BAR CODE MEDICATION ADMINISTRATION (BCMA)

TECHNICAL MANUAL/SECURITY GUIDE

Version 3.0
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Department of Veterans Affairs
V*IST***A** Health Systems Design & Development

Revision History

Each time this manual is updated, the Title Page lists the new revised date and this page describes the changes. Either update your existing manual with the Change Pages document, or replace it with the updated manual.

Note: The Change Pages document may include unedited pages needed for two-sided copying. Only edited pages display the patch number and revision date in the page footer.

Date	Revised Pages	Patch Number	Description
02/2004			Original Released BCMA V. 3.0 Technical Manual/Security Guide

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BCMA V. 3.0 and This Guide

Benefits of BCMA V. 3.0

TIP:

BCMA is designed to augment, not replace, the clinical judgment of the medication administrator, or clinician.

The Bar Code Medication Administration (BCMA) V. 3.0 software includes new routines and files, Phase Release changes, and maintenance fixes. This version also includes enhancements, which are a direct result of feedback from the BCMA Workgroup and our many end users.

The patch description for BCMA V. 2.0 includes more detailed information about the maintenance fixes and enhancements for Phase Releases I through IV, which were provided in patches PSB*2*20, *24, *31, and *36.

BCMA software is designed to improve the accuracy of the medication administration process. By automating this process, Department of Veterans Affairs Medical Centers (VAMCs) can expect enhanced patient safety and patient care.

The electronic information that BCMA V. 3.0 provides clinicians improves their ability to administer medications safely and effectively to patients on wards during their medication passes. It also helps to improve the daily communication that occurs between Nursing and Pharmacy staffs.

Benefits of This Guide

This guide will help you discover the many technical and security aspects of BCMA V. 3.0. It describes implementation and maintenance features; interfaces, variables, and relationships; and security management.

Our Target Audience

We have developed this guide for members of the Automated Data Processing (ADP) group and the Information Resources Management (IRM) group who are responsible for maintaining and supporting this package.

We assume that individuals within these groups have the following experience or skills.

- Experienced with other Veterans Health Information Systems and Technology Architecture (**V***IST***A**) software
- Have worked with or will work with an Applications Package Coordinator (ADPAC) or Clinical Applications Coordinator (CAC) familiar with the medication administration process in a VAMC

Other Sources of Information

TIP:

Bookmark these sites for future reference.

Refer to the Web sites listed below when you want to receive more background and technical information about BCMA V. 3.0, and to download this manual and related documentation.

Background/Technical Information

From your Intranet, enter http://vista.med.va.gov/bcma in the Address field to access the BCMA Main Web page.

This Manual and Related Documentation

From your Intranet, enter http://www.va.gov/vdl in the Address field to access this manual, and those listed below, from the **V*IST*A** Documentation Library (VDL).

- Installation Guide
- GUI User Manual
- Nursing CHUI User Manual
- Pharmacy CHUI User Manual
- Manager's User Manual

Conventions Used in This Guide

TIP:

In a CHUI environment, when you press **ENTER**, instead of typing a response, the system accepts the default value shown to the left of the double slash (//) at a prompt or a field.

Before installing BCMA V. 3.0, review this section to learn the many conventions used throughout this guide.

- **Keyboard Responses:** Keys provided in **boldface**, within the copy, help you quickly identify what to press on your keyboard to perform an action. For example, when you see **ENTER** in the copy, press this key on your keyboard.
- **Mouse Responses:** Buttons provided in **boldface**, within the steps, indicate what you should click on your computer screen using the mouse. For example, when you see **NEXT, YES/NO,** or **OK** in the steps, click the appropriate button on your screen.
- **Screen Captures:** Provide "shaded" examples of what you will see on your computer screen, and possible user responses.
- **Notes:** Provided within the steps, describe exceptions or special cases about the information presented. They reflect the experience of our Staff, Developers, and Testers.
- **Tips:** Located in the left margin, these helpful hints are designed to help you work more efficiently with BCMA V. 3.0.
- **Menu Options:** Provided in italics. For example, You may establish Electronic Signatures Codes using the Kernel *Electronic Signature code Edit* [XUSESIG] option.

Obtaining On-line Help

TIP:

The BCMA Virtual Due List (VDL) is called "BCMA VDL" in this guide to eliminate confusion with the V*IST*A Documentation Library (VDL) also mentioned in this guide.

On-line help is designed right into the Graphical User Interface (GUI) and Character-based User Interface (CHUI) versions of BCMA V. 3.0, making it quick and easy for you to get answers to your questions. Here's how to access help in both versions of BCMA V. 3.0:

- **GUI BCMA:** Provides context-sensitive, on-line help and the Help menu.
  - **Context-Sensitive Help:** Place your "focus" on a feature, button, or Tab on the BCMA Virtual Due List (VDL) using the **TAB** key, and then press **F1** to receive help specific to that area of the VDL. In the case of a command, first highlight it in the Menu Bar or Right Click drop-down menu, and then press **F1.**
  - **Help Menu:** Open the Help menu, and then choose the Contents and Index command to receive help for every feature in GUI BCMA V. 3.0.
- **CHUI BCMA:** Lets you enter up to two question marks at any prompt to receive on-line help.
  - **One Question Mark:** Provides a brief statement related to the prompt.
  - **Two Question Marks:** Displays more detailed information about the prompt, plus any hidden actions.

Locating Detailed Listings

You can obtain *and* print listings about BCMA V. 3.0 routines, and Data Dictionaries using the information provided below.

Routines

Use the Kernel routine XINDEX to produce detailed listings of routines. Use the Kernel *First Line Routine Print* [XU FIRST LINE PRINT] option to print a list containing the first line of every PSB routine.

Data Dictionaries

You can use the VA FileMan *List File Attributes* [DILIST] option, under the *Data Dictionary Utilities* [DI DDU] option, to print the Dictionaries.

Minimum Required Packages

Before installing BCMA V. 3.0, make sure that your system includes the following Department of Veterans Affairs (VA) software packages and versions (those listed or higher).

