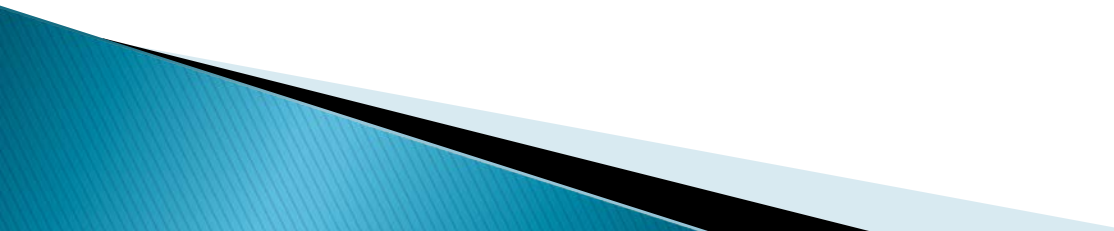


# Expert Review



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# Acknowledgements

- ▶ AMIA Usability Task Force
  - ▶ HIMSS Usability Task Force
  - ▶ Jiajie Zhang, Amy Franklin, Juhan Sonin – original learning module creators
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# Overview

- ▶ Expert Review is a methodology based on known user interface design best practice to identify departures from good design principles and the level of severity for the departures
- ▶ Also known as Heuristic Evaluation

# Learning Objectives

- ▶ Understand benefits and limitations of expert review
- ▶ Describe usability heuristics/guidelines
- ▶ Perform Expert Review

# What is Expert Review?

- ▶ An easy to use, easy to learn, discount usability evaluation technique
  - used to identify major usability problems of a product
  - in a timely manner with reasonable cost.
- ▶ Does not indicate what is right about an interface

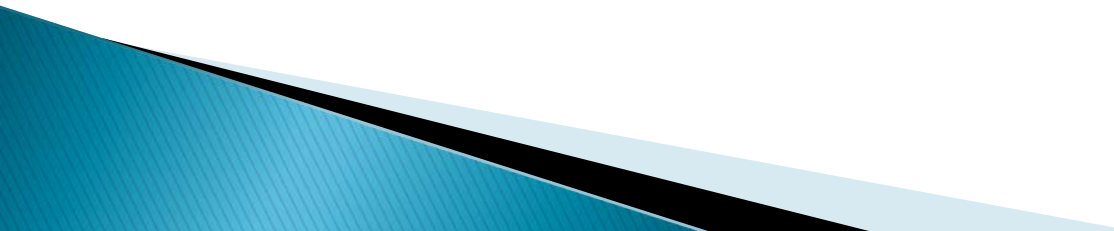
# What is Expert Review?

- ▶ Procedure
  - 2–5 evaluators independently check a system for violations to well-known usability guidelines
  - The potential usability problems are merged into a single master list
  - Evaluators independently rate the severity of each problem
- ▶ Additional Step: Evaluators suggest solutions for each problem

# Best Timing in the Software Development Lifecycle

- ▶ In the middle of the development cycle – immediately after any mockups, prototypes, or early versions of products.

# Expert Review (NISTIR 7804)

- ▶ Multi-disciplinary team of human factors experts and clinical experts compare the EHR's user interface design to scientific design principles and standards, and identify design issues that could lead to safety risks.
- 



# Usability Guidelines

- ▶ Detailed list of guidelines
  - Page 65–87 in NISTIR 7804
  
- ▶ Methodology
  - Page 32–35 in NISTIR 7804

# 1. Use errors in EHRs

- a. Patient Identification Error:
- b. Mode errors
- c. Data accuracy error
- d. Data availability error
- e. Interpretation error
- f. Recall error
- g. Feedback error
- h. Data integrity error

# General Principles

2. Visibility of system status
3. Match between System and the Real World
4. User Control and Freedom
5. Consistency and Standards
6. Help Users Recognize, Diagnose and Recover from Errors
7. Error Prevention

# General Principles




8. Recognition rather than recall
9. Flexibility and Minimalist Design
10. Aesthetic and Minimalist Design
11. Help and Documentation
12. Pleasurable and Respectful Interaction with the User
13. Privacy

## 2. Visibility of System Status

The system should always keep the user informed about what is going on, through appropriate feedback within reasonable time.


