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Under Pressure: A Quality Improvement Initiative to Reduce Rhabdomyolysis and Hospital-Acquired Pressure Injuries After Retroperitoneal Surgery

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Full-length article available at https://doi.org/10.1097/UPJ.0000000000000852.

Study Need and Importance: Many retroperitoneal surgeries are performed with the patient in a lateral decubitus position and can have prolonged operative times. While ideal for surgical access, lateral decubitus positioning during lengthy procedures can lead to hospital-acquired pressure injuries (HAPIs) and muscle breakdown, causing elevated creatinine kinase (CK) and postoperative rhabdomyolysis. These nonsurgical complications increase morbidity and lengthen the recovery process. In this study, we present a quality improvement analysis assessing the incidence and factors associated with elevated CK levels and HAPIs after complex retroperitoneal renal surgeries 2.5 years before and after the implementation of The Pink Pad for positioning.

What We Found: We analyzed 345 patients who underwent renal or retroperitoneal surgery in the lateral decubitus position: 153 (44.3%) had flank surgery without and 192 (55.7%) with The Pink Pad. In the whole cohort, patients who developed elevated CK were younger and had a higher BMI, higher preoperative creatine, and longer operative time ($P < .05$). HAPIs were more frequent in younger patients, those having right-sided surgery, those with hypertension, and those with longer surgeries ($P < .05$). The frequency of HAPIs (without Pink Pad = 7 [4.6%] vs with Pink Pad = 2 [1%], $P = .041$) and elevated CK values (without Pink Pad = 18 [11.8%] vs with Pink Pad = 0, $P < .001$) was significantly lower in The Pink Pad group (Table).

Table.
Frequency of Hospital-Acquired Pressure Injuries and Elevated Creatinine Kinase Levels After Surgery Was Compared Between Groups

	Without Pink Pad	With Pink Pad	*P* value
HAPIs, No. (%)	7 (4.6)	2 (1)	.041
Elevated CK, No. (%)	18 (11.8)	0	< .001

Abbreviations: CK, creatinine kinase; HAPI, hospital-acquired pressure injury.

Limitations: This study is limited by its retrospective design and small sample size.

Interpretation for Patient Care: Our findings highlight the importance of perioperative quality improvement initiatives that decrease the frequency of postoperative complications. Implementation of The Pink Pad was significantly associated with reduced rates of postoperative elevated CK, rhabdomyolysis, and HAPIs caused by lateral decubitus positioning.

https://doi.org/10.1097/UPJ.0000000000000852
Vol. 12, 717-724, November 2025
Published by Wolters Kluwer

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Under Pressure: A Quality Improvement Initiative to Reduce Rhabdomyolysis and Hospital-Acquired Pressure Injuries After Retroperitoneal Surgery

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Introduction: The purpose of this study was to present a retrospective quality improvement analysis assessing the incidence and factors associated with elevated creatine kinase (CK) levels, clinical rhabdomyolysis, and hospital-acquired pressure injuries (HAPIs) after complex retroperitoneal surgeries before and after the implementation of The Pink Pad for intraoperative positioning.

Methods: We performed a retrospective analysis of 364 patients who underwent renal or retroperitoneal surgery in the lateral decubitus position between July 2018 and July 2023; 19 patients were excluded. The 2 cohorts—pre−Pink Pad and post−Pink Pad utilization—were analyzed, each with 2.5 years of prospectively maintained data available for analysis.

Results: Three hundred forty-five patients were analyzed, and of those, 153 (44.3%) had flank surgery without and 192 (55.7%) with The Pink Pad. In the whole cohort, patients who developed elevated CK values were younger and had a higher BMI, higher preoperative creatine, and longer operative time ($P < .05$). HAPIs were more frequent in younger patients, those having right-sided surgery, those with hypertension, and those with longer surgeries ($P < .05$). The frequency of HAPIs (without Pink Pad = 7 [4.6%] vs with Pink Pad = 2 [1%], $P = .041$), elevated CK values (without Pink Pad = 18 [11.8%] vs with Pink Pad = 0, $P < .001$), and clinical rhabdomyolysis (without Pink Pad = 9 [2.6%] vs with Pink Pad = 0, $P < .001$) was significantly lower in The Pink Pad group.

