Title of Session: Research Highlights from the ASHP Foundation
Program #: 204-000-06-227-L01
Presentation Date and Time: Tuesday, December 5, 2006, 0800 to 1100

Presentation Title:

Collaborative Pharmacist and Nurse Before/After Study to Evaluate Patient Safety Using Electronically Standardized Admission and Discharge Medication Reconciliation in a Tertiary Care Hospital

Joan S. Kramer, Pharm.D., BCPS, Clinical Research and Hospital Medicine Specialist, Wesley Medical Center, Wichita, KS (PI-85)

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Dr. Joan Kramer is the Clinical Research and Hospital Medicine Specialist at Wesley Medical Center in Wichita, KS. Dr. Kramer completed her doctor of pharmacy degree at The University of Kansas and an ASHP-accredited primary care residency at the James A. Haley VA in Tampa, FL. Dr. Kramer's commitment to education involves precepting pharmacy students and residents in hospital medicine and oncology. Her research includes immunosuppressive medication compliance, mycophenolate mofetil pharmacokinetic studies, vaccination, deep vein thrombosis prophylaxis and medication reconciliation. Her professional memberships include ASHP, ACCP, AST, KPHA and KSHP.

Presentation Outline:

Collaborative Pharmacist and Nurse Before/After Study to Evaluate Patient Safety Using Electronically Standardized Admission and Discharge Medication Reconciliation in a Tertiary Care Hospital

I. Significance of Medication Reconciliation
II. Goals
   a. Feasibility
   b. Standardized system

c. Targeted population
d. Collaborative – Pharmacist/Nurse

III. Methods
a. Prospective Before/After design
b. Potential subjects identified through the use of trigger questions
c. Statistical analysis
d. Inclusion/exclusion criteria
e. Medication reconciliation process
f. Report development

IV. Results
a. Patient enrollment
b. Demographics
c. Admission medication reconciliation
d. Before phase vs. After phase nurse interventions
e. After phase vs. Before phase pharmacist interventions
f. After phase pharmacist time motion results
g. Physician participation
h. Patient satisfaction

V. Challenges

VI. Experience of medication reconciliation implementation

Abstract:
PI-85

<T1> Collaborative pharmacist and nurse before/after study to evaluate patient safety using electronically standardized admission and discharge medication reconciliation in a tertiary care hospital

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<AB> **Background:** Study goals were to implement and evaluate the feasibility and impact of a collaborative, standardized, targeted, electronic-based, pharmacist- and nurse-conducted admission and discharge medication reconciliation documentation process. **Methods:** This prospective Before/After study was conducted on a 48-bed adult general medical unit. Potential patients were identified through a set of trigger questions the nurse asked the patient during the admission assessment. Before phase: admission medication histories and discharge medication counseling followed standard care processes. After phase: pharmacists obtained the patient medication history and collaborated with nurses, using electronic admission and discharge medication

reconciliation. The Clinical Patient Care System was programmed to allow pharmacists to electronically document medications for reconciliation. **Results:** Four reports were developed and implemented to assist with medication reconciliation. One hundred forty-seven patients were enrolled during the Before phase and 136 patients in the After phase. In the Before phase, nurses completing the patient admission medication history identified more incomplete medication orders (p=0.0016) and medication dose changes (p=0.0009). In the After phase, pharmacists completed more dose changes (p=0.0184), documented a greater number of allergies (p<0.0001) and called a total of 50 retail pharmacies to obtain medication information for admission reconciliation. Prescribers completed both admission and discharge medication reconciliation in the After phase for 78 patients (56.9%). **Conclusion:** Patients who had their medications electronically reconciled reported a statistically significant (p=0.001) greater understanding of what medications should be continued after discharge, how and when to take their medications and potential side effects.

<AB> Learning objectives:

