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An Evaluation of Warfarin Use and 30-day Hemorrhage in Bariatric Surgery

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Background

- Lehigh Valley Hospital Health Network (LVHN), a non-profit tertiary care facility in Allentown, Pennsylvania is a Level 1, accredited Bariatric Surgery Center, performing over 375 procedures annually.
- LVHN is a participant in the American College of Surgeons National Surgical Quality Improvement Program (ACSNSQIP) as of May 2006.
- The Agency for Healthcare Research and Quality (AHRQ) estimates that 2 million patients are managed on Coumadin or other anticoagulants yearly.
- As the incidence of obesity in America continues to increase, the number of patients undergoing weight loss procedures is concurrently rising; the number of bariatric surgeries performed increased by 124,000 in 15 years.
- Patients on chronic anticoagulant therapy who undergo bariatric surgery represent a unique population, as patients often suffer from numerous comorbidities.
- Within LVHN, at the time of discharge post-bariatric surgery, chronic anticoagulant users are typically returned to their pre-operative anticoagulation regime.
- Approximately 16%-23% of anticoagulant patients develop hemorrhagic complications within LVHN.

Objective

- To evaluate pre- and post-operative INR levels, Coumadin doses, and BMIs of bariatric patients at risk of hemorrhagic complications due to surgery, and to aid in the future development of Coumadin management guidelines for patients undergoing bariatric surgery.

Methods

- INRs and Coumadin doses were collected via telephone and fax correspondences with patients' primary care providers and Coumadin managers (i.e. Cardiologists, Coumadin clinics, HeartCare Group, LVPG).
- A retrospective patient chart review was performed on the selected patients within the Lehigh Valley Health Network that were entered into the American College of Surgeons Bariatric Surgery Center Network (ACSBSCN) database from 4/1/2008-9/30/2011.
- Previously collected data by the research team, including readmission information, hemorrhage information, and initial INR levels, was incorporated into the results and discussion of this evaluation.

Results

- To proceed with bariatric surgery, surgical protocol states that patients must have an INR of 1.5 or below.
 - 22.2% (4/18) of patients did not report a pre-operation INR.
 - 92.9% (13/14) of remaining patients were within the optimal range.
 - Patient 3 had an INR of 1.9 and is an outlier. (Figure 1)

Table 1. INRs and Coumadin Dosages of Chronic Coumadin Users Pre- and Post- Bariatric Surgery

