Learning Outcomes

After completing this chapter, you should be able to:

◆ Discuss the importance of electronic orders and results
◆ Compare paper and electronic workflow of orders and results
◆ Search for a finding using the Search button
◆ Understand and use the Prompt feature
◆ Record orders for tests
◆ Describe the workflow of radiology orders and reports
◆ Use a CPOE to write a prescription
◆ Discuss Closed Loop Safe Medication Administration
◆ Name the five rights of medication administration
◆ Order medications using a quick-pick list
◆ Compare ICD-9-CM codes and ICD-10 codes
◆ Use a diagnosis to find protocols
◆ Order tests to confirm or rule out a diagnosis

The Importance of Electronic Orders and Results

As you learned in Chapter 1, computerized provider order entry, or CPOE, is viewed by IOM, Leapfrog, and others as one of the key features of an EHR that can improve quality of care, patient safety, and clinician efficiency.
According to the IOM report\(^1\) CPOE systems can improve workflow processes by:

- Preventing lost orders
- Eliminating ambiguities caused by illegible handwriting
- Reduce the medication errors of dose and frequency, drug–allergy, and drug–drug interactions
- Monitoring for duplicate orders
- Reducing the time to fill orders
- Automatically generating related orders
- Improve clinician productivity

Computerized results improve workflow processes because:

- They can be accessed more easily than paper reports by the provider at the time and place they are needed.
- They reduce lag time allowing for quicker recognition and treatment of medical problems.
- Automated display of previous test results makes it possible to reduce redundant and additional testing.
- They allow for better interpretation and for easier detection of abnormalities, thereby ensuring appropriate follow-up.
- Access to electronic consults and patient consents can establish critical linkages and improve care coordination among multiple providers, as well as between provider and patient.

All types of treatments and care events are the result of provider orders. Examples include labs, x-rays, other diagnostic tests, medications, oxygen, diet, therapy, and even home medical devices such as a walker or wheelchair. As the IOM report suggests, when care is ordered electronically, the care is expedited and the workflow process is improved to the benefit of the patient.

CPOE is used by many types of healthcare providers. Some examples include licensed nurse practitioners, physician assistants, registered nurses, and other types of doctors such as osteopaths, dentists, and chiropractors.

### Recording Orders in the Student Edition

In this chapter, we will discuss several types of orders, the effect of an EHR on the process, and the workflow. In subsequent exercises you will have the opportunity to record orders and view test results. Although you may not be a provider who writes orders, there are a number of reasons we include orders in this course:

1. Orders are an essential component of any patient chart and a key objective for the IOM, Leapfrog, HITECH Act, and the CMS “meaningful use” criteria.

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2. Charts that include electronic orders and results offer the student a more realistic view of the complete EHR workflow.

3. Nurses, medical assistants, ward clerks, and other allied health professionals often enter verbal orders into an EHR on behalf of the ordering clinician.

4. Nurses or other allied health professionals may enter their own patient orders directly in the EHR within their particular scope of practice.

5. Nurse practitioners and physician assistants in nearly all states are licensed to write prescriptions and thus will use an electronic prescription writer. Nurse practitioners order laboratory, radiology and other diagnostic tests with the same authority as their physician counterparts.

6. In some critical care units a nurse will act as a scribe for the code team, documenting the emergency care as it is being delivered, including the ordering of stat tests and meds.

You will learn to record orders for lab tests in the EHR and later exercises will simulate the process of ordering and tracking lab results on a computer. However, the Student Edition does not contain a working electronic lab order system. You cannot use the Student Edition software to write or send actual orders to a lab, as this ability would be inappropriate in a student edition.

Similarly, exercises later in the chapter include a simulation of writing prescriptions electronically. Again, the Student Edition does not contain a real electronic prescription system. You cannot use it to write or send actual prescriptions to a pharmacy; this also would be inappropriate in a student edition.

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**Lab Orders and Reports**

Laboratory and other diagnostic tests are ordered to determine the health status of the patient, to confirm, or to rule out a suspected diagnosis. The order is assigned a unique ID called a *requisition or accession* number.

Laboratory services consist of nine sciences:

- Hematology
- Chemistry
- Immunology
- Blood bank (donor and transfusion)
- Pathology
- Surgical pathology
- Cytology
- Microbiology
- Flow cytometry

Many laboratory tests use automated instruments to analyze blood and other samples. These instruments typically have an electronic interface to the
Laboratory Information System (LIS). This enables automated test equipment to transfer test results directly to the LIS database. Test results are first stored in the LIS and then transferred to the EHR or printed on a paper lab result report.

Some lab work cannot be performed by automated equipment. For example, some pathology tests are performed by growing cultures and examining them, or examining tissue samples through a microscope. There are three areas of pathology:

◆ Clinical pathology uses chemistry, microbiology, hematology, and molecular pathology to analyze blood, urine, and other body fluids.

◆ Anatomic pathology performs gross, microscopic, and molecular examination of organs and tissues and autopsies of whole bodies.

◆ Surgical pathology performs gross and microscopic examination of tissue removed from a patient by surgery or biopsy.

Hospitals and some medical offices have labs within the medical facility. There are also outside testing facilities called *reference laboratories*. These labs process tests for offices that do not have their own labs and perform esoteric tests that are beyond the capability of the hospital laboratory.

There are also medical tests that do not have to be performed in a laboratory. Certain tests may be performed by handheld instruments at the patient’s bedside or even the patient’s home. This is called *point-of-care testing*. One example of such an instrument is a glucose monitor. The glucose monitor measures the amount of a type of sugar in a patient’s blood. The results of this test can be electronically transferred from the glucose monitor device to the EHR. In a hospital, the data is usually transferred via the LIS.

The fluid or tissue to be examined is called the *specimen*. The specimen may be collected from the patient at the medical facility and then transported to the laboratory or the patient may be sent to the laboratory to have his or her blood drawn there.

Here are various ways a sample for a blood test might be obtained:

◆ A nurse in the emergency department may draw blood from a patient, but a different person may carry the sample to the hospital laboratory.

◆ A laboratory at an inpatient hospital may send a phlebotomist to patient’s room to draw the blood required for ordered tests.

◆ A surgery patient may be directed to the hospital laboratory during preadmission, where a phlebotomist or laboratory technician may draw the sample before the patient is admitted.

◆ A physician’s office may have a small laboratory where certain tests can be performed in the office.

◆ A physician’s office may draw the blood but send the specimen to an outside reference lab. In this case a courier will collect the specimens from the medical office and transport them to the lab.

◆ A physician’s office may give a written lab requisition to the patient and send them to the outside reference lab. When the patient arrives at the lab, a phlebotomist employed by the lab company will draw the blood.
Whether blood is drawn at a medical office, laboratory, or in a hospital at the patient’s bedside, a phlebotomist or nurse will collect a specified amount of blood from the patient in one or more vials.

A provider usually only collects the specimen when it is part of the exam or procedure—for example, taking a swab for a throat culture, or removing a mole that is to be sent to pathology.

If a test requires a urine sample or stool specimen, this might be obtained from the patient at the medical facility or might be brought by an outpatient to his or her appointment.

Certain tests may not be covered by the patient’s insurance and the patient must sign an acknowledgment that he or she has been advised that the test will not be paid by insurance. This is called an Advance Beneficiary Notice, or ABN. A sample ABN is shown in Chapter 2, Figure 2-23.

