

Appendix D: 508 Compliance

What Is 508 Compliance?

Section 508 of the Rehabilitation Act of 1973 and Rehabilitation Act Amendments of 1998 mandates that all software developed by federal agencies allow access to and use of information and data by individuals with disabilities. The Bar Code Medication Administration (BCMA) V. 3.0 graphical user interface (GUI) is updated to ensure 508 Compliance with respect to the requirements of the Section 508 Checklist for Software Applications and Operating Systems (see http://vista.med.va.gov/sqa_lib/Checklists/508ChecklistForSoftwareApplicationsAndOperatingSystems.doc).

Enhancements to BCMA in Patch PSB*3*10 ensure accessibility for color-blind, mobility-impaired, and visually-impaired users, without impacting software usability for our primary audience of users—sighted nurses who administer medications to patients.

Definitions Used in 508 Compliance

The following definitions are used in the 508 Compliance project:

- **508 Compliant User** — A user with one or more of the following disabilities (color-blind, mobility-impaired, visually-impaired) who requires access to software applications through the use of adaptive technology and tools.
- **Adaptive technology** — Products that help people who cannot use regular versions of products; primarily people with physical disabilities such as limitations to vision and mobility. Such products include alternate pointing devices, screen readers, screen magnifiers, voice recognition technology, etc.
- **Clear Focus** — A well-defined on-screen indication of the current application focus so that keyboard users and adaptive technology can track focus and focus changes.
- **Color-blind** — A color vision deficiency in humans, resulting in the inability to perceive differences between some or all colors that other people can distinguish.
- **Mobility-impaired** — A user with a physical impairment or limitation, such that they require alternative pointing devices, limited keyboard access, keyboard-only access, voice recognition technology, or a combination of the above, in order to use a computer.
- **Primary User** — Refers to the primary user of BCMA, a sighted nurse that administers medications to patients at bedside.
- **Visually-impaired** — A user that has vision loss or impairment such that they require adaptive technologies such as screen readers or magnifiers in order to read a computer screen. Includes partially sighted, low vision, legally blind, or totally blind users.

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Hardware and Software Interfaces for 508 Compliance

Section 508 Compliance standards do not specifically mention the use of screen readers; however, the reference to a clear on-screen focus allows assistive technology, such as screen readers, to track focus and focus changes in order to read the screen.

The 508 standard states that sufficient information about a user interface element, including the identity, operation, and state of the element, be available to assistive technology. The screen reader must be able to distinguish and read all controls such as checkboxes, menus, and toolbars to the user. When electronic forms are used, the form must allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

No specific brand of screen reader software is specified or standardized for Veterans Administration (VA) users. For development purposes, the popular JAWS software (by Freedom Scientific) was used to test screen reader compatibility. Other screen readers may perform differently. Since screen reader software is designed to verbalize data out loud, headphones must be used in conjunction with any screen reader, in order to protect confidential VA patient data—in accordance with the Health Insurance Portability & Accountability Act of 1996 (HIPAA) laws that guarantee security and privacy of health information.

BCMA supports Microsoft® Active Accessibility® (MSAA), which is built into the Windows operating system. MSAA provides a standard, consistent mechanism for exchanging information between applications and assistive technologies, such as allowing applications to expose screen readers to the type, name, location, and current state of all objects, and notifying screen readers of Windows events that lead to user interface changes.

Any adaptive technology used in conjunction with BCMA must be installed and configured separately from BCMA. Users utilizing adaptive technology must have sufficient RAM and disk space required by their individual hardware and software configurations.

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How It Works in BCMA

Functionality for 508 Compliance is added to BCMA, including audible signals, keyboard navigation, clear focus, consistent use of color, images, and text, and screen reader compatibility as appropriate.

There are two types of users for BCMA: those who administer medications and those who do not administer medications.

- **Users who administer medications** are assumed to be not visually-impaired but may be mobility-impaired and/or color-blind. Those users may use keyboard navigation, alternative pointing devices, or voice input technology.
- **Users who do not administer medications** may be color-blind, visually-impaired, or mobility-impaired. Those users may use screen readers, screen magnifiers, keyboard input, alternative pointing devices, or voice input technology.

The following features are included in 508 Compliance functionality.

Keyboard Navigation and Clear Focus

Section 508 Compliance standards require that all product functions be executable from the keyboard, and that a well-defined indication of current on-screen focus be provided. Keyboard navigation and clear focus work together to assist mobility-impaired users.