Patient ID Number		PRE-OP	1 WEEK	30 DAYS	60 DAYS	6 MONTHS
PT 16	INR	1.1	1.2	3.7	2.5	3.2
	Coumadin Dose	alt. 7.5mg/10mg	5mg	alt. 7.5mg/10mg	7.5mg	7.5mg
PT 11	INR	1.3	3.5	2.9	2.1	2.0
	Coumadin Dose	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg
PT 17	INR	1.3	2.2	3.4	1.3	3.7
	Coumadin Dose	5mg	5mg	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg	5mg
PT 5	INR	N/A	N/A	1.6	1.8	1.7
	Coumadin Dose	5mg	N/A	cyc. 5mg/7.5mg	cyc. 5mg/7.5mg	cyc. 5mg/7.5mg
PT 2	INR	1.4	1.7	3.6	N/A	1.5
	Coumadin Dose	cyc. 5mg/7.5mg	cyc. 7.5mg/5mg	cyc. 5mg/7.5mg	N/A	cyc. 7.5mg/5mg
PT 7	INR	N/A	2.0	3.2	2.3	2.1
	Coumadin Dose	3mg	3mg	3mg	cyc. 3mg/2mg	3mg
PT 13	INR	N/A	6.2	3.1	1.3	1.3
	Coumadin Dose	5mg	5mg	5mg	cyc. 5mg/2.5mg	cyc. 5mg/2.5mg
PT 12	INR	1.3	1.1	2.5	2.3	2.6
	Coumadin Dose	2mg + 100mg LMWH	2mg	3mg	2.5mg	2.5mg
PT 6	INR	1.0	N/A	1.7	N/A	1.8
	Coumadin Dose	10mg	N/A	N/A	10mg	N/A
PT 9	INR	N/A	2.1	2.2	1.7	2.0
	Coumadin Dose	5mg	cyc. 1mg/5mg	cyc. 2.5mg/5mg	5mg	cyc. 7.5mg/5mg
PT 3	INR	1.9	3.0	3.5	2.5	4.0
	Coumadin Dose	7mg	7mg	7mg	6mg	alt. 9mg/6mg
PT 18	INR	1.3	1.5	4.5	1.1	12.5
	Coumadin Dose	5mg + 125mg LMWH	7.5mg	alt. 2.5mg/5mg	2.5mg	5mg
PT 8	INR	1.2	2.4	2.0	2.8	2.5
	Coumadin Dose	11mg + 190mg LMWH	cyc. 11mg/12mg	cyc. 11mg/12mg	cyc. 11mg/10mg	cyc. 11mg/10mg
PT 14	INR	1.1	2.8	5.8	1.7	2.0
	Coumadin Dose	cyc. 15mg/14mg	cyc. 15mg/14mg	HOLD	11mg	11mg
PT 10	INR	1.1	3.3	5.7	1.4	2.9
	Coumadin Dose	cyc. 4.5mg/5mg	4mg	3mg	2.5mg	3.5mg
PT 4	INR	1.2	2.8	2.3	4.0	2.1
	Coumadin Dose	4mg + 150mg/LMWH	2mg	1mg	1mg	1.5mg
PT 1	INR	1.1	N/A	N/A	N/A	N/A
	Coumadin Dose	cyc. 10mg/2.5mg	12.5mg	D/C'd-bleeding	D/C'd-bleeding	D/C'd-bleeding
PT 15	INR	1.1	3.9	1.4	2.0	3.7
	Coumadin Dose	cyc. 6mg/7mg + 150mg LMWH	cyc. 6mg/7mg	6mg	cyc. 6mg/3mg	cyc. 5mg/7.5mg

INR – International Normalized Ratio
BMI – Body Mass Index
Cyc. – "Cycle of"
Alt. – "Alternate between"

LMWH – Low Molecular Weight Heparin
N/A – Information was not available
D/C'd – Discontinued

Table 1 Depicts the INRs and Coumadin dosages of the patient population from pre-operation to 6 months post-operation. The patients are arranged by increasing BMIs.

- The therapeutic INR range is 2.0 to 3.0.
 - At one week post-op, 16.7% (3/18) of patients had no data; 40% (6/15) were within range.
 - At 30 days post-op, 5.6% (1/18) of patients had no data; 23.5% (4/17) were within range.
 - At 60 days post-op, 16.7% (3/18) of patients had no data; 46.7% (7/15) were within range.
 - At 6 months post-op, 5.6% (1/18) of patients had no data; 47.1% (8/17) were within range. (Figure 1).
- Patients 4, 1, and 15 had the highest BMIs of this population and were the only patients from the included population readmitted to the hospital after bariatric surgery. (Figure 2)
- Of the total anticoagulated patients, 15.9% were readmitted for hemorrhaging. Of the included patients, 16.7% were readmitted for hemorrhaging. (Figure 3)