# 2. Visibility of System Status

FreeMED v0.8.5   System ▾   Main ▾   User ▾   Patients ▾   Notify ▾   Help   Prescription

Mark M. Twain   PAT1217        175 year(s) old, DOB 30 Nov, 1835

---

Prescription   Note

Starting Date  

Physician  ▾

▾

Drug  ▾

▾

Disp  ▾

Sig  ▾

Refill  ▾

Substitution  ▾

Original Prescription  ▾

# 3. Match between System and the Real World

The system should follow the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms.

Follow real-world conventions, making information appear in a natural and logical order

# 3. Match between System and the Real World

FreeMED v0.8.5    System ▾    Main ▾    User ▾    Patients ▾    Notify ▾    Help    Manage Patient

### Medications

[View/Manage](#) | [Add](#) | [Review All](#)

Drug	Dosage	Method	Reviewed	Action
Paroxetine	1		10/26/2010	
paracetamol	take three tab	orale	10/26/2010	
<u>Lipitor</u>	40 mg tablet	Take one tablet daily	10/26/2010	
Atenolol	50 mg tablet	oral	10/26/2010	
	1000 mg BID	by mouth	06/09/2011	

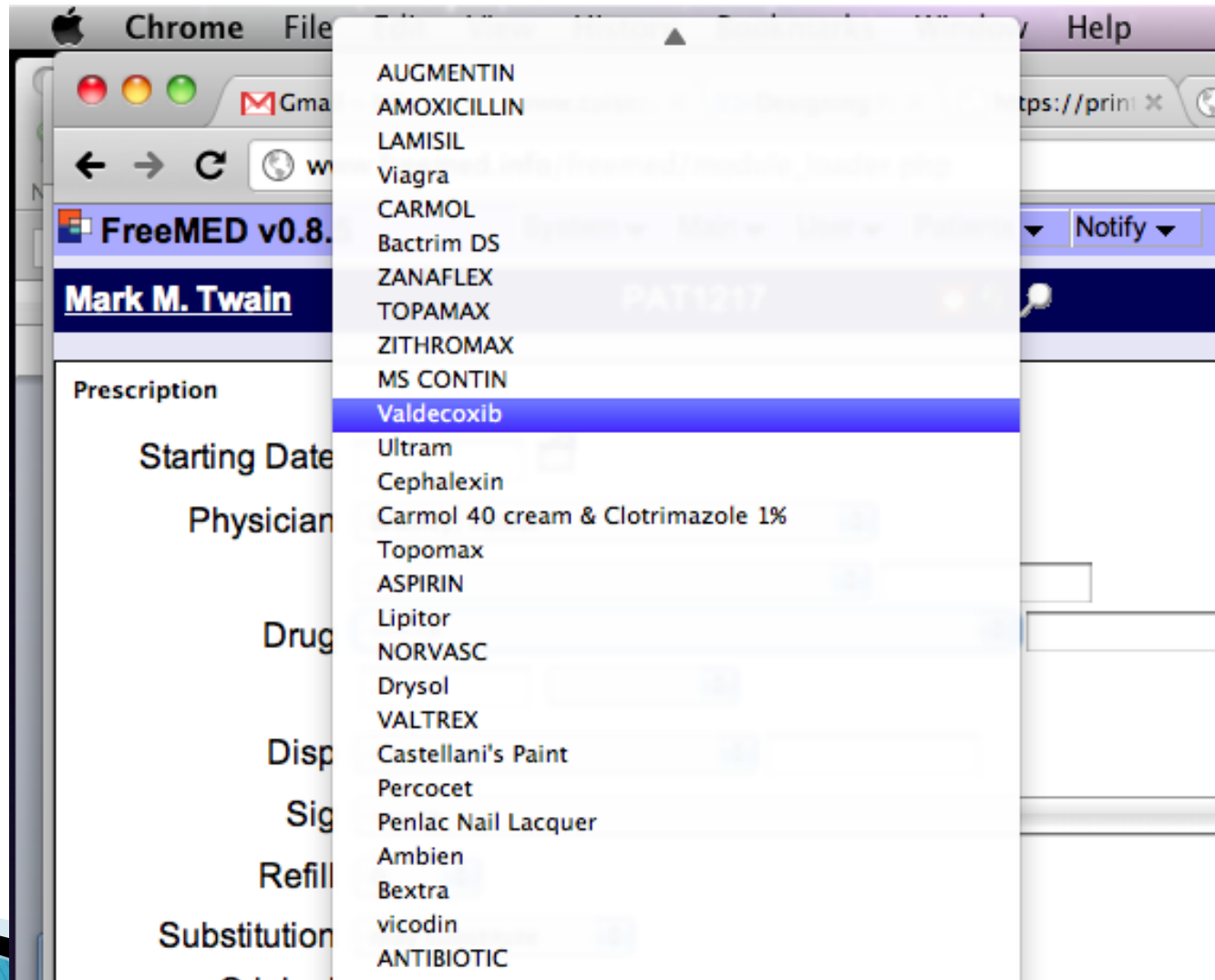
### Prescriptions

[View/Manage](#) | [Add](#)

Date From	Drug	Disp	Sig	By	Refills	Action
0000-00-00	Bottle Mobic	1 bottle bottle	1 par semaine	Volker Bradley, M.D.	0	
2010-06-04	Tablet ZANAFLEX 10 mg	1 tablet	20	Volker Bradley, M.D.	0	
0000-00-00	Tablets ANTIBIOTIC	180 tablets	Aply to affected area once a day	Volker Bradley, M.D.	1	
2009-11-09	Paxil CR 20 mg	30	Take one tablet daily	Volker Bradley, M.D.	3	
0000-00-00	Bottle Mycolog II cream	12 tabs bottle	1 drop bedtime both eyes	Volker Bradley, M.D.	2	
<u>2016-05-08</u>	Hydrocortisone 1% Ointment	One 30 gm tube	Aply to affected area once a day	Volker Bradley, M.D.	1	
2008-04-24	Capsules Bextra 20 mg	30 capsules	1 tab PO BID x 5 days	Volker Bradley, M.D.	0	
2007-10-19	Capsules Mobic	60 capsules	Take one capsule daily	Volker Bradley, M.D.	5	
