

Abstract: 3063

Safety/QA/QI Projects

Surgical, trauma and burns service nerve blocks were not associated with increased inpatient falls in one hospital over six year

Elizabeth Kim, Paul Bhalla, Andrew Walters

University of Washington Anesthesiology and Pain Medicine

Introduction

Injury due to falling is a frequent concern in the post-operative setting. Factors contributing to increased risk of post-operative falls include limited weight bearing ability, unfamiliar environment, CNS-modulating systemic medications (e.g., opioids, sedatives, gabapentinoids), residual anesthetic, disturbed sleep, and musculoskeletal deconditioning. Peripheral nerve blocks (PNBs) have been associated with decreased hospital length of stay and superior analgesia compared to systemic medications, but there is concern regarding the additional fall risk that PNBs may confer due to their effect on motor function and proprioception[1].

Should this causal link exist, PNBs must be identified as an independent risk for falls to help healthcare systems better mitigate harm with appropriate strategies. Previous studies focusing on elective joint replacement surgery showed mixed results[2]; however, a study using a national database looking at over 190,000 patients undergoing total knee arthroplasty found no association between peripheral nerve block and inpatient falls[3]. In addition, several prospective studies determined that falls occur on post-operative day 2 or later, suggesting a cause other than sensorimotor block[1].

In our level 1 trauma center the placement of PNBs has grown steadily between 2015 and 2021, most notably in the burns population. Recent anecdotal evidence suggested that an increase in falls might be related to the increasing number of PNBs. We therefore undertook a retrospective study using the electronic health record (EHR) to identify surgical cases associated with PNBs and the falls that were reported during the corresponding perioperative period in order to answer the following:

Question 1: Does PNB increase the risk of fall in post-surgical patients?

Question 2: When stratified by service and type of block, does the risk of post-surgical fall change?

Materials and Methods

The Human Subjects Division of The University of Washington determined that this study is exempt from IRB approval.

Surgical and regional block placement data were collected from the University of Washington Electronic Data Warehouse for a single hospital between January 2015 and March 2021. Fall incidents over the same time period were collected from the hospital QI system and linked to surgical cases. Surgical specialty plus timing of the nerve block in relation to the fall were recorded.

The records of patients who underwent repeat blocks or suffered multiple falls were manually reviewed for accuracy. All blocks performed or infusions in place from postop day (POD) 0 until POD 14 were counted as a single block event. Each block event was categorized as bilateral, lumbar/sacral, upper extremity only, epidural, or PNC with the possibility that each event could have multiple categorizations.

Results/Case Report

Overall Block and Fall Rates:

From January 2015 to December 2020, there were 11,206 blocks placed and 126 unique fall PSNs reported. The overall rate of falls in all patients with any block was 1.12%. When stratified by the location of nerve block, the fall rates were 1.56% for bilateral blocks; 1.04% for non-bilateral blocks; 1.55% for lower extremity blocks; and 0.53% for non-lower extremity blocks.

Block and fall rates across all surgical patients:

As the block rate per surgical procedure increased over the study period, the overall rate of falls, the rate of falls in patients with a nerve block, and the rate of falls in patients without a nerve block all increased comparably as well (Table 1).

Block and Fall Rates by Service – BURNS:

The increase in block rate per surgical procedure was most pronounced in the burns service; however, a concurrent increase in fall rate in patients with blocks was not evident (Table 2 and Figure 1).

Block and Fall Rates by Service – ORTHOPEDICS:

By contrast, the orthopedic service block volume has seen a decrease in block percentage with no significant change in the rate of falls (Table 3 and Figure 1)

Block-Fall Rates by Service and Time:

When the first two weeks following a block were stratified by 24-hours, the highest risk of fall was the first three days (0.125%, 0.116%, and 0.107% respectively, corresponding to 11.1%, 10.3%, and 9.5% of all block-fall events). When stratified by both time and service, the number of falls within the first 24 hours spread evenly among services: 4 burns, 4 ortho, 4 hand, 3 surgery, 1 vascular (Figure 2). The cumulative risk of fall within the first 7 days after a block was 0.59% and within the first 14 days 0.89%.

Discussion

The overall inpatient fall rate in surgical cases during the study period was 1.82%, which is similar to findings in previous studies[3]. Fall rates of patients who had PNBs was 1.61% compared to 1.87% for patients without PNBs, indicating no increased fall risk associated nerve blocks in our patient population.