Submitted April 22, 2025; accepted June 7, 2025; published June 13, 2025.

Funding/Support: This research was supported by the Intramural Research Program of the National Cancer Institute, National Institutes of Health, and the NIH Medical Research Scholar Program.

Conflict of Interest Disclosures: The Authors have no conflicts of interest to disclose.

Ethics Statement: This study received Institutional Review Board approval.

Author Contributions:

Conception and design: Nethala, Axelrod, Loebach, Ball, Blachman-Braun, Gurram.

Data analysis and interpretation: Mannes, Millan, Nethala, Saini, Loebach, Ball, Miller, Patel, Miao, Blachman-Braun, Linehan, Lu.

Critical revision of the manuscript for scientific and factual content: Mannes, Millan, Nethala, Saini, Axelrod, Loebach, Ball, Patel, Miao, Blachman-Braun, Gurram, Linehan, Lu.

Drafting the manuscript: Millan, Nethala, Ball, Miller, Blachman-Braun.

Statistical analysis: Loebach, Ball, Miller, Patel, Blachman-Braun.

Supervision: Mannes, Millan, Nethala, Saini, Axelrod, Ball, Blachman-Braun, Gurram, Linehan.

Data Availability: The data sets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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https://doi.org/10.1097/UPJ.0000000000000852
Vol. 12, 717-724, November 2025
Published by Wolters Kluwer

Conclusions: Implementation of The Pink Pad significantly reduced rates of postoperative CK value elevation and HAPIs caused by lateral decubitus positioning. Further studies should be performed to confirm these findings.

Key Words: retroperitoneal surgery, rhabdomyolysis, pressure injury, Pink Pad

Surgical intervention is the primary treatment of localized tumors in the kidneys, adrenal glands, or surrounding retroperitoneal space. Many of these surgeries are performed with the patient in a lateral decubitus position and can have prolonged operative times. Although ideal for surgical access, lateral decubitus positioning during lengthy procedures can lead to muscle compression that results in hospital-acquired pressure injuries (HAPIs) and muscle breakdown, causing postoperative rhabdomyolysis.[1,2] Dissolution of skeletal muscle results in leakage of muscle constituents such as potassium, phosphate, myoglobin, and creatine (Cr) kinase (CK) into the circulating bloodstream that can lead to further postoperative complications.[3,4] CK levels of $\geq$ 5000 U/L are known to greatly increase the risk of rhabdomyolysis-induced acute kidney injury.[5] These nonsurgical complications increase morbidity and lengthen the recovery process.

In 2016, Sidana et al[1] reported on rhabdomyolysis rates in our same institution enriched with patients with hereditary cancer and thus complex and prolonged surgical procedures, a majority of which were performed with an open approach. Their results showed a 42% incidence of rhabdomyolysis defined by CK levels $\geq$ 2000 U/L, while an alternate study on 600 laparoscopic partial nephrectomies showed a rhabdomyolysis rate of only 0.67%.[6] Of note, the latter study used laboratory values and clinical presentation to categorize rhabdomyolysis, while the former relied only on laboratory CK values. Given the results of this study, we sought to evaluate an approach to reduce the risk of this postoperative complication.

Perioperative padding may decrease the incidence of rhabdomyolysis and pressure injuries after prolonged surgery.[7,8] However, little is known about their true incidence and the effect of using newer padding technologies to limit postoperative pressure injuries and cases of rhabdomyolysis in those undergoing retroperitoneal surgery. In this study, we present a retrospective quality improvement analysis assessing the incidence and factors associated with elevated CK levels and HAPIs after complex renal, adrenal, and retroperitoneal surgeries in the lateral decubitus position before and after the implementation of The Pink Pad for positioning.

