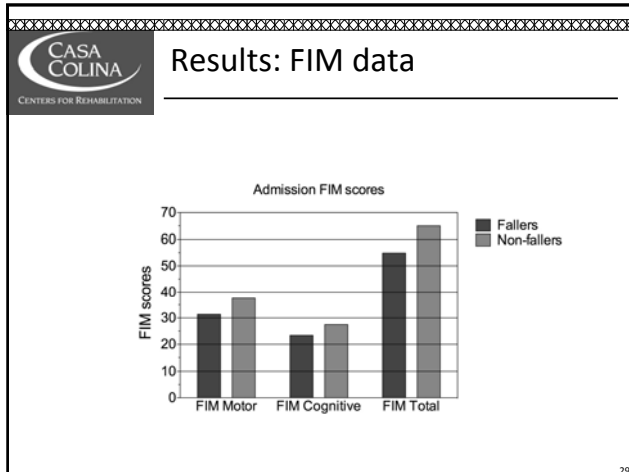
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Results

- No significant differences for Morse scores
- Significant differences between fallers and non-fallers for FIM motor, cognitive, and total scores
- Total FIM score accounts for approximately 11% of the in common variance separating the groups

	Mann-Whitney U	p
Morse #1	560.0	0.45
Morse #2	577.5	0.62
Morse #3	578.5	0.65
Morse #4	595.0	0.81
Morse #5	560.5	0.50
Morse #6	612.6	1.0
Morse total	537.0	0.37
FIM motor	438.0	0.04
FIM cognitive	414.5	0.02
FIM total	381.0	0.007

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Next Step- Prospective Study

- 4 falls assessment tools within 24 hours of admission
- Followed 35 subjects for fall(s) during their hospital stay
- Goal: determine the most appropriate falls assessment tool to identify patients at increased fall risk that can be performed by nursing staff

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Falls Risk Assessment Tools

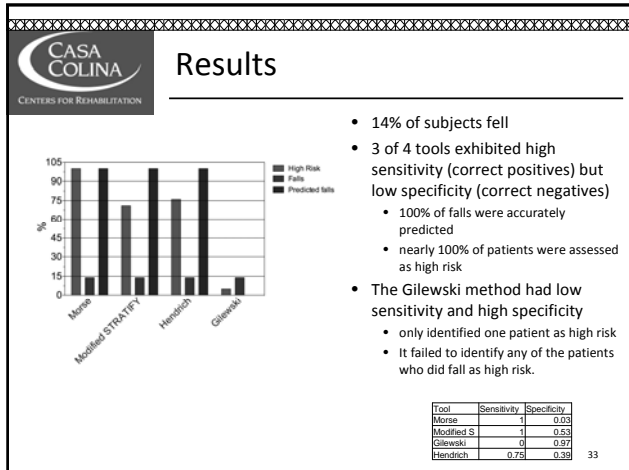
- Morse Fall Scale
- Revised Assessment for Designation of High Fall Risk on the Inpatient Rehabilitation Unit (Gilewski)
- Modified STRATIFY
- Hendrich II

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Summary

- Morse Fall Scale may not be the most appropriate tool for assessing fall risk in a general IRF
 - 86-91% scored as high fall risk
- Consider admission FIM scores and diagnosis
- Results agree with other published studies
 - Morse Fall Scale identified 75-90% of patients as high risk (cutoff score of 45) (Gilewski et al, 2007)
 - Fallers had lower cognitive, motor, and total FIM scores at admission (Saverino et al, 2006; Gilewski et al, 2007)

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Developing a tool for IRFs

Recap

- Falls present a huge health risk and expense
- Patient population in rehabilitation at increased risk to fall
- Morse Scale identifies 90% – 100% of patients at high risk in IRFs

Solution

- A risk assessment tool sensitive to our high-risk population
- Focus efforts on individuals at highest risk to prevent falls

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What factors predict falls in an acute rehab population?


