Curry: Sonography, 3rd Edition

Chapter 02: Ultrasound Instrumentation: "Knobology," Imaging Processing, and Storage

Test Bank

MULTIPLE CHOICE

1. The alphanumeric keyboard is used to
a. enter new patient information.
b. perform the initial configuration at installation of the ultrasound unit.
c. indicate which patient will be examined next.
d. house the sonologist workstation.

ANS: A
The alphanumeric keyboard controls allow the sonographer to enter the patient's name, ID number, and full screen annotation. The keyboard also may include specific function keys.

REF: pg. 8
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

2. Annotation On/Off
a. erases the last character to the left of the cursor.
b. erases all user-entered annotations, starting at the cursor's location.
c. clears the patient's ID number and stored images.
d. allows comments to be entered on the screen.

ANS: D
When turned on, Annotation On/Off (also called *Comments On/Off*) allows annotation, or comments, to be entered on the screen.

REF: pg. 9
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

3. The HELP menu provides quick access to the
a. on/off switch.
b. primary imaging controls.
c. reference manual.
d. clinical application specialist.

ANS: C
Some systems employ a HELP menu to access and provide a quick reference manual to the system usage. This is often accessed through a HELP key located directly on the keyboard or is a function key located on the top row of the keyboard.

REF: pg. 8
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

4. The frequency control ensures that
a. imaging depth is appropriate.
b. tissue resolution is adequate.
c. the right focal zone is used.
d. the image freezes.

ANS: B
The frequency control allows the sonographer to select the imaging frequency best suited to the patient's anatomy and the type of examination. Better tissue resolution of superficial structures is attained with higher frequencies. A lower imaging frequency is used for deeper structures, but image definition is lost for more superficial structures.

REF: pg. 10
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

5. The TGC control can strengthen echoes that are
a. returning from deep tissues.
b. emitted from the transducer to deep tissues.
c. returning from superficial tissues.
d. emitted from the transducer to superficial tissues.

ANS: A
The TGC control equalizes the differences in received echo amplitudes due to reflector depth. Returning echoes from deep in the body are amplified so that information on deeper structures can be received.

REF: pg. 10
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

6. When the focal zone indicator is set too deep for the organ being examined
a. the echogenicity is too bright.

b. the resolution is suboptimal.
c. the light output is inadequate.
d. the organ needs to be repositioned.

ANS: B
The focal zone should be set at the level of the area of interest. It provides the correct scan depth, ensuring optimal visualization of the target organ.

REF: pg. 12
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

7. A student sonographer notices that the TGC curve is lengthening and shortening rapidly. What is the probable cause of this?
a. Equipment malfunction
b. Back and forth manipulation of the TGC control
c. Too high a setting on the frequency control
d. Rapid patient breathing

ANS: B
Rapid lengthening and shortening of the TGC curve indicate that the TGC control is being turned back and forth rapidly. The TGC control directly affects the appearance of the TGC curve.

REF: pg. 10
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

8. The posterior border of the gallbladder cannot be seen on sagittal view; it appears to be cut off. Which control is most likely to correct this?
a. Depth
b. Frequency
c. TGC
d. Cine loop

ANS: A
The depth control places the area of interest in the center of the screen. The organ should appear large enough to fill a good portion of the image, yet the surrounding anatomy should be easily visualized. If the posterior portion of the organ is off the screen, the depth has been improperly set.

REF: pg. 10
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.

TOP: Knobology

9. The sonologist has requested a side-by-side comparison view. Which control should be used?
a. Focal zone position
b. Focal zone number
c. Left/right key
d. Imaging preset

ANS: C
The dual image (i.e., left/right) key is used to produce a side-by-side view. In this view, measurements from two different images can be compared.

REF: pg. 10
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

10. The trace function
a. places cursors for distance measurement.
b. erases cursors, outlines, and measurement results.
c. places cursors for distance and transverse measurements.
d. outlines circumference measurements.