Example: Minimum Required Packages and Versions

Package	Minimum Version Needed
Inpatient Medications	5.0
Kernel	8.0
MailMan	8.0
Nursing	4.0
Order Entry/Results Reporting	3.0
Pharmacy Data Management	1.0
RPC Broker (32-bit)	1.1
Toolkit	7.3
VA FileMan	22.0
Vitals/Measurements	5.0

Installation Time Estimates

IMPORTANT:

You should install and test BCMA in your test accounts ***before*** installing in your production accounts.

On average, it takes approximately two minutes to install BCMA V. 3.0. This estimate was provided by a few of our BCMA V. 3.0 Beta Test sites. Actual times may vary, depending on how your site is using its' system resources.

Suggested time to install: non-peak requirement hours. During the install process, PC Client users should not be accessing the Client Software.

Resource Requirements

TIP:

The approximate size for ^PSB was calculated using a "normal" medication pass for a Unit Dose and an IV medication order. This is only an estimated number; it serves as the "mean."

This section summarizes the (approximate) number of resources required to install BCMA V. 3.0.

- Routines 60
- Globals 1 (^PSB)
- Files 5 (53.66-53.79)
- ^PSB Size (in bytes) Unit Dose = 300 x # of Medications Administered
  IV = 2100 x # of IV Bags Administered
- FTEE Support .2
- FTEE Maintenance .2

Response Time Monitor

BCMA V. 3.0 does not include Response Time Monitor hooks.

Laptops and Bar Code Scanners

The approximate requirements for laptops and bar code scanners depend on the number of Inpatient areas, at your site, that use BCMA V. 3.0 for administering active medication orders. The BCMA Development Team recommends that your site have a minimum of three laptops and three scanners for each ward.

Printers

Your site should provide printers for creating patient wristbands and medication bar code labels, and for handling Missing Dose Requests sent from BCMA V. 3.0 to the Pharmacy.

Unit Dose Label Printer Devices

BCMA V. 3.0 includes the *Label Print* [PSBO BL] option for printing individual or batch Unit Dose bar code labels. It is specifically coded to the Zebra-brand printers using the Zebra Programming Language (ZPL). Model 105SE was used in the development of the labels. Routine PSBO BL uses site-specific printers or terminals to produce labels.

IV Label Printer Devices

Inpatient Medications V. 5.0 provides a menu option for printing individual or batch IV bar code labels. See the section "Interfacing with the Bar Code Label Printer" in the *Inpatient Medications V. 5.0 Technical Manual/Security Guide* for detailed setup information.

Files Required to Run BCMA V. 3.0

TIP:

The namespace for the BCMA package is PSB and the primary global is ^PSB.

BCMA V. 3.0 uses the following files installed on the **V*IST*A** Server. "Journaling" is recommended.

- ^PSB (53.66, BCMA IV Parameters
- ^PSB (53.68, BCMA Missing Dose Request
- ^PSB (53.69, BCMA Report Request
- ^PSB (53.78, BCMA Medication Variance Log
- ^PSB (53.79, BCMA Medication Log

Note: You can learn more about these files by generating a list with file attributes using VA FileMan.

Routines Installed

Review the listing below to learn the routines installed on to your site's **V*IST*A** Server during the installation of BCMA V. 3.0. The first line of each routine briefly describes its general function.

Note: You can use the *Kernel First Line Routine Print* [XU FIRST LINE PRINT] option to print a list containing the first line of each PSB routine.

Routine Mapping

At this time, we do *not* offer any recommendations for routine mapping. However, if you choose to map the BCMA V. 3.0 package routines, you will need to bring your system down, and then restart it to load the new routines into memory.

Example: BCMA V. 3.0 Routines Installed on to V*IST*A Server

```
PSBALL    PSBAPIPM  PSBCHIVH  PSBCHKIV  PSBMD     PSBML     PSBML1    PSBMLEN
PSBMLEN1  PSBMLHS   PSBMLTS   PSBMLU    PSBMLVAL  PSBO      PSBO1     PSBOAL
PSBOBL    PSBODL    PSBODL1   PSBODO    PSBOHDR   PSBOMD    PSBOMH    PSBOMH1
PSBOMH2   PSBOML    PSBOMM    PSBOMV    PSBOPE    PSBOPI    PSBOPM    PSBOVT
PSBOWA    PSBPAR    PSBPARIV  PSBPOIV   PSBPRN    PSBRPC    PSBRPC1   PSBRPC2
PSBRPC3   PSBRPCMO  PSBRPCXM  PSBSAGG   PSBSVHL7  PSBUTL    PSBVAR    PSBVDLIV
PSBVDLPA  PSBVDLPB  PSBVDLTB  PSBVDLU1  PSBVDLU2  PSBVDLU3  PSBVDLUD  PSBVDLVL
PSBVITFL  PSBVT     PSBVT1    PSBXMRG

60 routines
```

Exported Options

BCMA CHUI Menus

BCMA V. 3.0 exports three main menus. They include those listed below, in the CHUI version of BCMA V. 3.0. The options for each menu are listed in this section.

- **Manager Menu:** [PSB MGR] is assigned to managers
- **Pharmacist Menu:** [PSB PHARMACY] is assigned to all inpatient Pharmacists
- **Nurse Menu:** [PSB NURSE] is assigned to all clinicans and other personnel who administer active medication orders

Manager Menu [PSB MGR]

This menu includes the following options:

- Drug File Inquiry
- Medication Administration Menu Nursing
  - Medication Administration Log Report
  - Missed Medications Report
  - Edit Medication Log
  - Ward Administration Times Report
  - Due List Report
  - PRN Effectiveness List Report
  - Enter PRN Effectiveness
  - Manual Medication Entry
  - Medication Administration History (MAH) Report
  - Missing Dose Request
  - Medication Variance Log
  - Drug File Inquiry
- Medication Administration Menu Pharmacy
  - Medication Administration Log Report
  - Missed Medications Report
  - Due List Report
  - Medication Administration History (MAH) Report
  - Missing Dose Request
  - Missing Dose Followup
  - Missing Dose Report
  - Label Print
  - Drug File Inquiry
- Reset User Parameters
- Trouble Shoot Med Log

BCMA CHUI Menus (cont.)

