

## BACKGROUND

- Hospitals and medical homes have taken significant measures to reduce the risk of patient falls.<sup>1-4</sup>
- Falls remain the most commonly reported incident affecting patients inside of health care facilities.<sup>5,6</sup>
- Most falls result in no or only minor injuries, but they have the potential to cause serious injuries and death.<sup>7</sup>
- These events can change the course of a patient's treatment and lengthen their hospital stay, increasing the risk of adverse outcomes and total cost of hospital treatment.<sup>8</sup>
- Advanced age and male gender are two key demographics that predispose hospital inpatients to falling.<sup>7,9-12</sup>
- Elimination-related activities (getting in/out of bed, ambulating to/from the bathroom, sitting/standing up from the toilet) have been emphasized as contributory to inpatient falls.<sup>7,9,10,13</sup>
- Several classes of medications<sup>14,15</sup> and patient comorbidities<sup>16,17</sup> have also been shown to contribute to falls.
- Amongst orthopedic postoperative inpatients, those who received total knee arthroplasty (TKA) or total hip arthroplasty were more likely to fall than all other musculoskeletal procedures.<sup>13</sup>
- Studies have suggested that continuous postoperative analgesia via peripheral nerve catheter or non-continuous single-shot administration may be a predisposing factor to falls in these patients.<sup>13,18</sup>
- Peripheral nerve blockade has been shown to be a superior modality for postoperative pain management in these patients, with a higher level of patient satisfaction than epidural analgesia<sup>19</sup> and a longer duration of action that reduces the need for adjunctive opioid therapy.<sup>20-22</sup>
- No studies have been found that compare types of peripheral nerve blockade with individual patient characteristics in the event of an in-hospital fall during the postoperative period.

**STUDY AIM:** Comparative statistical analysis of inpatient falls after TKA to determine significance of patient characteristics, comorbidities, medications, and types peripheral nerve blockade present in the event of an in-hospital fall during the postoperative period.

## METHODS

- All patients who received TKA from January 2013 - March 2014 in our 520-bed community hospital were included in retrospective data mining from their electronic medical record (EMR).
- Patients with a history of falls prior to TKA as evidenced in their EMR data were excluded from analysis.
- TKA patients without matching nerve block data found in the peripheral anesthesia records database were excluded from analysis.
- Age, sex, body mass index (BMI), comorbidities, medications, preoperative ASA status, and peripheral nerve block information were collected for each patient from EMR and peripheral anesthesia records data.
- Patients who fell after receiving TKA were identified in a database for all inpatient falls managed by nursing staff.
- Univariate logistic models for falls were performed on all variables with significance at p<0.05 using SAS statistical software (Cary, NC).
- Multivariate logistic models for falls were performed with combinations of variables that had univariate p<0.2.

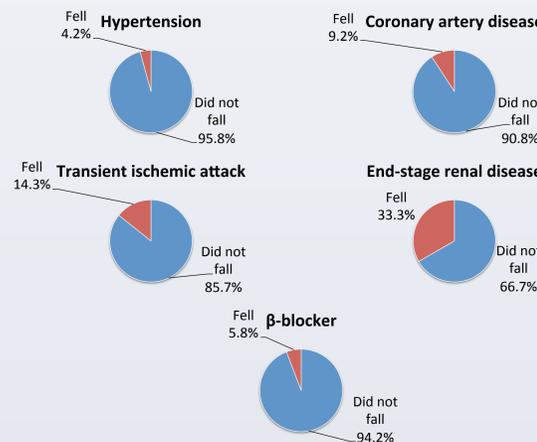
## RESULTS

### Summary

Patient Characteristics			
Variables		Did not fall (N=484)	Fell (N=17)
Age (years)*		67.9 ± 9.7	71.3 ± 7.7
Sex	Female	306 (97.1%)	9 (2.9%)
	Male	178 (95.7%)	8 (4.3%)
BMI		33.7 ± 7.0	33.7 ± 7.9
Comorbidities	Obesity	317 (96.9%)	10 (3.1%)
	Anxiety state	69 (94.5%)	4 (5.5%)
	Depression	77 (97.5%)	2 (2.5%)
	Anemia	223 (96.1%)	9 (3.9%)
	Hypertension*	338 (95.8%)	15 (4.2%)
	Atrial fibrillation	56 (96.6%)	2 (3.4%)
	Coronary artery disease ***	69 (90.8%)	7 (9.2%)
	Peripheral vascular disease	41 (95.3%)	2 (4.7%)
	Transient ischemic attack**	18 (85.7%)	3 (14.3%)
	End-stage renal disease*	2 (66.7%)	1 (33.3%)
Medications	Antidepressant	121 (96.0%)	5 (4.0%)
	Anxiolytic	171 (96.1%)	7 (3.9%)
	Non-narcotic analgesic	431 (96.2%)	17 (3.8%)
	Antihypertensive	282 (95.6%)	13 (4.4%)
	β-blocker***	195 (94.2%)	12 (5.8%)
ASA status	2	261 (97.4%)	7 (2.6%)
	3	162 (96.4%)	6 (3.6%)
	4	6 (100%)	0 (0.0%)