If the clinician’s diagnosis or plan of treatment is dependent on the outcome of the test, then timeliness is important. In such a case, the patient cannot be treated until the provider receives and reviews the results. Although many of the steps are the same, electronic lab orders enable the provider to begin treatment sooner because the provider is aware of the results sooner.

Similarly, tissue samples need to be examined for certain surgical pathologies and the results made available to the surgeon during the surgery.

The results of tests that are performed by automated equipment are communicated to the LIS, which assigns codes and records values for each component of the test. The lab system computer then compiles the results into a report that includes the information from the original requisition, test codes, codes for each component of the test, as well as standard reference ranges for each associated with the actual value measured with the component. Additional notes, such as whether the value is considered outside the reference range (high or low) and whether the results were verified by repeat testing, also are merged into the report data.

When the report is complete, it is sent to the ordering clinician. The clinician will review the results of the test and take appropriate action.

From the beginning of the order to completion of the review by the clinician, the status of the order is important. If too much time lapses between when the patient needs the test and a treatment is given based on that test’s results, the patient’s condition could deteriorate.

To determine how much time has elapsed, the medical office must know which patients have tests pending results and when they were ordered. The office is then in a position to follow up on the test by calling the lab or the patient.

Orders are tracked in an EHR from the moment they are entered in the system. If a patient fails to show up for a test, the lab can inform the medical office because the lab received the requisition electronically and is expecting the patient.

In the EHR system, all orders have a status. Lab orders that have been sent but have no results are “pending.” A report of pending orders is always available.
Labs may sometimes send “preliminary” results to give the clinician an early indication of the test and then send “final” results once the test has been repeated for verification. For example, a bacterial culture’s preliminary results may appear after 24 hours, but the culture may be monitored for 72 hours before the final results.

EHR systems may connect to the lab system frequently as new orders are written or at predefined intervals throughout the day. Whenever a connection is established between the two systems, all available results for all of the clinic’s patients are downloaded to the EHR. When lab results are received, most systems merge the data instantly into the patient’s chart. Software matches each result to the original requisition order.

The status will then be preliminary, final, or corrected, as designated by the lab.

With an electronic order system, the patient’s results are usually available the same day or the next morning. The clinician is notified as soon as results are ready. The clinician may order follow-up tests, a follow-up visit, send a “task” to have the patient called, add comments or annotations to the test, and compare the results to previous similar test results. The EHR system also keeps track of which results have not yet been reviewed by the clinician.

An important tool clinicians use to care for their patients is “trending,” which is comparing the change of certain test components or vital signs over a period of time.

In a paper chart, the trend is observed by paging through past tests, locating the desired component on each report, and making a mental comparison. However, when the lab results are stored as data in the EHR, the computer can instantly find all instances of any component the clinician wishes to consider. Additionally, with computerized data, graphs and charts can be easily created for any finding that has numerical results. Examples of trending lab data are shown in Chapter 2, Figure 2-19 and Figure 2-20.

The benefit of electronic lab results is that the codified data is merged into the EHR. Most practices cannot afford the personnel to have paper lab results keyed into the computer. Without an electronic laboratory interface, the provider and the patient both miss the advantages that codified lab data provides.

Electronic lab orders and results benefit both the patient and the practice. Waiting for the results of an important test is stressful to patients. Electronic laboratory interfaces help expedite the process, ensuring the provider knows about the results as soon as they are ready at the lab. Whether the patient is subsequently contacted by the phone or has access to lab results via the web, the waiting time (and accompanying anxiety) is reduced.

**Comparison of Orders and Results Workflows**

In Chapter 1 we compared the workflow of an office using paper charts with an office that fully uses an EHR. Let us now compare the workflow of a facility that writes orders on paper with one that uses electronic orders and results. As we previously used the example of laboratory tests to compare forms of data, let us use the workflow surrounding lab tests in this comparison as well.
In this scenario the clinician wants additional information about the patient’s health that can be obtained by analyzing the patient’s blood. The provider “orders” a blood test. Implied within the order is a request for a nurse, phlebotomist, or other medical personnel to draw a sample of the patient’s blood.

Figure 6-1 Workflow of paper-based lab orders and results.

Workflow of Paper Lab Orders and Results

Figure 6-1 illustrates the workflow of paper-based lab orders and results. Follow the workflow as you read the following:

1. The workflow begins when the clinician decides a lab test will be useful and writes an order. In a facility that uses paper orders, this may be a verbal order to the nurse or medical assistant who will obtain and complete the paper requisition form. The test order may be noted in the handwritten paper chart or mentioned in the clinician’s dictation.

2. A paper requisition form supplied by the reference laboratory is filled out. The patient’s demographic and insurance information is copied by hand, onto the form, with inherent risks of a mistake while copying by hand.

Certain tests may not be covered by the patient’s insurance and the patient must sign an ABN. Whether an ABN will be required for a particular test relies on either a call to the lab, a call to the insurance plan, or the nurse’s memory.
The specimen of the patient’s blood is drawn.

The paper form is accompanied by uniquely numbered labels. The nurse will write the patient name and ID on the labels and attach them to the specimen vial or container.

If the blood is drawn in the clinic, the sample is picked up by a courier and transported to the lab.

If the specimen is delivered to the lab by courier, the paper requisition will accompany the specimen. If the patient is going to have the blood drawn at the lab, the patient will bring the requisition form.

The paper requisition is keyed into the lab system computer by a lab employee. There is an inherent risk of a typing error.

The laboratory performs the tests, assigns codes and values for each component of the test, and then compiles the results into a report.

A pathologist reviews the results and a printed copy of the results will be faxed, mailed, or sent by courier to the ordering clinic or facility.

A staff person at the medical facility will file the paper copy in the patient’s chart and make the clinician aware that the report has arrived.

The clinician will review the results in the paper chart. To compare results with any previous tests, the clinician will thumb through the pages of the chart.

The doctor will handwrite notes, or leave voice mail for his staff, who will call the patient with the results.

Although a copy of the order is in the paper chart, unless a separate list is maintained of what tests are ordered and when results are received, the clinician never knows if a test is lost.

If the patient was sent to an outside lab with a paper requisition in hand and fails to show up, neither the lab nor the medical office knows that the test is pending.

Workflow of Electronic Lab Orders and Results

EHR systems allow the clinician to order a test while the clinician is creating the encounter note. The order is automatically documented as part of the encounter note (in the Plan section). You will see this in Guided Exercise 37.

Figure 6-2 illustrates the workflow of electronic lab orders and results. Follow the workflow as you read the following:

The workflow begins when the provider orders a lab test. Using an EHR at the point of care, the provider can create the order from within the EHR.

The electronic order system compares the test codes on the order to coverage rules for the patient’s insurance and automatically alerts the user if a signed ABN is required.

CPOE systems also display a list of recent and pending orders for the patient. This serves two purposes. First it prevents unintentional duplicate orders as the clinician is aware if another provider has already ordered the same or similar test. Second, the clinician is made aware of regular preventative or health maintenance tests for which the patient is due.
In CPOE systems the provider does not complete the actual requisition form. The lab order initiates a "task" for a nurse, medical assistant, or phlebotomist to act on. The task involves at least two actions: completing the requisition and obtaining a specimen.

A nurse, phlebotomist, or other staff person will complete the electronic requisition in a computer. The patient’s demographic and insurance information is populated automatically, eliminating mistakes caused by retyping.

Uniquely numbered labels are automatically printed as part of the electronic requisition process.

The specimen of the patient’s blood is drawn. The labels are attached to the specimen vial or container.