Pharmacy Medication Administration Menu [PSB PHARMACY]

This menu includes the following options:

- Medication Administration Log Report
- Missed Medications Report
- Due List Report
- Medication Administration History (MAH) Report
- Missing Dose Request
- Missing Dose Followup
- Missing Dose Report
- Label Print
- Drug File Inquiry

Nursing Medication Administration Menu [PSB NURSE]

This menu includes the following options:

- Medication Administration Log Report
- Missed Medications Report
- Edit Medication Log
- Ward Administration Times Report
- Due List Report
- PRN Effectiveness List Report
- Enter PRN Effectiveness
- Manual Medication Entry
- Medication Administration History (MAH) Report
- Missing Dose Request
- Medication Variance Log
- Drug File Inquiry

Archive and Purge Capabilities

TIP:

Archive and purge capabilities are *not* available in BCMA V. 3.0.

BCMA V. 3.0 stores detailed information about each inpatient, at your VAMC, including medications administered to them and the PRN Effectiveness (when applicable).

- **Average Unit Dose Administration**: Requires about 300 bytes of disk space
- **Average IV Administration:** Requires about 2100 bytes of disk space

Note: Although archive and purge capabilities are *not* currently available in BCMA V. 3.0, when they are, they will be consistent with the Computerized Patient Record System (CPRS) package. BCMA V. 3.0 will offer this feature once it is made available in CPRS.

Defining Mail Groups in BCMA

In BCMA V. 3.0, you can define two "Mail Groups" for notifying Pharmacy, IRM, and other internal staff about errors and Missing Dose Requests. This section describes how you can create mail groups, and the purpose of each group.

Creating Mail Groups for BCMA V. 3.0

Creating mail groups for BCMA V. 3.0 involves using the **V*IST*A** Mail Group *Enter/Edit* [XMUSER] option to set the TYPE field to PUBLIC. Once this task is accomplished, you can then use the Parameters Tab of the GUI BCMA Site Parameters application to define the mail groups that you created.

Mail Group Types in BCMA V. 3.0

This section describes the mail groups that you can define using the Parameters Tab of the GUI BCMA Site Parameters application.

- **Due List Error:** Generates an E-mail message for any medication order that BCMA V. 3.0 cannot resolve for the BCMA VDL placement, and sends it to the mail group members. An example might include no administration times entered for a Continuous order.
- **Missing Dose Notification:** Generates an E-mail message for any Missing Dose Request entered using the BCMA V. 3.0 CHUI or GUI menu options. The E-mail is sent to all members of the mail group, specifically Pharmacy, as a "fail safe" even if the designated Missing Dose printer is not functioning.

Assigning Menus to Users

Use this section to assign menus to BCMA V. 3.0 CHUI and GUI users, if they have not already been assigned.

CHUI Version

Refer to this section for BCMA V. 3.0 CHUI menu assignments.

- **PSB MGR:** assign to a manager
- **PSB PHARMACY:** assign to all Inpatient Pharmacists
- **PSB NURSE:** assign to all clinicians and other personnel who administer active medication orders

GUI Version

Refer to this section for BCMA V. 3.0 GUI menu assignments.

- **PSB GUI CONTEXT – USER:** assign to all clinicians and other personnel who administer active medication orders

Allocating Security Keys to Users

Refer to this section to allocate the following security keys to appropriate site personnel.

- **PSB MANAGER:** designates the holder as a manager
- **PSB INSTRUCTOR:** designates the holder as a nursing instructor supervising student nurses
- **PSB STUDENT:** designates the holder as a student nurse, requiring that an instructor also sign on to BCMA V. 3.0 at the same time
- **PSB CPRS MED BUTTON:** designates the holder as a nurse who can document administered verbal- and phone-type STAT and NOW (One-Time) orders using the CPRS Med Order Button on the BCMA VDL

Establishing Electronic Signature Codes

You may establish Electronic Signatures Codes using the Kernel *Electronic Signature code Edit* [XUSESIG] option.

Note: For easier access by all users, this option is tied to the Common Options, under the *User's Toolbox* [XUSERTOOLS] submenu.

Developing a Contingency Plan

In August 2003, patch PSB*2*17, the BCMA Backup System, was released to the field as a Class I solution for the BCMA Contingency Plan. This patch provides real-time backup of all inpatient medication activities on a designated workstation. Review the patch description to learn more about the benefits of this patch.

Internal and External Relations

Internal Relations

This section describes options, package-wide variables, and templates within BCMA V. 3.0.

Options

You can invoke ALL options in BCMA V. 3.0 independently.

Package-Wide Variables

BCMA V. 3.0 does *not* include package-wide variables.

Templates

BCMA V. 3.0 does *not* include any templates for Sort, Input, or Print.

External Relations

BCMA V. 3.0 can only be run in an environment that already has several existing features, such as a standard MUMPS operating system.

It also requires the following Department of Veterans Affairs (VA) software packages (versions listed or higher) — and all current patches. Otherwise, BCMA V. 3.0 will *not* be fully functional for your users.

- Inpatient Medications 5.0
- Kernel 8.0
- MailMan 8.0
- Nursing 4.0
- Order Entry/Results Reporting 3.0
- Pharmacy Data Management 1.0
- RPC Broker (32-bit) 1.1
- Toolkit 7.3
- VA FileMan 22.0
- Vitals/Measurements 5.0

External Relations (cont.)

Callable Routines, Entry Points, and Variables

BCMA V. 3.0 includes two callable routines: PSBAPIPM and PSBMLHS. Each routine is described in this section, along with the entry points and variables information for each.

- **PSBAPIPM:** Provides information to Inpatient Medications V. 5.0 for determining the start date for a renewed order.
- **PSBMLHS:** Provides other software packages with the ability to call the BCMA Medication History Report. The report lists medications, that a patient has received, by orderable item.

Database Integration Agreements (DBIAs)

BCMA subscribes to Database Integration Agreements (DBIAs) with the Inpatient Medications, CPRS, Nursing, and Registration packages. BCMA V. 3.0 also offers DBIAs for other packages to subscribe to as well.

For detailed information about these DBIAs, log in to FORUM and select the *Integration Agreements Menu* [DBA IA ISC] option located under the *DBA* [DBA] option (Data Base Administrator). Once in the Integration Agreements Menu Option, select "Inquire" and type **BCMA** at the "Select INTEGRATION REFERENCES:" prompt.

Glossary

Learning BCMA V. 3.0 Lingo

The alphabetical listing, in this section, is designed to familiarize you with the many acronyms and terms used throughout this guide.