- Literature suggests
 - Diagnosis
 - Cognitive status
 - co-morbidities
 - Functional Ability

Lee et al, 2008; Morrison et al, 2011; Mayo et al, 1989; Nyberg et al, 1996; Rapport et al, 1993; Rapport et al, 1998; Sze et al, 2001; Teasell et al, 2002

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Determining predictors for falls in an acute rehab population

- Clinicians and past research guided the creation of a tracking tool

- Diagnosis

Condition		Check for Yes
CVA		
	Right	
	Left	
TBI		
	Right parietal or temporo-parietal	
	Rancho level IV	
	Other	
Ortho		
	Hip FX	
	TKR	
	THR	
	Other	
Other	Di:	




Determining predictors for falls in an acute rehab population

- Diagnosis
- Pre-morbid history


Pre-morbid history	Check for Yes
Previous trauma with altered consciousness	
Previous stroke	
History of psychopathy, sociopathy, or personality disorder	
- Symptoms / behaviors

Symptoms / Behavior	Check for Yes
Any abnormal impulsive behavior	
Neglect	
Disorientation to place or purpose	
Dementia	
Anti-psychotic meds	
Poor insight, does not recognize or rejects own diagnosis or limitations	
Any non-compliant behavior	



Tracking variables for fall risk

- Clinicians and past research guided the creation of a tracking tool
 - Diagnosis
 - Pre-morbid history
 - Symptoms / Behaviors
- Physiatrists completed these for all new admits for 5 months
- FIM data and Fall information were completed following discharge



Diagnosis predicts falls

- 179 patients were included in the analysis
- 29 falls occurred during this time
- T-tests and Chi-sq analysis were used to identify potential predictors for falling


DIAGNOSIS	Fallers (n = 29)	Non-Fallers (n = 150)	ChiSq
CVA R	7	19	0.1
CVA L	2	13	0.74
TBI Temporal / parietal	1	2	0.41
TBI other	5	7	0.0023*
Ortho Hip FX	1	11	0.4
Ortho TKR	2	8	0.7
Ortho THR	0	13	0.3
Ortho - Amputation	4	5	.001*

* denotes significant effect, p < 0.05

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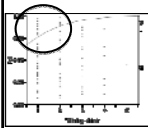
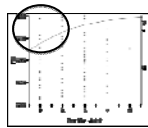
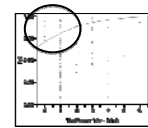
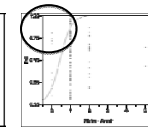
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FIM scores predict falls

FIM SCORES	Fallers (n = 29)	Non-Fallers (n = 150)	T test p=	ChiSq
Toileting	1.4	1.9	0.02*	.1
Bed transfer	1.9	2.6	0.002*	.01*
Tub/shower transfer	0.8	1.8	0.0004*	.001*
Stairs	0.6	1.2	0.0001*	.001*

- All FIM scores were evaluated using T test and Chi-Sq
- Logistical regression was done to bin FIM scores




Casa Colina Falls Risk Assessment

- Relative risk was determined and used to develop a new risk assessment

Diagnosis	If yes, patient receives the following score
RCVA	20
TBI	50
Ortho – other (not FX, THR, or TKR)	40
FIM Score	
Toileting score 1,2	30
Bed transfer 1,2	20
Tub/shower transfer 0,1	20
Stairs 0	60

- High Risk set at 80 and above
- 20 – 35% of patient population at any given time identified as High Risk




Evaluation of the CCFAS

- Sensitivity and Specificity
 - 60 patients (100% new population)
 - 22 identified as High Risk (37%)
 - 8 falls (13%)
 - 7 or 8 fallers were high risk (87.5%) – good sensitivity
 - Of non-fallers 71% were identified as low risk – good specificity

	Fallers	Non-Fallers
High Risk	7	15
Low Risk	1	37

ChiSq = 0.0013*



Casa Colina Falls Risk Assessment

- Upon admission all patients are viewed as high risk
- Therapy completes CCFAS within 72 hours
- Patient is re-assessed every week at team conference

Diagnosis	If yes, patient receives the following score	Team Conference Date	Team Conference Date	Team Conference Date	Team Conference Date	Team Conference Date
RCVA	20					
TBI	50					
Ortho – other (not FX, THR, or TKR)	40					
FIM Score						
Toileting score 1,2	30					
Bed transfer 1,2	20					
Tub/shower transfer 0,1	20					
Stairs 0	60					
Total						

HIGH FALL RISK Interventions

Discuss line reading progress

Discuss activities

Discuss transfer if needed

Discuss toileting if needed


Discuss stairs if needed

Discuss other interventions as needed

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High Falls Risk Interventions