The requisition is transmitted electronically to the lab system computer and contains the information required to process the test. Electronic orders are transmitted to the lab either in real time as each requisition is completed or in batches throughout the day.

Specimens obtained at the medical office for tests performed at an outside lab are picked up by a courier and transported to the lab one or more times a day.

If the patient is sent to an outside lab for the blood to be drawn, the requisition is already waiting in the lab system when the patient arrives because it was sent electronically.
The lab performs the requested tests and communicates the results through the Laboratory Information System (LIS).

As soon as any results are ready at the lab, they are reviewed by the pathologist and made available to the medical facility’s EHR.

The results are returned electronically and merged into the patient’s EHR. The EHR will alert the clinician that the results are ready.

The clinician will review the results on screen. Access to other components of the EHR allows easy comparison of current results with previous tests and allows the clinician to graph trends. The clinician can then order the treatments and follow-up tests, send messages to the staff or the patient, and do it all from the EHR.

In an outpatient setting, a nurse or other staff member receives an electronic “task” to call the patient.

Alternatively, some facilities allow the patient to view the test results online via a secure web site.

Electronic lab orders are assigned a status the moment they are created. This means it is easy for a clinician to see that a test has already been ordered by another provider. It also means that the order is not buried in some paper chart, but electronically tracked so the clinic is alert to missing or overdue results.

Learning to Use the Search and Prompt Features

As you learned in Chapter 2, medical nomenclatures such as SNOMED-CT and Medcin have hundreds of thousands of findings. The challenges with large clinical vocabularies include:

◆ How can you locate a finding among hundreds of thousands?
◆ Does the nomenclature use the same term for the finding as you do?
◆ Where are other related findings?

The Search feature provides a quick way for the provider to locate a desired finding in the nomenclature. Search produces a list of the findings almost instantly. Medcin addresses semantic differences in medical terms in several ways:

1. Search performs automatic word completion so if you search for “knee” but the finding is for “knees” it will still find it.

2. Medcin includes an extensive list of synonyms that are used in an alternate word search. For example, if you search for knee injury, the search results will also include findings for knee burns, knee trauma, and fractured patella, among others.

3. Search identifies related findings in other tabs so that when you search for a word or phrase in a particular tab, related findings are automatically available in the other tabs. This means that when you are using search while documenting a patient exam, as you proceed through the exam, the other tabs may already have related findings that you will use.
How Search Works

Search is not designed to find every instance that contains the words being searched because the search results would often have too many findings. Instead, search uses the Medcin hierarchy (the tree view you have expanded in previous exercises). It finds and shows the highest level match and does not list all the expanded findings below it.

For example, in Chapter 3 you did an exercise with Headache during which you expanded the tree to show many types of headache. If you searched for Headache, the search results would display the finding “Headache” with a small plus sign next to it. If you wanted to peruse the various types of headaches, you would click on the plus sign to expand the next level of the tree. If, however, you were searching for “migraine headache,” the search results would have expanded the tree for Headache to show migraine, which is at a lower level.

Search always begins in the tab you are currently in when you start the search. If there are search results in another tab but none in the current tab, the software will automatically change tabs to the first one with results. The order of the tabs you see on the screen is the same order in which it will display the search results. For example, if you are on the Tx tab when you search and there are no results but there are results for the other tabs, it will automatically change the left pane to the Dx tab to display those results because that is the next tab in order.

Guided Exercise 36: Using Search and Prompt

When patients are referred for diagnosis or follow-up care, a battery of diagnostic test may be ordered to be done before the patient’s scheduled appointment so the results can be available when the clinician sees the patient. This is especially true of tests that require more time to result or require the capabilities of an outside lab or radiology center.

Having the results ready when the clinician sees the patient allows the results to be considered during the exam, used in the current assessment, and used to educate and counsel the patient.

Case Study

The patient, Gary Yamamoto, has been referred to the cardiology clinic with suspected angina. The patient did not seem in any immediate danger when he was seen by his family physician at the time of the referral and has been given an appointment at the clinic later this week. In the meantime, we are going to enter orders for some tests to be done prior to the scheduled appointment so the results will be available at the scheduled clinic visit.

In this exercise, you will learn to use the Search and Prompt features as well as several new buttons on the Toolbar. The exercise will not produce a very thorough exam note, but it will give you experience using the features.
Rather than navigate the entire Medcin nomenclature, you can start with a known symptom or disease and work forward. To quickly locate the desired findings, we will use the Search function.

**Step 1**

If you have not already done so, start the Student Edition software.

Click Select on the Menu bar, and then click Patient.

In the Patient Selection window, locate and click on Gary Yamamoto, as shown in Figure 6-3.

**Step 2**

Click Select on the Menu bar again, and then click New Encounter.

You may use the current date and time for this exercise.

Select the reason Pre-visit Workup from the drop-down list. Click on the OK button.

In the next two steps, the medical assistant enters the Chief complaint and Vital Signs.

**Step 3**

Enter the Chief complaint by locating the button in the Toolbar labeled “Chief” and clicking on it.

In the dialog window that will open, type “Pt. referred with suspected Angina.”

Compare your screen to Figure 6-4 before clicking on the button labeled “Close the note form.”

**Step 4**

Enter Mr. Yamamoto’s vital signs using the Vitals Form.

Locate and click on the button labeled “Forms” in the Toolbar at the top of your screen.

Select the form labeled “Vitals” from the list in the Form Manager window.

Enter Gary Yamamoto’s vital signs in the corresponding fields as follows:

- **Temperature:** 98.6
- **Respiration:** 20
- **Pulse:** 70
- **BP:** 130/86
- **Height:** 65
- **Weight:** 138
When you have finished, compare your screen to Figure 6-5. If it is correct, click on the tab labeled “Encounter” at the bottom of the window.

**Figure 6-5 Vital Signs form for Gary Yamamoto.**

**Figure 6-6 Search button (highlighted) invokes Search Dialog window.**

### Step 5

Locate the Search button on the Toolbar near the top of the screen. The search icon resembles a small pair of binoculars. It is highlighted in Figure 6-6.
Click your mouse on it to invoke the “Search String” window. Position your mouse in the Search String field and enter the medical term “angina pectoris.” Verify that you have spelled this correctly, then click the button in the box that says “Search.”

**Figure 6-7 Search results (List Size button circled in red).**

**Step 6**

Compare your screen to Figure 6-7, which shows the search has succeeded. Notice that you started the search on the Sx tab but the screen is now on the Dx tab. This is because the search was for a very specific pair of words that did not exist in the other tabs.

As discussed earlier in this section, the Search result displays in the current tab if there are any findings that match the search string; otherwise, it displays in the first tab with findings that match. Had the search simply been for angina, History of Angina would have been found and the Hx tab would have been displayed.

**Note**

If your screen does not match Figure 6-7, or you received the message “nothing found to match search,” repeat step 5 and verify that you have spelled the medical terms correctly. In this exercise you are searching for a very specific match, and a spelling error will alter the search results.

**Step 7**

Locate the button labeled “List Size” on the Toolbar near the top of the screen. The List Size button is circled in red in Figure 6-7, and you have used the button
in previous chapters. As the name implies, the List Size controls the number of findings that will be displayed in a “prompt list.”

For this step, set the List Size to 1. If the List Size is currently greater than 1, click your mouse on the List Size button repeatedly until it displays a 1.