Example: Alphabetical Listing of BCMA V. 3.0 Acronyms and Terms

Acronym/Term	Definition
Archive	To transfer files from a computer onto long-term storage.
BCMA Clinical Reminders	A marquee located in the lower, right-hand corner of the VDL that identifies PRN medication orders needing effectiveness documentation. The setting is based on the "PRN Documentation" site parameter, and applies to current admissions or the site parameter timeframe (whichever is greater). A mouse-over list displays when the pointer is placed over the PRN Effectiveness Activity, or a full list is available by double clicking on the Activity.
CHUI	**Ch**aracter-based **U**ser **I**nterface.
Client	An architecture in which one computer can get information from another. The Client is the computer that asks for access to data, software, or services.
CPRS	**C**omputerized **P**atient **R**ecord **S**ystem. A **V***IST***A** software application that allows users to enter patient orders into different packages from a single application. All pending orders that appear in the Unit Dose and IV packages are initially entered through the CPRS package. Clinicians, Managers, Quality Assurance Staff, and Researchers use this integrated record system.
Data Dictionary	Also called "DD," the dictionary that contains file attributes.
DBIA	**D**ata**b**ase **I**ntegration **A**greement. A formal understanding between two or more application packages which describes how data is shared or how packages interact. This Agreement maintains information between package Developers, allowing the use of internal entry points or other package-specific features.
FileMan	The **V***IST***A** database management system.
GUI	**G**raphical **U**ser **I**nterface. The type of interface chosen for BCMA V. 3.0.
IV	A medication given intravenously (within a vein) to a patient from an IV bag. IV types include Admixture, Chemotherapy, Hyperal, Piggyback, and Syringe.
Journaling	A record of changes made in files and messages transmitted. It is quite useful when recovering previous versions of a file before updates were made, or to reconstruct updates if an updated file gets damaged.

Learning BCMA V. 3.0 Lingo (cont.)

The alphabetical listing, in this section, is designed to familiarize you with the many acronyms and terms used throughout this guide.

Example: Alphabetical Listing of BCMA V. 3.0 Acronyms and Terms

Acronym/Term	Definition
MAH	**M**edication **A**dministration **H**istory. A patient report that lists a clinician's name and initials, and the exact time that an action was taken on an order (in a conventional MAR format). Each order is listed alphabetically by the orderable item. The date column lists three asterisks (***) if a medication was Discontinued.
MAR	**M**edication **A**dministration **R**ecord. The traditional, handwritten record used for noting when a patient received a medication. BCMA V. 3.0 replaces this record with an MAH.
NOW Order	A medication order given ASAP to a patient, entered as a One-Time order by Providers and Pharmacists. This order type displays for a fixed length of time on the VDL, as defined by the order Start and Stop Date/Time.
Patient Transfer Notification	A message that displays when a patient's record is opened or the Unit Dose or IVP/IVPB Medication Tab is viewed for the first time. This message indicates that the patient has had a movement type (usually a transfer) within the site-definable parameter, and the last action for the medication occurred before the movement, but still within the defined timeframe.
PRN Order	The Latin abbreviation for **P**ro **R**e **N**ata. A medication dosage given to a patient on an "as needed" basis.
PSB CPRS MED BUTTON	The name of the security "key" that must be assigned to nurses who document verbal- and phone-type STAT and NOW (One-Time) medication orders using the CPRS Med Order Button on the BCMA VDL.
PSB INSTRUCTOR	The name of the security "key" that must be assigned to nursing instructors, supervising nursing students, so they can access user options within BCMA V. 3.0.
PSB MANAGER	The name of the security "key" that must be assigned to managers so they can access the PSB Manager options within BCMA V. 3.0.
PSB STUDENT	The name of the security "key" that must be assigned to nursing students, supervised by nursing instructors, so they can access user options within BCMA V. 3.0. This key also requires that a nursing instructor sign on to BCMA.
Purge	To delete a set of data, and all references to the data.

Learning BCMA V. 3.0 Lingo (cont.)

The alphabetical listing, in this section, is designed to familiarize you with the many acronyms and terms used throughout this guide.

Example: Alphabetical Listing of BCMA V. 3.0 Acronyms and Terms

Acronym/Term	Definition
RPC	**R**emote **P**rocedure **C**all. A procedure stored on the **V***IST***A** Server, which is executed to return data to the Client.
RPC Broker	A Client/Server System within the VA's Veterans Health Information Systems and Technology Architecture (**V***IST***A**) environment. It enables client applications to communicate and exchange data with M Servers.
Security Keys	Used to access specific options within BCMA V. 3.0 that are otherwise "locked" without the security key. Only users designated as "Holders" may access these options.
Server	An architecture in which one computer can get information from another. The Server, which can be anything from a personal computer to a mainframe, supplies the requested data or services to the Client.
STAT Order	A medication order given immediately to a patient, entered as a One-Time order by Providers and Pharmacists. This order type displays for a fixed length of time on the VDL, as defined by the order Start and Stop Date/Time.
VDL	**V**irtual **D**ue **L**ist. An on-line "list" used by clinicians when administering active medication orders (i.e., Unit Dose, IV Push, IV Piggyback, and large-volume IVs) to a patient. This is the Main Screen in BCMA V. 3.0. **Note:** This is called BCMA VDL in this guide to eliminate confusion with the **V***IST***A** Documentation Library (VDL) also mentioned in this guide.
VISTA	**V**eterans Health **I**nformation **S**ystems and **T**echnology **A**rchitecture.
Ward Stock	Unit Dose and IV medications that are "stocked" on an ongoing basis on wards and patient care areas. They are packaged in a ready-to-use form or compounded by the medication administrator.
ZPL	**Z**ebra **P**rogramming **L**anguage.

Appendix A: Processing of Schedule Information

How BCMA Processes Schedule Information

This section describes how BCMA V. 3.0 processes Schedule information from Inpatient Medications V. 5.0, and how it determines when to display a Continuous medication order on the VDL. Keep in mind that BCMA displays medication orders on the VDL between the order Start and Stop Date and Time.