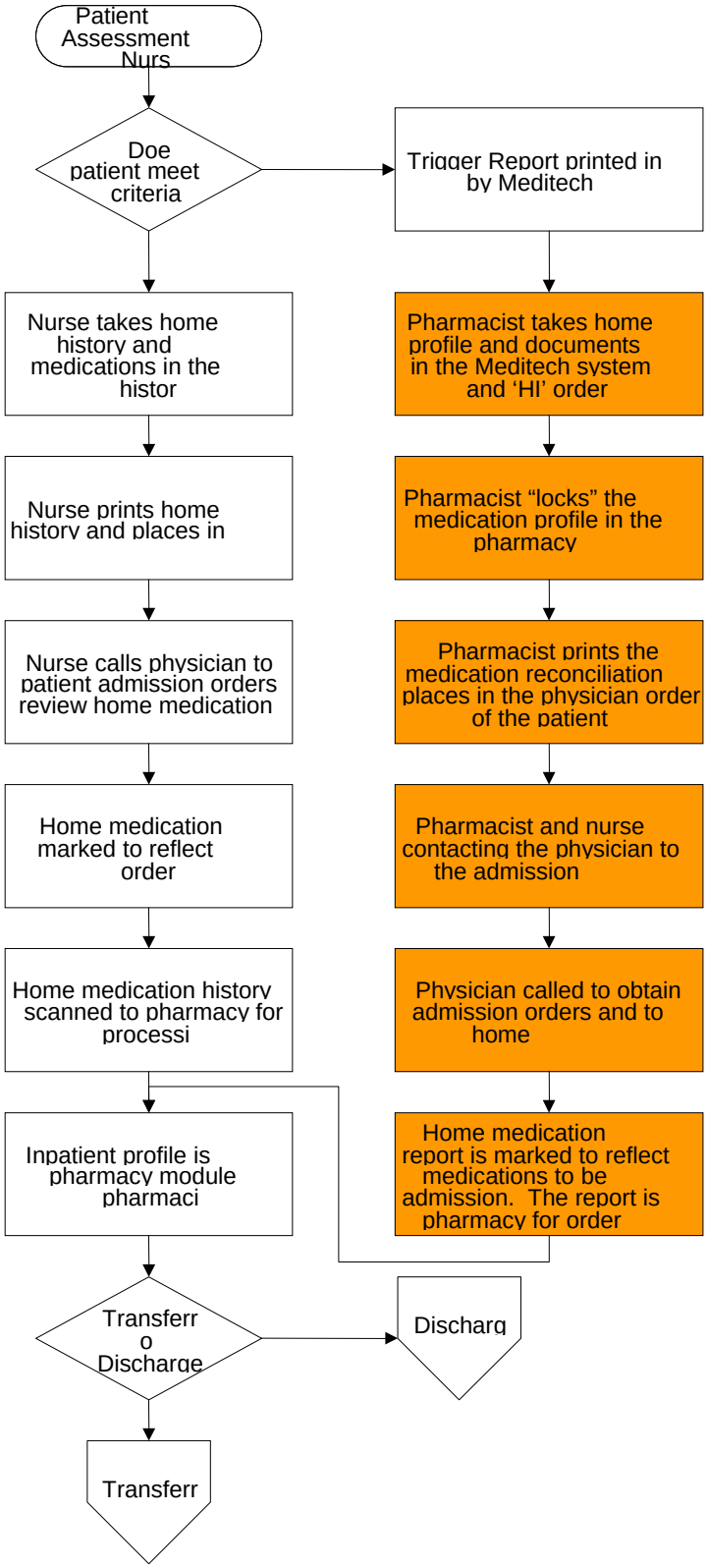
1. Explain the results of patients surveyed who had medication reconciliation documentation process completed during hospitalization.

<AB> Self-assessment questions:

1. True or False. Patients who received a Patient Discharge Medication Profile report at discharge did have a good understanding their medications, including when and how to take their medications and potential side effects.

<AB> Answers:
1. True

Additional Handout Material:
Admission and Discharge Medication Reconciliation Process



**** TRIGGER***

- ❑ Do you > 7 medications (total prescriptions, over-the-counter, product
- ❑ Do you have
- ❑ Do you have chronic obstructive disease
- ❑ Do you have
- ❑ Do you have any cardiac condition infarction (MI), congestive heart arrhythmias, hypertension
- ❑ Were you admitted with an reactio
- ❑ Do you need vaccinated pneumococcal disease (i.e. never Pneumococcal ®) received it more than 5
- ❑ Do you need to be vaccinated influenza (e.g. not yet vaccinated
- ❑ Do you have more than 3 allergie
- ❑ Do you have medications that identifie

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Slides: See PowerPoint file

Collaborative Pharmacist and Nurse Before/After Study to Evaluate Patient Safety Using Electronically Standardized Admission and Discharge Medication Reconciliation in a Tertiary Care Hospital

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Wesley Medical Center

Wesley Medical Center
Wichita, Kansas
www. wesleymc. com

- Full scope of inpatient and outpatient diagnostic and treatment services
- Medical staff of 700 physicians
- > 2,000 other healthcare providers and support staff
- Licensed 760-bed, 102 bassinet teaching hospital
- Serves Wichita, much of Kansas and parts of northern Oklahoma.

WESLEY
MEDICAL CENTER

Medication Reconciliation

Significance

- 60% of medication errors occur during transitions in care
- 5% of U.S. hospitals utilize pharmacists to obtain medication histories
- Joint Commission for the Accreditation of Healthcare Organizations requirement

Study Goals

- Feasibility
- Standardized system
- Targeted population
- Collaborative – Pharmacist/Nurse

Methods

- Prospective Before/After design
- 48-bed adult general medical unit
- Potential subjects identified by trigger questions
- Approved by local scientific review committee and Institutional Review Board

Methods

Statistical Analysis

- Categorical data: Fisher's Exact Test
- Continuous measures: unpaired t test
- Statistical significance set a priori at $p<0.05$

