

The Utility of Routine Preoperative Laboratory Testing in Low-Risk Endocrine (and Colorectal) Surgeries

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Background

- ASA guidelines 2012-2013 recommended against routine preoperative laboratory testing (PLTs) in ASA class 1 and 2 patients undergoing low-risk, elective surgeries¹
 - Choosing Wisely campaign²

Don't obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery – specifically complete blood count, basic or comprehensive metabolic panel, coagulation studies when blood loss (or fluid shifts) is/are expected to be minimal.

Performing routine laboratory tests in patients who are otherwise healthy is of little value in detecting disease. Evidence suggests that a targeted history and physical exam should determine whether pre-procedure laboratory studies should be obtained. The current recommendation from the 2003 ASA amendment that all female patients of childbearing age be offered pregnancy testing rather than required to undergo testing has provided individual physicians and hospitals the opportunity to set their own practices and policies relating to preoperative pregnancy testing. Some institutions respect the right of a patient to refuse testing after a thorough explanation of the anesthetic risks during pregnancy and the required signing of a waiver. The avoidance of the routine administration of the pregnancy test was therefore excluded from our Top 5 preoperative recommendations.

The risk specifically related to the surgical procedure could however modify the above preoperative recommendation to obtain laboratory studies and when the need arises; the decision to implement should include a joint decision between the anesthesiologists and surgeons. This should be applicable to all outpatient surgery.

- Estimated cost of all routine PLTs in the US = \$18-30 billion annually^{3,4}
 - Potential for large-scale savings if any PLTs can be eliminated⁵



Background

- NSQIP-based studies in inguinal/ventral hernia repair⁶, plastic surgery⁴, and urology⁷ showed no increase in complications in patients who receive PLTs
- Also did not see increased complications in abnormal PLTs when compared to those with normal test results
 - Data used were all prior to implementation or promotion of new ASA guidelines



Background

- These associations have not been studied in the setting of low-risk, elective endocrine surgeries of the neck
 - Nor in similar settings for colorectal surgery



Patient population

- 2015-2017 NSQIP datasets were queried for all thyroid and parathyroid surgeries of the neck (CPT)
 - Included – ≥ 18 yo, elective surgery, outpatient
 - Exclusion – ASA ≥ 3 , or any of the following in the 30 days prior to surgery: vent support, sepsis disseminated cancer, pregnancy, impaired sensorium, acute renal failure



Data collection

- Demographics
 - Age, race, gender
- Comorbidities
 - Diabetes, smoking within the year prior to surgery, COPD, dyspnea, HTN requiring meds, chronic steroid use, currently on dialysis, bleeding disorders
- Postoperative outcomes
 - Mortality, morbidity, readmission



Lab definitions

- Chem
 - Na (135-145 mEq/L)
 - BUN (0-20 mg/dL)
 - Cr (0-1.2 mg/dL)
- LFT
 - Alb (3.2-4.6 g/dL)
 - Bili (0-1 mg/dL)
 - AST (0-37 U/L)
 - Alkaline Phosphatase (0-116 U/L)
- CBC
 - WBC (4-12 x 10³/uL)
 - Hct (35.9-44.6%)
 - Plt (150-450 x 10³/uL)
- Coags
 - aPTT (\leq 37.7 seconds)
 - INR (\leq 1.5)



Statistical analyses

- Primary outcome: rate of preoperative testing
 - Chi-squared analyses and unpaired t-tests comparing those with PLTs to those without
- Secondary outcomes:
 - Normal vs abnormal labs
 - Rate of each test performed
- Multivariate regression
 - Which factors were predictive of obtaining PLTs?
 - When obtained, which PLTs were predictive of poor outcomes?



