Predictors of Delayed Mobilization After Major Abdominal Surgery

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Introduction

- Delayed mobilization post-abdominal surgery is associated with increased complications (insulin resistance, muscle wasting, thromboembolism, prolonged hospital stay, readmissions).
- Early mobilization (as recommended by ERAS® guidelines) improves outcomes.
- There is limited research using objective activity data to identify predictors of delayed mobilization.

Objective

Identify perioperative factors associated with delayed postoperative mobility using accelerometer data.

Methods

- **Study Design:** Secondary analysis of a prospective observational study (Aug 2021–Feb 2022).
- **Participants:** 96 adult patients undergoing major abdominal surgery, functionally independent at baseline at the University of Colorado Hospital.

•Data Collection:

- Activity measured via **ActivPAL accelerometer** (standing time, sit-to-stand transitions, step count).
- Perioperative factors: demographics, comorbidities, surgery details, pain scores, opioid consumption, Foley catheter use, fatigue, dyspnea, sleep quality.

•Statistical Analysis:

- Linear regression and negative binomial models for mobility metrics.
- Variables selected using stepwise regression.
- Analyses conducted using R Statistical Software.

Table 1: Parameter estimates and confidence intervals, modeling minutes of standing

Characteristics	IRR (95% CI)	p-value
Age	1.00 (0.98, 1.01)	0.600
Sex		
Male		
Female	1.02 (0.73, 1.42)	0.900
BMI		
Underweight/Normal weight		
Overweight	1.26 (0.89, 1.77)	0.200
Obese	0.73 (0.47, 1.16)	0.200
Preoperative functional status		
High		
Moderate	1.13 (0.82, 1.57)	0.400
Postoperative day*	0.84 (0.77, 0.91)	<0.001
Average Pain	1.08 (0.98, 1.19)	0.100
Duration of anesthesia (min)	1.00 (1.00, 1.00)	0.003
Charlson Comorbidity Index	1.01 (0.94, 1.08)	0.800
Dyspnea (Pre-op)	0.99 (0.97, 1.01)	0.400

* Postoperative day the foley catheter was removed
IRR: Incidence rate ratio
CI = Confidence interval

Table 2: IRR estimates and confidence intervals, modeling sit and stand transition

Characteristics	Beta (95% CI)	p-value
Age	0.00 (-0.02, 0.03)	0.900
Sex		
Male		
Female	-0.33 (-0.86, 0.20)	0.200
BMI		
Underweight/Normal weight		
Overweight	0.23 (-0.33, 0.79)	0.400
Obese	-0.64 (-1.4, 0.08)	0.080
Preoperative functional status		
High		
Moderate	0.08 (-0.43, 0.60)	0.800
Postoperative day*	-0.18 (-0.31, -0.04)	0.012
Average Pain	0.13 (-0.02, 0.27)	0.094
Duration of anesthesia (min)	0.00 (0.00, 0.00)	0.052
Charlson Comorbidity Index	-0.05 (-0.15, 0.06)	0.400
Dyspnea (Pre-op)	0.02 (-0.02, 0.06)	0.400

* Postoperative day the foley catheter was removed
CI = Confidence interval

Table 3: IRR estimates and confidence intervals, modeling total number of steps

Characteristics	IRR (95% CI)	p-value
Age		0.150
Sex	0.97 (0.93, 1.02)	
Male		
Female		0.700
BMI	1.15 (0.48, 2.68)	
Underweight/Normal weight		
Overweight	2.33 (0.95, 5.68)	0.030
Obese	0.40 (0.15, 1.20)	0.073
Preoperative functional status		
High		
Moderate	1.51 (0.70, 3.39)	0.300
Postoperative day*	0.83 (0.68, 1.02)	0.050
Average Pain	0.74 (0.57, 0.96)	0.003
Duration of anesthesia (min)	1.00 (0.99, 1.00)	0.020
Charlson Comorbidity Index	1.05 (0.89, 1.24)	0.500
Dyspnea (Pre-op)	0.99 (0.94, 1.05)	0.800

1 IRR = Incidence Rate Ratio, CI = Confidence Interval

* Postoperative day the foley catheter was removed
IRR: Incidence rate ratio
CI = Confidence interval

Results

•Sample Characteristics: (N=80 after exclusions)

- Sample size: 80 Age: 61 [SD 12] years; Sex: 54% Female
- Surgery Duration: 367 [SD 158] min
- Average daily steps: **984**, standing time: **38.1 min**.

•Key Findings:

- **Foley catheter duration** significantly correlated with decreased mobility (**p < 0.001**).
- **Pain scores** negatively correlated with step count (**p = 0.003**) but not standing/sit-to-stand transitions.
- **Longer anesthesia duration** associated with fewer steps (**p = 0.02**) and sit-to-stand transitions (**p = 0.003**).

Discussion & Conclusion

•Increased duration to Foley catheter removal was the strongest predictor of delayed mobilization.

•Contrary to prior research, age, preoperative dyspnea, and functional status were not significant predictors.

•Pain's impact on mobility was mixed, suggesting patients may shift position due to discomfort but may avoid walking.

•Anesthesia duration and mobility relationship warrants further investigation.

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