2007-10-25	Tablets Viagra 40 mg	40 tablets	Take one tablet daily	Volker Bradley, M.D.	2	



# 3. Match between System and the Real World



# 4. User Control and Freedom

Users should be free to select and sequence tasks (when appropriate), rather than having the system do this for them. Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue.

Users should make their own decisions (with clear information) regarding the costs of exiting current work. The system should support undo and redo.

# 4. User Control and Freedom

The image shows a screenshot of an EHR data entry form. It contains several input fields and radio button options:

- Height/Length:   Inch  cm
- Weight:   Lbs. oz  kg
- Temperature:   F  C
- Sys. BP:  / Dia. BP:
- Pulse:
- RR:
- O<sup>2</sup> Sat.:

This EHR reverts to prior data if a parameter is entered that is not “in range” with NO WARNING to the user.

# 5. Consistency and Standards




Users should not have to wonder whether different words, situations or actions mean the same thing. Follow platform conventions.

# 6. Help Users Recognize, Diagnose and Recover from Errors

Error messages should be expressed in plain language (NO CODES).


# 6. Help Users Recognize, Diagnose and Recover from Errors

System ▾ Main ▾ User ▾ Patients ▾ Notify ▾ Help

037648   

Interval	Vital
Superbill	Asse

Progress Notes Temp  
Prov  
Ty  
Descrip



**The page at [www.freemed.info](http://www.freemed.info) says:**


Mozilla < 1.3 Beta is not supported!  
I'll try, though, but it might not work.

Prevent this page from creating additional dialogs.

OK

Related Episode(s)

CRPS (2004-03-29 to 2004-06-08)

Date  

# 7. Error Prevention

Even better than good error messages is a careful design that prevents a problem from occurring in the first place.