Methods

Patient Selection and Variable Collection

We performed a retrospective analysis of 364 patients who underwent renal or retroperitoneal surgery in the lateral decubitus position between July 2018 and July 2023 at the National Cancer Institute under our institutional research protocol (No. NCI-97-C-0147). Each patient was placed in a lateral decubitus position with the operating table flexed and pressure points padded during their surgery (Figure). Before January 2021, all patients undergoing renal surgery were placed in position using gel rolls, egg crates, and pillows. Starting in January 2021, all patients were positioned using The Pink Pad Lateral Positioning Kit (LPK10010) system by Xodus Medical. The Lateral Positioning Kit included the following components:

- 1× multiangle lateral body wedge—large (41,942)
- 1× lateral leg positioner—Savatta (41,941)
- 1× The Pink Pad—or table-length pad 72″ × 20″ with straps (41,598)
- 1× large armboards (pair)—with a DermaProx layer (41,537)
- 1× lateral head rest positioner—adjustable—perforated (41,471)
- 3× body strap (31,220)

The 2 respective cohorts—pre−Pink Pad and post−Pink Pad utilization—were analyzed, each with 2.5 years of data for analysis. Baseline demographic data including age at the time of surgery, sex, race, ethnicity, and BMI were documented before each surgery. Clinicopathologic data including American Society of Anesthesiologists (ASA) score, type of surgery, surgical approach, operative time, preoperative and postoperative estimated glomerular filtration rate, postoperative CK levels, and presence of postoperative HAPIs were analyzed. Type of surgery and approach were defined as the final surgery performed and approach taken (eg, conversion to open or radical nephrectomy). Operative times, ASA scores, and intraoperative urine output were obtained from anesthesia reports. Preoperative and postoperative serum Cr values were obtained from laboratory records and estimated glomerular filtration rate was calculated for each using the 2021 CKD-EPI equation. HAPIs were defined as skin injuries resulting from positioning during surgery (ie, in a body location that underwent pressure during surgery) ranging from erythema with tenderness to pressure ulcers recorded by wound care nurses. All patients were admitted for a minimum of 1 night after surgery.

For the pre−Pink Pad study period, serum CK levels were routinely collected in the immediate postoperative period. If initial CK levels were elevated, or if there was clinical

concern of rhabdomyolysis, CK levels were serially repeated until they peaked or at the discretion of the primary treatment team. Overall, 123 of 153 (80.4%) pre−Pink Pad patients had postoperative CK values available. However, after introduction of The Pink Pad system, clinicians saw a period of no elevated postoperative CK values and the decision was made to only test CK values if rhabdomyolysis was suspected because of operative time and BMI. After introduction of The Pink Pad system, 46 of 192 (24.0%) post−Pink Pad patients had CK values. Because of this discrepancy, all patients had their discharge notes reviewed for clinical rhabdomyolysis, which was analyzed as a separate variable from elevated CK values. Elevated CK values were defined by laboratory CK levels over 5000 U/L based on methodology in a robot-assisted radical prostatectomy cohort.[9] A large literature review from Stahl et al[10] suggests 1000 U/L as a lower cutoff point for rhabdomyolysis in the presence of symptoms. We considered that a higher cutoff point of 5000 U/L was appropriate for determination of elevated CK regardless of symptoms due to the fact that renal surgery populations likely experience higher CK changes because renal surgery necessitates both cutting of muscle layers and acute kidney injury associated with renal surgery.