INRs and BMIs of Chronic Coumadin Users Pre and Post Bariatric Surgery

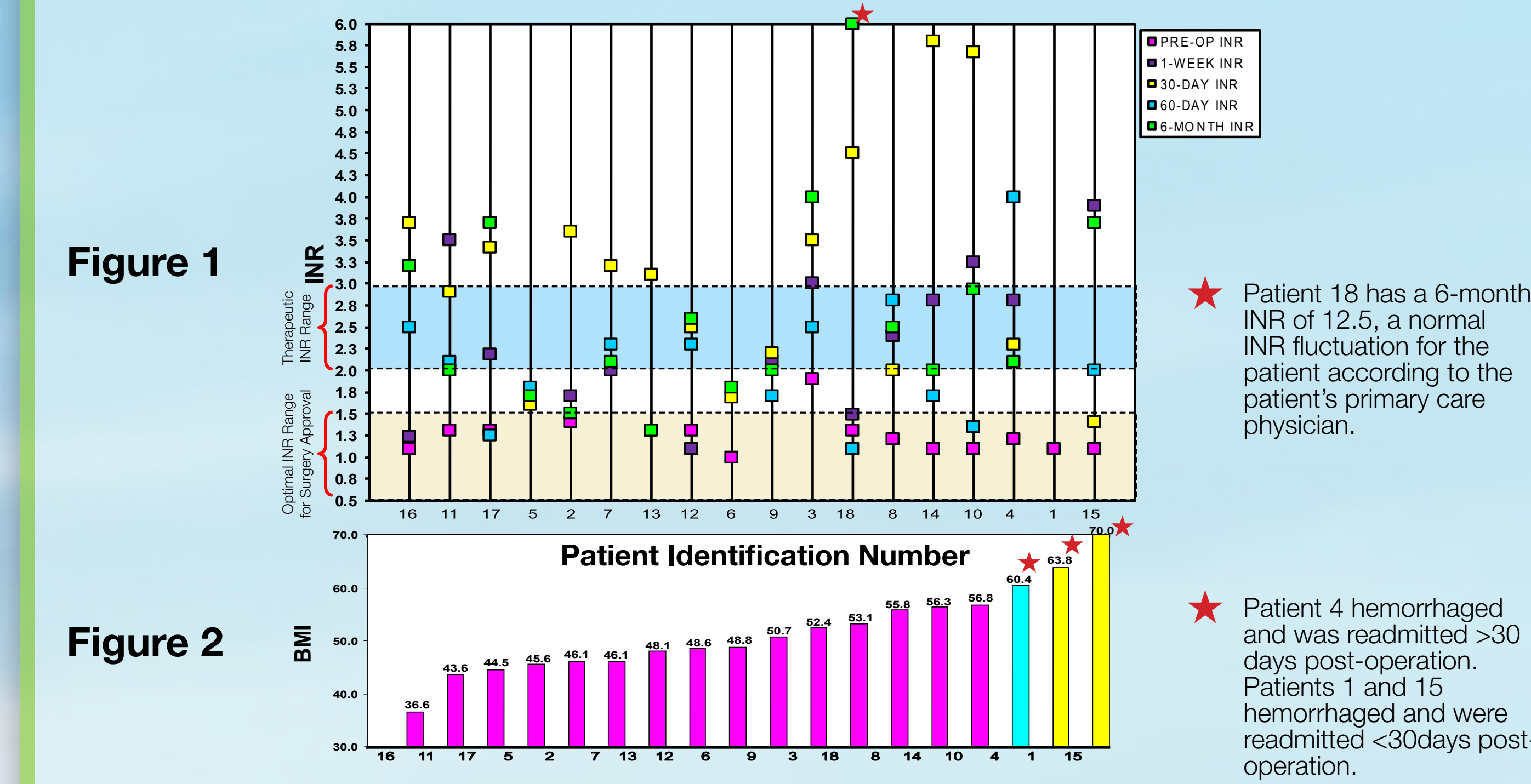


Figure 1

Figure 2

Figure 1 Depicts the INRs of the patient population from pre-operation to 6 months post-operation. The patients are arranged by increasing BMIs.

Figure 2 Describes the patient population in order of increasing BMIs, beginning with patient 16.