# 7. Error Prevention

**1**

**Patient Select**

**Patient Information**  
**PATIENT, CLINICAL F**  
MRN: TST900000101  
Age/Sex: 55 (Female)  
DOB: 4/27/1955  
Location: MED/SURG  
Room-Bed:

**Quick List Options**  
 Default: Most Recent  
 Providers  Clinics  Specialties  
 Team/Personal  Units  Most Recent

Select an Item

No items

List Appointments For: Today

All Days of Week  Current Day Only

**All Patients (Most Recent)**  
PATIENT, CLINICAL F  
DUBOIS, FRANCESCA  
ANDERSON, LYNNE  
BLANKENSHIP, BRAD  
DUBOIS, FRANCESCA  
GASS, PATSY  
JONES, CHRISTOPHER  
**PATIENT, CLINICAL F**  
PATIENT, CLINICAL M  
PATIENT, DIETARY  
PATIENT, LABORATORY  
PATIENT, PEDIATRIC  
PATIENT, PHARMACY  
PATIENT, RADIOLOGY  
REED, HENRY

**2**

**3**

**My Alerts (35)**

Urgency	Patient	Location	Alert Date/Time	Message
High	PATIENT, P (P)	PSYCH	06/08/2009@13:44	Order requires electronic signa
High	PATIENT, C (P)	MED/SU...	05/05/2009@07:49	Order requires electronic signa
Med	PATIENT, P (P)	PSYCH	05/01/2009@06:46	Completed Consult PHARMACY
High	PATIENT, L (P)	MED/SU...	04/02/2009@09:12	Critical labs - [CBC]
High	PATIENT, L (P)	MED/SU...	04/02/2009@09:12	Critical lab: WBC 800 04/02 09:12

powered by **medsphere**





































# 8. Recognition rather than Recall













Make objects, actions and options visible. The user should not have to remember information from one part of the dialogue to another.

Instructions for use of the system should be visible or easily retrievable whenever appropriate.

# 8. Recognition rather than Recall

Progress Notes Box			
<a href="#">View/Manage</a>   <a href="#">Add</a>			
Date	Provider	Description	Action
06/09/2011	Dr. Volker Bradley	test krin	     
<u>02/10/2011</u>	Dr. Volker Bradley	Newborn WCC	     
11/12/2009	Dr. Volker Bradley	Breast Mass	   
10/30/2009	Dr. Volker Bradley		     
05/18/2009		jojo	     
04/17/2009	Dr. Volker Bradley	jklkj;	     

Vitals							
<a href="#">View/Manage</a>   <a href="#">Add</a>							
Date	BP	P	Resp	Temp	H	W	Action
05/10/2010	120/80	50	22	97	68	160	     
03/14/2010	120/90	70	56	99	14	120	     

# 9. Flexibility and Minimalist Design

Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Provide alternative means of access and operation for users who differ from the “average” user (e.g., physical or cognitive ability, culture, language, etc.)

# 10. Aesthetic and Minimalist Design

Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

# 11. Help and Documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation.

Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large

# 12. Pleasurable and Respectful Interaction with the User

The user's interactions with the system should enhance the quality of her or his work-life. The user should be treated with respect.

The design should be aesthetically pleasing—with artistic as well as functional value.

# 13. Privacy

The system should help the user to protect personal or private information belonging to the user or his/her patients

# Rating Severity

Each violation of a usability principle is categorized as follows:

Rating	Severity
4	<b>Catastrophic:</b> Potential for patient mortality.
3	<b>Major:</b> Potential for patient morbidity.
2	<b>Moderate:</b> Potential for workarounds that create patient safety risks.
1	<b>Minor:</b> Potential for lower quality of clinical care due to decreased efficiency, increased frustration, or increased documentation burden or workload burden.
0	<b>No Issue / Not applicable</b>



# Documenting Findings

Place of Occurrence	Usability Problem Description	Usability Guidelines Violated	Severity Score
Med List in eRX screen	Concepts in drop down lists not fully visible	Visibility, Recognition / recall	3

# Details for Planning & Executing the Method

- ▶ Decide on the scope of the review and on the scenarios and data sets to be used
- ▶ Evaluators perform expert review independently
- ▶ Analyze results and make recommendations for redesign

# Exercise

- ▶ Perform expert review on sample screenshots
  - Conduct individually for 7 minutes
- ▶ Share your findings with neighbor
  - Discuss for 7 minutes and refine your list as necessary
- ▶ Rank severity of identified problems
  - Conduct individually for 5 minutes
  - Share your scores with neighbor for 5 minutes

# Screen 1

USER, TEST: AHLTA (Privacy Act of 1974/FOUO) - Training System

File Edit View Go Tools Actions Help

Refresh Open Appt New Appt Print Appts Patient Labels View Comments Cancel Transfer Providers Check-In Check-Out Ins. Form Undo Cancel Sign Encounters Options Close Today+Incompl

<No Patient Selected>

Folder List

- Desktop
- Notifications (2)
- Appointments
- Telephone Consults (3) !
- Search
- Patient List
- Consult Log
- Co-signs (2)
- Patient Registries
- New Results (16) !
- Reports
- Tools
- Tasking (1)
- Sign Orders
- Immunizations Admin

Reminders

Appointments

Change Selections... My Appointments in This Clinic for Today Plus All Incomplete Back 1 days .