**Step 8**

Locate the Prompt button on the Toolbar near the top of the screen. The Prompt icon resembles a small magnifying glass. It is highlighted in Figure 6-7. The full name of the feature is “Prompt with current finding.” This feature generates a list of findings that are clinically related to the finding currently highlighted. For this step, Angina Pectoris should be highlighted in blue on your screen.

Once the list is displayed, you can use it just like you have been using Lists in previous exercises. That is, you can record findings by clicking on the red or blue buttons next to the findings. You also can change tabs; however, the findings displayed in the other tabs will be limited to those that are clinically related to the finding that was highlighted when you clicked the Prompt button.

Click your mouse on the Prompt button at this time.

**Step 9**

The left pane should have automatically changed to the Sx tab; if it did not, click on the tab labeled “Sx.”

Compare the list in the left pane of your screen to Figure 6-8, ignoring the red and blue buttons for the moment. Note that the list of findings is much shorter than is normally displayed in the Sx tab.

The first line in the left pane usually includes the name or source of the list. Heretofore, this was just the name of the tab, for example, Medcin (Symptoms):
now, however, the first line reads “Dx: ANGINA PECTORIS (Symptoms).” This indicates that the list is limited to findings that are clinically related to the diagnosis of angina pectoris.

Proceed with the exercise by locating and clicking on the following symptoms reported by the patient:

- (red button) jaw pain during exercise (myocardial)
- (blue button) chest pain or discomfort
- (blue button) difficulty breathing (dyspnea)

Compare your screen to the selected red and blue buttons in Figure 6-8 before proceeding.

**Step 10**

The patient does not smoke, and denies any history of high blood pressure or diabetes. Click on the Hx tab and enter the patient’s history information by locating and clicking on the following history findings:

- (blue button) current smoker
- (blue button) history of HYPERTENSION (Systemic)
- (blue button) history of DIABETES MELLITUS

Compare your screen to Figure 6-9.

**Step 11**

The first test to be ordered is an electrocardiogram (ECG). Although some tests, such as electrocardiograms, are performed in the clinic, most lab tests and many radiology procedures are “ordered” at the clinic, but the test is performed elsewhere.
The ECG was performed today at the clinic.

Verify the List Size displays the numeral 1.

Click on the Tx tab, which will display a list of tests that might be ordered for angina pectoris.

You can indicate that your office performed a test by clicking on the red button next to its name. Locate and click on the following finding:

- (red button) Electrocardiogram

The encounter note should now read, “An ECG was performed,” as shown in Figure 6-10.

Do not exit the program until you have completed the following exercise.

**Guided Exercise 37: Ordering Diagnostic Tests**

Continuing with Mr. Yamamoto’s visit, this exercise will explore several methods of recording tests and orders.

In this exercise, you will order several lab tests. There are two ways to do this: by using the Entry Details Prefix field or by using the Orders button on the Toolbar. In this step, you are going to use a prefix.

![Figure 6-11 Drop-down list of the Prefix field used for electrolyte panel.](image-url)
Step 12
Locate and click on the following test:

- (red button) Electrolyte panel

Note that the electrolyte panel appears in the encounter note under Tests: “An electrolyte panel was performed.” However, your clinic did not really perform the electrolyte panel test; the clinician just wanted to order it.

With the finding of “An electrolyte panel was performed” still highlighted, click on the Prefix field in the bottom of the screen. A drop-down list will appear as shown in Figure 6-11. Locate and click on the word “Ordered” in the list of prefixes.

Figure 6-12 Electrolyte panel “ordered.”

Step 13
Compare your screen to Figure 6-12. Notice that when you added the prefix “Ordered” to the finding of Electrolyte Panel, it not only changed the meaning in the encounter note but also moved the test to a different category in the encounter notes. Medcin assigns a test that was performed or has a result status to the category of test procedures but assigns a test that is ordered to the category “Plan.”

Step 14
Now that you are familiar with one method of ordering, you can see that it requires two steps, clicking the finding and then setting the prefix. However, both of these actions can be accomplished in a single step by using the “Order” button on the Toolbar. To order a test using the order button, you only need to highlight the finding and click the “Order” button. You do not have to click either the red or blue button for the finding.
Figure 6-13 Lipids test panel is highlighted and Order button is orange.

Locate and click on the description “Lipids Test Panel” to highlight it (as shown in Figure 6-13).

Locate and click on the button labeled “Order” in the Toolbar at the top of your screen. The Order icon resembles a lab beaker and test tube. It is highlighted orange in Figure 6-13.

Figure 6-14 Tests and x-rays ordered using the Order button.
Step 15
Using what you have learned in the previous step, order an additional test and an x-ray. Highlight each of the following findings and then click on the Order button. Do not click on the red or blue buttons beside these findings. The Order button will set them once they are ordered.

- Total Cholesterol
- Chest X-Ray Posterior-Anterior and Lateral Views

Compare your screen to Figure 6-14. From this example, you can see the advantage of using Toolbar buttons for orders. Similar buttons also are useful for History items and prescriptions, as you will learn in subsequent exercises.

Note
Electronic Lab Orders
Most commercial EHR systems offer sophisticated laboratory interface systems that electronically send orders, receive results, and automatically populate the EHR with lab data. In an EHR, a button similar to the lab orders button shown here typically will invoke a window in which you create the actual electronic lab order and send it to the lab.

Step 16
The clinician will determine the final assessment after the complete workup later this week. Therefore, the diagnosis at this time will be the referral diagnosis angina pectoris.

Click on the Dx tab and record the assessment.

Locate and highlight Angina Pectoris.
Locate the Prefix field in the Entry Details section. Click the mouse on the button with the down arrow in the Prefix field.

Scroll the drop-down list to locate and click on the words **Referral diagnosis**, as shown in Figure 6-15.

**Step 17**

This completes Mr. Yamamoto’s pre-visit workup. Print your completed encounter note. Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.

Be certain there is a check mark in the box next to “Current Encounter” and then click on the appropriate button to either print or export a file, as directed by your instructor.

Compare your printout or file output to Figure 6-16. If it is correct, hand it in to your instructor. If there are any differences (other than date or the patient’s age), review the previous steps in the exercise and find your error.

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**Figure 6-16** Printed encounter note with angina orders for Gary Yamamoto.
Radiology Orders and Reports

Most acute care hospitals have radiology departments. Radiology departments typically have a radiology information system (RIS), a picture archiving and communication system (PACS) for storing diagnostic images, and a dictation/transcription or voice recognition system for reports.

When diagnostic information is needed, the provider may order an x-ray or other radiology study. CPOE systems in hospitals may send orders to the radiology department RIS system electronically. Radiology orders may also be hand-written or verbal orders. Most medical offices do not yet send electronic radiology orders unless the x-ray or other device is located in the same facility as the ordering provider. Whatever the original form of the order, virtually all radiology department orders are entered into the RIS, where they become electronic orders for the remainder of the process.

Many of the diagnostic imaging devices used in the radiology department are capable of receiving order and patient data electronically from the RIS system. Patient data is then incorporated in the image data. Once the image is captured, it will transfer electronically into the PACS.

Traditional x-rays used to be taken on photographic film. To be stored in a PAC system, the film then had to be digitized using a scanner. Today, x-ray systems can record the image on a special plate that captures the image digitally, eliminating the steps of developing the film and then scanning it. In addition to x-rays, other types of diagnostic images studied by radiologists include:

- **Computerized axial tomography (CAT)** systems use x-rays to see into the patient’s body and capture thousands of digital images. Using computer software, it then constructs a view of cross sections of the body from the digital images. In some facilities this is also referred to as CT or computed tomography.