Reports

Currently, all BCMA reports are text-based and screen reader compatible, but the reports may not read in a logical order for comprehension by visually-impaired users. The Reports Redesign phase of BCMA-HSC solves the usability issues of the existing reports.

Use of Color

User-selected contrast and color selections and other individual display attributes are not overridden.

Color is used to enhance, but color coding is not used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. If color is used to convey information, the information is also displayed in another format.

Use of Images

Images are not used alone to convey information; the information is also available in text format. When images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images is used consistently throughout BCMA.

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How It Works in BCMA (Continued)

Use of Text

All textual information on the screen is readable by assistive technologies. Note that this is implemented only in the areas designated for screen reader support.

Use of Sounds

Along with an informational message, an audible “beep” will sound 30 seconds, 20 seconds, and 10 seconds prior to timeout of BCMA because the application is idle. This time limit is set in the “BCMA Idle Timeout In Minutes” field on the Parameters Tab of the BCMA Site Parameters screen.

Alternate Methods for Accessing Information

For features that are not screen reader compatible, an alternate method to access the same information is provided.

- The VDL is not screen reader compatible, but all information on the VDL is accessible via reports.
- The Cover Sheet is not screen reader compatible, but all information will be accessible via reports in the Reports Redesign phase of BCMA-HSC.

Keyboard Navigation and Clear Focus

508 Compliance features include keyboard navigation and clear focus for the features and elements listed below. At a minimum, navigation via use of arrow keys and Tab and Shift+Tab is provided.

- All Menus
- All Dialogs
- All Reports
- Virtual Due List (VDL)
- Cover Sheet
- Read-Only mode
- BCMA Site Parameter Application

Although keyboard shortcuts (hotkeys) are not a Section 508 Compliance requirement, they are included, where possible, to assist both mobility-impaired and visually-impaired users, depending on the complexity of the window/object and level of difficulty to implement.

Since focus cannot be set on the Flag button on the VDL, the Patient Flag option is added to the View menu. This is in addition to the current documented keyboard shortcut of Ctrl+F.

The Cover Sheet and medication tabs (Unit Dose, IVP/IVPB, IV) do not get focus via keyboard navigation; however, there are two alternate methods to access them, through menu options (View, Med Tab) and function keys (F9, F10, F11, F12).

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Screen Reader Support

Features Supported

Screen reader support is implemented in functional areas where needed, as listed below, based on the assumption that users who need screen reader support will not be administering medications and will access BCMA in Read-Only mode.

- All Menus and options that are active in Read-Only mode.
- Patient Lookup dialog.
- Patient Confirmation dialog:
 - Fields and focus as necessary to provide screen reader support for all textual information on the dialog, without adding a usability burden for existing users.
 - Support for Sensitive Patient records.
- All Report criteria dialog boxes:
 - Labels are linked to fields so that the screen reader reads the field label and data pair each time the field is accessed.
 - Check box and radio button controls are placed into logical groups where necessary, so that the screen reader reads the group/field name, control, state of the control, and data.
- All Reports displayed on the screen.
- Online Help.
- BCMA Site Parameters Application:
 - Fields and focus as necessary to provide screen reader support for all textual information on the dialog, without adding a usability burden for existing users.
 - Labels are linked to fields so that the screen reader reads the field label and data pair each time the field is accessed.
 - Check box and radio button controls are placed into logical groups where necessary, such that the screen reader reads the group/field name, control, state of the control, and data.
 - Online Help.

Features Not Supported

The following features do not provide screen reader support:

- Scan Patient Wristband dialog
- Scan Medication dialog
- VDL and Medication tabs
- Cover Sheet
- Edit Med Log
- CPRS Med Order Button
- Debug mode
- Mark
- Add Comment
- Missing Dose Request
- Take Action on Ward Stock
- PRN Effectiveness Comment

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Hot Keys

Although keyboard shortcuts (hot keys) are not a Section 508 Compliance requirement, they are included, where possible, to assist both mobility-impaired and visually-impaired users. The table below lists all hot keys available for BCMA.

