

Evaluation of a New Oxytocin Protocol

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The speaker has no conflict to disclose.



Learning Objectives

- Review the use of oxytocin in labor and delivery (L+D)
- Review the potential advantages of implementing a standardized oxytocin protocol
- Discuss the effect of an oxytocin infusion protocol that includes active management of the 3rd stage of labor on hypotension in cesarean deliveries

Oxytocin

- Endogenous oxytocin is a hormone secreted by the hypothalamus and stored in the posterior pituitary
- It stimulates contraction of uterine smooth muscle during gestation and causes milk ejection after milk has been produced in the breast
- Clinically, oxytocin is commonly used to induce/augment labor and control postpartum bleeding associated with third stage of labor

Oxytocin. Clinical Pharmacology [database online]. Available at: <http://www.clinicalpharmacology.com>.
Accessed: April 16, 2009.
Pitocin ® [package insert]. Rochester (MI): JHP Pharmaceuticals; 2007.

Third Stage of Labor

- Time from birth of the baby to delivery of the placenta
- On average lasts about 5-6 minutes
- The most important complication of the third stage of labor is post partum hemorrhage (PPH)



Prendiville WJP. The Cochrane Library 2008, Issue 4.
Dombrowski MP. J Obstet Gynecol 1995 Apr;172(4 Pt 1):1279-84.
Combs CA. Obstet Gynecol 1991 Jun;77(6):863-7.

Post Partum Hemorrhage

- PPH is an obstetric emergency that can follow vaginal or cesarean deliveries
- Incidence of PPH varies, but it is estimated to occur in 1-5% of deliveries
- PPH is one of the top five causes of maternal mortality
- PPH in vaginal delivery
 - Maternal blood loss of >500 mL
- PPH in cesarean delivery
 - Maternal blood loss of >1000 mL

Prendiville WJP. The Cochrane Library 2008, Issue 4.
Mousa HA. Cochrane Database Syst Rev 2003;(1).

Post Partum Hemorrhage

- Treatment – Uterotonics or “Rescue Medications”
 - Methylergonovine
 - 0.2 mg IM
 - Carboprost Tromethamine
 - 250 mcg IM
 - Misoprostol
 - 800-1000 mcg rectally
 - 200 mcg PO + 400 mcg sublingually
 - 200 mcg PO + 400 mcg sublingually + 400 mcg rectally

Methergine® [package insert]. East Hanover (NJ): Novartis; 2006.
Hemabate® [package insert]. New York (NY): Pfizer; 2006.
Cytotec® [package insert]. New York (NY): Pfizer; 2006.

Management of Third Stage of Labor

- Expectant management (conservative or physiological management)
 - Spontaneous delivery of placenta
- Active management
 - Administration of prophylactic oxytocin with or directly after delivery of the baby
 - Early cord clamping and cutting
 - Controlled traction of the umbilical cord
 - Standard practice in UK, and Australia

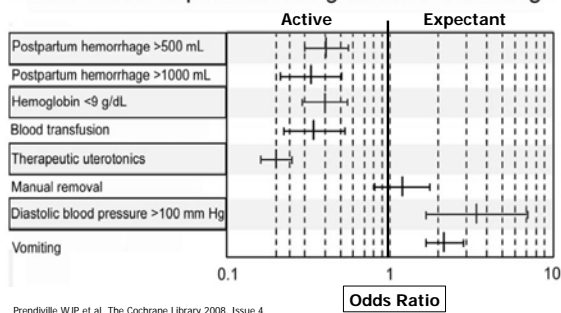
Prendiville WJP et al. The Cochrane Library 2008, Issue 4.
Chong YS. Curr Opin Obstet Gynecol 16:143-150

Management of Third Stage of Labor

- 5 randomized controlled trials of active versus expectant management of third stage of labor
- In maternity units in Ireland or UK
- Used oxytocin, ergometrine, or a mixture (Syntometrine-not available in US)
- Trials
 - Abu Dhabi. Am J Obstet Gynecol 1997;177:770-4.
 - Brighton. Eur J Obstet Gynecol Reprod Biol 1993;48:19-22.
 - Bristol. BMJ 1988;297:1295-300.
 - Dublin. Midwifery 1990;6:60-72.
 - Hichingbrooke. Lancet 1998;351:693-9.

Prendiville WJP et al. The Cochrane Library 2008, Issue 4

Management of Third Stage of Labor Active Versus Expectant Management of Third Stage



Prendiville WJP et al. The Cochrane Library 2008, Issue 4.

Potential Adverse Effects of Oxytocin

- Pinder, AJ. Int J Obstet Anesth (2002) 11, 156-9.
 - Prospective, randomized, double blind
 - 34 healthy term parturients for cesarean section (CS) under spinal anesthesia
 - Rapid IV bolus of 5 or 10 units of oxytocin was administered upon delivery of the infant
 - Reduction in MAP 30 seconds after 10 unit infusion ($P<0.05$)
 - Increased HR and CO 1 minute after 5 unit infusion and 2 minutes after 10 unit infusion ($P<0.05$)

Potential Adverse Effects of Oxytocin

- Svanstrom, MC. Br J Anaesth 2008;100:683-9.
 - Prospective, randomized, double blind
 - 40 women undergoing elective CS under spinal anesthesia
 - IV bolus of 10 units oxytocin or 0.2 mg methylergometrine
 - Control group of 10 non-pregnant, non-anesthetized women were given 10 units oxytocin IV
 - Oxytocin produced significant increase in HR ($P>0.001$), decrease in MAP ($P<0.001$), and ECG changes ($P<0.001$) in CS patients and controls

Why a New Protocol?

- Compared to expectant management, active management of third stage of labor was associated with reduced risk of PPH
- Oxytocin given at or above certain amounts, can cause undesired hemodynamic changes during cesarean delivery

Su LL. Cochrane Database Syst Rev. 2007; 18(3).
Prendiville WJ. Cochrane Database Syst Rev. 2000; (3).
Elbourne DB. Cochrane Database Syst Rev. 2001; (4).
Chang YS. Curr Opin Obstet Gynecol. 2004; 16(2): 143-50.
Svanstrom MC. Br J Anaesthesia 2008; 100(3): 683-9.
Pinder AJ. Int J Obstet Anesthesia 2002; 11(3): 156-9.