The information provided below defines term used in this section:

- **Admin Time:** The ADMIN TIMES field (#41) of the UNIT DOSE multiple (#62) of the PHARMACY PATIENT file (#55), and the ADMINISTRATION TIMES field (#.12) of the IV multiple (#100) of the PHARMACY PATIENT file (#55).
- **Frequency:** The FREQUENCY field (#42) of the UNIT DOSE multiple (#62) of the PHARMACY PATIENT file (#55), and the SCHEDULE INTERVAL field (#.17) of the IV multiple (#100) of the PHARMACY PATIENT file (#55).
- **Schedule:** The SCHEDULE field (#26) of the UNIT DOSE multiple (#62) of the PHARMACY PATIENT file (#55), and the SCHEDULE field (#.09) of the IV multiple (#100) of the PHARMACY PATIENT file (#55).
- **Schedule Type:** The SCHEDULE TYPE field (#7) of the UNIT DOSE multiple (#62) of the PHARMACY PATIENT file (#55). For IV orders, it refers to the pseudo-type determined by Inpatient Medications that is sent to BCMA.

Steps for Processing Schedule Information

This section describes the steps for processing schedule information from Inpatient Medications to BCMA.

1. BCMA checks the Inpatient Medications order for a Schedule Type of "Continuous."
   - If a Schedule Type other than "Continuous" is listed, BCMA quits processing the order, and proceeds to the correct processing method for that order's Schedule Type.

Steps for Processing Schedule Information (cont.)

2 BCMA verifies information provided in the Schedule of the Inpatient Medications order.

- If the Schedule is blank, BCMA quits processing the order and sends a Due List Error Notification message. (**Note:** A blank indicates that no Schedule was specified.)
- If the Schedule lists a Day of the Week (i.e., MO-WE@1200), BCMA checks the Admin Time(s) for the correct two- or four-digit format (i.e., 12-14, 1200, 1400).
  - If an Admin Time is listed, BCMA displays the order on the VDL, on specified days, using the Admin Time.
  - If no Admin Time is listed, BCMA quits processing the order and sends a Due List Error Notification message.
- If the Schedule lists an Admin Time (i.e., 12-14, 1200, 1400), BCMA checks the Admin Time in the Inpatient Medications order.
  - If the Admin Time is blank, BCMA quits processing the order and sends a Due List Error Notification message.
  - If an Admin Time is listed, BCMA verifies for the correct two- or four-digit format (i.e., 12-14, 1200, 1400). If **valid**, BCMA displays the order on the VDL every day using the Admin Time provided. If **invalid**, BCMA quits processing the order and sends a Due List Error Notification message.

3 BCMA verifies information provided in the Frequency of the Inpatient Medications order. **(Note:** The Frequency is the amount of time between medication administrations.)

- If the Frequency is blank, contains a letter other than "O" (the letter), or lists a Frequency less than one minute, BCMA quits processing the order and sends a Due List Error Notification message. (**Note:** A blank indicates that no Frequency was specified.)
- If the Frequency lists "O" (the letter), BCMA converts the Frequency to 1440 minutes (one day) and proceeds to Step #4.

Steps for Processing Schedule Information (cont.)

4 BCMA verifies whether the order contains an Odd Schedule by determining that data in the order Frequency is not divisible by 1440 minutes (one day), and that 1440 minutes is not divisible by the data in the order Frequency. See the examples provided below.

- If the order contains an Odd Schedule and times in the Admin Time, BCMA quits processing the order and sends a Due List Error Notification message.
- If the order contains an Odd Schedule, but no times in the Admin Time, BCMA displays the medication order on the VDL using the Frequency and order Start Date/Time provided by Inpatient Medications to calculate the Admin Times.
- If the order does *not* contain an Odd Schedule and no times are listed in the Admin Time, BCMA displays the medication order on the VDL using the Frequency and order Start Date/Time provided by Inpatient Medications to calculate the Admin Times.
- If the order does *not* contain an Odd Schedule, but times are listed in the Admin Time, BCMA verifies the Frequency listed in the order.
  - If the Frequency is *less than* 1440 minutes (or one day), BCMA displays the medication order on the VDL every day, based on the Admin Times provided in the order.
  - If the Frequency is *greater than* 1440 minutes (or one day), BCMA uses the Frequency information from Inpatient Medications to determine which day to display the medication order on the VDL, based on the Admin Time provided in the order.

Steps for Processing Schedule Information (cont.)

This section provides examples showing Schedule Types that are processed as Odd Schedules and those that are not.

Note: For an Odd Schedule to occur, both statements for a Schedule Type must be False.

Examples of Odd Schedules

Schedule Type: Q5H (300 minutes)

- 300 minutes divided by 1440 minutes = fraction, not a whole number = False
- 1440 divided by 300 minutes = 4.8 (fraction, not a whole number) = False

Schedule Type: Q3XM (13440 minutes)

- 13440 minutes divided by 1440 minutes = 9.3 (fraction, not a whole number) = False
- 1440 divided by 13440 minutes = fraction, not a whole number = False

Examples of Schedules That Are Not Odd Schedules

Schedule Type: Q2H (120 minutes)

- 120 minutes divided by 1440 minutes = 8.3 (fraction, not a whole number) = False
- 1440 minutes divided by 120 = 12 (whole number) = True

Schedule Type: QOD (2880 minutes)

- 2880 minutes divided by 1440 minutes = 2 (whole number) = True
- 1440 minutes divided by 2880 = 0.5 (fraction, not a whole number) = False

Appendix B: HL7 Messaging for BCMA

Sample HL7 Data Fields Broadcast to BCMA Subscribers

BCMA includes the Standards from the HL7 V. 2.4 (**V***IST***A** Messaging) package. For more information, refer to the **V***IST***A** Messaging and Interface Services Web site at: http://vista.med.va.gov/messaging/hl7.

This section provides a list of sample Health Level Seven (HL7) data fields that BCMA broadcasts to BCMA HL7 subscribers. Review the information to learn the "RAS" messages created for the administration and/or update of a medication order. The activities, which cause the broadcast of BCMA HL7 messages, are called "trigger events." BCMA HL7 trigger events are MEDPASS, UPDATE STATUS, PRN EFFECTIVENESS, and ADD COMMENT.

Note: Every message will not use every data field and every segment provided. Some segments may repeat as necessary. Some segments may not appear in the exact order depicted below for all trigger events, but they will be consistent for each specific trigger event.