Methods

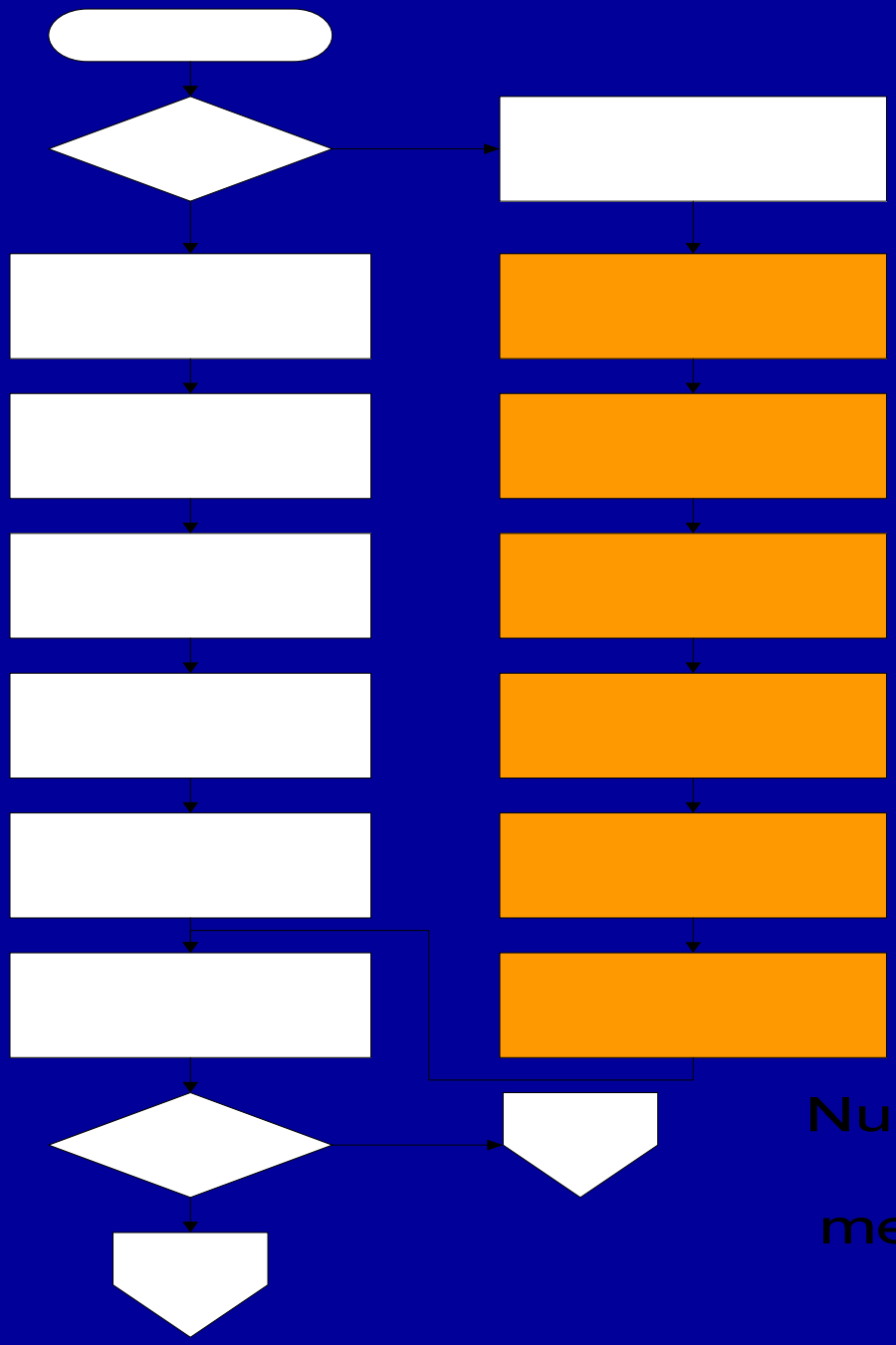
Inclusion criteria

- Admission to study unit
- ≥ 18 years old
- Trigger question criteria met
- Signed consent (later verbal)

Exclusion criteria

- Nursing medication history > 2 hours post-admission
- 23-hour observation patients
- Transfer to or from another unit
- Intentional drug overdose
- Patients unusable to provide content