Endocrine Surgery Results

- Overall cohort: 37,077
 - Mean age 50.3 years old, 81.8% Female, 72.5% White, 92.5% ASA class 2
 - 77.8% thyroid procedures
 - 43.5% with at least 1 NSQIP-tracked comorbidity
 - 66.4% (23,889) received PLTs
 - CBC: 21,328 (89.3% of patients who had PLTs)
 - BMP: 20,622 (86.3%)
 - LFT: 11,002 (46.1%)
 - Coag: 7,014 (29.4%)



Endocrine: Cohort Demographics

	Total (n=37077)	No labs (n=13188)	≥ 1 lab (n=23889)	p-value
Age years, mean (SD)	50.53 (14.69)	48.61 (14.60)	51.58 (14.64)	t-test: <u>0.00</u>
Gender, n (%)				X ² : 0.082
Female	30329 (81.8)	10736 (81.3)	19603 (82.1)	
Male	6748 (18.2)	2462 (18.7)	4286 (17.9)	
Race, n (%)				<u>0.00</u>
AI/AN	100 (0.3)	41 (0.3)	59 (0.2)	
Asian	1993 (5.4)	699 (5.3)	1294 (5.4)	
Black or AA	4547 (12.3)	1358 (10.3)	3189 (13.3)	
NH/PI	141 (0.4)	53 (0.4)	88 (0.4)	
White	26898 (72.5)	10088 (76.5)	16810 (70.4)	
Hispanic	3398 (9.2)	949 (7.2)	2449 (10.3)	
ASA, n (%)				<u>0.00</u>
Class 1	2783 (7.5)	1234 (9.4)	1549 (6.5)	
Class 2	34294 (92.5)	11954 (90.6)	22340 (93.5)	
Anesthesia type, n (%)				0.015
General	36855 (99.4)	13133 (99.6)	23722 (99.3)	
MAC	142 (0.4)	38 (0.3)	104 (0.4)	
Other	80 (0.2)	17 (0.1)	63 (0.3)	
Comorbidities, n (%)				<u>0.00</u>
≥ 1 comorbidity	16120 (43.5)	4884 (37.2)	11236 (43.5)	
Smoke ≤ 1yr	4496 (12.1)	1570 (11.9)	2926 (12.2)	0.332
Diabetes	2622 (7.1)	685 (5.2)	1937 (8.1)	<u>0.00</u>
Dyspnea	939 (2.5)	232 (1.8)	707 (3.0)	<u>0.00</u>
COPD	281 (0.8)	85 (0.6)	196 (0.8)	0.061
HTN	11283 (30.4)	3156 (23.9)	8127 (34.0)	<u>0.00</u>
Steroids	585 (1.6)	170 (1.3)	415 (1.7)	<u>0.001</u>
Dialysis	36 (0.1)	3 (<0.1)	33 (0.1)	<u>0.001</u>
Bleeding dis	154 (0.4)	36 (0.3)	118 (0.5)	<u>0.002</u>
FnI status, n (%)				<u>0.015</u>
Independent	36714 (99.0)	13081 (99.2)	23633 (98.9)	
Other dep. status	363 (1.0)	107 (0.8)	256 (1.1)	