In the burns population, the fall rate is higher than in the total surgical population. However, that the more than five-fold increase in the number of blocks performed is not reflected in a similar increase in the fall rate of patients with PNBs suggests that PNBs are not the cause of the majority of the inpatient

falls.

In the orthopedic population, there is no difference in fall rate compared to that of the total surgical population; furthermore, the risk of fall with nerve block is similar to or lower than the risk of fall without a nerve block.

Although the first 24 and 48 hours had the greatest post-block day rate of falls, they nonetheless constituted a minority (21.4%) of all post-block falls, suggesting a cause other than sensorimotor block for most post-block falls, consistent with previous studies[1].

Our experience and fall rates indicate the benefits of nerve blocks in trauma and burns patients likely outweigh the risk of falls. We therefore should concentrate on strategies to reduce falls such as education, awareness, and motor sparing blocks (lower anesthetic concentration, better anatomical targets). Previous papers have looked only at elective joint arthroplasty, and this study appears to be the first to look at trauma blocks, a significant distinction because arthroplasties normally follow a set 'recipe' that makes nursing/PT/OT awareness and patient education much easier.

References

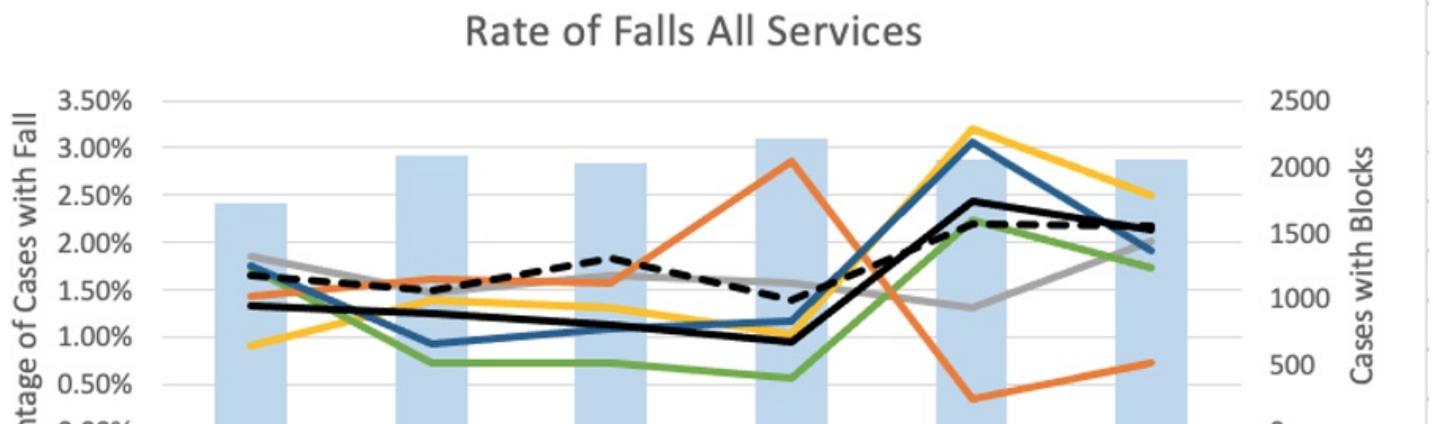
1. Johnson, R. L., Kopp, S. L., Hebl, J. R., Erwin, P. J., & Mantilla, C. B. (2013). Falls and major orthopaedic surgery with peripheral nerve blockade: a systematic review and meta-analysis. *British Journal of Anaesthesia*, 110(4), 518-528.
2. Aybar, B. L. C., Gillespie, M. J., Gipson, S. F., Mullaney, C. E., & Tommasino-Storz, M. (2016). Peripheral nerve blocks causing increased risk for fall and difficulty in ambulation for the hip and knee joint replacement patient. *Journal of perianesthesia nursing*, 31(6), 504-519.
3. Memtsoudis, S. G., Danninger, T., Rasul, R., Poeran, J., Gerner, P., Stundner, O., ... & Mazumdar, M. (2014). Inpatient falls after total knee arthroplasty: the role of anesthesia type and peripheral nerve blocks. *Anesthesiology*, 120(3), 551-563.