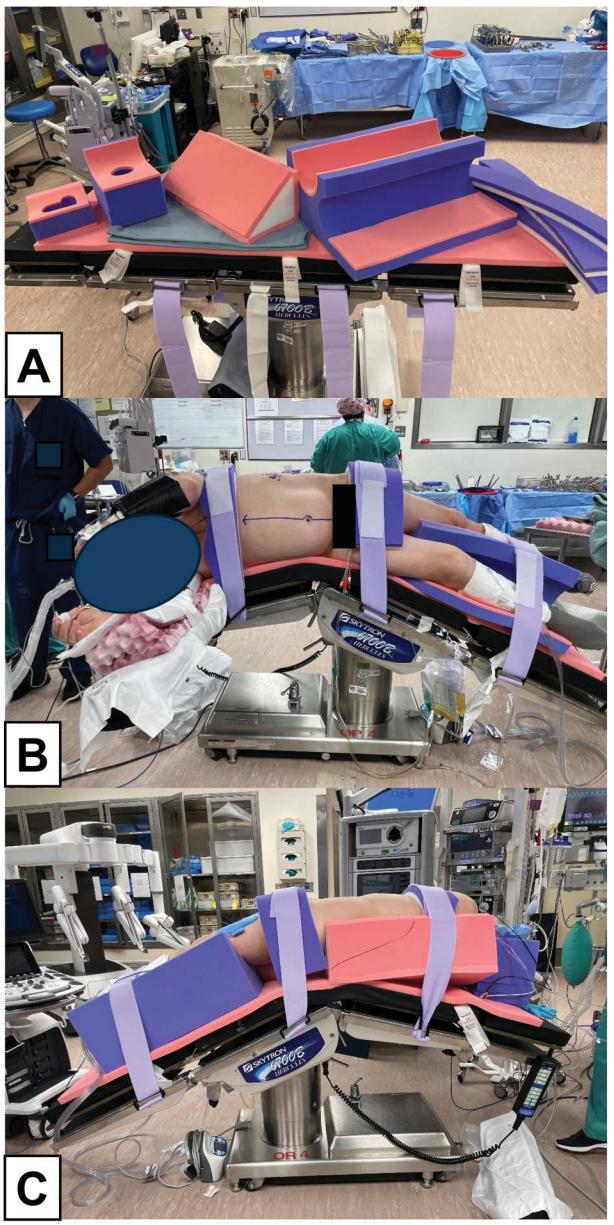

Figure. A, The Pink Pad Lateral Positioning Kit components; anterior (B) and posterior (C) view of lateral decubitus positioning with the bed flexed and The Pink Pad implemented for padding.

Statistical Analysis

Statistical analysis was performed with SPSS v.30 software. Continuous variables were reported as mean ± SD or medians and IQR (25th-75th percentile) in accordance with the data distribution, and comparison between groups was performed using the Student *t* test or Mann-Whitney *U* test. Categorical variables were analyzed with the χ^2 test. A *P* value $< .05$ was considered statistically significant.

Results

A total of 345 patients were analyzed after excluding a total of 19 patients who were pediatric (n = 9), missing operative data (n = 9), or required repositioning during surgery (n = 1). Of the included patients, 153 (44.3%) had flank surgery without and 192 (55.7%) with The Pink Pad. The most common diagnosis was von Hippel-Lindau disease with 161 (46.7%) patients. The mean age at surgery was 50.3 ± 14.4 years, median BMI was 28.9 (25.1-32.8) kg/m^2, most frequent ASA classification was 3 for 308 (89.3%) patients, and 41 (11.9%) of the retroperitoneal cases were performed using an open approach. In our cohort, there were 0 cases of compartment syndrome or nerve injury associated with surgery, and the frequency of CK value elevation (without Pink Pad = 18 [11.8%] vs with Pink Pad = 0, $P < .001$), clinical rhabdomyolysis (without Pink Pad = 9 [2.6%] vs with Pink Pad = 0, $P < .001$), and HAPIs (without pink pad = 7 [4.6%] vs with Pink Pad = 2 [1%], $P = .041$) was lower in The Pink Pad group (Table 1). All patients with clinical rhabdomyolysis diagnoses in their charts also had elevated CK values > 5000 U/L. HAPIs in our cohort consisted mostly of erythema with tenderness (n = 8), along with a stage 2 pressure ulcer (n = 1). Pre−Pink Pad patients had a median postoperative CK value of 904 (280-2862) U/L, while post−Pink Pad patients had a significantly lower median CK value at 349.5 (159.8-890) U/L ($P < .001$).

It was observed that the patients with elevated CK values were younger and had a higher BMI, higher preoperative Cr,

longer operative time, and higher frequency of HAPIs ($P < .05$; Table 2). HAPIs were more frequent in patients who were younger, had hypertension, were undergoing right-sided surgery, and had longer operative times ($P < .05$; Table 3).

Discussion

Rhabdomyolysis is a rare and potentially lethal clinical syndrome that results from the dissolution of skeletal muscle and subsequent release of muscle tissue contents into the bloodstream. While rhabdomyolysis is generally associated with traumatic injury, it can also occur after prolonged surgery in a lateral decubitus position as documented in a case report of severe rhabdomyolysis after radical nephrectomy and cholecystectomy.[11] Xodus Medical's Pink Pad is an operating room positioning and pressure management system that advertises a 43% reduction in average peak pressure and reduced postoperative pain and erythema.[12,13] Our study analyzes a cohort of 395 patients who similarly underwent retroperitoneal surgery in the lateral decubitus

Table 1.
Clinical, and Demographic Characteristics of the Analyzed Patients and Comparison Between Groups