- **Magnetic resonance imaging (MRI)** uses magnetic fields and pulses of energy to create images of organs and structures inside the body that cannot be seen by x-ray or CAT scan.

- **Positron emission tomography (PET)** combines CT and nuclear scanning using a radioactive substance called a tracer, which is injected into a patient’s vein. A computer records the tracer as it collects in certain organs, then converts the data into three-dimensional (3-D) images of the organ. PET can be used to detect or evaluate cancer.

A set of related images interpreted by the radiologist is called a study; a hanging protocol refers to the number of images that simultaneously display on the radiologist’s monitor.

Once the x-ray, CAT scan, or other study images have been captured, a radiologist interprets the results. Increasingly, these images are stored and read in a digital format. The radiologist uses a computer monitor with much higher resolution than standard computer screens to view the images. Special software not only displays the image but also allows the radiologist to manipulate it, zooming in and out, changing the contrast, reversing the image colors, and offering many other capabilities that help the radiologist.
While looking at the image, radiologists dictate a report; describe what they see, its size, location, and any other comments. Because the radiologists are using the computer controls to manipulate and control the image, their observations are seldom keyed into an EHR program. It is standard practice for a radiologist’s report to be dictated, and then typed by a medical transcriber. However, some radiology practices use speech recognition software, which converts the human voice into typed reports. This was discussed in Chapter 1.

When the report is complete and reviewed by the radiologist, it is sent to the ordering provider. Radiology reports are almost always originated in an electronic text format at the radiologist’s office, and are usually sent on paper as a letter or fax.

Radiology reports are seldom available as a codified EHR record, but some medical offices may scan the paper reports as document images in the patient’s EHR. Radiological observations that are codified are those related to the size and stage of tumors.

Additionally, within most hospital systems and between some medical offices, electronic text files of the reports may be available. Copies of the images studied by the radiologist also are sometimes sent to the ordering provider. These images are usually in an electronic format, although x-rays may be sent as film. Electronic transmission of images uses a national standard called DICOM which stands for Digital Imaging and Communications in Medicine. Electronic orders, results, and other data may be communicated between the hospital systems using another standard, called HL-7. Both DICOM and HL7 were discussed in Chapter 2.

**Critical Thinking Exercise 38: Ordering an X-Ray**

Patient Juan Garcia has injured his knee and is examined by a nurse practitioner, who will order an x-ray. Using what you have learned in this chapter, document his visit and the nurse practitioner’s orders.

**Step 1**
Click Select on the Menu bar, and then click Patient.

In the Patient Selection window, locate and click on **Juan Garcia**.

**Step 2**
Click Select on the Menu bar, and then click New Encounter.

You may use the current date and time for this exercise.

Select the reason **Office Visit** from the drop-down list. Click on the OK button.

**Step 3**
Enter the Chief complaint by locating the button in the Toolbar labeled “Chief” and clicking on it.

In the dialog window that will open, type “Twisted his knee.”

Click on the button labeled “Close the note form.”
Step 4
Locate and click on the Search button on the Toolbar near the top of the screen. (The Search button was highlighted in Figure 6-6.)

Click your mouse in the Search String field and enter the medical term “**knee sprain**.” Verify that you have spelled this correctly, and then click the button in the box labeled “Search.”

If you see the message “nothing found to match search,” repeat step 4 and verify that you have spelled the medical term correctly.

Step 5
Locate and click on the Prompt button on the Toolbar near the top of the screen. (The Prompt button was highlighted in Figure 6-7.)

Step 6
If the left pane is not automatically on the Symptoms tab, click the Sx tab. List Size should be 1.

Locate and click on the following findings:
- (red button) joint pain localized in the knee
- (red button) joint swelling of the lateral left knee

Step 7
Click the Hx tab.

Click on the small plus sign next to “Reported trauma to the knee”

Locate and click on the following finding:
- (red button) due to twisting

Step 8
Click the Px tab.

Click on the small plus sign next to “Knee swelling.”

Locate and click on the following findings:
- (red button) Left

Scroll the list and then click on the small plus sign next to “Knee tenderness on palpitation.”

Locate and click on the following findings:
- (red button) On the left

Step 9
Click the Dx tab.

Locate and click on the following finding:
- (red button) Knee sprain
Step 10
Click the Tx tab.

Locate and highlight the following finding. When the finding is highlighted, locate and click the order button on the Toolbar:

- (order button) X-Ray Knee Views W/oblique(s), 3 or more views

Step 11
Click the Rx tab.

Locate the List Size button on the Toolbar and click on it. It should change to size 2.

Locate and click on the following findings:
- (red button) ordered knee brace
- (red button) ordered pain management by immobilization

⚠️ Alert
Do not close or exit the encounter until you have a printed copy in your hand. You will lose your work if you exit before printing.

Step 12
Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.

Juan Garcia

Student: your name or id here
Patient: Juan Garcia: M: 7/31/1984: 5/14/2012 02:30PM

Chief complaint
The Chief Complaint is: Twisted his knee.

History of present illness
Juan Garcia is a 27 year old male.
He reported: Knee joint pain and knee joint swelling on the left laterally.

Past medical/surgical history
Reported History:
Physical Trauma: Trauma to the knee due to twisting.

Physical findings
Musculoskeletal System:
Knee:
- Left Knee:
  - Swelling.
  - Tenderness on palpation.

Assessment
- Knee sprain

Plan
- X-rays of the knee with oblique(s), three or more views
- Knee brace
- Pain management by immobilization

Figure 6-17 Printed encounter note with radiology orders for Juan Garcia.
Be certain there is a check mark in the box next to “Current Encounter” and then click on the appropriate button to either print or export a file, as directed by your instructor.

Compare your printout or file output to Figure 6-17. If it is correct, hand it in to your instructor. If there are any differences, review the previous steps in the exercise and find your error.

**Medication Orders**

The most common type of order is for medication. Ever since the IOM report revealed that high numbers of deaths have occurred because of preventable medical errors, hospitals have increased their focus on patient safety. Hospital’s efforts have included CPOE, computerizing the pharmacy, and using positive identification systems to correctly match the medication with the patient, thus ensuring the right patient receives the right medication. In ambulatory settings, electronic prescription writers have been incorporated into EHR software and include drug utilization review and formulary checking functions (described in Chapter 2 and below).

**Written Prescriptions**

At an inpatient facility using paper charts, the order is written on a Doctor Order sheet and a copy is sent to the hospital pharmacy. The clerk or nurse transcribes the medication order onto an administration record form in the patient’s chart.

In an outpatient facility using a paper system, drug prescriptions are written by hand on a prescription pad and given to the patient to have filled at a pharmacy. Information about the medication is recorded in the chart by hand or the prescription is copied and filed in the paper chart. Alternatively, a member of the clinic staff may phone the prescription to the pharmacy or the clinician may give the patient samples of drugs provided by pharmaceutical companies.

When the patient goes to the pharmacy to have the prescription filled, the pharmacist will enter the information in the pharmacy computer system. The patient’s insurance may require that a generic or less costly drug be substituted for a brand-name drug on the prescription. Unless the provider has indicated DAW or “Dispense As Written” on the prescription, it is very likely that the pharmacist will substitute a medically equivalent drug for the one prescribed by the provider.

The pharmacy computer system is also likely to perform two other functions: “formulary compliance checking” and “drug utilization review,” or “DUR.”