Disclosures

No

Tables / Images

Figure 1. Rate of falls in all surgical, burns and orthopedic services



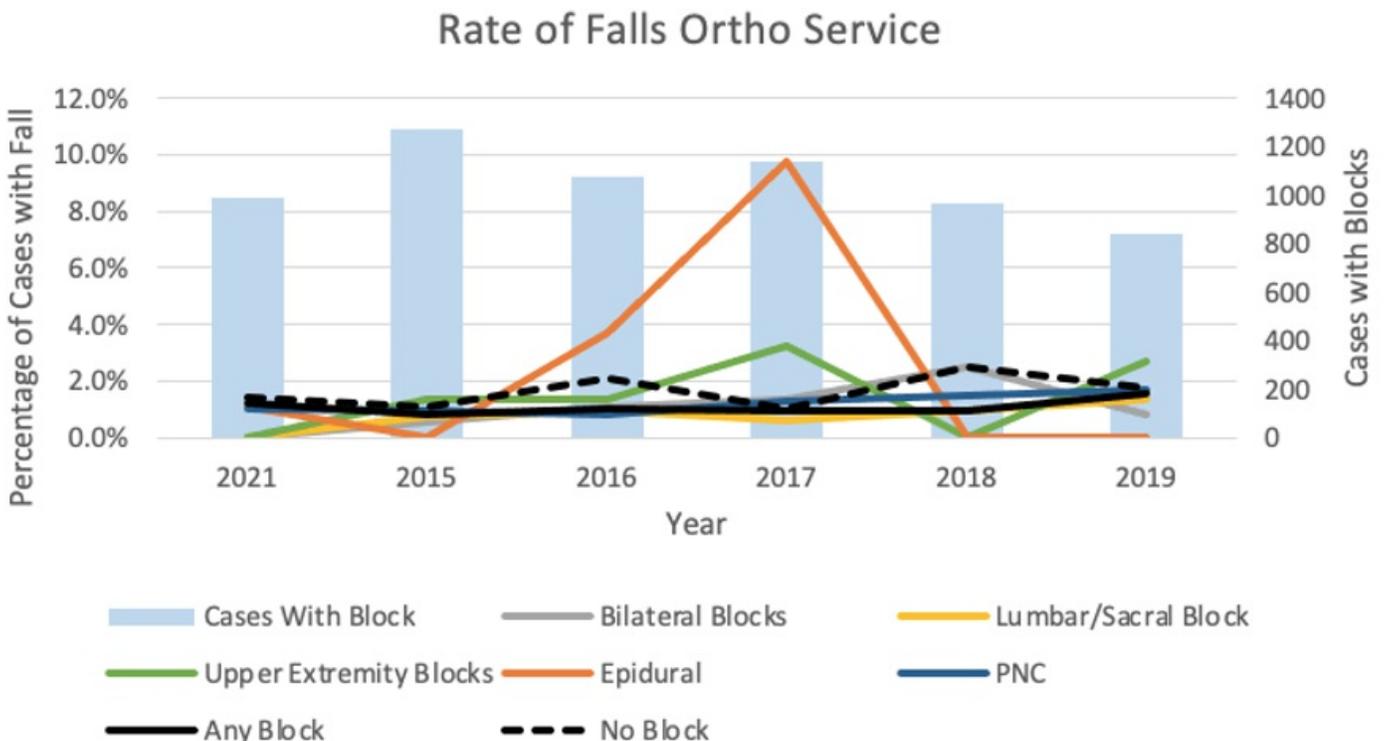
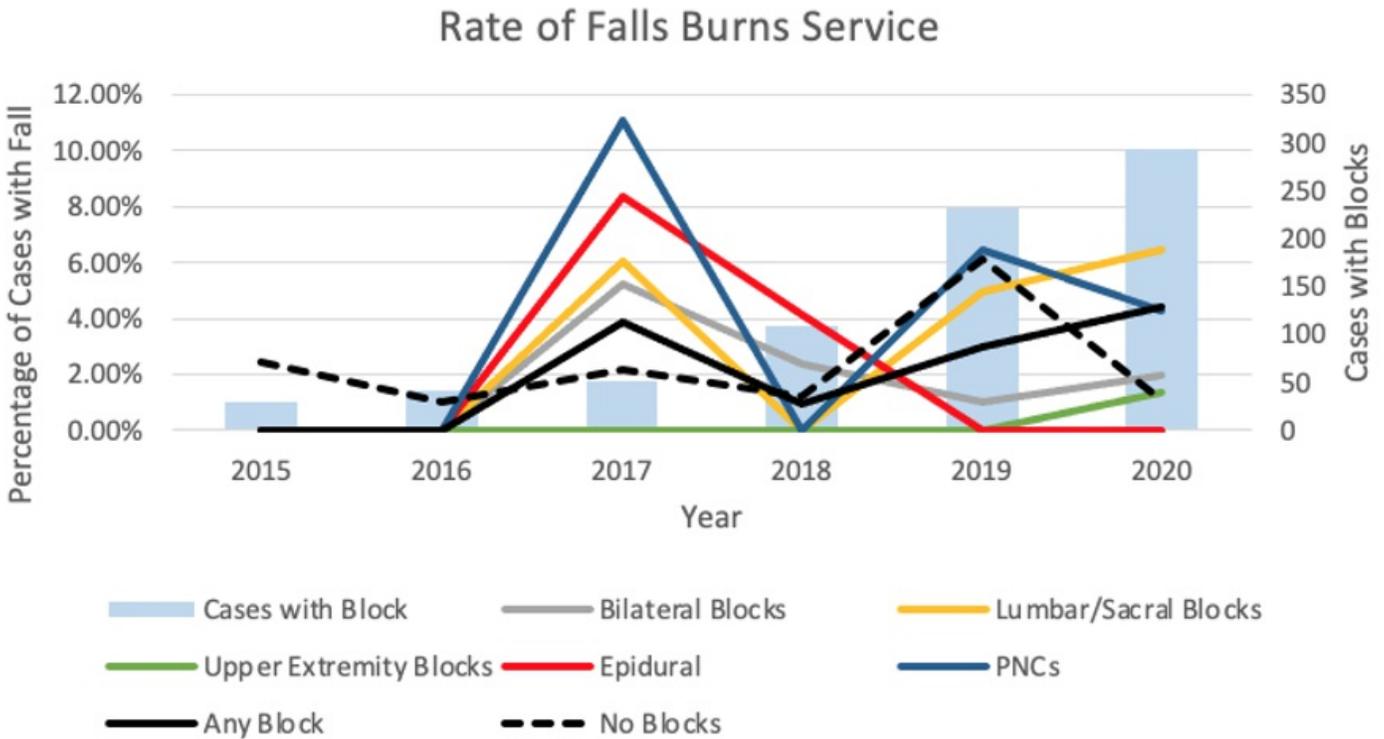