CASA COLINA Fall Rounding Form		PAT		DATE: 8/22/11											
Room	Name	Room	Adm	AM	PM	Evening	8	12	18	24	30	36	42		
1051A	J. J.	801													
1051B	J. J.	801													
1051C	J. J.	801													
1051D	J. J.	801													
1051E	J. J.	801													
1051F	J. J.	801													
1051G	J. J.	801													
1051H	J. J.	801													
1051I	J. J.	801													
1051J	J. J.	801													
1051K	J. J.	801													
1051L	J. J.	801													
1051M	J. J.	801													
1051N	J. J.	801													
1051O	J. J.	801													
1051P	J. J.	801													
1051Q	J. J.	801													
1051R	J. J.	801													
1051S	J. J.	801													
1051T	J. J.	801													
1051U	J. J.	801													
1051V	J. J.	801													
1051W	J. J.	801													
1051X	J. J.	801													
1051Y	J. J.	801													
1051Z	J. J.	801													

Interventions for all HR patients

1. receive yellow wrist band and yellow star on door
2. Hourly rounding
3. Assure bedside table, phone, call light and TV are within reach

Potential interventions

1. Discuss time voiding
2. Discuss restraints
3. Issue reacher
4. Set wheelchair and bed alarms

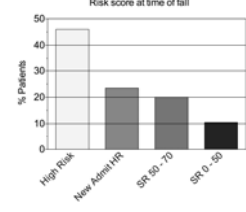


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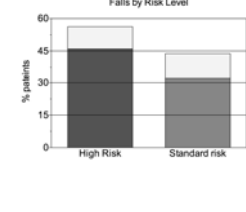
CCFAS Pilot Results


At any given time we have between 20 – 60% of patients monitored as High Risk with an average = 45% (this includes those with score of 80 or above and new admits)

Risk score at time of fall



Falls by Risk Level



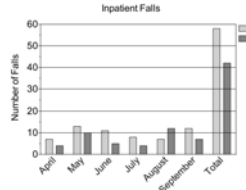


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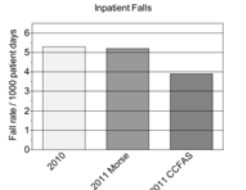
CCFAS reduces patient falls

Number of falls were reduced by 38% during the initial 6mo pilot study


Inpatient Falls



Inpatient Falls



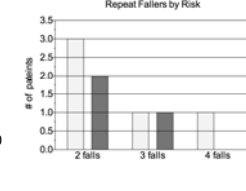
Increased awareness, changes in nursing staff may also be contributing to this large reduction in falls.



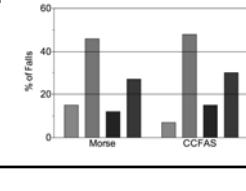
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Clinical issues and Lessons learned

Repeat Fallers by Risk



Time of Falls from Admission

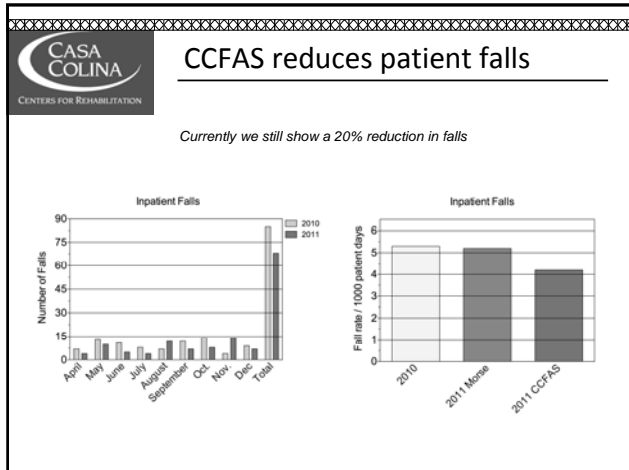


- Clinician buy in
- Repeat fallers not at high risk
 - This was addressed by changing the falls form to include a previous fall while in hospital = 80
- Delay in scoring
 - No major change in timing of falls, primary concern is the increase in patients monitored as high risk
- Follow through with interventions

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Conclusions

Moving from retrospective to prospective studies to solve a clinical problem

- Identified clinical problem
- Retrospective study reinforced clinical problem and suggested predictors for falling
- Prospective assessment for risk factors identified predictive variables that supported creation of a new assessment tool
- Pilot study supported the clinical use of this tool to
 - predict individuals at high risk for falling
 - reduce falls

Research + clinical interventions = solutions to clinical problems