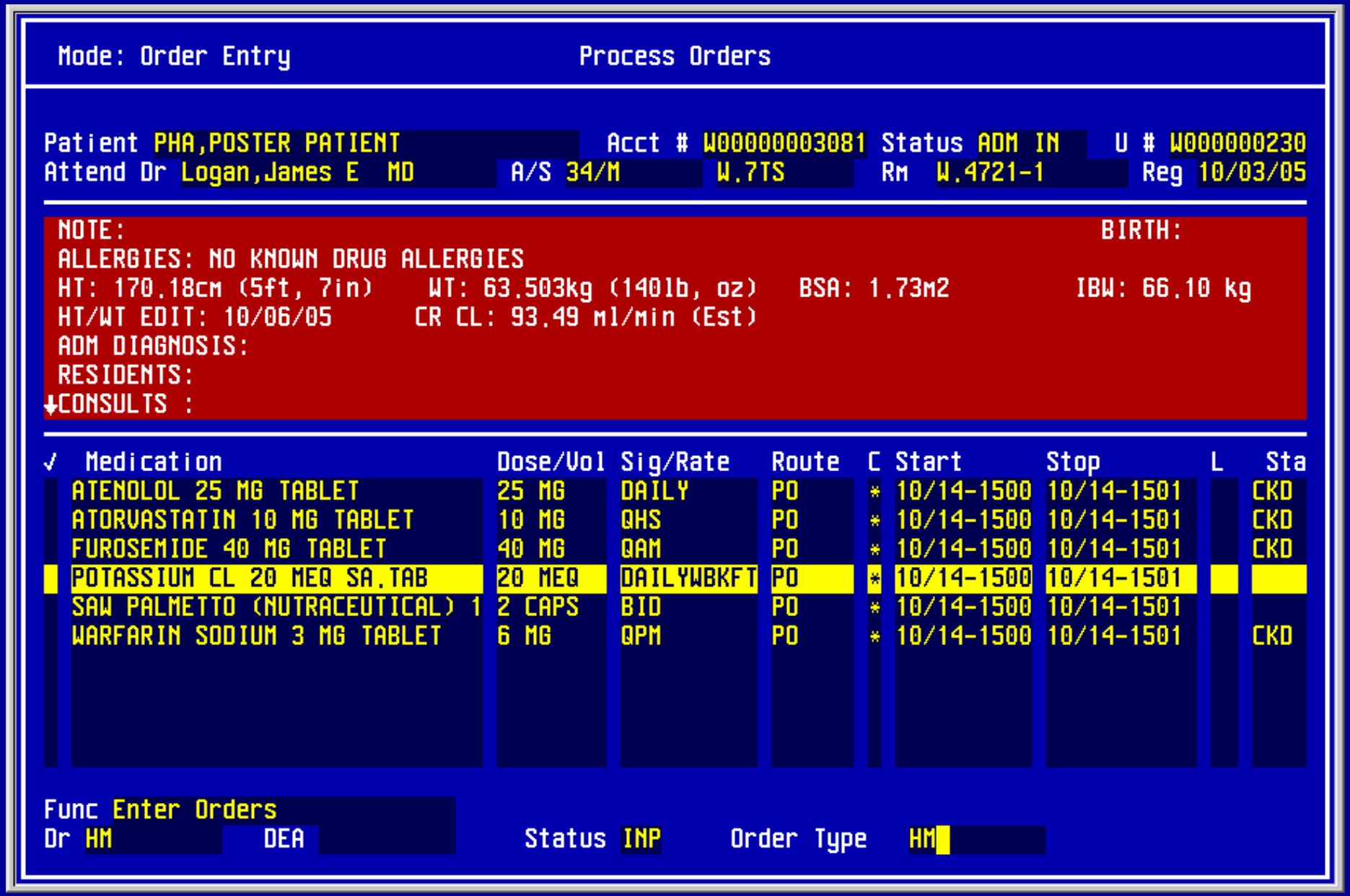
Reconciliation Process

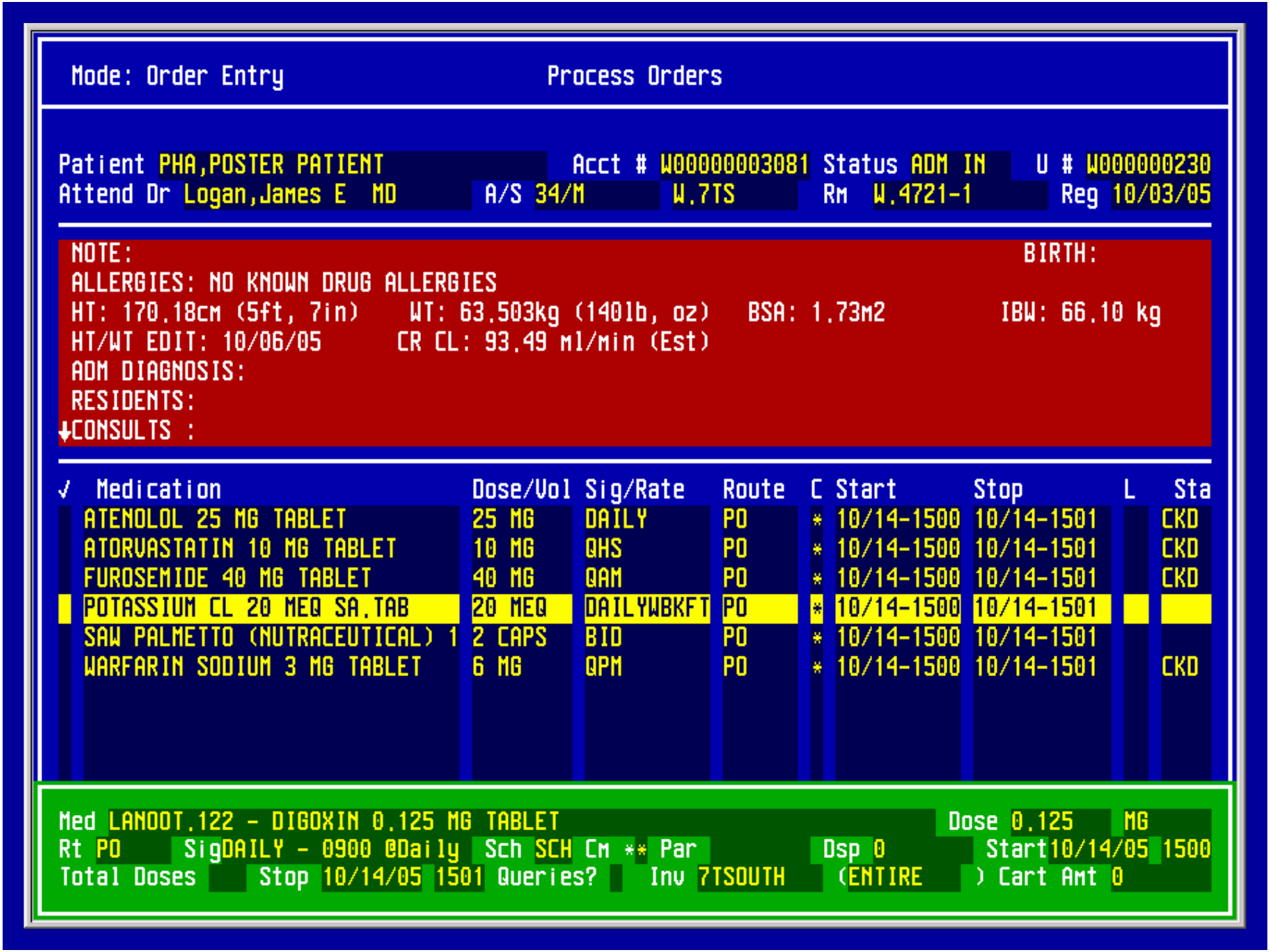


Patient Admission

Nurse takes home medication history and documents medications in the admission history.

Pharmacist Order Entry Process