Appt. Date/Time	Patient	Encounter Status	Reason for Visit	FMP/SSN	CheckIn Time	Type	Classification	Home P
26 Mar 2008 0900	ALEXANDER, MARIE D	InProgress	Ankle Sprain	02/202455743	08 Apr 2008 1514	ACUTE APPT	Outpatient	123 33
26 Mar 2008 0930	ALEXANDER, VIOLET W	CheckedIn	cough & fever HTN followup	20/202455743	08 Apr 2008 1310	ACUTE APPT	Outpatient	123 33
26 Mar 2008 1000	SUAREZ, EDUARDO A	CheckedIn	diabetes/diabetes followup	20/454723217	08 Apr 2008 1531	ESTABLISHED/FOLLOW UP APPT	Outpatient	123 88
26 Mar 2008 1030	BERG, OLAF V	CheckedIn	Cold and Flu	20/245638943	08 Apr 2008 1531	ACUTE APPT	Outpatient	123 77
26 Mar 2008 1100	WILLIAMS, CLAYTON U	CheckedIn	headache/physical	20/967628867	08 Apr 2008 1544	ROUTINE	Outpatient	123 32
26 Mar 2008 1130	SUGARMAN, REGINOLD T	InProgress	worsening eczema	20/575342160	27 Mar 2008 1025	ACUTE APPT	Inpatient	123 65
26 Mar 2008 1200	CHANG, JON S	CheckedIn	vasectomy status	20/732679231	08 Apr 2008 1530	ACUTE APPT	Outpatient	123 99

Training Use Only

USER, TEST in CHCSII Test Clinic at CHCSII ITT Facility

USER, TEST: AHLTA ... WatermarkWnd Microsoft PowerPoi...

12:50 PM

# Screen 2

USER, TEST: AHLTA (Privacy Act of 1974/FOUO) - Training System

File Edit View Go Tools Actions Help

Refresh Open Appt New Appt Print Appts Patient Labels View Comments Cancel Transfer Providers Check-In Check-Out Ins. Form Undo Cancel Sign Encounters Options Close Today+Incompl

SUGARMAN, REGINOLD T 20/575-34-2160 80yo M DOB:10 Oct 1927

Folder List

- Demographics
- Health History
- Problems
- Meds
- Allergy
- Wellness
- Immunizations
- Vital Signs Review
- PKC Couplers
- Readiness
- Patient Questionnaire
- Lab
- Radiology
- Clinical Notes
- Previous Encounters
- Flowsheets
- Current Encounter
- Screening
- Vital Signs Entry
- S/O
- Drawing
- A/P
- Disposition

Appointments Current Encounter

Date: 26 Mar 2008 1130 CDT Status: In Progress Treatment Facility: CHCSII ITT Facility  
 Primary Provider: USER, TEST Type: ACUT\$ Clinic: CHCSII Test Clinic  
 Patient Status: Inpatient Inpatient Location: AAAA

AutoCite...

Reminders

Filtered for this Clinic Unfiltered Overdue and Due w/in 1 mo

Select	Modify	Reminder	Ordered	Due	Default Order/Documentation Details
<input type="checkbox"/>	<input type="checkbox"/>	Registries			
<input type="checkbox"/>	<input type="checkbox"/>	Wellness			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Adequate Calcium Counseling		6/5/2008	Document Adequate Calcium Counseling Complete
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Anti-Tobacco Counseling		6/9/2008	Document Anti-tobacco Counseling Complete
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Blood Pressure Screen		3/25/2008	ENTER: Blood Pressure
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Regular Activity Counseling		5/8/2008	OTHER THERAPIES ORDER: Patient Goals - Begin Regular Exercise, ___ Tir
<input type="checkbox"/>	<input type="checkbox"/>	Immunizations			