Patient Population Breakdown Figure 3

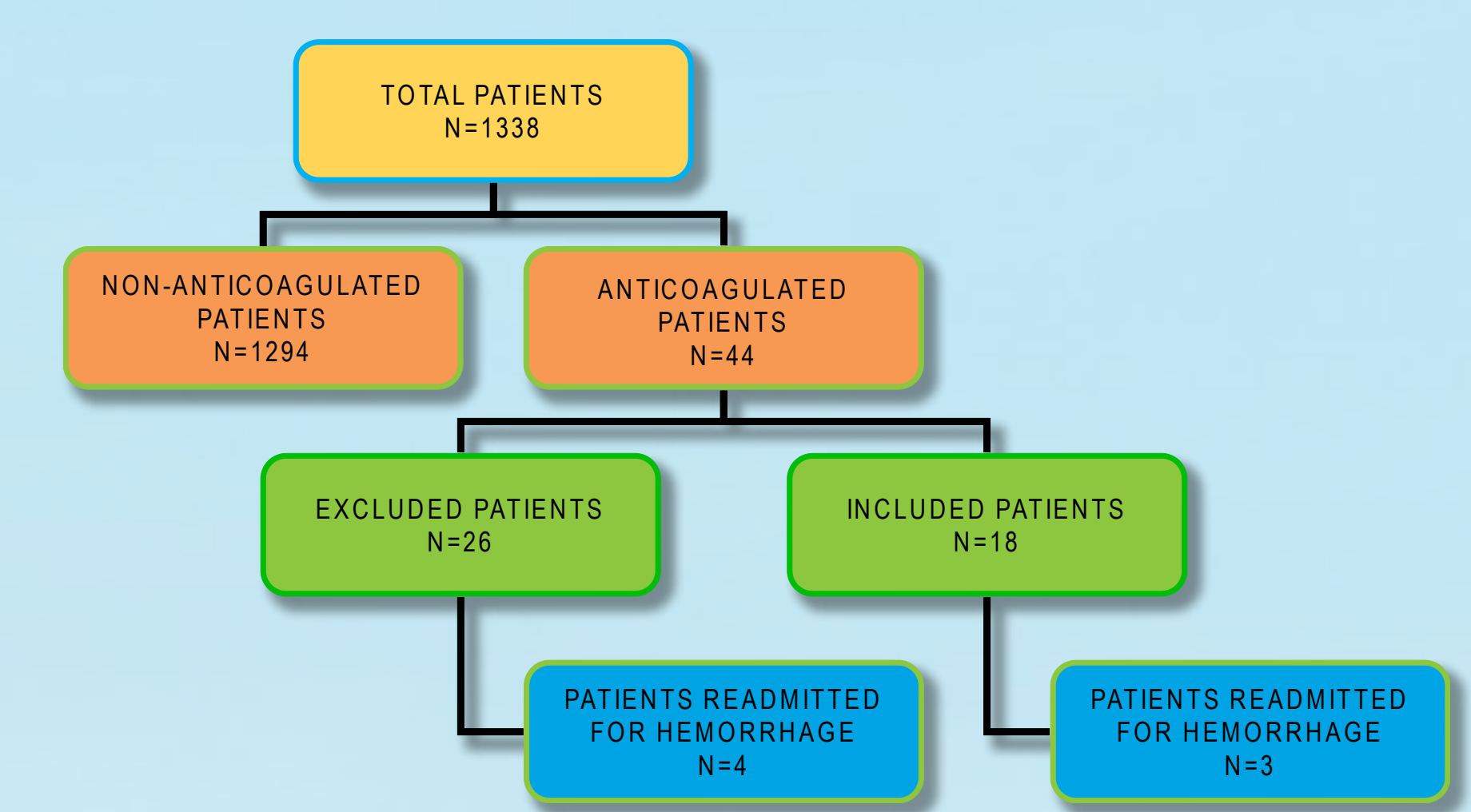


Figure 3 Illustrates the stratification of the patient population. Patients were excluded due to lack of data points or discontinuation of Coumadin.

Conclusions

- Patients appear to have a higher incidence of readmittance within the first 30 days post-operation and present with elevated INR levels (Table 2).
- No explanation for the trend in coagulopathy can be identified. Potential causes and risk factors are drug interactions, diet modification, biological and physiological adjustment to procedure, BMI, age, and gender. Further study has been initiated to test these concepts and to aid in the identification of causes.
- No observed trend in Coumadin management can be identified (Table 1). Theoretically, low INR levels should be managed with a higher dose of Coumadin, whereas high INR levels should be managed with a lower dose of Coumadin.
- Patients' Coumadin doses and INR levels should be monitored within 48-72 hours post-discharge.
- Coumadin and INRs should be managed by a single healthcare provider in order to provide the patient with flawless transfer care between inpatient and outpatient settings. However, this cohort of patients has a proclivity to not follow-up.
- Due to the small sample size, this study should be continued in order to increase the patient population to allow for proper statistical analysis.