Time for a Change

- On November 17, 2008, a multidisciplinary team implemented a new protocol at Prentice Women's Hospital for the administration of oxytocin post-delivery (vaginal and cesarean)



Prentice Women's Hospital



- Part of Northwestern Memorial Hospital
 - Large academic medical center in Chicago, IL
- Largest birthing center in the Midwest
- 11,675 deliveries in 2008

New Protocol

	BEFORE	AFTER
Concentration available	15 units/250 mL NS 10 units/500 mL NS	30 units/500 mL NS
Rate of Infusion	Often "wide open" or "off the pump"	18 units over 1 hour* then 3.6 units/hour
When started	After delivery of the placenta (expectant)	After delivery of the fetus (active)

*Could be increased to 36 units in the presence of uterine atony

Potential Advantages

- Efficacy
 - Facilitates active management of third stage of labor
- Safety
 - A single concentration of oxytocin on L+D floors
 - Consistent practice
 - Fewer adverse events
- Cost
 - Cost and space savings

Study Objectives

- Assess protocol compliance and cost savings
- Assess the effect of this new protocol on EBL, and use of rescue medications
- Determine the effect of this new protocol on the incidence of hypotension as defined by use of vasopressors in cesarean deliveries

Methods

- Retrospective Chart Review
- Inclusion Criteria
 - Patients receiving neuraxial analgesia surrounding protocol implementation
 - Before: 9/15/08 – 11/15/08
 - After: 11/20/08 – 1/09/09
- Exclusion Criteria
 - Receipt of general anesthesia for a cesarean delivery

Data Collection

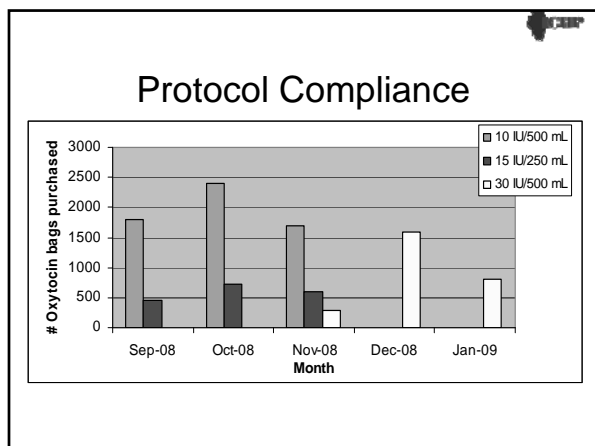
- Patient Demographics
 - Age
 - Gravity/Parity status
- Delivery type
- Amount of oxytocin infused following delivery
- Estimated blood loss (EBL)
- Administration of rescue medications
- # of hypotensive episodes requiring vasopressor administration

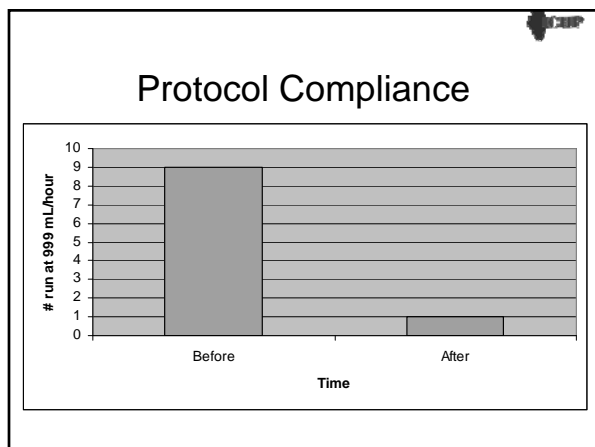
Statistical Analysis

- Data was stratified by the delivery type and compared between before and after protocol implementation
- Descriptive statistics were used to analyze continuous data
- Mann Whitney U test was used to compare independent groups

☐ $\alpha = 0.05$

Results





Cost Savings

- FY '09 2nd quarter (12/08 – 2/09)
 - Oxytocin delivery protocol fully implemented
 - Savings = \$17,666
- Projected annualized savings
 - \$70,664

Baseline Characteristics

	Vaginal Delivery			Cesarean Delivery		
	Before	After	p	Before	After	p
n	601	472	-	361	381	-
Age	31.5±5.3	31.3±5.4	0.608	32.4±5.9	32.6±5.7	0.385
Amount oxytocin infused (units)	13.5±6.3	22.4±7.7	0	22±8.1	14±8	0
Gravity	2.3±2.3	2.2±1.4	0.648	2.1±1.3	2.2±1.4	0.405
Parity	0.71±1.0	0.69±1.0	0.717	0.66±0.88	0.6±0.83	0.388

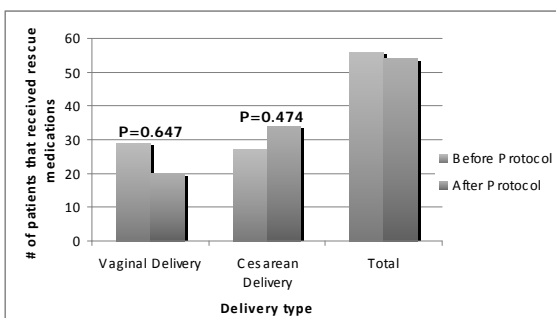
Values are shown as mean ± standard deviation

Estimated Blood Loss

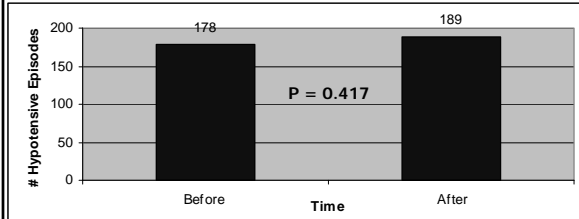
		Estimated blood loss (mL)
Vaginal Delivery	Before	355 ± 356
	After	323 ± 106
	p	0.43
Cesarean Delivery	Before	789 ± 318
	After	846 ± 283
	p	0.003

Values are shown as mean ± standard deviation.