Mode: Order Entry Process Orders

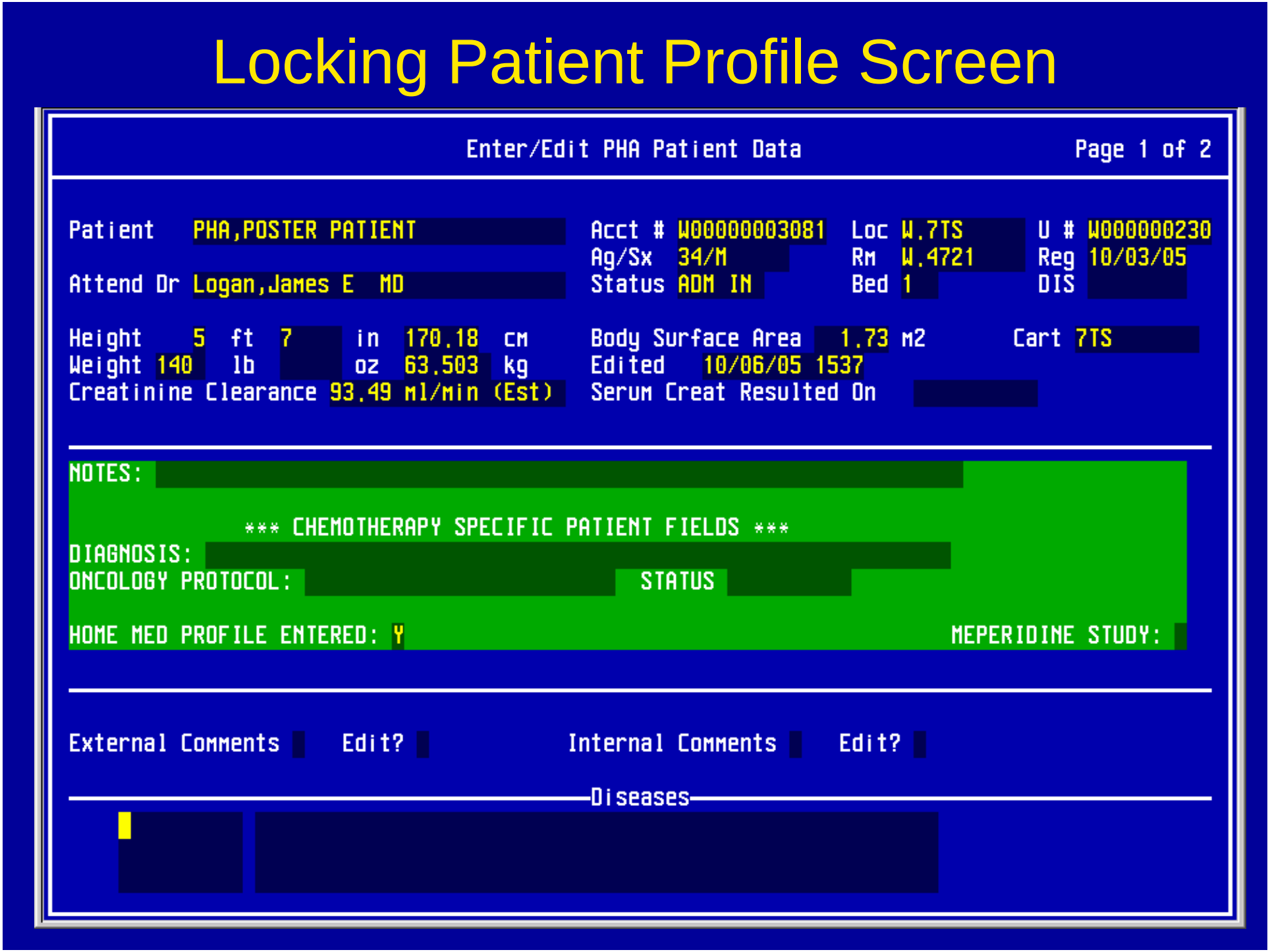
Patient PHA,POSTER PATIENT Acct # W00000003081 Status ADM IN U # W000000230
Attend Dr Logan,James E MD A/S 34/M W.7TS Rm W.4721-1 Reg 10/03/05