Screening

Vitals

S/O

Drawing

A/P

Reminders

Adequate Calcium Counseling  
 Anti-Tobacco Counseling  
 Blood Pressure Screen  
 Regular Activity Counseling

Legend:   
■ Due ■ Due within 1 month ■ Addressed Today or Ordered, but not resulted ■ Deactivated ■ Series Completed  Show Most Recent Results

Unselect All Select All \* Default wellness reminder configurations are based on the US Preventive Services Task Force (USPSTF) Submit Cancel

APP LAST UPDATED BY USER, TEST @ 02 JUN 2008 1117 CDT

1. DIABETE S MELLITUS

Procedure(s):

- An ECG was performed x1
- Layer closure of a wound of the scalp x 1
- An extensive initial fundoscopic exam was performed x 1
- Amputation of the foot by disarticulation at the ankle x1 (T3-LEFT FOOT, FOURTH DIGIT, 26-PROFESSIONAL COMPONENT, 50-BILATERAL PROCEDURE)
- Emetic administration / observation x1
- Layer closure of a wound of the scalp 20 to 30 cm x 1
- Tooth extraction x 1 (66-SURGICAL TEAM, 23-UNUSUAL ANESTHESIA, 47-ANESTHESIA BY SURGEON)

USER, TEST in CHCSII Test Clinic at CHCSII ITT Facility



# Screen 3

USER, TEST: AHLTA (Privacy Act of 1974/FOUO) - Training System

File Edit View Go Tools Actions Help

Preview Save Delete Template Mgt Reminders SO Drawing Disposition Sign Modifiers Submit All Options Close

SUGARMAN, REGINOLD T 20/575-34-2160 80yo M DOB:10 Oct 1927

Folder List

- Patient Questionnaire
- Lab
- Radiology
- Clinical Notes
- Previous Encounters
- Flowsheets
- Current Encounter
- Screening
- Vital Signs Entry
- S/O
- Drawing
- A/P
- Diagnosis
- Encounter Order
- Procedure
- Reminders
- Order Entry Con
- Order Entry Lab
- Order Entry Rad
- Order Entry Med
- Other Therapies
- Disposition

Appointments Current Encounter A/P

Priority	ICD	Diagnosis	Chronic/Acute	Type
1	250.00	DIABETES MELLITUS	Chronic	New

Plan/Comments

Procedure(s)

- Emetic administration / observation
- Tooth extraction (66-SURGICAL TEAM, 23-UNUSUAL ANESTHESIA, 47-ANESTHESIA BY SURGEON)
- An ECG was performed
- Layer closure of a wound of the scalp
- Layer closure of a wound of the scalp 20 to 30 cm
- An extensive initial fundoscopic exam was performed
- Amputation of the foot by disarticulation at the ankle (T3-LEFT FOOT, FOURTH DIGIT, 26-PROFESSIONAL)

Medication(s)

AI RIUTFRDI (PROVFNTHII 1-INH 0.5% SOL N

Priority

Orders & Procedures

- Amputation of the foot by disarticulation at the ankle
- An ECG was performed
- An extensive initial fundoscopic exam was performed
- Anterior chamber paracentesis with dissection
- Emetic administration / observation
- Layer closure of a wound of the scalp
- Layer closure of a wound of the scalp 20 to 30 cm
- Tooth extraction
- AI RIUTFRDI (PROVFNTHII 1-INH 0.5% SOL N

Diagnosis Order Sets Procedure Reminders Order Consults Order Lab Order Rad Order Med Other Therapies

Patient's Weight: Undefined

New Med Order

Item Name:

SIG:

Qty: Max Days Supply Default Unit

Refills: Maximum Start Date: 19-Jun-2008

Note to Provider:

Dispensing Location: CHCSII ITT Pharmacy

Comments: (Optional)

More Detail ... Clear Save To Queue Submit

Current Outpatient Medications

Show Orders

Reminders

- Adequate Calcium Counseling
- Anti-Tobacco Counseling
- Blood Pressure Screen
- Regular Activity Counseling

Health History

USER, TEST in CHCSII Test Clinic at CHCSII ITT Facility

USER, TEST: AHLTA ... WatermarkWnd Microsoft PowerPoi... 1:00 PM

# Discussion

- ▶ For more information:
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  - [www.SHARPC.org](http://www.SHARPC.org)