Example: "RAS" Messages Created for the Administration of a Medication Order

SEG	SEQ	Field Name	Example	HL7 Type
MSH	1	Field Separator	^	string
	2	Encoding Characters	~|\&	string
	3	Sending Application	PSB HL7 SRV	hierarchic designator
	4	Sending Facility		hierarchic designator
	5	Receiving Application	PSB HL7 SUB	hierarchic designator
	6	Receiving Facility		hierarchic designator
	7	D/T of Message	20030530075514-0600	HL7 format timestamp (yyyymmddhhnnss-0600)
	8	Security		string
	9	Message Type	RAS~O17	composite
	10	Message Control ID	5001457	string
	11	Processing ID	P	processing type
	12	Version ID	2.4	ID
	13	Sequence Number		numeric
	14	Continuation Pointer		string
	15	Accept Acknowledgement Type	AL	ID
	16	Application Acknowledgment Type	NE	ID
	17	Country Code	USA	ID
	18	Character Set		ID
	19	Principal Language of Message		coded element

Example: "RAS" Messages Created for the Administration of a Medication Order (cont.)

SEG	SEQ	Field Name	Example	HL7 Type
PID	3	Patient Identifier List	748	composite ID
	4	Alternate Patient ID	54~~~~AGE	extended composite ID
	5	Patient Name	MONTANA~JOHNNY	patient name
	7	Date/Time of Birth	19490101	HL7 format timestamp (yyyymmdd)
	8	Administrative Sex	M	user table
	19	SSN Number – Patient	000001000	string
PV1	2	Patient Class	U	table 0004
	3	Patient Location	7A GEN MED 724-A~~~500	user table
	7	Attending Doctor	1~DENVER~DONNA	composite ID
ORC	1	Order Control	XX	table 119
	2	Placer Order Number	1045~PSB~1045~IEN	entity identifier
	3	Filler Order Number	13V	entity identifier
	7	Quantity/Timing	~~~~~~~~~C	dosage, scheduled administration time, schedule type
	8	Parent	~	composite
	9	D/T of Transaction	20030530075514-0600	HL7 format timestamp (yyyymmddhhnnss-0600)
	10	Entered by	1~DENVER~DONNA	extended composite name
	15	Order Effective D/T	20030530075514-0600	HL7 format timestamp (yyyymmddhhnnss-0600)
	19	Action By	1~DENVER~DONNA	extended composite name
RXR	1	Route	IV	table 0162
	2	Administration Site	3 INJECTION SITE	table 0163
RXO	1	Requested Give Code	269~FLUOROURACIL	coded element
	2	Requested Give Amount		numeric
	10	Requested Dispense Code	748V52	coded element
	21	Requested Give Rate Amount	~250 ml/hr	string

Example: "RAS" Messages Created for the Administration of a Medication Order (cont.)

SEG	SEQ	Field Name	Example	HL7 Type
RXC	1	RX Component Type	A	table 0166
	2	Component Code	20~5-FLUOURACIL	coded element
	3	Component Amount	5-FLUOURACIL	numeric
	4	Component Units		coded element
RXC	1	RX Component Type	B	table 0166
	2	Component Code	8~AMINO ACID SOLUTION 8.5%	coded element
	3	Component Amount	AMINO ACID SOLUTION 8.5%	numeric
	4	Component Units		coded element
RXA	1	Give Sub-ID Counter	0	number
	2	Administration Sub-ID Counter	1	number
	3	Date/Time Start of Administration	20030530075514-0600	HL7 format timestamp (yyyymmddhhnnss-0600)
	5	Administered Code	20~5-FLUOURACIL	coded element
	6	Administered Amount	450 MG	number
	7	Administered Unit		
	9	Administration Notes		coded element
	18	Substance/Treatment Refusal Reason	~Elevated Blood Sugar	coded element
	19	Indication	~	coded element
	20	Completion Status	C	user table
NTE	2	Source of Comment		table 105
	3	Comment	This is a comment …	free text
	4	Comment Type	1~DENVER~DONNA~20030530075514-0600~Date Entered	coded element (includes HL7 format timestamp [yyyymmddhhnnss-0600])

Definitions of Data Fields Under FIELD NAME Column

This section lists the definitions for some of the data fields provided under the FIELD NAME column, along with the location of the data field. The message header (i.e., the MSH segment) is constructed and supported by the **V*IST*A** HL7 message development tool.

Note: The MSH segment field names are *not* described below.

- **PATIENT ID:** Field (#.01) of the BCMA MEDICATION LOG file (#53.79) and Internal Entry Number (IEN) pointer to the PATIENT file (#2).
- **PATIENT NAME:** As returned by the Application Program Interface (API) VADPT.
- **DATE OF BIRTH:** As returned by the API VADPT.
- **ADMINISTRATIVE SEX:** As returned by the API VADPT.
- **SSN NUMBER:** As returned by the API VADPT.
- **PATIENT LOCATION:** Field (#.02) of the BCMA MEDICATION LOG file (#53.79), which contains the actual room-bed and ward location of the patient at the time the medication pass occurred. Also contains field (#.03) of the BCMA MEDICATION LOG file (#53.79), which contains the division number of the ward that the patient was on during the medication pass.
- **PLACER ORDER NUMBER:** IEN for the BCMA MEDICATION LOG file (#53.79).
- **FILLER ORDER NUMBER:** Contains the ORDER REFERENCE NUMBER field (#.11) of the BCMA MEDICATION LOG file (#53.79), which contains the IEN of the actual medication order from the PHARMACY PATIENT file (#55)PREVIOUS ORDER NUMBER as returned by the API PSJBCMA1.
- **QUANTITY/TIMING:** Contains the order dosage, schedule type, and scheduled administration time data from the BCMA MEDICATION LOG file (#53.79), fields #.15, #.12, and #.13 respectively.
- **PARENT:** Contains the PREVIOUS ORDER NUMBER as returned by the PSB routine PSBVT.
- **DATE/TIME OF TRANSACTION:** Contains the ACTION DATE/TIME field (#.06) of the BCMA MEDICATION LOG file (#53.79), which contains the FileMan date/time of the actual time that the action was taken.

Definitions of Data Fields Under FIELD NAME Column (cont.)

This section lists the definitions for some of the data fields provided under the FIELD NAME column, along with the location of the data field.