Rescue Medication Use



Episodes of Hypotension



Conclusions

- Based on purchase data and smart pump usage data, the L+D teams have been compliant with the protocol
- This new protocol will provide an annual cost savings of over \$70,500

Conclusions

- There was no statistically significant change in EBL for vaginal deliveries, and an increased EBL of 50mL found for cesarean deliveries
- The amount of rescue medications used did not change for either group surrounding protocol implementation
- The number of hypotensive episodes in cesarean deliveries is not statistically significantly different surrounding protocol implementation

Implications

- Implementation of a protocol standardizing oxytocin administration is beneficial in terms of usage and cost and did not confer significant increase in rate of adverse events such as hypotension

Limitations

- Retrospective review
- Paper chart review
- Restricted time frame



Resident's Role

- Study design
- Chart review and data collection
 - Recruiting, training, and overseeing pharmacy students in data collection
- Statistical Analysis
- Data Interpretation

Future

- Protocol will continue
- Data will be presented at OB Quality and Safety committee meeting and P+T meeting
- Further data collection
- Re-analyze data to see if outcomes change as protocol is in place longer
- Manuscript preparation

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Post-Test

Questions

1. TRUE or FALSE?
MR is a 31 y/o woman who gives birth vaginally, but loses an estimated 1200mL of blood in the process. She would be a candidate for administration of Carboprost Tromethamine.
2. Which of the following are potential adverse effects of administering oxytocin “off the pump” or “wide open”?
 - A. Hypotension
 - B. Chest Pain
 - C. Tachycardia
 - D. ECG Changes
 - E. All of the above

Anticholinergic Use in Children and Adolescents Taking Antipsychotics

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PGY2 Resident – Drug Information
September 12, 2009

No conflict of interest to disclose

Objectives

- Review the use of antipsychotics in children and adolescents
- Compare anticholinergic use across children and adolescents receiving aripiprazole, risperidone, and quetiapine

Antipsychotics

- Two second generation antipsychotics (SGA) approved for use in pediatric patients:
 - Aripiprazole, Risperidone
- Both approved for:
 - Schizophrenia (13 y/o)
 - Bipolar type I (10 y/o)
- Risperidone also for:
 - Irritability associated with autism (5 y/o)

Antipsychotics

- All target dopamine type-2 receptors (D2)
- First Generation Antipsychotics (FGA): Bind more tightly, dissociate more slowly
- SGA: Bind more loosely, dissociate more rapidly
 - Also block serotonin type-2A receptors, reducing side-effect liability of D2 receptor antagonists

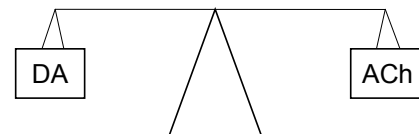
Antipsychotics

- Clinical observations indicate children/adolescents may be more sensitive
- In a review of the use of risperidone in youth with bipolar disorder and schizophrenia, EPS reported in up to 61.5% of subjects
 - Higher percentages (up to 67%) of anticholinergic use in patients receiving risperidone ≥ 3.3 mg daily

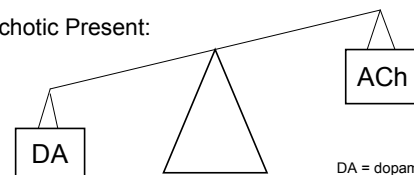
Bishop JR. Neuropsychiatr Dis Treat. 2008;4(1):55-68.

EPS

Antipsychotic Absent:



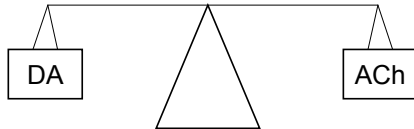
Antipsychotic Present:



DA = dopamine
ACh = acetylcholine

Anticholinergics

- Restore balance of dopaminergic/cholinergic activity
- Examples: benztropine, diphenhydramine, trihexyphenidyl



Anticholinergic Risks vs Benefits

Benefits

- Treat EPS
 - EPS may be stigmatizing
 - Affects social interactions
 - May disrupt learning
 - Fine motor skills (writing)
 - Restlessness

Risks

- May cause sedation, cognitive dulling, memory impairment
- Worsening performance in school
- Other side effects

Which of the following antipsychotic medications is most likely to require the use of anticholinergic therapy to control or prevent EPS in a 15 year old patient with schizophrenia?

- A. Quetiapine
- B. Aripiprazole
- C. Risperidone
- D. All of the above

Study Purpose

- To characterize proportion of patients 5 to 18 y/o taking antipsychotics at UIC
- To identify clinical characteristics associated with anticholinergic use in children and adolescents
- To compare anticholinergic use across pediatric patients receiving aripiprazole, risperidone, and quetiapine

Study Design

- Retrospective chart review
- Subjects identified through UIC outpatient pharmacy prescription database
 - Prescription for antipsychotics filled between January 1, 2005 and September 1, 2008

Approved by UIC investigational review board

Study Design

Inclusion Criteria

- Age: 5 to 18 y/o
- Received at least 2 consecutive months of SGA
 - 2 consecutive refills in pharmacy database
 - Presence of medication in electronic medical record notes from visits spanning ≥60 days

Exclusion Criteria

- Age: ≥19 y/o
- Medication other than antipsychotic causing EPS
- Neurologic disorder known to elicit EPS

Study Design

- Data collected:
 - Age
 - Gender
 - Race
 - Medical and psychiatric diagnoses
 - Antipsychotic therapy
 - Anticholinergic therapy
 - Adverse events

Study Design

- Statistical Methods:
 - Summary statistics
 - Comparisons of data across antipsychotic groups using analysis of variance
 - Chi-squared analysis
 - Spearman's rho
 - Univariate and multiple logistic regression analyses

Results

235 antipsychotic trials identified (197 subjects)

Excluded:
 29 – not enough info
 11 – no records > 1 month
 7 – age
 4 – dates
 3 – non-antipsychotic causing EPS
 2 – other

179 trials (152 subjects)

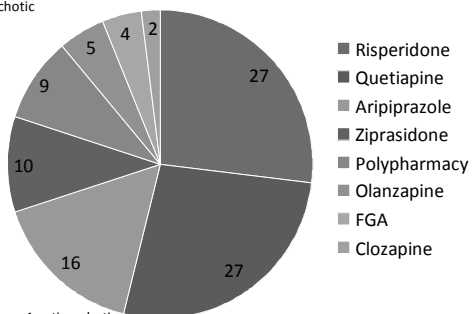
Results

Characteristic	Value
Age	14.5 yrs (5 – 18)
Gender	77 female, 75 male
Race	110 – African American 28 – Caucasian 9 – Hispanic 3 – Other 2 – Asian

Reported for 152 subjects
 For subjects with > 1 antipsychotic trial, only assessed first trial