Endocrine: no tests vs PLTs

Overall	Total n = 37077	No labs n = 13188	At least 1 lab in 30 days n = 23889	p-value
Overall complication rate	856 (2.3)	285 (2.2)	571 (2.4)	0.160
Morbidity, n (% column)	447 (1.2)	144 (1.1)	303 (1.3)	0.136
- Wound complication, n (%)	109 (0.3)	34 (0.3)	75 (0.3)	0.339
S-SSI	85 (0.2)	25 (0.2)	60 (0.3)	0.235
D-SSI	13 (<0.1)	5 (<0.1)	8 (<0.1)	0.828
DO-SSI	8 (<0.1)	2 (<0.1)	6 (<0.1)	0.720
Wound Disrupt.	3 (<0.1)	2 (<0.1)	1 (<0.1)	0.290
- Procedure-related, n (%)	203 (0.5)	67 (0.5)	136 (0.6)	0.444
Unp. Return OR Day 1	158 (0.4)	57 (0.4)	101 (0.4)	0.894
Unplanned Intubation	56 (0.2)	11 (0.1)	45 (0.2)	0.013
- Major complications, n (%)	170 (0.5)	53 (0.4)	117 (0.5)	0.230
Pneumonia	26 (0.1)	9 (0.1)	17 (0.1)	0.919
PE	16 (<0.1)	7 (0.1)	9 (<0.1)	0.494
PRI/ARF	1 (<0.1)	0 (0)	1 (<0.1)	1.00
UTI	74 (0.2)	25 (0.2)	49 (0.2)	0.748
CVA/stroke	8 (<0.1)	3 (<0.1)	5 (<0.1)	1.00
Arrest/CPR	9 (<0.1)	2 (<0.1)	7 (<0.1)	0.506
MI	14 (<0.1)	3 (<0.1)	11 (<0.1)	0.269
Transfusion	10 (<0.1)	0 (0.0)	10 (<0.1)	0.019
DVT	14 (<0.1)	6 (<0.1)	8 (<0.1)	0.569
Sepsis/shock	23 (0.1)	12 (0.1)	11 (<0.1)	0.096
Unplanned Readmission, n (%)	504 (1.4)	179 (1.4)	325 (1.4)	0.980
- Related to procedure	408 (1.1)	149 (1.1)	259 (1.1)	0.687
Mortality, n (%)	5 (<0.1)	1 (<0.1)	4 (<0.1)	0.662

Endocrine: Normal vs Abnormal PLTs

Patients who underwent PLTs	Total, n = 23889	Normal, n = 13671	Abnormal, n = 10218	p-value
Overall complication rate	571 (2.4)	287 (2.1)	284 (2.8)	0.001
Morbidity, n (% column)	303 (1.3)	155 (1.1)	148 (1.4)	0.032
- Wound complication, n (%)	75 (0.3)	38 (0.3)	37 (0.4)	0.250
S-SSI	60 (0.3)	31 (0.2)	29 (0.3)	0.383
D-SSI	8 (<0.1)	5 (<0.1)	3 (<0.1)	1.00
DO-SSI	6 (<0.1)	2 (<0.1)	4 (<0.1)	0.412
Wound Disrupt.	1 (<0.1)	0 (0)	1 (<0.1)	0.428
- Procedure-related, n (%)	136 (0.6)	74 (0.5)	62 (0.6)	0.506
Unp. Return OR Day 1	101 (0.4)	51 (0.4)	50 (0.5)	0.171
Unplanned Intubation	45 (0.2)	25 (0.2)	16 (0.2)	0.707
- Major complications, n (%)	117 (0.5)	53 (0.4)	64 (0.6)	0.009
Pneumonia	17 (0.1)	8 (0.1)	9 (0.1)	0.397
PE	9 (<0.1)	7 (<0.1)	2 (<0.1)	0.317
PRI/ARF	1 (<0.1)	0 (0)	1 (<0.1)	0.428
UTI	49 (0.2)	26 (0.2)	23 (0.2)	0.568
CVA/stroke	5 (<0.1)	1 (<0.1)	4 (<0.1)	0.171
Arrest/CPR	7 (<0.1)	2 (<0.1)	5 (<0.1)	0.146
MI	11 (<0.1)	3 (<0.1)	8 (0.1)	0.045
Transfusion	10 (<0.1)	4 (<0.1)	6 (0.1)	0.271
DVT	8 (<0.1)	3 (<0.1)	5 (<0.1)	0.300
Sepsis/shock	11 (<0.1)	4 (<0.1)	7 (0.1)	0.162
Unplanned Readmission, n (%)	325 (1.4)	162 (1.2)	163 (1.6)	0.007
- Related to procedure	259 (1.1)	136 (1.0)	123 (1.2)	0.123
Mortality, n (%)	4 (<0.1)	1 (<0.1)	3 (<0.1)	0.320

Endocrine: Multivariate regression

- Which factors were more predictive of patients getting PLTs?
- Only included if p-value for $X^2 \leq 0.1$