NOTE: BIRTH:
ALLERGIES: NO KNOWN DRUG ALLERGIES
HT: 170.18cm (5ft, 7in) WT: 63.503kg (140lb, oz) BSA: 1.73m2 IBW: 66.10 kg
HT/WT EDIT: 10/06/05 CR CL: 93.49 ml/min (Est)
ADM DIAGNOSIS:
RESIDENTS:
CONSULTS :

✓	Medication	Dose/Vol	Sig/Rate	Route	C	Start	Stop	L	Sta
	ATENOLOL 25 MG TABLET	25 MG	DAILY	PO	*	10/14-1500	10/14-1501		CKD
	ATORVASTATIN 10 MG TABLET	10 MG	QHS	PO	*	10/14-1500	10/14-1501		CKD
	FUROSEMIDE 40 MG TABLET	40 MG	QAM	PO	*	10/14-1500	10/14-1501		CKD
	POTASSIUM CL 20 MEQ SA.TAB	20 MEQ	DAILYWBKFT	PO	*	10/14-1500	10/14-1501		
	SAW PALMETTO (NUTRACEUTICAL) 1	2 CAPS	BID	PO	*	10/14-1500	10/14-1501		
	WARFARIN SODIUM 3 MG TABLET	6 MG	QPM	PO	*	10/14-1500	10/14-1501		CKD

Med LANOOT,122 - DIGOXIN 0.125 MG TABLET Dose 0.125 MG
Rt PO SigDAILY - 0900 @Daily Sch SCH Cm ** Par Dsp 0 Start10/14/05 1500
Total Doses Stop 10/14/05 1501 Queries? Inv 7TSOUTH (ENTIRE) Cart Amt 0

Locking Patient Profile Screen



RUN DATE: 10/14/05
RUN TIME: 1513
RUN USER: WMEN.PHA5

Wesley Medical Center Pharmacy *TEST*
HOME MED PHARMACY PROFILE

*** HOME MED RECONCILIATION REPORT ***

*** PERMANENT PART OF PATIENT RECORD PLACE IN PHYSICIAN <<<ORDERS SECTION>>> ***

PHA,POSTER PATIENT W00000003081

4-721-1 W.7TS
ADM: Logan,James E MD
ALLERGIES:

ADMIT DATE: 10/03/05
BSA: 1.73m2

AGE/SEX: 34/M
HEIGHT: 170.18cm
WEIGHT: 63.502932kg

ORDER #	DRUG NAME/ORDER DESCRIPTION	DOSE	ROUTE	FREQUENCY
00000231	**ATENOLOL 25 MG TABLET** COMMENTS: FOR HYPERTENSION THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	25 MG	PO	DAILY
00000230	**ATORVASTATIN 10 MG TABLET** COMMENTS: For Hypercholesterolemia ******NON-FORMULARY DRUG ******	10 MG	PO	QHS
00000243	**DIGOXIN 0.125 MG TABLET** COMMENTS: THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	~~0.125 MG~~ 0.25mg	PO	DAILY
00000234	**FUROSEMIDE 40 MG TABLET** COMMENTS: For Diuresis THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	40 MG	PO	QAM
00000235	**POTASSIUM CL 20 MEQ SA.TAB** COMMENTS: For Potassium Replacement	20 MEQ	PO	DAILYWBKFT
00000233	**SAW PALMETTO (NUTRACEUTICAL) 1 EA EACH** COMMENTS: FOR BPH ***** PATIENT'S OWN MED ***** *****NON-FORMULARY NUTRACEUTICAL***** DOSE INSTRUCTIONS: 2 CAPS ***** PATIENT'S OWN MED ***** ***NON-FORM NUTRACEUTICAL***	SEE DOSE INSTRUCTIONS	PO	BID Discontinue
00000244	**VANCOMYCIN 1 GM IN D5W 250 ML** COMMENTS: Treatment or Prevention of Infection INFUSE OVER 1 HOUR ACTIVATE PRIOR TO USE!!!!!	250 MLS/HR	IV	Q12H
00000232	**WARFARIN SODIUM 3 MG TABLET** COMMENTS: For Anticoagulation RN: IF THIS IS NEW DRUG TREATMENT FOR THIS PATIENT, CONSULT DIETICIAN.	~~3 MG~~ 3mg	PO	QPM

PHYSICIAN SIGNATURE: Physician Signature DATE: Today

This profile is part of the PERMANENT PATIENT MEDICAL RECORD
DO NOT DISCARD!!!