Formulary compliance was discussed earlier in Chapter 2 as an example of decision support. Formulary lists are usually per insurance plan, and because there are so many different plans, the pharmacy system usually checks the formulary by electronically communicating with an intermediary company called a pharmacy benefit manager.

DUR is also performed by the pharmacy computer system. The computer compares the prescription about to be filled with other prescriptions the patient is
currently taking to determine if harmful interactions could occur when two or more medicines are combined. DUR is also capable of checking for potential errors where the dose in the prescription is too large or too small. If allergy information about the patient is available to the DUR system, warnings also can be given where allergic reactions might occur.

If either the formulary checking or the DUR indicates any problem with the handwritten prescription, the pharmacist must contact the prescribing provider. Often the call from the pharmacist comes when the provider is with another patient, so a message is left and the call is returned at a later time. This creates a delay for the patient and pharmacist and consumes extra time for the provider, who has to return the phone calls.

**Electronic Prescriptions**

Writing prescriptions electronically has several advantages over the paper chart method. First, the provider issues the prescription and records it in the chart in one step. Second, the prescription can be transmitted electronically from the provider’s computer system to the pharmacy, saving time for the patient, eliminating the need for the provider’s staff to call in the prescription, and reducing errors caused by handwritten prescriptions. Finally, the DUR and formulary compliance checking can be performed by the clinician’s computer at the time the prescription is written. This allows any problems with the prescription to be corrected prior to sending it to the pharmacy. This drastically reduces phone calls back to the prescribing provider from the pharmacy, saving everyone time. Figures 2-21 and Figure 2-22 in Chapter 2 show examples of DUR and formulary compliance screens in an electronic prescription system.

DUR is a very important feature that reduces the patient’s risk of adverse drug reactions. DUR works best when all of the known drugs and allergy information is available and current. Therefore, an EHR should record not only prescriptions issued by the provider’s system but also medications prescribed elsewhere. These are usually reported by the patient during the nurse’s interview or during the exam. The current medications list should be updated each visit before the provider issues any prescriptions.

The electronic prescription component of an EHR can provide additional benefits to both the clinician and the patient. Because each medication is automatically recorded in the medications list as the prescription is created, a current and recent medications list is available to the clinician when writing the prescription. This reduces prescribing errors.

EHR systems also shorten the time it takes to write a prescription by maintaining a list of prescriptions the clinician writes frequently. This speeds up the writing of prescriptions for common ailments seen at the practice. Physicians of patients with chronic diseases frequently write renewals for existing prescriptions; with EHR systems, they perform this task with a few clicks of the mouse. Additional time is saved because all FDA-approved drugs are listed in the computer, eliminating the need to use a drug reference book to find less frequently prescribed drugs. An example of an EHR prescription writer will be used in Exercise 39.
Closing the Loop on Safe Medication Administration

Hospital EHR systems help protect patients by closing the loop on medication administration. This safety initiative starts with electronic medication prescription from CPOE to the pharmacy computer system, where the order is checked and approved by the pharmacist for dispensing to the nurse. The nurse can then use an electronically document process to ensure the five patient rights of medication administration safety. Before administering the medication, a handheld scanner device is used to read a barcode on the patient's armband to ensure the medication is being given to the right patient. Next the nurse scans the barcodes on each medication or intravenous solution and the computer program checks the electronic order and warns the nurse of any discrepancies. If the medication dose, route, and time match the order for the patient, the nurse can then administer the medication to the patient. In some electronic systems a repeat scan of the patient armband or the scan of the nurse's identification badge completes the documentation, confirming that the medication has been administered.

Figure 6-18 Medication safety—the closed loop process.

Follow the numbers in Figure 6-18 as you read the following:

1. Clinician writes prescription using CPOE.
2. Prescription is checked and approved by the pharmacist.
3. Nurse receives order electronically and removes vial from medication-dispensing system.
A handheld scanner device is used to read a barcode on the patient’s armband to ensure the medication is being given to the right patient.

Nurse scans the barcodes on each medication or intravenous solution and the computer program checks the electronic order and warns the nurse of any discrepancies.

Nurse administers the medication to the patient.

Nurse documents the patient’s chart. (In some EHR systems a repeat scan of the patient’s armband or the scan of the nurse’s identification badge completes the chart documentation, without manual entry.)

### Medication Administration—The Five Rights

1. Right patient
2. Right time and frequency
3. Right medication
4. Right dose
5. Right route of administration

### Guided Exercise 39: Writing Prescriptions in an EHR

In this exercise you will learn to use the Student Edition prescription writer to enter orders a nurse has received by phone from the doctor. It is necessary for the nurse to enter the prescription, because the patient needs to start taking the antibiotic immediately and the doctor does not have remote access to his EHR to write the prescription himself.

**Case Study**

You will recall from the previous chapter that Kerry Baker is a 36-year-old female recently seen for an upper respiratory infection. It has been 10 days since she was seen and her condition has not improved. She would like a prescription for an antibiotic, but the physician has already left for the day. The nurse contacts the physician, who verbally orders amoxicillin. The nurse will write the prescription and the doctor will cosign the order later, usually within 24 hours.

**Step 1**

If you have not already done so, start the Student Edition software.

Click Select on the Menu bar, and then click Patient.

In the Patient Selection window, locate and click on **Kerry Baker**, as shown in Figure 6-19.

**Step 2**

Enter the Chief complaint by locating the button in the Toolbar labeled “Chief” and clicking on it.

![Figure 6-19 Select Patient Kerry Baker.](image)
In the dialog window that will open, type “Prescription request.”

Compare your screen to Figure 6-20 before clicking on the button labeled “Close the note form.”

**Step 3**

Click on the Dx tab.

Locate and click on the small plus signs next to “ENT Disorders,” “Nose,” and “Sinusitis.”

Locate and click on the following finding:

- (red button) Acute

Compare your screen to Figure 6-21.

Locate the Entry Details “Status” field and click the down arrow to display a drop-down list (also shown in Figure 6-21).

Locate and click on the status “Failing to change as expected.”

**Step 4**

You will now enter the medication order using the prescription writer. Although clinicians usually have personal order sets that allow them to quickly pick from a list of frequently prescribed drugs, you do not have access to this doctor’s list. Therefore you will use search to locate the ordered drug.
Click on the Rx tab.

The prescription writer is invoked by clicking the Rx button in the Toolbar at the top of your screen. The button is shown circled in red in Figure 6-22. The icon resembles a small prescription bottle, but notice that the button is grayed out.

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**Figure 6-22** Search for amoxicillin (Rx button circled in red).

**Figure 6-23** Rx button enabled when amoxicillin is highlighted.
Step 5  
Locate and click on the Search button on the Toolbar to invoke the Search String window.

Type “Amoxicillin” in the search dialog window and click on the button labeled “Search.” Note that amoxicillin is a generic drug, but even when you type in a brand name, the search will automatically find the generic version of the drug for you.

Step 6  
The finding “Antibacterial Amoxicillin” should be highlighted.

The Rx button on the Toolbar is now active. If you position the mouse pointer over it, it will change color (as shown in Figure 6-23.) The prescription (Rx) button is enabled only when you are on the Rx tab and only if the highlighted finding is a medication.

With the finding “Antibacterial Amoxicillin” highlighted, click on the Prescription button in the Toolbar. A simple Prescription writer window will be invoked, as shown in Figure 6-24.