$R^2 = 0.030$	Preop labs total		
	OR	95% CI	p-value
1+ Comorbidity	1.347	1.286 - 1.411	<u>0.00</u>
Age	1.012	1.010 - 1.013	<u>0.00</u>
Race			
1 = White (ref)			
2 = AI/AN	0.925	0.618 - 1.383	0.703
3 = Asian	1.182	1.074 - 1.302	<u>0.001</u>
4 = Af Amer	1.379	1.287 - 1.478	<u>0.00</u>
5 = NH/PI	1.012	0.717 - 1.427	0.948
7 = Hisp	1.667	1.539 - 1.806	<u>0.00</u>
ASA			
1 = No dis (ref)			
2 = Mild dis	1.194	1.101 - 1.294	<u>0.00</u>
Gender			
Female (ref)			
Male	0.928	0.878 - 0.981	<u>0.008</u>
Functional Status			
Independent (ref)			
Other fxn status	1.275	1.014 - 1.604	<u>0.038</u>



Discussion

- 66.4% (23,889) received PLTs
- Overall complication rate was 2.3%
 - No significant difference between patients with and without PLTs
- Among patients with PLTs...
 - Increased complication rate seen in patients with abnormal results, however not clinically significant due to low rates overall and small differences in rates



Conclusions

- Routine preoperative laboratory testing should be used more judiciously in ASA 1 and 2 patients undergoing low-risk endocrine surgeries



There's More (CRS)!

- Same methods described earlier
 - CPT codes/procedures:
 - 45005, 45020, 46040, 46045, 46060 – incision/drainage of rectal abscess
 - 45505 – repair of rectum
 - 46706 – repair of anal fistula
 - 46940 – treatment of anal fissure
 - 46947 – treatment of hemorrhoids



There's More (CRS)!

	Total (n=2730)	≥ 1 lab (n=1390)	No labs (n=1340)	p-value
Age years, mean (SD)	45.44 (14.45)	47.65 (15.11)	43.15 (13.36)	t-test: <u>0.00</u>
Gender, n (%)				X ² : 0.064
Female	1079 (39.5)	573 (41.2)	506 (37.8)	
Male	1651 (60.5)	817 (58.8)	834 (62.2)	
Race, n (%)				
AI/AN	5 (0.2)	4 (0.3)	1 (0.1)	<u>0.017</u>
Asian	154 (5.6)	75 (5.4)	79 (5.9)	
Black or AA	342 (12.5)	196 (14.1)	146 (10.9)	
NH/PI	9 (0.3)	2 (0.1)	7 (0.5)	
White	1954 (71.6)	967 (69.6)	987 (73.7)	
Hispanic	266 (9.7)	146 (10.5)	120 (9.0)	
ASA, n (%)				<u>0.00</u>
Class 1	486 (17.8)	206 (14.8)	280 (20.9)	
Class 2	2244 (82.2)	1184 (85.2)	1060 (79.1)	
Anesthesia type, n (%)				<u>0.00</u>
General	2115 (77.5)	1098 (79.0)	1017 (75.9)	
MAC	505 (18.5)	221 (15.9)	284 (21.2)	
Spinal/Epidural	84 (3.1)	55 (4.0)	29 (2.2)	
Local/Regional	18 (0.7)	9 (0.6)	9 (0.7)	
Other	8 (0.3)	7 (0.5)	1 (0.1)	
Comorbidities, n (%)				
≥ 1 comorbidity	1268 (46.4)	731 (52.6)	537 (40.1)	<u>0.00</u>
Smoke ≤ 1yr	582 (21.3)	314 (22.6)	268 (20)	0.099
Diabetes	141 (5.2)	91 (6.5)	50 (3.7)	<u>0.001</u>
Dyspnea	31 (1.1)	20 (1.4)	11 (0.8)	0.128
COPD	21 (0.8)	15 (1.1)	6 (0.4)	0.059
HTN	580 (21.2)	372 (26.8)	208 (15.5)	<u>0.00</u>
Steroids	192 (7.0)	102 (7.3)	90 (6.7)	0.525
Dialysis	0 (0)	0 (0)	0 (0)	N/A
Bleeding dis	11 (0.4)	9 (0.6)	2 (0.1)	<u>0.04</u>
Enl status, n (%)				0.474
Independent	2707 (99.2)	1380 (99.3)	1327 (99.0)	
Other dep. status	23 (0.8)	10 (0.7)	13 (1.0)	

