



Outcomes of a Hospital-Wide Diabetic Ketoacidosis Order Set Implementation

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BACKGROUND

- ❖ Diabetic ketoacidosis (DKA) is a serious complication of diabetes and warrants prompt and effective treatment.
- ❖ There is currently no comprehensive, hospital-wide protocol available at Community Regional Medical Center (CRMC) for the initial management of DKA.
- ❖ Implementation of a standardized treatment guideline for DKA is expected to positively impact various clinical outcomes.

OBJECTIVES

- ❖ The primary objective of this study is to evaluate the effects of a newly developed comprehensive diabetic ketoacidosis order set on the time to anion gap closure.
- ❖ Secondary objectives of this study are to evaluate the effects of the order set on time to resolution of DKA, effects on various clinical outcomes such as
 - ❖ Hospital length of stay
 - ❖ Frequency of hypokalemia (< 3.5 mg/dL)
 - ❖ Frequency of hyperkalemia (> 5.0 mg/dL)
 - ❖ Frequency of hypoglycemia (< 55 mg/dL)
 - ❖ Frequency of hypophosphatemia (< 2.7 mg/dL)
 - ❖ Incidence of anion gap recurrence

METHODOLOGY

- ❖ A retrospective chart analysis
 - ❖ Includes patients ≥ 18 years admitted to the ICU or medical-surgical floors with a diagnosis of DKA from September 1, 2008 to March 31, 2009.
 - ❖ In-services will be scheduled and informational flyers and newsletters will be distributed during the initial implementation / pilot phase from November 2008 through December 2008.
 - ❖ Data will be collected and analyzed from the pre-implementation period, September 2008 to November 2008 and from the post-implementation period December 2008 to March 2009.

- ❖ Data to be collected are as follows:
 - ❖ Time to anion gap closure, to resolution of DKA, to normalization of serum bicarbonate
 - ❖ Frequency of hypoglycemia, hypokalemia, hyperkalemia, hypophosphatemia
 - ❖ Incidence of recurrence of DKA after resolution
- ❖ Statistical Analyses:
 - ❖ The primary outcome will be analyzed using a student's t-test
 - ❖ The secondary outcome will be analyzed using a student's t-test or Fisher's exact test, as appropriate for the data type.

This study proposal was submitted to and approved by the Institutional Review Board (IRB). All data will be recorded without patient specific identifiers and maintained in a confidential manner to protect patient privacy.

RESULTS

- ❖ Preliminary Results
- ❖ Pre-implementation data: September – November 2008

❖ September 2008

Patient Characteristics	N	n=16
Diabetes Mellitus Type 1	8	
Diabetes Mellitus Type 2	8	
Male	7	
Precipitating Factors		
Medication noncompliance	10	
Medications	1	
Infection	1	
Other	6	
2005 DKA order set utilization	0	

Primary Endpoint	Mean Time (hrs)	Range Time (hrs)
Time to anion gap closure	14.5	2.5 - 46.5
Secondary Endpoints		
Time to blood glucose normalization	10.6	2.5 - 16
Hospital length of stay	91.5	41 - 269
Frequency		
	Within 24 hrs	After 24 hrs
Hypokalemia	9	16
Hyperkalemia	10	0
Hypoglycemia	0	14
Hypophosphatemia	11	13
Anion gap recurrence	3	0

- ❖ Implementation/ Pilot phase: Currently in Progress
- ❖ Post-implementation data: December 2008 – March 2009

CONCLUSION

- ❖ Based on the preliminary results, the implementation of a comprehensive DKA order set could benefit time to closure of anion gap and through a standardized set of therapy, improve patient care.

FUTURE DIRECTION

- ❖ Complete data collection and analysis.
- ❖ Evaluate and determine if a comprehensive DKA order set is improving clinical outcomes of patients at CRMC.

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All authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

Retrospective review of warfarin therapy monitoring pre- and post-implementation of the Joint Commission National Patient Safety Goal 03.05.01

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BACKGROUND

- The Joint Commission National Patient Safety Goal 03.05.01 (NPSG.03.05.01) implementation requires that warfarin be appropriately ordered, dispensed, administered and monitored in the inpatient hospital setting by January 1, 2009.
- Previously, CRMC and CCMC did not have an established warfarin policy that defined appropriate warfarin prescribing guidelines, including the requirement for consistent INR monitoring.
- An inpatient pharmacy anticoagulation consulting service will be available starting January 1, 2009.
- A warfarin order set will also be put in place that requires several elements including the indication for warfarin therapy, initial dose, and the schedule for INR and CBC lab draws to monitor therapy.

OBJECTIVE

- Compare the effectiveness, monitoring practices, and safety of warfarin use pre- and post-implementation of NPSG.03.05.01.

Reviewed by the Institutional Review Board (IRB) at CRMC.

METHODOLOGY

Study Design

Retrospective, chart review

Pre-implementation: January 1, 2008 - March 31, 2008
 Post-implementation: January 1, 2009 - March 31, 2009

Inclusion Criteria

- Age \geq 18 years old at time of warfarin therapy
- Received warfarin therapy during hospital stay for \geq 3 days
- Warfarin naïve patients, or patients on warfarin as outpatient, but who present with a break in therapy for a minimum of four days, or baseline INR $<$ 1.3 when first hospitalized

Exclusion Criteria

- Patients with a pre-existing coagulopathy as defined by INR $>$ 1.5 or platelets $<$ 50,000
- Patients on concomitant argatroban for HIT
- Patients admitted to hospital with active bleeding who were on warfarin as outpatient
- Patients with acquired bleeding disorders: DIC, ITP, TTP, drug-induced thrombocytopenia, or vitamin K deficiency

Outcome Measures

- Presence of INRs $>$ 4 during hospitalization
- Documentation of a baseline INR (taken no more than 24 hours before warfarin initiation)
- Bleeding events requiring Vitamin K, FFP, blood transfusion, or surgical intervention while on warfarin during hospitalization

Statistical Analysis

- Nominal data will be analyzed using the chi square test, and continuous data will be analyzed using the student's t-test.

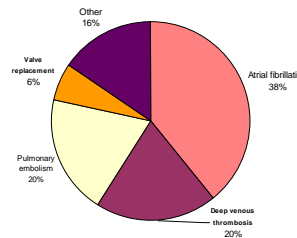
RESULTS

Preliminary Results ~ Pre-Implementation Data January – March 2008

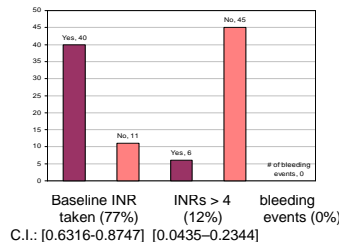
Baseline Characteristics of the Patients (N=51)

Variable	Number (percent)
Female	32 (63)
Mean age (years)	68
Age range	29-91

Warfarin Indication



Outcome Measures



CONCLUSIONS

- Based on the results of previous studies, implementation of a pharmacy-based warfarin monitoring process in the inpatient setting may result in improved rates of therapeutic INR levels, as well as improved safety as demonstrated by fewer bleeding events.

FUTURE DIRECTION

- Pharmacy warfarin consultation service, and warfarin order set will be in place by January 1, 2009.
- Complete data collection and analysis.
- Evaluate the effectiveness of the post-implementation of NPSG.03.05.01 based on the outcome measures.

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