Variable	Overall		Without Pink Pad		With Pink Pad		*P* value
No. (%)	345	(100)	153	(44.3)	192	(55.7)	
Age, mean ± SD, y	50.3 ± 14.4		50.2 ± 14.7		50.4 ± 14.1		.872
Reported diagnosis, No. (%)							
BMF	38	(11)	18	(11.8)	20	(10.4)	
BHD	22	(6.4)	10	(6.5)	12	(6.3)	
HLRCC	17	(4.9)	7	(4.6)	10	(5.2)	
HPRC	8	(2.3)	3	(2.0)	5	(2.6)	
SDH-deficient	5	(1.4)	2	(1.3)	3	(1.6)	
VHL	161	(46.7)	75	(49)	86	(44.8)	
TSC	12	(3.5)	4	(2.6)	8	(4.2)	
Others	82	(23.8)	34	(22.2)	48	(25)	.979
Male, No. (%)	219	(63.5)	93	(60.8)	126	(65.6)	.354
BMI, median (IQR), kg/m^2	28.9	(25.1-32.8)	27.9	(25-32.6)	29.1	(25.1-33.1)	.605
Laterality, No. (%)							
Left	150	(47.6)	56	(41.8)	94	(51.9)	
Right	165	(52.4)	78	(58.2)	87	(48.1)	.075
Race, No. (%)							
White	260	(75.4)	121	(79.1)	139	(72.4)	
Black/African American	51	(14.8)	22	(14.4)	29	(15.1)	
Other, multiracial, not reported	34	(9.9)	10	(6.5)	24	(12.5)	.165
Diabetes mellitus, No. (%)	45	(13)	19	(12.4)	26	(13.5)	.758
Hypertension, No. (%)	153	(44.3)	80	(52.3)	73	(38)	.008
Preoperative Cr, median (IQR), mg/dL	1.02	(0.85-1.23)	1.01	(0.84-1.19)	1.04	(0.86-1.28)	.286
ASA classification, No. (%)							
2	24	(7)	12	(7.8)	12	(6.3)	
3	308	(89.3)	137	(89.5)	171	(89.1)	
4	13	(3.8)	4	(2.6)	9	(4.7)	.526
Approach, No. (%)							
Open	41	(11.9)	23	(15)	18	(9.4)	
Robotic	301	(87.2)	127	(83)	174	(90.6)	
Laparoscopic	3	(0.9)	3	(2)	0		.036
Surgical intervention, No. (%)							
Radical nephrectomy	57	(16.5)	27	(17.6)	30	(15.6)	
Partial nephrectomy	275	(79.7)	118	(77.1)	157	(81.8)	
Adrenal surgery	6	(1.7)	4	(2.6)	2	(1)	
Other retroperitoneal mass removal	7	(2)	4	(2.6)	3	(1.6)	.549
Operative time, median (IQR), min	371	(287-468.5)	368	(293-434.5)	376	(281.8-481.8)	.443
Estimated blood loss, median (IQR), mL	350	(150-800)	400	(150-900)	300	(125-750)	.123
Intraoperative urine output, median (IQR), mL	450	(340-600)	425	(325-550)	452.5	(350-650)	.025
Compartment syndrome, No. (%)	0		0		0		—
Nerve injury, No. (%)	0		0		0		—
HAPIs, No. (%)	9	(2.6)	7	(4.6)	2	(1)	.041
CK value, median (IQR), U/L[a]	671	(236-2459)	904	(280-2862)	349.5	(159.8-890)	< .001
Elevated CK value, No. (%)	18	(5.2)	18	(11.8)	0		< .001
Clinical rhabdomyolysis, No. (%)	9	(2.6)	9	(5.9)	**0**		< .001

Abbreviations: ASA, American Society of Anesthesiologists classification; BHD, Birt-Hogg-Dubé syndrome; BMF, bilateral multifocal renal masses; CK, creatine kinase; Cr, creatinine; HAPI, hospital-acquired pressure injury; HLRCC, hereditary leiomyomatosis and renal cell cancer; HPRC, hereditary papillary renal carcinoma; SDH, succinate dehydrogenase; TSC, tuberous sclerosis complex; VHL, von Hippel-Lindau Disease.

[a] CK values were reported in 123 (80.4%) patients who had surgery without The Pink Pad and 46 (24%) patients who had surgery with The Pink Pad.