Menu	Sub Menu	Hot Key (Alt)	Function Key
File		F	
	Open Patient Record	FO	
	Ok	O	
	Cancel	C	
	Patient Confirmation		
	Yes	Y	
	Cancel	C	
	Open (Read-Only)	FR	
	Ok	O	
	Cancel	C	
	Patient Confirmation		
	Yes	Y	
	Cancel	C	
	Close Patient Record	FC	
	Edit Med Log	FE	
	Ok	O	
	Cancel	C	
	Yes	Y	
	Cancel	C	
	Rejoin Patient Context	FJ	
	Set New Context	FJS	
	Use Existing Context	FJU	
	Break Patient Link	FB	
	Exit	FX	
View		V	
	Med Tab	VM	
	Coversheet	VMC	F9
	Unit Dose	VMU	F10
	IVP/IVPB	VMI	F11
	IV	VMV	F12
	Allergies	VG	
	Patient Demographics	VP	

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Hot Keys (Continued)

<u>Menu</u>	<u>Sub Menu</u>	<u>Hot Key (Alt)</u>	<u>Function Key</u>
Reports		R	
	Due List	RD	
	Medication Log	RL	
	Medication Admin History	RH	
	Missed Medications	RM	
	PRN Effectiveness List	RP	
	Administration Times	RA	
	Medication Variance Log	RV	
	*Unknown Actions	RU	
	Vitals Cumulative	RI	

<u>Menu</u>	<u>Sub Menu</u>	<u>Hot Key (Alt)</u>	<u>Function Key</u>
	On All Reports		
	Print	P	
	Cancel	C	
Due List		D	
	Add Comment	DA	
	Available Bags	DV	
	Display Order	DO	F4
	Mark	DM	
	Held	DMH	
	Undo	DMU	
	Refused	DMR	
	Removed	DME	
	Med History	DE	
	Missing Dose	DI	
	PRN Effectiveness	DP	
	Drug IEN Code	DD	
	Take Action on WS	DT	
	Sort By	DS	
	Status	DSS	
	Verifying Nurse	DSV	
	Hospital Self Med	DSH	
	Type	DST	
	Active Medication	DSA	
	Medication/Solution	DSA	
	Dosage	DSD	
	Infusion Rate	DSI	

* New

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Hot Keys (Continued)

<u>Menu</u>	<u>Sub Menu</u>	<u>Hot Key (Alt)</u>	<u>Function Key</u>
Due List (continued)			
	Route	DSR	
	Administration Time	DSM	
	Last Action	DSL	
	Bag Information	DSB	
	Refresh	DR	F5
Tools		S	
Help		H	
	Contents and Index	HC	
	Index	HI	
	About BCMA	HA	
<u>Tool Bar</u>		<u>Hot Key (Alt)</u>	
Missing Dose		I	
	Submit	S	
	Cancel	C	
Medication Log		L	
Medication Admin History		E	
Allergies		G	
CPRS Med Order		M	
	Review/Sign	R	
	Order	O	
	Cancel	C	
Flag		Ctrl+F	
<u>Group Box</u>		<u>Hot Key (Alt)</u>	
Virtual Due List Parameters: Start Time		A	
Virtual Due List Parameters: Stop Time		O	
Schedule Types Continuous		C	
Schedule Types PRN		P	
Schedule Types On Call		N	
Schedule Types One-Time		T	
<u>Edit Box on VDL</u>		<u>Hot Key (Alt)</u>	
Scan Medication Bar Code:		B	

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Hot Keys (Continued)

Popup		Hot Key (Alt)	Function Key
Menu	Sub Menu		
Add Comment		A	
Available Bags		V	
Display Order		O	F4
Drug IEN Code		D	
Mark		M	
	Held	MH	
	Undo	MU	
	Refused	MR	
	Removed	ME	
Med History		E	
Missing Dose		I	
	Take Action on WS	T	
PRN Effectiveness		P	
	Ok	O	
	Cancel	C	
	Med History	M	
	Exit	E	

BCMA Site Parameters

Main Tab Hot Keys

Action	Hot Key
Facility	A
Parameters	P
Default Answer Lists	D
*IV Parameters	V

BCMA Site Parameters

Facility Tab Hot Keys

Action	Hot Key
BCMA On-Line	O
*Navigate through Read-Only fields	Shift+Tab and Tab

BCMA Site Parameters

Default Answer Lists Tab Hot Keys

Action	Hot Key
List Name	N
Save List	S

* New

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Hot Keys (Continued)

BCMA Site Parameters Parameters Tab Hot Keys

<u>Action</u>	<u>Hot Key</u>
*Output Devices	E
*Mail Groups	M
*Reports	R
*Bar Code Options	B
*Administration	N
*Allowable Time Limits (In Minutes)	L
*Virtual Due List Default Times	T
*Include Schedule Types	I
*Misc Options	O

BCMA Site Parameters IV Parameters Tab Hot Keys

<u>Action</u>	<u>Hot Key</u>
*Location	L
*IV Type	T
*Prompts	R
* New	