- **ENTERED BY:** Field (#.05) of the BCMA MEDICATION LOG file (#53.79), which contains the IEN pointer to the NEW PERSON file (#200) for the user who entered the data, along with the actual name of that person as returned by FileMan.
- **ORDER EFFECTIVE DATE/TIME:** Provides data from the ENTERED DATE/TIME field (#.04) of the BCMA MEDICATION LOG file (#53.79), which contains the FileMan date/time that the action was taken.
- **ACTION BY:** Field (#.07) of the BCMA MEDICATION LOG file (#53.79), which contains the IEN pointer to the NEW PERSON file (#200) for the user who took the action.
- **ROUTE:** Contains MEDICATION ROUTE data as returned by the PSB routine PSBVT. The ROUTE data is required for the RXR message segment.
- **ADMINISTRATION SITE:** Presents the INJECTION SITE field (#.16) of the BCMA MEDICATION LOG file (#53.79), which lists the injection site where the medication was administered.
- **REQUESTED GIVE CODE:** Presents the ADMINISTRATION MEDICATION field (#.08) of the BCMA MEDICATION LOG file (#53.79), containing a pointer to the ORDERABLE ITEM file (#50.7), which provides the medication entered for the order, as well as the actual orderable item name as returned by FileMan.
- **REQUESTED GIVE AMOUNT:** Provides the ORDER DOSAGE field (#.15) of the BCMA MEDICATION LOG file (#53.79), which contains the dosage from the original medication order.
- **REQUESTED DISPENSE CODE:** Presents the IV UNIQUE ID field (#.26) of the BCMA MEDICATION LOG file (#53.79), which contains the unique ID number for an IV bag.
- **REQUESTED GIVE RATE AMOUNT:** Presents the INFUSION RATE field (#.35) of the BCMA MEDICATION LOG file (#53.79), which contains the infusion rate for an IV bag.
- **RX COMPONENT TYPE:** Contains data specifying the "type" of item/component processed. Within the HL7 standard table, "A" signifies additive and "B" signifies base.

Definitions of Data Fields Under FIELD NAME Column (cont.)

This section lists the definitions for some of the data fields provided under the FIELD NAME column, along with the location of the data field.

- **COMPONENT CODE:** Presents the ADMINISTRATION MEDICATION field (#.08) of the BCMA MEDICATION LOG file (#53.79), containing a pointer to the ORDERABLE ITEM file (#50.7), which provides the medication entered for the order, as well as the actual orderable item name as returned by FileMan.
- **COMPONENT AMOUNT:**Presents the DOSES ORDERED field (#.02) within the DISPENSE DRUG multiple (#.5) within the BCMA MEDICATION LOG file (#53.79), which contains the number of units.
- **COMPONENT UNITS:** Consists of the UNIT OF ADMINISTRATION field (#.04) of the respective file multiple (i.e., DISPENSE DRUG [#.5], ADDITIVES [#.6], or SOLUTIONS [.7]) within the BCMA MEDICATION LOG file (#53.79), which contains the unit(s) for the medication administered.
- **GIVE SUB-ID COUNTER:** A required field with a value of "00."
- **ADMINISTRATION SUB-ID COUNTER:** A required field with a numeric value.
- **DATE/TIME START OF ADMINISTRATION:** Presents the ACTION DATE/TIME field (#.06) of the BCMA MEDICATION LOG file (#53.79), which contains the FileMan date/time that the action was taken.
- **ADMINISTERED CODE:** Composed of the ADMINISTRATION MEDICATION field (#.08) of the BCMA MEDICATION LOG file (#53.79), which contains a pointer to ORDERABLE ITEM file (#50.7), which provides the medication entered for the order, as well as the actual orderable item name as returned by FileMan.
- **ADMINISTERED AMOUNT:** Consists of the DOSES GIVEN field (#.03) of the respective file multiple (i.e., DISPENSE DRUG [#.5], ADDITIVES [#.6], or SOLUTIONS [.7]) within the BCMA MEDICATION LOG file (#53.79), which contains the actual number of units administered to the patient.

TIP:

The RXC segment may repeat, once for each solution and each additive, in an IV medication order. The RX COMPONENT TYPE is "A" for an additive" and "B" for a solution.

Definitions of Data Fields Under FIELD NAME Column (cont.)

This section lists the definitions for some of the data fields provided under the FIELD NAME column, along with the location of the data field.

- **ADMINISTERED UNIT:** UNIT OF ADMINISTRATION field (#.04) of the respective file multiple (i.e., DISPENSE DRUG [#.5], ADDITIVES [#.6], or SOLUTIONS [.7]) within the BCMA MEDICATION LOG file (#53.79), which contains the unit(s) for the medication administered.
- **ADMINISTRATION NOTES:** Consists of the AUDIT LOG field (#.9) and the AUDIT LOG field (#.01) of the AUDIT LOG multiple (#.9) within the BCMA MEDICATION LOG file (#53.79).
- **SUBSTANCE/TREATMENT REFUSAL REASON:** Field (#.21) of the BCMA MEDICATION LOG file (#53.79), which contains the PRN reason for administering a PRN medication.
- **INDICATION:** Consists of the ORDER ADMINISTRATION VARIANCE field (#.14), of the BCMA MEDICATION LOG file (#53.79), which if a Continuous medication order, will contain the minutes early (<1) or late (>1) that the medication was administered.
- **COMPLETION STATUS:** Consists of the ACTION STATUS field (#.09) of the BCMA MEDICATION LOG file (#53.79), which contains the status of the medication pass. Values in this field will equal an ACTION STATUS value.
- **SOURCE OF COMMENTS:** "O" source of the subsequent message.
- **COMMENT:** Contains the PRN EFFECTIVENESS field (#.22) of the BCMA MEDICATION LOG file (#53.79). When appropriate, contains a composite of the COMMENT field (#.3) and the COMMENT field (#.01) of the COMMENT multiple (#.3) within the BCMA MEDICATION LOG file (#53.79), which contains the comments entered.
- **COMMENT TYPE:** Contains a composite of the ENTERED BY field (#.02) of the COMMENT multiple (#.3) within the BCMA MEDICATION LOG file (#53.79), which contains the pointer to the NEW PERSON file (#200) for the user that entered the comment; along with the actual name of the user as returned by FileMan; as well as the ENTERED DATE/TIME field (#.03) of the COMMENT multiple (#.3) within the BCMA MEDICATION LOG file (#53.79), which contains the date and time that the entry was filed and the string "Date Entered."