Figure 2. Block-falls by time and service

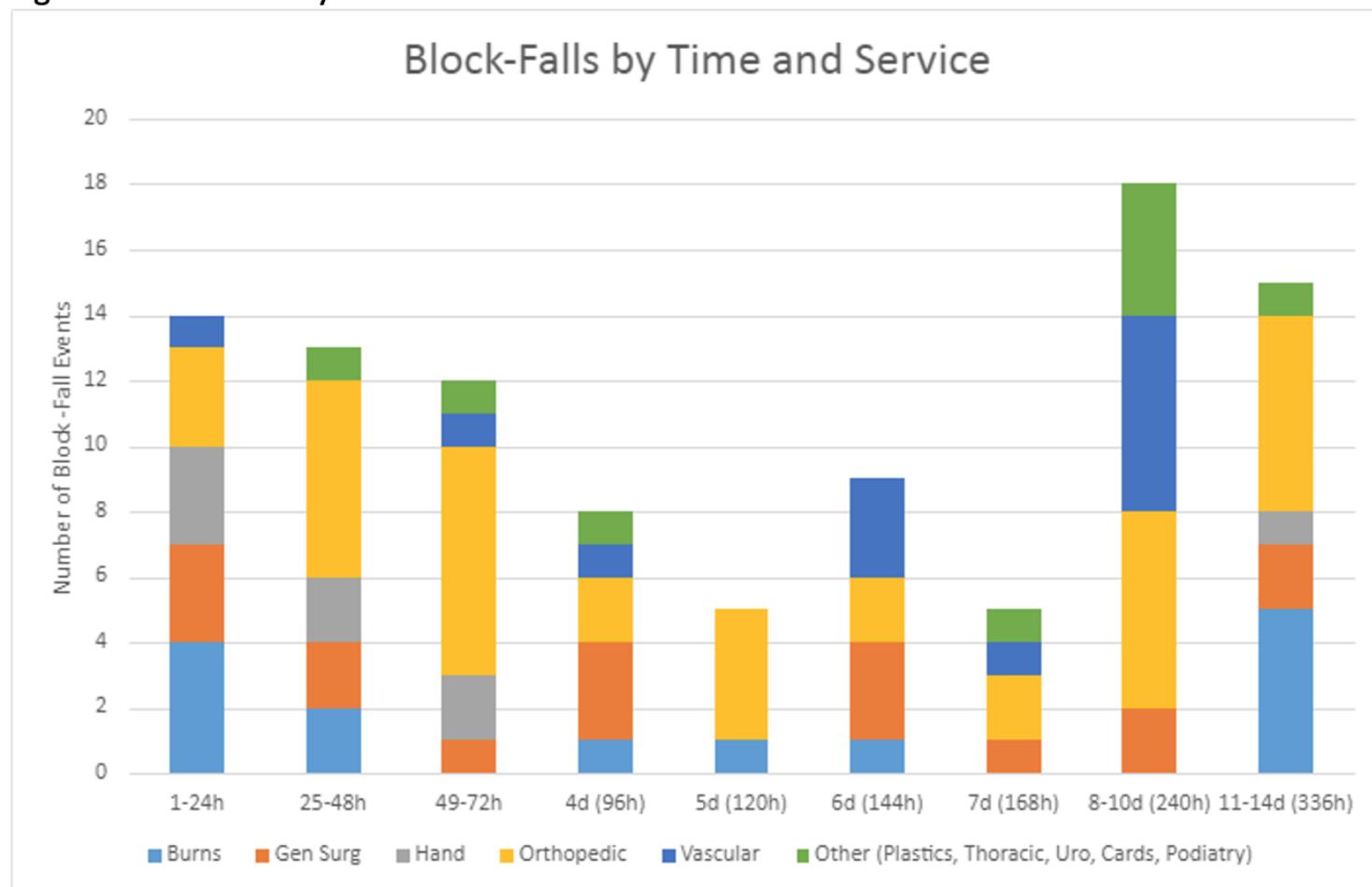


Table 1. Falls in All Surgical Cases

Year	Cases	Falls (Events)	Fall (% of cases)	Blocks (Total)	Fall with block (Events)	Fall with block (% of cases)	Fall with No block (% of cases)
2015	12177	195	1.60%	1724	23	1.33%	1.65%
2016	12386	180	1.45%	2074	26	1.25%	1.49%
2017	12338	212	1.72%	2025	23	1.14%	1.83%
2018	12686	166	1.31%	2206	21	0.95%	1.38%
2019	12330	275	2.23%	2056	50	2.43%	2.19%
2020	11270	244	2.17%	2054	44	2.14%	2.17%
2021 (projected)	10608	256	2.41%	1972	40	2.03%	2.50%
TOTAL	83795	1528	1.82%	14111	227	1.61%	1.87%

Table 2. Falls in Burns Cases

Year	Cases	Falls (Events)	Fall (% of cases)	Blocks (Total)	Fall with block (Events)	Fall with block (% of cases)	Fall with No block (% of cases)
2015	184	5	2.72%	24	0	0.00%	3.13%
2016	316	2	0.63%	40	1	2.50%	0.36%
2017	362	10	2.76%	49	3	6.12%	2.24%
2018	355	5	1.41%	76	1	1.32%	1.43%
2019	413	24	5.81%	173	6	3.47%	7.50%
2020	397	13	3.27%	200	10	5.00%	1.52%
2021	99	1	1.01%	55	1	1.82%	0.00%
2021 (Projected)	396	4	1.01%	220	4	1.82%	0.00%
TOTALS	2423	63	2.60%	782	25	3.20%	2.31%

Table 3. Falls in Ortho Cases

Year	Cases	Falls (Events)	Fall (% of cases)	Blocks (Total)	Fall with block (Events)	Fall with block (% of cases)	Fall with No block (% of cases)
2015	3117	43	1.38%	990	11	1.11%	1.50%
2016	3445	38	1.10%	1271	13	1.02%	1.15%
2017	3895	74	1.90%	1076	10	0.93%	2.27%
2018	3876	42	1.08%	1137	12	1.06%	1.10%
2019	3640	85	2.34%	969	16	1.65%	2.58%
2020	3328	57	1.71%	838	12	1.43%	1.81%
2021	736	10	1.36%	179	2	1.12%	1.44%
2021 (Projected)	2944	40	1.36%	716	8	1.12%	1.44%
TOTALS	24245	379	1.56%	6997	2	1.17%	1.72%