Colorectal: No labs vs PLTs

	Total (n=2730)	≥ 1 lab (n=1390)	No labs (n=1340)	p-value
Overall complication rate	123 (4.5)	72 (5.2)	51 (3.8)	0.084
Morbidity, n (% column)	85 (3.1)	48 (3.5)	37 (2.8)	0.298
- Wound complication, n (%)	57 (2.1)	32 (2.3)	25 (1.9)	0.425
S-SSI	20 (0.7)	9 (0.6)	11 (0.8)	0.595
D-SSI	22 (0.8)	12 (0.9)	10 (0.7)	0.732
DO-SSI	13 (0.5)	10 (0.7)	3 (0.2)	0.060
Wound Disrupt.	2 (0.1)	1 (0.1)	1 (0.1)	1.00
- Procedure-related, n (%)				
Unp. Ret. OR 1d	4 (0.1)	2 (0.1)	2 (0.1)	1.00
- Major complications, n (%)	25 (0.9)	15 (1.1)	10 (0.7)	0.361
Pneumonia	0 (0)	0 (0)	0 (0)	N/A
Unp. Intubation	0 (0)	0 (0)	0 (0)	N/A
PE	0 (0)	0 (0)	0 (0)	N/A
PRI/ARF	0 (0)	0 (0)	0 (0)	N/A
UTI	10 (0.4)	7 (0.5)	3 (0.2)	0.227
CVA/stroke	0 (0)	0 (0)	0 (0)	N/A
Arrest/CPR	0 (0)	0 (0)	0 (0)	N/A
MI	1 (<0.1)	0 (0)	1 (<0.1)	0.491
Transfusion	3 (0.1)	3 (0.2)	0 (0)	0.250
DVT	1 (<0.1)	0 (0)	1 (0.1)	0.491
Sepsis/shock	12 (0.4)	7 (0.5)	5 (0.4)	0.606
Unplanned Readmission, n (%)	52 (1.9)	33 (2.4)	19 (1.4)	0.068
- Related to procedure	34 (1.2)	21 (1.5)	13 (1.0)	0.203
Mortality, n (%)	0 (0)	0 (0)	0 (0)	N/A

Colorectal: Multivariate regression

- Which factors were more predictive of patients getting PLTs?
- Only included if p-value for $X^2 \leq 0.1$

$R^2 = 0.056$	Preop labs total		
	OR	95% CI	p-value
Comorbidity (0 ref)	1.493	1.269 - 1.755	0.00
Age	1.020	1.015 - 1.026	0.00
Race			
1 = White (ref)			
2 = AI/AN	3.668	0.406 - 33.167	0.247
3 = Asian	1.098	0.784 - 1.539	0.586
4 = Af Amer	1.433	1.130 - 1.818	0.003
5 = NH/PI	0.329	0.066 - 1.640	0.175
7 = Hisp	1.355	1.042 - 1.761	0.023
ASA			
1 = No dis (ref)			
2 = Mild dis	1.110	0.896 - 1.374	0.339
Gender			
Male (ref)			
Female	1.168	0.998 - 1.368	0.053



Conclusions

- Routine preoperative laboratory testing should be used more judiciously in ASA 1 and 2 patients undergoing low-risk endocrine and colorectal surgeries
- Will examine other fields of surgery to determine overall need for routine PLTs in low-risk patients for low-risk surgeries
 - All existing literature used data collected prior to new ASA guidelines



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