Step 7  
When you clicked on the prescription (Rx) button and invoked the prescription writing window, the drug was automatically selected from the finding. A list of available dosages is automatically displayed. This is the “Sig” information that the pharmacist will include on the label. It consists of the quantity prescribed, the number of times per day, capsules to take each time, number of days to take the drug, the total quantity prescribed, the number of refills allowed, and any free-text instructions to the patient. The list of available Sig choices makes writing the prescription very fast. It is found in virtually all commercial EHR prescription systems.

Locate and click your mouse on the Sig: “500 milligram cap 1 po q8h 10 DSP:30,” shown highlighted in Figure 6-24.

The next window displaying available brands (as shown in Figure 6-25) will be displayed automatically.

Step 8  
Locate and click on “Amoxil SmithKline Beecham,” as shown in Figure 6-25.

2Sig, from the Latin sigma, are instructions for labeling a prescription.
Step 9

Compare your screen to Figure 6-26. Locate the “Generic Allowed” fields. The “Yes” and “No” indicate if the pharmacist is allowed to substitute a generic drug for a prescribed brand. Click in the small circle next to Yes. The small circle is then filled in.

If you need to make any changes or corrections in the prescription, click on the button labeled “Rx Inquiry” to invoke the Dosage and Brand windows again.

When everything in your prescription screen matches Figure 6-26, click on the Save Rx button.

Step 10

The prescription information will be written into your patient encounter note as shown in Figure 6-27.

Step 11

The nurse now documents the doctor’s instructions.

Locate and click on the Search button on the Toolbar to invoke the Search String window.

Type “verbal orders” in the search dialog window (shown in Figure 6-28) and click on the button labeled “Search.”
Step 12
Locate and click on the following finding:

- (red button) Verbal orders to change plan of care

Locate the free-text field just below the right pane. Type "Dr. Thomas" and press the Enter key.

Compare your screen to Figure 6-29.

Step 13
Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.
Be certain there is a check mark in the box next to “Current Encounter” and then click on the appropriate button to either print or export a file, as directed by your instructor.

Compare your printout or file output to Figure 6-30. (The contents should be the same except for the encounter date and patient’s age.) If your work is correct, hand it in to your instructor. If there are any differences, review the previous steps in the exercise and find your error.

Quick Access to Frequent Orders

In the previous exercise we mentioned a time-saving feature that is typical in all CPOE systems is a quick-pick list of a clinician’s frequently used orders. These may take the form of diagnosis-based order sets, or a more generalized list of the prescriptions the clinician writes most frequently.

With thousands of tests that could be ordered and thousands of drugs to choose from, a clinician does not have the time to go through a search of medications or tests to write a prescription or order a lab. Many clinicians find that they order a fairly narrow range of tests (appropriate to their specialty and patient population) and write prescriptions for only a small group of medications.

It makes sense for clinicians to keep a list of the items they most frequently use from which they can select when writing the order. Commercial EHR systems handle this in different ways; some automatically create the list by memorizing what the clinician has been ordering, whereas other systems allow the clinicians to build their own lists. Most EHR systems offer a combination of both.

The EHR system you will use in a medical facility will most certainly have this type of feature. Making use of the feature is definitely a good way to speed up data entry at the point of care. Creating or customizing Rx and orders lists will certainly save time when the clinician is with the patient.

The next exercise emulates this feature by allowing you to select from a small list of medications instead of searching for each drug. However, commercial EHR systems provide a much more robust application that allows the clinician to save the complete sig information, which enables the clinician to write an entire prescription or lab order with a single click of the mouse.

Critical Thinking Exercise 40: Ordering Medications Using a Quick-Pick List

In this exercise you will learn to use a quick-pick list with the prescription writer to enter multiple medication orders that a nurse has received by phone from the doctor. The doctor will cosign the orders later, usually within 24 hours.
Case Study
Nancy Anderson is a 61-year-old female who was admitted to the hospital for congestive heart failure. She is to be discharged today and is anxious to leave. Her doctor has called you with orders for her discharge medications. As you have in the previous exercise, you will enter medication orders on the doctor’s behalf. The doctor has ordered Lasix 40 mg BID, Lanoxin 0.125 mg daily, Potassium chloride 20 mg BID, and Nitroglycerine sl PRN.

Step 1
If you have not already done so, start the Student Edition software.

Click Select on the Menu bar, and then click Patient.

In the Patient Selection window, locate and click on Nancy Anderson.

Step 2
Locate and click on the “List” button on the Toolbar.

Scroll the List Manager window to the right until you see the list named “N CHF Discharge Meds.” Highlight it (as shown in Figure 6-31) and then click the button labeled “Load List.”

Step 3
You should automatically be on the Rx tab.

The CHF Discharge Meds list displays medications typically prescribed to CHF patients when they are discharged.

Locate and highlight the medication finding of ordered Anginal Preparations Nitroglycerine, and then click on the Rx button on the Toolbar. This will invoke the prescription writer.

Step 4
The dosage selection will automatically be displayed. Select the first dosage 0.15 mg.

When the brand window is displayed click on the brand Nitrostat.

When the prescription is displayed, locate the “Generic Allowed” fields and click in the small circle next to Yes.

Click on the Save Rx button.

Step 5
Enter the next order by highlighting the medication finding of ordered Cardiac Glycosides Digoxin and then click on the Rx button on the Toolbar.
When the dosage selection is displayed, select the first dosage on the list **0.125 mg tab**.

When the brand window is displayed click on the brand **Lanoxin**.

Locate the Generic Allowed fields and click in the small circle next to **Yes**.

Click on the Save Rx button.

**Step 6**
Enter the next order by highlighting the medication finding of **ordered Diuretic Loop Acting Furosemide** and then click on the Rx button on the Toolbar.

When the dosage selection is displayed, select the second dosage on the list **40 milligram tab 1 po BID**.

When the brand window is displayed, click on the brand **Lasix**.

Locate the Generic Allowed fields and click in the small circle next to **Yes**.

Click on the Save Rx button.

**Step 7**
Enter the last order by highlighting the medication finding of **ordered Potassium Chloride** and then click on the Rx button on the Toolbar.

When the dosage selection is displayed, select the last dosage on the list: **20 mEq tab**.

The brand will not be selected; click the button labeled Cancel in the brand window.

When the prescription is displayed, locate and click your mouse in the “Quantity” field, and then type **1**.

Locate the frequency field (labeled “Freq”) and click on the down arrow in the field to display the drop-down list. Select **twice daily**, from the list.

Locate the field labeled “Per Day” and type the numeral **2**.

Locate the field labeled “Route” and click on the down arrow in the field to display the drop-down list. Select **by mouth**, from the list.

Locate the field labeled “Days” and type the numeral **30**.

In the Dispense section, locate the field labeled “Amount” and type the numeral **60**.

Locate the field labeled “Number of Refills” and type the numeral **3**.
Click on the Save Rx button.

**Alert**

*Do not close or exit the encounter until you have a printed copy in your hand. You will lose your work if you exit before printing.*

---

Nancy Anderson

Student: your name or id here

Plan

- Nitroglycerin
  - 0.15 mg tab (1 sl prn) DISP:100 Refill:5 Generic:Y Using:Nitrostat Mfg: Parke Davis
- Digoxin
  - 0.125 mg tab (1 po qd) DISP:100 Refill:5 Generic:Y Using:Lanoxin Tablets Mfg: Burroughs Wellcome
- Furosemide
  - 40 mg tab (1 po bid) DISP:100 Refill:3 Generic:Y Using:Lasix Mfg: Hoechst
- Potassium chloride
  - 20 mEq tab (1 po bid) DISP:60 Refill:3 Generic:Y

**Figure 6-32** Printout of Nancy Anderson’s medication orders.

**Step 8**

Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.