Table 2.
Clinical and Demographic Characteristics of the Analyzed Patients and Comparison Between Groups

Variable	No elevated CK value	Elevated CK value	*P* value
No. (%)	327 (94.8)	18 (5.2)	
Age, mean ± SD, y	50.8 ± 14.3	41.1 ± 12.1	.005
Male, No. (%)	205 (62.7)	14 (77.8)	.196
BMI, median (IQR), kg/m^2	28.6 (24.9-32.2)	36.6 (27.9-44)	.002
Laterality, No. (%)			
Left	146 (48.8)	4 (25)	
Right	153 (51.2)	12 (75)	.063
Race, No. (%)			
White	246 (75.2)	14 (77.8)	
Black/African American	48 (14.7)	3 (16.7)	
Other, multiracial, not reported	33 (10.1)	1 (5.6)	.812
Diabetes mellitus, No. (%)	41 (12.5)	4 (22.2)	.235
Hypertension, No. (%)	141 (43.1)	12 (66.7)	.050
Preoperative Cr, median (IQR), mg/dL	1.01 (0.84-1.23)	1.17 (1.06-1.27)	.011
ASA classification, No. (%)			
2	24 (7.3)	0	
3	290 (88.7)	18 (100)	
4	13 (4)	0	.320
Approach, No. (%)			
Open	38 (11.6)	3 (16.7)	
Robotic	286 (87.5)	15 (83.3)	
Laparoscopic	3 (0.9)	0	.754
Surgical intervention, No. (%)			
Radical nephrectomy	56 (17.1)	1 (5.6)	
Partial nephrectomy	260 (79.5)	15 (83.3)	
Adrenal surgery	5 (1.5)	1 (5.6)	
Other retroperitoneal mass removal	6 (1.8)	1 (5.6)	.244
Operative time, median (IQR), min	368 (283-459)	438 (373.3-545)	.004
Estimated blood loss, median (IQR), mL	350 (125-800)	525 (250-1325)	.061
Intraoperative urine output, median (IQR), mL	450 (335-600)	450 (393.8-600)	.609
HAPIs, No. (%)	7 (2.1)	2 (11.1)	.020

Abbreviations: ASA, American Society of Anesthesiologists classification; CK, creatine kinase; Cr, creatinine; HAPI, hospital-acquired pressure injury.

position before and after implementation of The Pink Pad to describe rhabdomyolysis incidence in our complex renal surgery population and benefits of using The Pink Pad to prevent HAPIs and rhabdomyolysis. Before Pink Pad implementation, HAPIs due to surgical positioning were noted in 4.6% of patients and 11.8% of patients had elevated postoperative CK values. After Pink Pad implementation, CK value elevation was not observed in any patients, and only 1% of patients had HAPIs due to surgery.

In the whole cohort, elevated CK was observed after 5.2% of surgeries and was associated with younger age, higher BMI, hypertension, higher preoperative Cr, and longer operative time. These results align with previous research on rhabdomyolysis risk factors, which consistently shows younger age, higher BMI, poor baseline renal function, and longer surgeries to be associated with increased risk of rhabdomyolysis.[14,15] Younger patients who generally are less vulnerable to other complications are believed to be at higher risk of rhabdomyolysis because of their increased lean muscle mass.[16] In addition, patients with higher BMI are heavier in proportion to their height, which increases the reciprocal pressure between the operating bed and the patient and can result in skeletal muscle breakdown per a 2021 study by Deane et al.[17] Of note, while Deane et al additionally found that male sex is an independent predictor of increased pressure, we did not see clinical implications of that finding.

Pressure injuries occurred in 2.6% of surgeries and were more frequent with longer operative time, higher BMI, and a history of hypertension. We additionally found that younger patients and those who underwent right-sided renal surgery were more likely to develop HAPIs. While previous research supports the finding that longer surgeries and higher BMI increase risk of pressure injuries, the idea that younger patients are at higher risk contradicts previous research and longstanding understanding of pressure injuries.[18-20] We are unsure as to why right-sided renal surgery patients were found to be more likely to undergo pressure injuries and believe that this may be a statistical aberration related to the rather small number of pressure injuries in total.