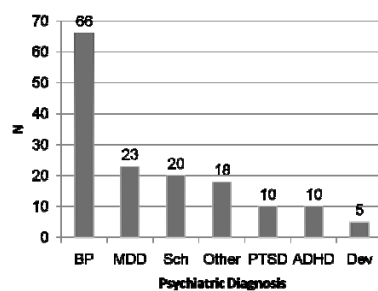
Antipsychotic Use: Baseline

% antipsychotic use



Polypharmacy: > 1 antipsychotic
 FGA: fluphenazine, chlorpromazine, haloperidol

Psychiatric Diagnoses



Comorbid Dx:
 Other (42)
 PTSD (39)
 ADHD (25)
 Dev (24)
 MDD (3)

Psych Dx: 2 (1-3)
 Other Dx: 3 (1-7)

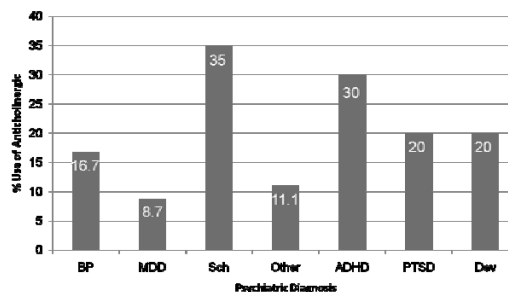
BP = bipolar disorder, MDD = major depressive disorder, Sch = schizophrenia, PTSD = post-traumatic stress disorder, ADHD = attention deficit hyperactivity disorder, Dev = developmental disorder

Anticholinergic Use

- Concomitant anticholinergic use with antipsychotic identified in 32 subjects (21%)
 - Before start of AP: n=3 (2%)
 - Simultaneous initiation: n=17 (11.2%)
 - Within 30 days after AP: n=28 (18.4%)
- Only 12 subjects (8%) with documented EPS
- Anticholinergics used:
 - Benztropine (n=32)
 - Diphenhydramine (n=1)

Anticholinergic Use

Anticholinergic Use Across Psychiatric Diagnoses

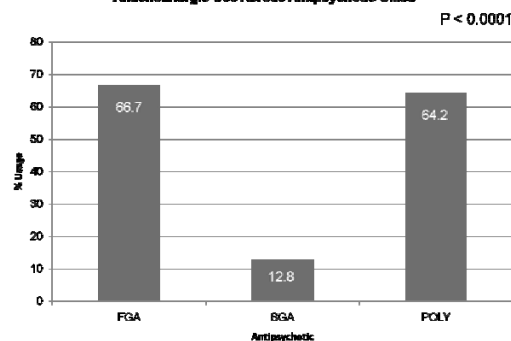


Anticholinergic Use – 30 Days

Variable	Mean \pm SD		Difference	P value
	On AC	Not on AC		
Age	14.5 \pm 2.3	14.5 \pm 2.4	0.05	0.92
BMI	27.8 \pm 6.5	28.2 \pm 6	-0.37	0.78
AP Dose	551 \pm 436	384 \pm 378	167	0.041
Total # of meds	4.5 \pm 2.3	3.5 \pm 1.8	1.04	0.0096
# psych diagnoses	2.2 \pm 0.7	1.8 \pm 0.8	0.36	0.037
# total diagnoses	3.4 \pm 1.3	3 \pm 1.4	0.34	0.23

Anticholinergic Use

Anticholinergic Use Across Antipsychotic Class

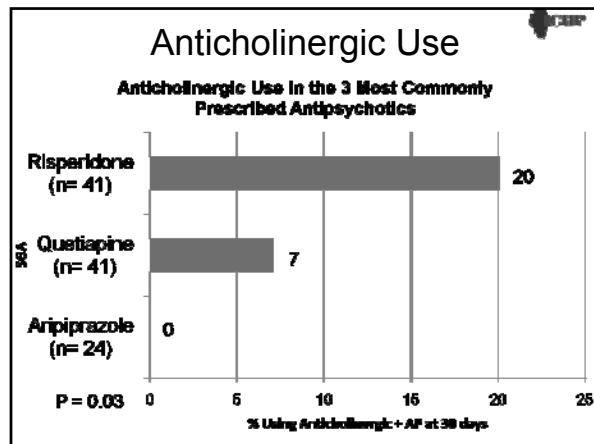


Odds Ratios – Anticholinergic for 30 days (unadjusted)

Variable	Odds Ratio	95% CI	P value
Age	1.12	(0.13, 11.7)	0.92
Gender (male)	2.56	(2.56, 2.56)	0.03
Total # psych	4.45	(1.06, 19.1)	0.04
Total # dx	2.99	(0.49, 17.9)	0.23
AP Start Class (SGA vs FGA/poly)	14.49	(14.49, 14.49)	<0.0001
Start Dose	5.14	(1.07, 24)	0.04
Daily Dose 1 mo	4.76	(1, 22.1)	0.009

Odds Ratios – Anticholinergic for 30 days (adjusted)

Variable	Odds Ratio	95% CI	P value
Gender (male)	1.52	(1.52, 1.52)	0.41
Total # psych	4.72	(0.88, 25.9)	0.07
AP Start Class (SGA vs FGA/poly)	18	(14.49, 14.49)	<0.0001
Start Dose	0.14	(0.005, 3.4)	0.24
Daily Dose 1 mo	3.8	(0.24, 51.3)	0.33



Discussion

- Substantial number of pediatric patients with documented usage of antipsychotics
- Extensive off-label usage of antipsychotics
- Majority using SGA vs. conventional agents
- Most commonly used SGA in study subjects consistent with a priori observations

Discussion

- Documented EPS in 8% of subjects
- Anticholinergic use documented in 21% of subjects
- Anticholinergic started before, after and concurrently with antipsychotics
- Use of anticholinergic at 30 days observed more frequently in subjects taking risperidone; less commonly in those taking quetiapine; not at all in those taking aripiprazole
- Controlling for confounding variables with multiple logistic regression:
 - **Antipsychotic class = key predictor**

Which of the following antipsychotic medications is most likely to require the use of anticholinergic therapy to control or prevent EPS in a 15 year old patient with schizophrenia?

- Quetiapine
- Aripiprazole
- Risperidone
- All of the above

Limitations

- Retrospective study
- Lack of documentation
 - Short duration of AP therapy
 - Indications for medications
 - Specific EPS
 - Psychiatric history
 - Majority of subjects transferred from outside facility
 - Antipsychotic medications commonly initiated prior to start date documented in UIC medical records/pharmacy database
- Other

Future Directions

- Prospective, randomized controlled studies needed to assess cause-effect relationship among variables
- Investigate predictors of anticholinergic use in pediatric patients taking antipsychotics
 - Gender, psychiatric diagnoses, antipsychotic class, dose
 - Genetic predisposition to EPS

Acknowledgements

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Questions?