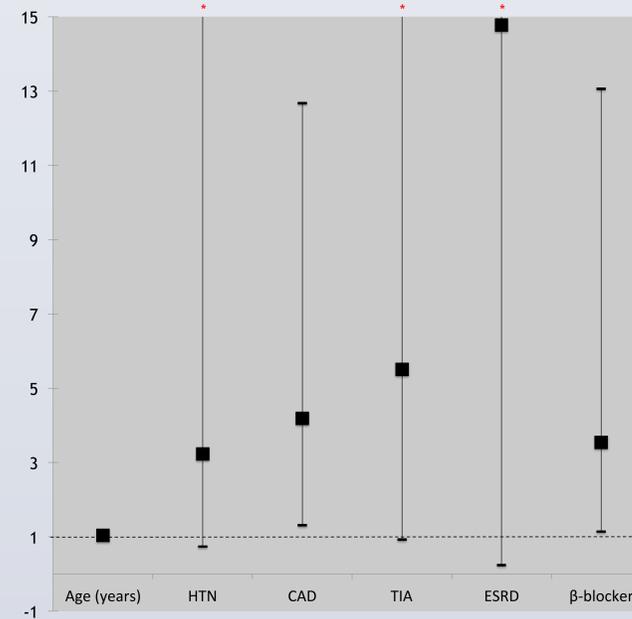
### Peripheral Nerve Blocks

Location		Did not fall (N=484)	Fell (N=17)
1 <sup>st</sup> Nerve Block	Femoral	474 (96.5%)	17 (3.5%)
	Adductor canal	3 (100%)	0 (0.0%)
	Lumbar plexus	3 (100%)	0 (0.0%)
	Popliteal	2 (100%)	0 (0.0%)
	Tibial	1 (100%)	0 (0.0%)
2 <sup>nd</sup> Nerve Block	Femoral	5 (83.3%)	1 (16.7%)
	Popliteal	9 (100%)	0 (0.0%)
	Sciatic	5 (100%)	0 (0.0%)
	TAP	1 (50.0%)	1 (50.0%)
	Tibial	61 (95.3%)	3 (4.7%)



### Univariate Analysis

Variables	Odds Ratio	95% CI	p-value	
Age (years)*	1.040	(0.99, 1.10)	0.1433	
Sex	Female vs. Male	1.527	(0.50, 4.55)	0.5362
BMI		0.999	(0.93, 1.07)	0.9921
Comorbidities	Obesity	0.753	(0.25, 2.38)	0.7413
	Anxiety state	1.848	(0.43, 6.21)	0.4505
	Depression	0.705	(0.08, 3.13)	0.9631
	Anemia	1.316	(0.44, 3.99)	0.7531
	Hypertension*	3.234	(0.74, 29.51)	0.1593
	Atrial fibrillation	1.019	(0.11, 4.57)	1.0000
	Coronary artery disease***	4.192	(1.31, 12.68)	0.0154
	Peripheral vascular disease	1.439	(0.15, 6.54)	0.8753
	Transient ischemic attack**	5.509	(0.93, 22.41)	0.0591
	End-stage renal disease*	14.783	(0.24, 297.9)	0.1971
Medications	Antidepressant	1.249	(0.34, 3.91)	0.8639
	Anxiolytic	1.281	(0.41, 3.80)	0.7960
	Non-narcotic analgesic	2.928	(0.62, 1)	0.2892
	Antihypertensive	2.325	(0.70, 9.93)	0.2076
	β-blocker***	3.548	(1.14, 13.06)	0.0258
Calcium channel blocker	1.249	(0.34, 3.91)	0.8639	
ASA status	3 vs. 2	1.380	(0.38, 4.89)	0.7627



\*Multivariate analysis is not displayed because none of the variables remained significant in the logistic model.

## DISCUSSION

- Patients taking beta-blockers and patients with coronary artery disease were both associated with significantly increased odds of falling during the postoperative period following TKA (3.548 and 4.192, respectively).
- A limitation of this study is determining the extent of overlap between patients on beta-blockers and patients with coronary artery disease, given that beta-blockers are a mainstay of treatment for coronary artery disease.<sup>23</sup>
- Other patient characteristics that were not significant but were associated with falls were increased age, hypertension, transient ischemic attack, and end-stage renal disease.
- Diarrhea was also associated with falling, however, it was not included in analyses because there were only two patients with diarrhea in the patient set.
- None of the different types of peripheral nerve blocks showed an increased odds of falling during the postoperative period. This may be attributed to heightened vigilance by providers and success of preexisting safety protocols during the postoperative period.

**Future directions:** expand patient set for more robust analyses; test variables against control patients who did not receive peripheral nerve blocks following TKA; develop fall-risk stratification system for postoperative patients with lower limb peripheral nerve blocks.

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