DISCHARGE MEDICATION RECONCILIATION REPORT

*** PERMANENT PART OF THE PATIENT'S RECORD -- PLACE IN THE <<<ORDERS SECTION>>> ***

PHA,POSTER PATIENT W00000003081 AGE/SEX: 34/M

4-721-1 W.7TS ADMIT DATE: 10/03/05 HEIGHT: 170.18cm

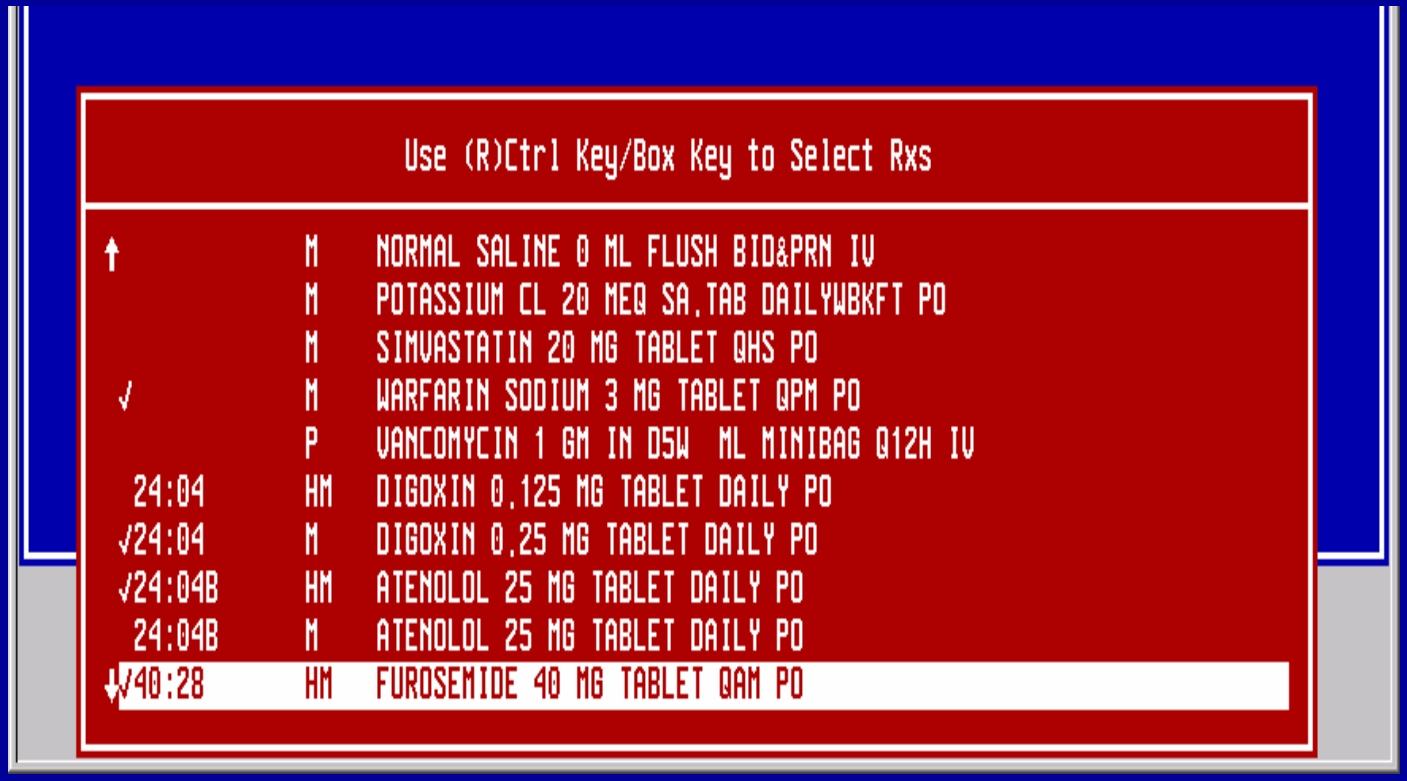
ADM: Logan,James E MD BSA: 1.73m2 IBW: kg WEIGHT: 63.502932kg

ALLERGIES: NO KNOWN DRUG ALLERGIES

TO DISCONTINUE A LISTED ORDER: Mark a line through the order and write 'DC' beside it.
TO CHANGE A LISTED ORDER: DC it (as above) and write the new order in 'ADDITIONAL ORDERS'.

STATUS	DRUG NAME/ORDER DESCRIPTION	DOSE	ROUTE	FREQUENCY
8:12.28	MISCELLANEOUS ANTIBACTERIALS			
HOME	VANCOMYCIN 1 GM IN D5W 250 ML	250 MLS/HR	IV	Q12H
	CHANGE TO:			
	LABEL COMMENTS: Treatment or Prevention of Infection			
20:12.04	ANTICOAGULANTS			
HOME	WARFARIN SODIUM 3 MG TABLET	6 MG	PO	QPM
	CHANGE TO:			
	LABEL COMMENTS: For Anticoagulation			
24:04	CARDIAC DRUGS			
HOME	DIGOXIN 0.125 MG TABLET	0.125 MG	PO	DAILY
	CHANGE TO:			
	LABEL COMMENTS: THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL			
24:04B	BETA BLOCKERS			
HOME	ATENOLOL 25 MG TABLET	25 MG	PO	DAILY
	CHANGE TO:			
	LABEL COMMENTS: FOR HYPERTENSION			
24:06	ANTILIPEMIC AGENTS			
HOME	ATORVASTATIN 10 MG TABLET	10 MG	PO	QHS
	CHANGE TO:			
	LABEL COMMENTS: For Hypercholesterolemia			
INPT	SIMVASTATIN 20 MG TABLET	20 MG	PO	QHS
	CHANGE TO:			
	LABEL COMMENTS: For Hypercholesterolemia			
40:12	REPLACEMENT PREPARATIONS			
HOME	POTASSIUM CL 20 MEQ SA.TAB	20 MEQ	PO	DAILYWBKFT
	CHANGE TO:			
	LABEL COMMENTS: For Potassium Replacement			
INPT	POTASSIUM CL 20 MEQ SA.TAB	20 MEQ	PO	DAILYWBKFT
	CHANGE TO:			
	LABEL COMMENTS: For Potassium Replacement			