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Residency Project Pearls – Anticholinergic Use in Children and Adolescents Taking Antipsychotics

Irene Hong, Pharm.D.

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Residency Project Pearls – Anticholinergic Use in Children and Adolescents Taking Antipsychotics

Irene Hong

Post-test questions

Which second-generation antipsychotic(s) is/are FDA-approved for use in children and adolescents with schizophrenia or bipolar disorder I?

- A. Olanzapine
- B. Risperidone
- C. Aripiprazole
- D. B and C
- E. All of the above

Which of the following antipsychotic-associated side-effects are commonly treated with anticholinergic therapy?

- A. Weight gain
- B. Dystonia
- C. Hyperprolactinemia
- D. Insulin resistance

Development and Implementation of a Code Blue Training Program for Pharmacists: Simulation-Based vs. Traditional Methods

Nadine Lomotan, Pharm.D.
September 12, 2009

Speaker Disclosure

The speaker has no conflict of interest to disclose.

Learning Objectives

- Describe the value of having a pharmacist as part of the code blue team
- Identify the most effective method for training pharmacists in code blue emergencies

Advocate Christ Medical Center (ACMC) and Hope Children's Hospital



- Located in Oak Lawn, IL
- Private, non-profit, 695-bed community teaching hospital
- Level I Trauma Center
- 44 full-time staff pharmacists
- 296 code blue emergencies in 2008

Multidisciplinary Code Team

- Members:
 - Medical Intensive Cardiac Care Unit (MICCU) Residents and Interns
 - Two MICCU nurses
 - Nursing Manager
 - Respiratory Therapist
 - Anesthesia Representative
 - Chaplain

Audience Poll

How many of you are at an institution where pharmacists respond to code blues?

Of the ones that participate in code blues, how many have used simulation to train your pharmacists?

Background

- Pharmacist participation in code blue events was first reported in the 1970s
 - As of 2006, only 37% of 1,125 institutions report that their pharmacists participate on a code team
- Benefits
 - Lowers mortality rates by 10.5%
 - Decreases adverse drug reactions by 33%

Bond CA, Raehl CL. *Pharmacotherapy* 2007; 27:481-93.
Bond CA, Raehl CL. *Pharmacotherapy* 2006; 26:735-47.

Background

- Many methods have been used to train pharmacists for medical emergencies
 - Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) certification
 - Continuing education programs
- No studies evaluating the use of simulation as a training method for pharmacists

Machado C, et al. *Hospital Pharmacy*. 2003;38(1):40-49.

Background

- Use of simulation technology is expanding in medical education
- Simulation places trainees in life-like situations with immediate feedback
- Several studies with medical residents have demonstrated improved proficiency in their trauma skills using patient simulators

Wayne DB, et al. *Teach Learn Med*. 2005;17(3):202-208.
Wayne DB, et al. *J Gen Intern Med*. 2006;21:251-256.
Wayne DB, et al. *Chest*. 2008;133:56-61.

ACMC's Simulation Learning Center

- Opened in August 2008
- Contains 3 hospital beds, medical equipment and 5 life-sized mannequins specially designed for medical training



ACMC's Simulation Learning Center

- Features of patient simulator:
 - Palpable pulse
 - Audible heart and breath sounds
 - Mouth speaker with patient responses
- Active telemetry monitors display real-time EKG rhythms, blood pressure, and oxygen saturation

ACMC's Simulation Learning Center

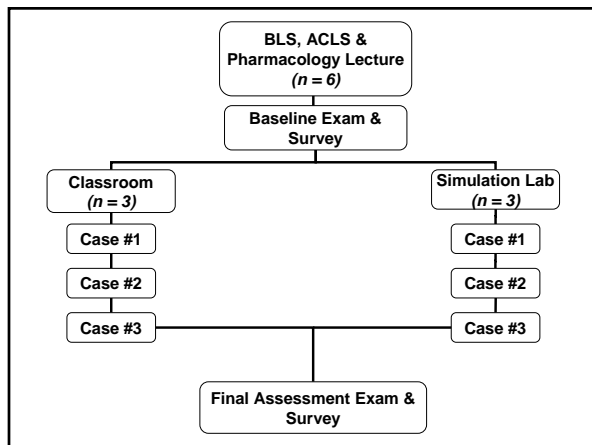


Study Objective

- To determine the effectiveness of a simulation-based code blue training program for pharmacists compared to a traditional training method in a classroom environment

Methods

- Prospective, pre- and post-test design
 - Primary measurements obtained at baseline and after the educational intervention
- IRB exempt
- Inclusion criteria
 - Must be a pharmacist currently employed at APMC
- Exclusion criteria
 - Previous ACLS training
 - Previous experience in responding to code blues



Methods

- Primary Outcome
 - Change in mean written test and survey scores
- Secondary Outcome
 - Comparison of oral competency exam scores

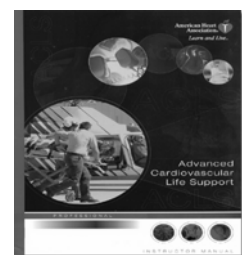
Training Program

- All study participants completed the American Heart Association (AHA)-approved BLS course
- Time Requirement = 4 hours classroom instruction



Training Program

- All study participants completed the AHA-approved ACLS course
- Time Requirement = 14 hours classroom instruction



Training Program

- ACLS Pharmacology Lecture
 - 1 hour
 - Attended by all study participants
 - Review of indications, appropriate dosing, and side effects of each resuscitation medication

Training Program

- Written baseline test
 - Completed by all study participants prior to randomization
 - Time allotted: 30 minutes
 - 17 questions
 - Multiple-choice, true/false, fill-in-the-blank
 - Content
 - Dosing, indications, administration, case-based

Training Program

- Survey (18 questions)
 - Completed by all study participants prior to randomization
 - Evaluating comfort level with various resuscitation tasks
 - 5-point Likert scale
 - 1 = Very uncomfortable to 5 = Very comfortable
 - Maximum score of 90

9. Provide drug information (ie, dosing recommendations)

1 2 3 4 5

Training Program

- Participants then randomized to train in either a simulation lab or classroom setting
 - Randomization via online software (www.randomization.com)
 - Practice 3 scenarios
 - Case 1 = Pulseless arrhythmias (asystole, pulseless electrical activity, ventricular fibrillation/tachycardia)
 - Case 2 = Bradycardia
 - Case 3 = Supraventricular tachycardia
 - Facilitated by same instructors