ANS: D
The trace function is a measurement key that outlines a circumference for measurements.

REF: pg. 12
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

11. The body pattern control
a. displays the body pattern to indicate patient positioning.
b. adjusts automatically when the patient is turned to another position.
c. allows pulsed wave and M-mode images to overlie the body pattern.
d. adjusts the detail for images.

ANS: A
The body pattern control displays the body pattern to indicate patient positioning. The pattern appears on the monitor screen.

REF: pg. 13
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.

TOP: Knobology

12. Doppler can be added to the image by which control?
a.   M mode
b.   Brightness and contrast
c.   Power Doppler
d.   Trackball

ANS: C
The Doppler function can be activated by the Color Doppler or Power Doppler controls.

REF: pg. 13 OBJ: Demonstrate the steps to operate the ultrasound system.
TOP: Knobology

13. Which is the proper order for operating the ultrasound system?
a.   Adjust the TGC, focal zones, and image size; enter the patient's name and ID number; and select the transducer
b.   Adjust the focal zones, image size, and TGC; select the transducer; and enter the patient's name and ID number
c.   Enter the patient's name and ID number; adjust the focal zones, image size, and TGC; and select the transducer
d.   Enter the patient's name and ID number; select the transducer; and adjust the TGC, focal zones, and image size

ANS: D
The recommended order for operating the ultrasound system is: Enter the patient's name and ID number; select the appropriate transducer; place the transducer on the patient with a generous amount of coupling gel; and then adjust the TGC, focal zones, and image size.

REF: pgs. 11 – 12
OBJ: Demonstrate the steps to operate the ultrasound system.
TOP: Knobology

14. PACS is a computer technology system that
a.   captures the patient's demographics and other information from the person's medical record.
b.   allows for storage of digital images.
c.   unites the Hospital Information System and the Radiology Information System.
d.   automatically selects the correct frequency, depth, and focal zone controls.

ANS: B
Most hospitals and imaging centers currently run filmless by using a computer technology system called *PACS,* which stands for Picture Archiving and Communication System. This system allows for improved image resolution, because

images are stored in a digital format and can be manipulated by software programs. Ultrasound images are acquired digitally and viewed and stored on a computer. PACS can be dedicated to the ultrasound department, or it can be used on a larger scale, such as throughout the radiology division or the hospital. Facilities with PACS can communicate with other PACS-equipped hospitals and imaging centers anywhere in the world.

REF: pgs. 13, 15   OBJ: Describe the differences between PACS, HIS, and RIS.
TOP: Image processing and storage

15. The Worklist electronic program allows sonographers to
a.   connect the Hospital Information System, Radiology Information System, and Picture Archiving and Communication System in one database.
b.   order the patient examinations for the day.
c.   query for patient demographic information from the ultrasound system.
d.   engage the preset function of the system.

ANS: C
Many hospitals and imaging centers now use the Worklist program, which transfers patient information electronically to the ultrasound system. Sonographers "query" Worklist from the ultrasound system through a dedicated computer network. Detailed, pertinent patient information (e.g., the patient's full name and date of birth, the referring physician's name, the patient's medical record number, and the type of study to be done) then is populated into a patient information page on the ultrasound system.

REF: pg. 9   OBJ: Discuss the functions of the Worklist program.
TOP: Image processing and storage

TRUE/FALSE

1.   The advantages of the Radiology Information System include appointment scheduling and the use of work lists. _____

ANS: T
The Radiology Information System (RIS) can be integrated with other hospital information systems, allowing patient scheduling, the use of work lists, and digital dictation.

REF: pg. 14 OBJ: Describe the differences between PACS, HIS, and RIS.
TOP: Image processing and storage

2.   The advantages of the Picture Archiving and Communication System include a capability for remote radiologic consultation. _____

ANS: T

The Picture Archiving and Communication System at external hospitals allows for remote radiologic consultation through electronic imaging.