After the implementation of The Pink Pad, our whole cohort saw a significant decrease in surgery-related HAPIs and elevated postoperative CKs with no incidence of clinical rhabdomyolysis. In addition, we note that there were

Table 3.
Clinical and Demographic Characteristics of the Analyzed Patients and Comparison Between Patients Who Reported Hospital-Acquired Pressure Injuries During Hospitalization and Those Who Did Not

Variable	No hospital-acquired pressure injuries		Hospital-acquired pressure injuries		*P* value
No. (%)	336	(97.4)	9	(2.6)	
Age, mean ± SD, y	50.6 ± 14.3		39.9 ± 11.2		.027
Male, No. (%)	213	(63.4)	6	(66.7)	.840
BMI, median (IQR), kg/m^2	29	(25.1-33.1)	27.9	(24.5-32)	.723
Laterality, No. (%)					
Left	149	(48.7)	1	(11.1)	
Right	157	(51.3)	8	(88.9)	.026
Race, No. (%)					
White	252	(75)	8	(88.9)	
Black/African American	51	(15.2)	0		
Other, multiracial, not reported	33	(9.8)	1	(11.1)	.448
Diabetes mellitus, No. (%)	44	(13.1)	1	(11.1)	.862
Hypertension, No. (%)	146	(43.5)	7	(77.8)	.041
Preoperative Cr, median (IQR), mg/dL	1.02	(0.85-1.23)	1.11	(0.88-1.37)	.372
ASA classification, No. (%)					
2	24	(7.1)	0		
3	299	(89)	9	(100)	
4	13	(3.9)	0		.574
Approach, No. (%)					
Open	41	(12.2)	0		
Robotic	292	(86.9)	9	(100)	
Laparoscopic	3	(0.9)	0		.509
Surgical intervention, No. (%)					
Radical nephrectomy	56	(16.7)	1	(11.1)	
Partial nephrectomy	267	(79.5)	8	(88.9)	
Adrenal surgery	6	(1.8)	0		
Other retroperitoneal mass removal	7	(2.1)	0		.894
Operative time, median (IQR), min	368.5	(284.3-457.5)	542	(425.5-572)	< .001
Estimated blood loss, median (IQR), mL	350	(150-800)	500	(175-875)	.642
Intraoperative urine output, median (IQR), mL	450	(340-600)	400	(337.5-575)	.570
Pink Pad used, No. (%)					
No	146	(43.5)	7	(77.8)	
Yes	190	(56.5)	2	(22.2)	.041

Abbreviations: ASA, American Society of Anesthesiologists classification; Cr, creatinine.

no significant changes in the rate of the aforementioned risk factors (age, BMI, baseline serum Cr, and operative time) between the 2 cohorts (Table 1), suggesting that The Pink Pad may mitigate rhabdomyolysis and HAPI risk in patients deemed high risk based on age, BMI, renal function, and/or operative time. Previous research, specifically on The Pink Pad, has focused primarily on increased friction yielding antislip effects, and the literature is largely missing comprehensive research on the potential for The Pink Pad to prevent pressure injuries and rhabdomyolysis, although the manufacturer does advertise a significant reduction in peak pressure.[21,22] Although we do not attempt to measure or corroborate the advertised reduction in peak pressure, we find that use of The Pink Pad in our complex lateral decubitus–positioned retroperitoneal surgery population was associated with a significant reduction in pressure-related postoperative complications.

To our knowledge, this is the first study to comprehensively assess the quality measure improvement provided by The Pink Pad in limiting cases of rhabdomyolysis and HAPIs after complex retroperitoneal surgery in the lateral decubitus position. Our pre–Pink Pad and post–Pink Pad cohorts were clinically and surgically similar, with a select number and consistent group of operating surgeons, suggesting that the observed differences were primarily due to the implementation of The Pink Pad. Our patient population is enriched with hereditary cancer conditions, bilateral multifocal tumors, and reoperative surgeries, which tend to require prolonged operative times and thus higher risk of elevated CK than in a general urology practice.

Conclusions

In a cohort of patients undergoing retroperitoneal surgical intervention in the lateral decubitus position with a wide range of surgical complexity, implementation of The Pink Pad was associated with significantly reduced rates of pressure-related complications caused by lateral decubitus positioning. The Pink Pad may be helpful in reducing HAPI and rhabdomyolysis in retroperitoneal surgeries.

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