Training Program

- Simulation Group
 - Patient simulator programmed to mimic the 3 case scenarios
 - All 3 participants worked together during the cases
 - Participants were required to read EKG rhythms using monitors
 - Participants were able to practice preparing medications

Training Program

- Traditional Group
 - Classroom setting
 - All 3 participants worked together during the cases
 - Electrocardiographic paper strips were used
 - ED pharmacist verbally moderated changes in vital signs or physical exam
 - Participants also able to practice preparing medications

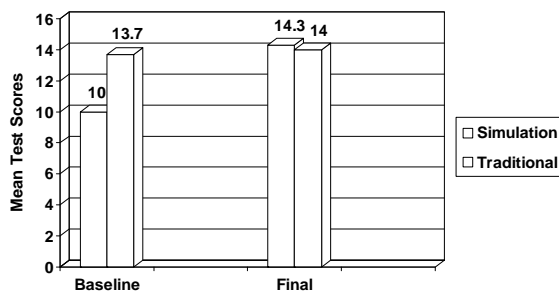
Training Program

- Oral competency exams
 - Both groups were tested during each case to check adherence to ACLS guidelines
 - Scoring system
 - 0 = not done/done incorrectly
 - 1 = done correctly
 - Case 1: maximum score of 13
 - Case 2: maximum score of 4
 - Case 3: maximum score of 6
- At completion, participants completed the same written assessment exam and survey

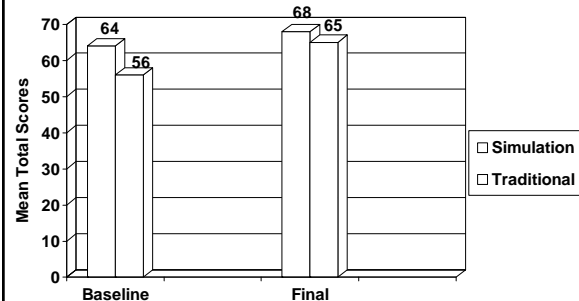
Baseline Demographic Data (n = 6)

Characteristic	Simulation Group (n=3)	Traditional Group (n=3)
Mean Age, y (Range)	36 (25-57)	46 (26-59)
Male (%)	1 (33)	2 (67)
Female (%)	2 (67)	1 (33)
Mean pharmacy experience, y (Range)	11.7 (1-32)	23.3 (4-36)

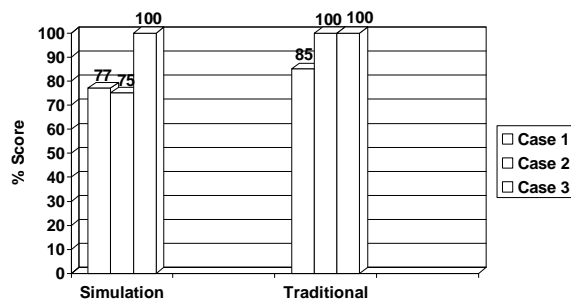
Written Assessment Exam Results (Maximum score = 17)



Comfort Level Survey Results (Maximum score = 90)



Oral Competency Exam Results



Conclusions

- Traditional group performed better overall during intervention
 - Also with a greater increase in comfort level
- Simulation group had greatest improvement in mean written test scores
- Need larger sample size to determine significance and full effect of study

Limitations

- Small sample size
 - Scheduling conflicts and lack of pharmacy coverage
 - Budget issues
- No statistics due to sample size
- Recall bias
- Lack of familiarity with simulation
- Confounding variable: years of experience

Future Directions

- An additional 18 pharmacists will be enrolled in the study
- Goal is to have all pharmacists trained
- Implementation of pharmacists as members of code blue team
- Continued training and performance reviews
- Publication of study

Special Thanks To...

- Rolla Sweis, Pharm.D., M.A.
 - ED Clinical Coordinator
- Daniel Girzadas, M.D.
 - ED Director of Simulation Learning Center

Question

- What is the approximate percentage of hospitals nation-wide that have pharmacists as part of their code blue team?
 - A. 50%
 - B. 70%
 - C. 35%
 - D. 15%

Question

- A key difference between training in a simulated environment versus in a classroom is that:
 - A. Simulation provides more interaction with a moderator than in the classroom.
 - B. New skills can only be taught in the classroom.
 - C. Simulation improves knowledge retention better than in a classroom.
 - D. All of the above.

Questions?



Nadine Lomotan
121-000-09-045-L01P

Post-Test Questions:

1. True/False. Studies have shown that pharmacist participation in code blue emergencies reduce adverse drug reactions and improve hospital mortality rates.
2. What are some barriers to incorporating pharmacists as part of the code blue team?

The Impact of Pharmacist Intervention on Stress Ulcer Prophylaxis

Jenny Niemerg, Pharm.D.
Clinical Assistant Professor
SIUE School of Pharmacy

Speaker has no conflict of interest

Objectives

- Recognize risk factors for developing stress-related mucosal disease (SRMD).
- Determine the appropriate length of therapy for stress ulcer prevention.

Case

JD is a 50 y/o AAM who has been on a ventilator in the SICU for 5 days since he was successfully resuscitated after going into cardiac arrest during a CABG procedure. You're looking over the medication list and notice the patient is receiving a simplified lansoprazole suspension.

Case

Labs: $\frac{140}{3.8} \frac{100}{25} \frac{11}{0.9} \times 122$ $\frac{13.2}{15.0} \frac{188}{36.1}$

AST 29, ALT 17, Alk P. 42
INR 0.9

Chest X-ray: left lower lobe infiltrate

Case

What risk factor for SRMD does this patient have?

- A. Mechanical ventilation >48 hours
- B. Pneumonia
- C. Myocardial infarction
- D. Acute renal failure

Therapeutic Guidelines on Stress Ulcer Prophylaxis

- American Society of Health-System Pharmacists (ASHP)
- Focus on intensive care unit patients
- Not recommended for non-ICU patients
- Reasonable to treat non-ICU patients with ≥ 1 risk factor

ASHP. Am J Health-Syst Pharm. 1999;56:347-79.

Major Risk Factors

- Independent risk factors
 - Mechanical ventilation >48h
 - Coagulopathy (PLT <50,000, or INR >1.5)

ASHP, Am J Health-Syst Pharm. 1999;56:347-79.