Appendix B: HL7 Messaging for BCMA

Sample HL7 Data Fields Passed in Each Trigger Event

This section identifies the HL7 data fields that are passed in each of the four "trigger events" associated with BCMA, and examples of medication administrations. The processed trigger events are MEDPASS, UPDATE STATUS, PRN EFFECTIVENESS, and ADD COMMENT. For each event, there is an order control code and a set of data fields listed. For any given event; however, some of the data fields may be empty. Administration Notes is such an example.

The protocols provided in the table, use the BCMA name spacing convention ("PSB"), as do the messages sent by BCMA. The BCMA HL7 messages are unsolicited; therefore, acknowledgment messages are unnecessary and not recognized by the PSB protocol.

Note: Word wrapping is in effect for the example Medications Administrations on the following pages.

Example: Data Fields Passed in Each Trigger Event Associated with BCMA HL7

Action	Broadcast from BCMA	Subscribing Application
MEDPASS		
Protocol	PSB RAS O17 SRV	PSB RAS O17 SUB
Order Control	XX (Order/service changed)	
HL7 Fields	MSH (as prepared by HL7 tool) PID: 3,4,5,7,8,19 PV1: 2,3,7 ORC: 1,2,3,7,8,9,10,15,19 RXO: 1,2,10,21 NTE: 2,3,4 RXR: 1,2 RXC: 1,2,3,4 RXA: 1,2,3,4,5,6,7,9,18,19,20	

Example: Medication Administrations

MEDPASS

Message:

MESSAGE HEADER:

```
MSH^~|\&^PSB HL7 SRV^^PSB HL7 SUB^^20030530075514-0600^^RAS~O17^5001559^P^2.4^^^AL^NE^USA
```

MESSAGE TEXT:

```
PID^^^748^54~~~~AGE^MONTANA~JOHNNY^^19490101^M^^^^^^^^^^000001000
PV1^^U^7A GEN MED 724-A~~~500^^^^1~DENVER~DONNA
ORC^XX^1045~PSB~1045~IEN^13V^^^^~~~~~~~~~C^~^200305300755140-
600^1~DENVER~DONNA^^^^^20030530075514-0600^^^^1~DENVER~DONNA
RXO^269~FLUOROURACIL^^^^^^^^^748V52^^^^^^^^^^~250 ml/hr
NTE^^O^1~This is a comment...^1~DENVER~DONNA~20030530075514-0600~Date Entered
RXR^IV^3 INJECTION SITE
RXC^A^20~5-FLUOURACIL^5-FLUOURACIL^
RXC^B^8~AMINO ACID SOLUTION 8.5%^AMINO ACID SOLUTION 8.5%^
RXA^0^1^20030530075514-0600^ ^20~5-FLUOURACIL^450 MG^^^^^^^^^^^^^~^I
RXA^0^2^20030530075514-0600^ ^8~AMINO ACID SOLUTION 8.5%^500 ML^^^^^^^^^^^^^~^I
```

UPDATE STATUS

Message:

MESSAGE HEADER:

```
MSH^~|\&^PSB HL7 SRV^^PSB HL7 SUB^^20030530090340-0600^^RAS~O17^5001561^P^2.4^^^AL^NE^USA
```

MESSAGE TEXT:

```
PID^^^748^54~~~~AGE^MONTANA~JOHNNY^^19490101^M^^^^^^^^^^000001000
PV1^^U^7A GEN MED 724-A~~~500^^^^1~DENVER~DONNA
ORC^XX^1045~PSB~1045~IEN^13V^^^^~~~~~~~~~C^~^200305300903400-
600^1~DENVER~DONNA^^^^^20030530075514-0600^^^^1~DENVER~DONNA
RXO^269~FLUOROURACIL^^^^^^^^^748V52^^^^^^^^^^~250 ml/hr
NTE^^O^2~Add this comment to the administration...^1~DENVER~DONNA~20030530082444-0600~Date Entered
RXR^IV^3 INJECTION SITE
RXC^A^20~5-FLUOURACIL^5-FLUOURACIL^
RXC^B^8~AMINO ACID SOLUTION 8.5%^AMINO ACID SOLUTION 8.5%^
RXA^0^1^20030530090340-0600^ ^20~5-FLUOURACIL^450 MG^^^4~20030530090340-0600^^^^^^^^^^~^C
RXA^0^2^20030530090340-0600^ ^8~AMINO ACID SOLUTION 8.5%^500 ML^^^4~20030530090340-
0600^^^^^^^^^^~^C
```

Example: Medication Administrations (cont.)

PRN EFFECTIVENESS

Message:

MESSAGE HEADER:
```
MSH^~|\&^PSB HL7 SRV^^PSB HL7 SUB^^20030530110049-0600^^RAS~O17^5001562^P^2.4^^^AL^NE^USA
```

MESSAGE TEXT:
```
PID^^^748^54~~~~AGE^MONTANA~JOHNNY^^19490101^M^^^^^^^^^^000001000
ORC^XX^1040~PSB~1040~IEN^28U^^^^13oz~Q6H~~~~~~~~P^~^20030529132246-
0600^1~DENVER~DONNA^^^^^20030529132246-0600^^^^1~DENVER~DONNA
NTE^^O^ Effectiveness comment for 5/29/2003 1:22PM admin...^1~DENVER~DONNA~20030530110049-
0600~Date Entered~~1298~PRN Minutes
```

ADD COMMENT

Message:

MESSAGE HEADER:
```
MSH^~|\&^PSB HL7 SRV^^PSB HL7 SUB^^20030530082444-0600^^RAS~O17^5001560^P^2.4^^^AL^NE^USA
```

MESSAGE TEXT:
```
PID^^^748^54~~~~AGE^MONTANA~JOHNNY^^19490101^M^^^^^^^^^^000001000
ORC^XX^1045~PSB~1045~IEN^13V^^^^~~~~~~~~~C^~^20030530075514-
0600^1~DENVER~DONNA^^^^^20030530075514-0600^^^^1~DENVER~DONNA
NTE^^O^2~Add this comment to the administration...^1~DENVER~DONNA~20030530082444-0600~Date Entered
```