Discharge Medication Selection



PATIENT DISCHARGE MEDICATION PROFILE

***** GIVE COPY TO THE PATIENT *****

PHA,POSTER PATIENT W00000003081 **AGE/SEX:** 34/M

4-721-1 W.7TS **ADMIT DATE:** 10/03/05 **HEIGHT:** 170.18cm

ADM: Logan,James E MD **BSA:** 1.73m2 **WEIGHT:** 63.502932kg

ALLERGIES: NO KNOWN DRUG ALLERGIES

DRUG NAME/ORDER DESCRIPTION	DOSE	ROUTE	FREQUENCY
ATORVASTATIN 10 MG TABLET (LIPITOR) **COMMENTS:** For Hypercholesterolemia ******NON-FORMULARY DRUG ******	10 MG	ORAL	AT BEDTIME
POTASSIUM CL 20 MEQ SA.TAB (K-DUR) **COMMENTS:** For Potassium Replacement	20 MEQ	ORAL	DAILY WITH BREAKFAST
WARFARIN SODIUM 3 MG TABLET (COUMADIN) **COMMENTS:** For Anticoagulation RN: IF THIS IS NEW DRUG TREATMENT FOR THIS	3 MG	ORAL	EVERY AFTERNOON
DIGOXIN 0.25 MG TABLET (LANOXIN) **COMMENTS:** FOR ATRIAL FIBRILLATION THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	0.25 MG	ORAL	DAILY
ATENOLOL 25 MG TABLET (TENORMIN) **COMMENTS:** FOR HYPERTENSION THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	25 MG	ORAL	DAILY
FUROSEMIDE 40 MG TABLET (LASIX) **COMMENTS:** For Diuresis THIS MEDICATION MAY INCREASE PATIENT RISK OF FALL	40 MG	ORAL	EVERY MORNING
FAMOTIDINE 20 MG TABLET (PEPCID) **COMMENTS:** FOR GERD *** *NURSE PLEASE PRINT LEXICOMP PATIENT INSTRUCTION SHEET FOR THIS MEDICATION* ***	20 MG	ORAL	EVERY 12 HOURS STANDARD

This profile is a part of the PERMANENT PATIENT MEDICAL RECORD
DO NOT DISCARD!!!

PHA.PAT.zcus.wmc.dismiss.pt.profile.jcr

Results: Patient Enrollment

Before Phase

- 147 patients enrolled
- September 2004 through February 2005

After Phase

- 136 patients enrolled
- May 2005 through October 2005

Results: Demographics

After vs. Before Phase Trigger Question Results

- More patients identified with ≥ 7 medications ($p<0.0001$; CI 0.5284 - 0.7604)
- History of CAD ($p<0.0001$; CI 0.3274 - 0.5444)

Results: Admission Medication Reconciliation

After vs. Before Phase Number of Medications

- Prescription medications
  (6.2 ± 4.3 vs. 4.9 ± 3.5; p=0.0059)
- OTC medications
  (2 ± 1.9 vs. 1 ± 1.6, p=0.0001)
- Total medications
  (8.3 ± 5.2 vs. 6 ± 4, p=0.0001)

Results: Before Phase vs. After Phase Nurse Interventions

- Incomplete medication orders (24 in 8 patients vs. 6 in 4 patients, p=0.0016)
- Medication dose changes (11 in 7 patients vs. 0 in 0 patients, p=0.0009)
- 59 interventions vs. 27 interventions (p=0.0003)

Results: After Phase vs. Before Phase Pharmacist Interventions

- Greater number of dose changes (15 in 12 patients vs. 5 in 3 patients, p=0.0184)
- Greater number of allergies identified (24 allergies in 17 patients vs. 0 in 0 patients, p<0.0001)
- 50 pharmacies contacted
- 48 interventions vs. 24 interventions (p=0.0003)

Results: After Phase Pharmacist Time Motion Results (minutes)

- Admission medication history 12.9 ± 9.34
- Medication clarifications 1.18 ± 5.84
- Interventions 1.4 ± 2.25
- *Self-documented* time 16.3 ± 17.5

Results: After Phase Physician Participation

- Admission and discharge reconciliation completed for 78 patients (57.4%)
- Admission reconciliation not completed for 10 patients (7.3%)
- Discharge medication reconciliation not completed for 34 patients (25%)

Results: Patient Satisfaction

- After phase reported improved understanding of discharge medication:
  - Continuation (p=0.007)
  - Dose and route (p=0.007)
  - Frequency and special instructions (p=0.006)
  - Side effects (p=0.001)
  - Overall understanding (p=0.001)
- More patients remembered speaking to a pharmacist in the After phase (63% vs. 8%, p<0.001)

Challenges

- Adequately staffed pharmacist personnel
- Prescriber collaboration
- Technical support availability

Medication Reconciliation: What We Learned

- Required teamwork and communication
- Intensive time commitment
- After phase patients reported a greater understanding of their medications
  - Attention to detail
  - Opportunity for additional patient medication education

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