Major Risk Factors

- Acute renal failure
- Acute hepatic failure
- Severe head injury
- Thermal injury of >35% BSA
- Major trauma
- Spinal cord injury
- Major surgery (lasting >4 h)
- History of GI ulceration or bleeding within 1 year

ASHP, Am J Health-Syst Pharm. 1999;56:347-79.

Minor Risk Factors

≥2 of the following

- ICU stay >1 week
- Occult bleeding lasting >6 days
- High dose corticosteroids
 - (>250mg hydrocortisone or equivalent)
- Sepsis

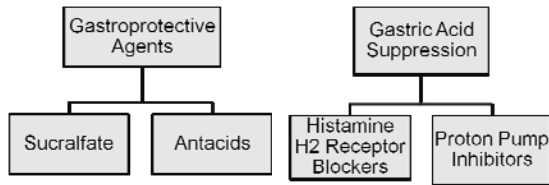
ASHP, Am J Health-Syst Pharm. 1999;56:347-79.

Case

What risk factor for SRMD does this patient have?

- A. Mechanical ventilation >48 hours
- B. Pneumonia
- C. Myocardial infarction
- D. Acute renal failure

Pharmacologic Therapy



Contraindications

No absolute contraindication to short-term prophylaxis

Potential Complications

- Inappropriate continuation of therapy
- ADR
- Dosing adjustments
- Drug interactions
- Duplication of therapy
- Polypharmacy
- Cost

Potential Complications

- Nosocomial pneumonia
- Community-acquired pneumonia (CAP)
- *Clostridium difficile* colitis
- Bone fractures

Cunningham R, et al. J Hosp Infect. 2003; 54:243-5.
Dial S, et al. JAMA. 2005; 294:2089-95.
Lowe DO. Clin Infect Dis. 2006; 43:1272-6.
Maton PN. Aliment Pharmacol Ther. 2005; 22:45-52.
Yang YX, et al. JAMA. 2006; 296:2947-53.

Case

One week later, the same patient has improved and has been extubated. What is the next step regarding SUP?

- A. Change lansoprazole to famotidine
- B. Lansoprazole should be discontinued because he no longer has risk factors for SRMD
- C. SUP should be continued for 4 weeks
- D. SUP should be continued until discharge

Appropriate use of stress ulcer prophylaxis in general medicine patients

- Primary Objective: To compare the appropriate use of SUP in general medicine patients before and after physician education
- Secondary Objective: To determine how many patients receiving SUP receive AST upon discharge
- Retrospective medication use evaluation of AST for SUP

Subjects

Inclusion criteria	Exclusion criteria
Age ≥ 18 years	Continuation of AST taken prior to admission
Admission to general internal medicine teaching service	Condition requiring AST
AST administered during hospital stay	

Methods

- Data collection
 - Pyxis reports from general medicine floors
 - One month period before and after intervention
 - Famotidine (tabs or inj.) or omeprazole (caps)
 - Paper and electronic charts
- Criteria for stress ulcer risk
 - Major and minor risk factors adapted from ASHP guidelines

Methods

- Educational intervention
 - Pharmacist delivered didactic lecture
 - Summary of ASHP therapeutic guidelines on SUP
 - Literature review
 - Epidemiology, pathophysiology, risk factors, prevention
 - Potential complications of AST

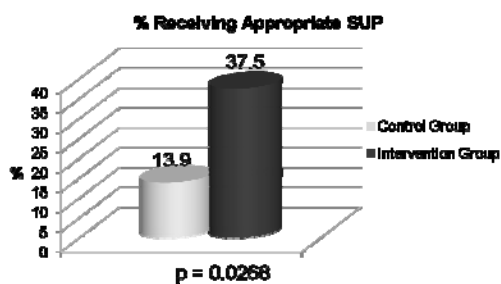
Methods

- E-mailed summary of lecture
- Laminated pocket card
- Statistical Analysis
 - Chi-square test
 - $\alpha = 0.05$

Comparison of SUP Before and After Intervention

	Control (n = 122)	Intervention (n = 54)
Received AST for SUP	72	16
Met criteria for SUP	10	6

Comparison of SUP Before and After Intervention



SUP Continued Upon Discharge

	Control (n = 72)	Intervention (n = 16)
Discharged on AST	11 (15%)	5 (31%)

Limitations

- Study design
- Charting
- No long-term follow-up
- Education provided to medical residents only
- Individual resident variability
- Generalizability

Conclusions

- Pharmacist intervention improved appropriate use of SUP in non-ICU patients
- Expand role of pharmacist-driven education
- Discharge counseling
- Target misuse of other medications

The Impact of Pharmacist Intervention on Stress Ulcer Prophylaxis

Jenny Niemerg, Pharm.D.
Clinical Assistant Professor
SIUE School of Pharmacy

Learning Objectives

1. Recognize risk factors for stress-related mucosal disease
 2. Determine the appropriate length of therapy for stress ulcer prevention
-

Patient Case

1. JD is a 50 y/o AAM who has been on a ventilator in the SICU for 5 days since he was successfully resuscitated after going into cardiac arrest during a CABG procedure. You're looking over the medication list and notice the patient is receiving a simplified lansoprazole suspension.

Labs: BUN 11, S.Cr. 0.9, AST 29, ALT 17, INR 0.9, WBC 15.0, Hgb 13.2, Hct 36.1, PLT 188

Chest X-ray: left lower lobe infiltrate

What risk factor for SRMD does this patient have?

- A. Mechanical ventilation >48 hours
- B. Pneumonia
- C. Myocardial infarction
- D. Acute renal failure

2. One week later, the same patient has improved and has been extubated. What is the next step regarding SUP?

- A. Change lansoprazole to famotidine
- B. Lansoprazole should be discontinued because he no longer has risk factors for SRMD
- C. SUP should be continued for 4 weeks
- D. SUP should be continued until discharge

I. Therapeutic Guidelines on Stress Ulcer Prophylaxis (SUP)¹

- A. American Society of Health-System Pharmacists (ASHP)
- B. Focus on intensive care unit patients
- C. Not recommended for non-ICU patients
- D. Reasonable to treat non-ICU patients with ≥ 1 risk factor

II. Risk Factors¹

- A. Major Risk Factors

Independent risk factors

1. Mechanical ventilation >48h
2. Coagulopathy
 - a. PLT <50,000
 - b. INR >1.5
3. Acute renal failure
4. Acute hepatic failure
5. Severe head injury
6. Thermal injury of >35% BSA
7. Major trauma
8. Spinal cord injury
9. Major surgery (lasting >4 h)
10. History of GI ulceration or bleeding within 1 year