REF: pgs. 14 - 15   OBJ: Describe the differences between PACS, HIS, and RIS. TOP: Image processing and storage

3.   An advantage of the Hospital Information System is electronic storage of patients' demographics and chart information. ____

ANS: T
The Hospital Information System electronically stores patients' demographics and chart information.

REF: pg. 14 OBJ: Describe the differences between PACS, HIS, and RIS. TOP: Image processing and storage

4.   Teleradiology involves radiologic consultations done within the imaging center where an examination was performed. ____

ANS: F
Teleradiology involves remote radiologic consultations done through the use of PACS at the sending and receiving institutions.

REF: pgs. 14 - 15   OBJ: Describe the differences between PACS, HIS, and RIS. TOP: Image processing and storage

5.   Sonographers must learn to use a wide range of technologic tools to ensure optimum imaging and to facilitate sonologist reporting. ____

ANS: T
Sonographers have a wide range of technologic support at their disposal, such as ever-advancing ultrasound systems and electronically connected patient data and physician workstations. Therefore, it is important that sonographers develop superb technologic skills to ensure proper handling of the ultrasound system and additional electronic data systems at their disposal. Well-educated sonographers advance patient care and the ultrasound profession through the proper use of technology and their assistance to sonologists.

REF: pg. 15
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

ESSAY

1. Explain why it is important to learn the knobology of the ultrasound system.

ANS:
The sonographer's knowledge of knobology allows for optimum manipulation of system controls to produce images of diagnostic quality. Sonographers must master the ultrasound system controls to produce these optimum images and to retrieve diagnostic information from the ultrasound examination.

REF: pg. 8
OBJ: Explain the importance of learning the knobology of the ultrasound system.
TOP: Knobology

2. Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.

ANS:
Primary imaging controls (i.e., transducer selection, imaging preset, frequency, depth, TCG, TCG curve, focal zone position, focal zone number, dual image, image direction, freeze, cine loop, print/store, and trackball) are essential for producing and recording images of diagnostic quality. Calculation controls include the calculations package activated upon imaging preset and measurement functions (i.e., distance, trace, measure, and off). Additional important controls include body pattern and Doppler, color, power Doppler, pulsed wave, and M-mode controls, as well as monitor controls for brightness and contrast.

REF: pgs. 9 - 13
OBJ: Compare and contrast the functions of the keyboard controls: primary imaging controls, calculation controls, and additional controls.
TOP: Knobology

3. List the steps followed to operate an ultrasound system.

ANS:
The steps for operating an ultrasound system are (1) Enter the patient identification data; (2) select the appropriate transducer and scanning preset; (3) place the transducer on the patient, along with coupling gel; (4) adjust the TGC until the returning echoes are appropriately amplified; (5) adjust the focal zones to ensure that the area of interest is optimally displayed; (6) use depth control to adjust the image size.

REF: pg. 11
OBJ: Demonstrate the steps to operate the ultrasound system.
TOP: Knobology

4. Describe the differences between PACS, HIS, and RIS.

ANS:
HIS is a hospital-wide computerized data collection system, of which RIS is a specialized, radiology-centered subset. PACS is the computer system that allows electronic storage, retrieval, and viewing of digitized images on computer workstations. PACS is a computer system that allows electronic storage and viewing of digital images. It works basically by capturing the ultrasound image, storing it locally on a hard drive, and then sending it to the computer workstation and external locations. HIS captures the patient's demographic information, as well as information from the patient's medical record. RIS can integrate with other information systems to allow patient scheduling, digital dictation, and the use of work lists.

REF: pg. 13 - 15   OBJ: Describe the differences between PACS, HIS, and RIS.
TOP: Image processing and storage

5. Discuss the functions of the Worklist program.

ANS:
Worklist is an electronic program that transfers patient information electronically to the ultrasound system. Sonographers can "query" Worklist from the ultrasound system. When information is requested for a particular patient, the Worklist program automatically enters the data into the ultrasound system.

REF: pg. 9   OBJ: Discuss the functions of the Worklist program.
TOP: Image processing and storage