- B. Minor Risk Factors: ≥ 2 of the following

1. ICU stay >1 week
2. Occult bleeding lasting ≥ 6 days
3. High dose corticosteroids (>250mg hydrocortisone or equivalent)
4. Sepsis

III. Therapy Options^{1,2,3,4,5}

- A. Volume and hemodynamic support
- B. Enteral nutrition
- C. Gastroprotective Agents
 1. Antacids
 2. Sucralfate
- D. Acid Suppressive Therapy
 1. H2 Receptor Antagonists
 2. Proton Pump Inhibitors

IV. Contraindications¹

- A. No absolute contraindications to short-term use of prophylaxis medications
- B. Potential complications
 1. Side effects
 2. Dosing adjustments
 3. Polypharmacy
 4. Cost
 5. Inappropriate continuation of therapy after discharge
 6. Duplication of therapy

V. Complications^{6,7,8,9,10,11,12}

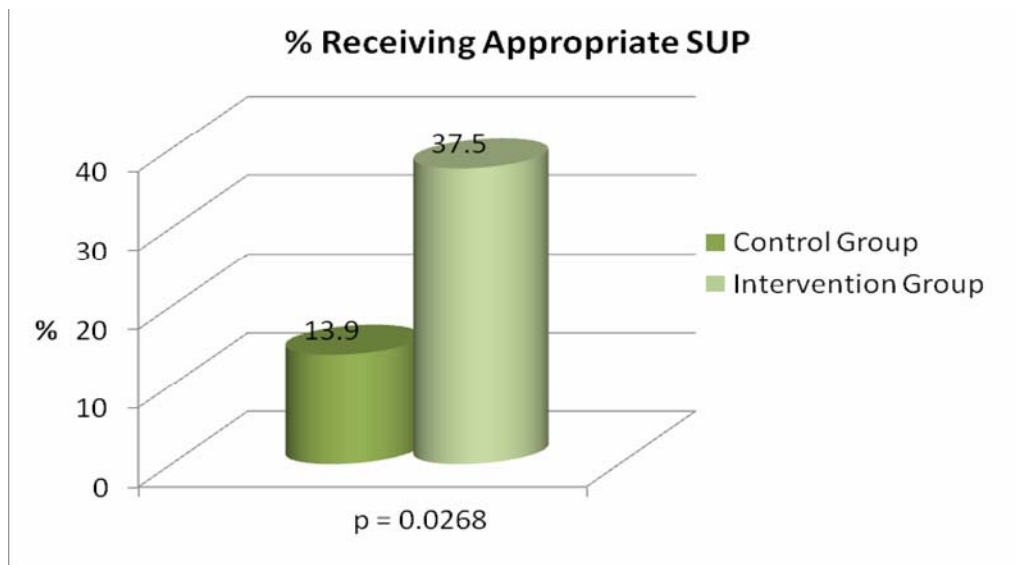
- A. Nosocomial pneumonia
- B. Community-acquired pneumonia (CAP)
- C. *Clostridium difficile* colitis
- D. Bone fractures

VI. Pharmacist Intervention

Title	Appropriate use of stress ulcer prophylaxis in general medicine patients
Study Design	Retrospective medication use evaluation (MUE)
Hypothesis	Physician education will decrease the frequency of inappropriate SUP
Outcomes	Number of patients receiving appropriate AST for SUP
Methods	<ul style="list-style-type: none"> • Inclusion: Age ≥ 18 years, admission to general internal medicine teaching service, AST administered during hospital stay • Exclusion: Continuation of AST taken prior to admission, health condition requiring AST (GERD, PUD, gastrointestinal bleeding, etc.) • Data collection <ul style="list-style-type: none"> -Pyxis reports of famotidine tablets or injection, or omeprazole capsules administered to any patient on general medicine floors for one month before and after physician education -Paper and electronic charts • Criteria for stress ulcer risk <ul style="list-style-type: none"> -Major Risk Factors: mechanical ventilation >48h, coagulopathy, PLT <50,000, INR >1.5, acute renal failure, acute hepatic failure, severe head injury, thermal injury of >35% BSA, major trauma, spinal cord injury, major surgery (lasting >4 hours), history of GI ulceration or bleeding within 1 year -Minor Risk Factors- ≥ 2 of the following: ICU stay >1 week, occult bleeding lasting ≥ 6 days, high dose corticosteroids (>250mg hydrocortisone or equivalent), sepsis • Educational intervention <ul style="list-style-type: none"> -Pharmacist delivered didactic lecture on stress ulcers: ASHP therapeutic

	<p>guidelines on stress ulcer prophylaxis, literature review, epidemiology, pathophysiology, risk factors, prophylactic treatment, complications of AST</p> <ul style="list-style-type: none"> -E-mailed summary of the lecture -Pocket card distributed to all medical residents
Statistical Analysis	<ul style="list-style-type: none"> • $\alpha = 0.05$ • Chi-square test
Results	<ul style="list-style-type: none"> • Figure 1 • Prior to intervention <ul style="list-style-type: none"> -72 patients received AST for SUP -10 patients (13.9%) met criteria for SUP -11 patients (15%) discharged on AST • Post-intervention <ul style="list-style-type: none"> -16 patients received AST for SUP -6 patients (37.5%) met criteria for SUP -5 patients (31%) discharged on AST
Limitations	<ul style="list-style-type: none"> • Study design • Charting • No long-term follow-up • Education provided to medical residents only • Individual resident variability • Generalizability
Conclusions	<ul style="list-style-type: none"> • Pharmacist intervention improved appropriate use of SUP in non-ICU patients

Figure 1: Percentage of general medicine patients receiving SUP



VII. Conclusions

- Pharmacist intervention improved appropriate use of SUP in non-ICU patients
- Expand role of pharmacist-driven education
- Discharge counseling
- Target misuse of other medications

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Post-test Questions
J. Niemerg
09-045

1. Which of the following are the 2 independent major risk factors for stress ulcers?
 - a. Thermal injuries over >35% of BSA and ICU stay >7 days
 - b. Major surgery and occult bleeding lasting 6 days
 - c. High dosage corticosteroids and sepsis
 - d. Mechanical ventilation lasting >48 hours and coagulopathy
2. How long should a patient receive stress ulcer prophylaxis?
 - a. 3 months after the patient no longer has a risk factor
 - b. Lifetime
 - c. Once risk factors are no longer present, stress ulcer prophylaxis should be discontinued
 - d. 3 days