Be certain there is a check mark in the box next to Current Encounter and then click on the appropriate button to either print or export a file, as directed by your instructor.

Compare your printout or file output to Figure 6-32. (The contents should be the same except for the encounter date and patient’s age.) If your work is correct, hand it in to your instructor. If there are any differences, review the previous steps in the exercise and find your error.
Real-Life Story

When Orders and Results Are Critical

By Marney Thompson, RN

Marney Thompson is a registered nurse working in the critical care unit of a large hospital.

When I was in nursing school I did a 16-week rotation in a critical care setting and loved it. Since then I have always worked in medical intensive care, or critical care units. I like the challenges of that type of nursing where you have an intensive patient with multiple needs and you are managing all the complications that come along with the acute phase—so you can get that patient to the next phase, which is recovery. I feel a strong sense of purpose being part of the team who responds when there is a patient who is coding.

I have been fortunate that all the hospitals I have worked in used electronic records. The patient’s vital signs, CVP (cerebral vascular pressure) monitoring, heart rate, oxygenation, blood pressure—all transfer directly into our charts electronically. Our hospital EHR also has CPOE, so all lab and medication orders are electronic. The lab results are also electronic, which means the intensivist and I can both be looking at a patient’s most recent results at the same time, even though the doctor might be in a different part of the hospital.

In addition, our hospital pharmacy is computerized, which means that when a situation is critical I can order meds on behalf of the doctor; the pharmacist can then review them and communicate with the Pyxis Medstation in the nursing unit to dispense them. Here is a situation that happened recently.

This patient was on BIPAP (bilevel positive airway pressure) and his respirations were agonal looking. He was not responsive—had not been responsive since coming to the unit—but he started to look like he was going downhill. I contacted the doctor (our intensivist), who ordered some stat tests: a BMP (basic metabolic panel), a CBC (complete blood count), and a magnesium level—pretty standard stuff for any patient who is crashing. We drew the specimens and sent them to the lab stat. The BMP takes about 45 minutes to be processed. In the meantime, I noticed that his QRS intervals started to widen. I suspected that it was related to possible electrolyte imbalances because his urine output had significantly decreased despite fluid boluses. I got an EKG, which confirmed it. I, another nurse, and an RT (respiratory therapist) were in the room trying to get an ABG (arterial blood gas) from the femoral artery, when suddenly none of us could feel a pulse. Basically, he was in PEA (pulsless electrical activity). Of course at that point we called the code.

The code team arrived. We had started CPR (cardio-pulmonary resuscitation) and shortly after starting CPR we got a pulse back. We still had to intubate the patient because of his respiratory status. While the CRNA (Certified Registered Nurse Anesthesiologist) was intubating, I was able to bring up his lab results so we could get a bigger picture. At that time his potassium was extremely high. The doctor was at the bedside assessing the patient, assisting with intubation and calling out orders. I was at the computer looking at the labs and entering orders.

The doctor said, “Let’s go ahead and push an amp of D-50 (dextrose) and ten units of insulin. Then we’ll push an amp of calcium chloride after that. His bi-carb is low—push 2 amps of bi-carb and put an order in for another ABG right away.”

The doctor was ordering this in rapid succession, while I entered the orders and transmitted them to the pharmacist, who cleared them very quickly; my co-worker went to pull the meds from the Pyxis machine. Literally in a matter of minutes, people were handing the drugs through the door, scanning and administering them. It was over and done, just that quick.

Our hospital policy supports the closed loop medication administration safety initiative which you will read about elsewhere in this chapter. Let me describe how that works. When the doctor was giving me verbal orders, I was entering them in the CPOE. The medication orders were automatically sent to the pharmacy. The pharmacist interacted with that order on the pharmacy system, validated that the orders were safe and ready to dispense, and sent an order to the dispensing system. When the nurse went to the drawer to pull it out of the machine, the order was in there and allowed her to get it. Then she gave it to the nurse in the room, who scanned the patient’s arm band, scanned the medication, and then administered it. The system also documented it. So there is no transcription error, no misinterpretation of the orders— it is all electronically one order moving through the systems. I love it. I feel like I am getting double-checked five times. The pharmacist is also getting double-checked because when the order goes to the Pyxis machine it also comes up on my order list screen, highlighted in yellow for the nurse to confirm this is in fact the correct order for the correct patient.

When the crisis is over and the doctor has time to get into his own CPOE system, there is a button there labeled “cosign.” He can click the cosign button and it will show him all the verbal
orders that he has given—that someone else has entered for him. He can select them and cosign them at that time. Also, each doctor has a work folder in the EHR, so if he does not cosign them at that time they will show up in his work folder as items he needs to attend to. Most of the intensivists on our unit cosign their orders before the end of their shift.

Even when we are not in a code situation, there are times throughout the night when nurses are entering orders. For example, last night I had a patient come in who was already on a dopamine drip at 20 micrograms. The patient was tachycardic; blood pressure was 70 and 80 systolic. The doctor was at the bedside speaking with the surgeon when the anesthesiologist came to intubate. I said to the doctor, “Can I have Levophed?” and entered the order. I got the Levophed hanging, but the patient’s pressure was still dumping. Because the physicians were evaluating the patient for septic versus cardiogenic shock, I asked, “How about some dobutamine?” The doctor told me to go ahead with the order.

Even with all three of those hanging, the patient still was not improving, and the anesthesiologist was requesting a better BP before sedation for intubation. I asked, “What else do we want to hang to get some blood pressure—can I have some vasopressin?” The doctors preferred to have me enter the orders in the computer while they continued to confer about the patient. By me entering the orders at the bedside, pharmacy was able to get the drugs to me more quickly as well.

I enjoy working in the CCU. You are responsible for almost every aspect of your patient’s care. You have to be an advocate for your patient, someone who can handle herself in stressful situations, and think quickly in crisis.

Protocols Based on Diagnosis Codes

Disease-based protocols can help the clinician write the orders and document the exam more quickly. Instead of searching through a list of a thousand prescription drugs, the clinician can access a short list of drugs that are regularly prescribed for a particular type of infection. These lists can be created for individual prescribing clinicians, for the practice as a whole, or by some recognized authority such as a medical association.

Similarly, the clinician can create a specific group of orders used to test for certain conditions. When a diagnosis is suspected, the list can be quickly located and the clinician can order tests, consults, or radiological studies all at once.

Introducing Diagnosis Codes

Each of the encounters you have documented in the previous exercises included an Assessment finding that was selected on the Dx tab of the software. As you are already aware, Dx is an acronym for “Diagnosis.” Diagnoses are assigned codes using the ICD-9-CM code set (or ICD-10 after 2013).

People sometimes erroneously think of ICD-9-CM codes as “billing” codes, because reimbursement is tied to the diagnoses codes and they are required on health insurance claims. However, ICD-9-CM codes are important for reasons other than billing, including statistical studies of causes of death, disease, and injury. ICD-9-CM provides an internationally recognized system of codifying the patient’s condition.

Because ICD-9-CM are standardized codes for diseases, those codes can be used for problem lists and associated with protocols and treatment plans. Many professional journals, associations, and practices create protocols for treating certain diseases. These may consist of specific regimens such as an oncologist might use to treat a particular form of cancer, or they might consist of a list of all possible antibiotics known to be effective for a certain type of infection. In either case, the protocol or plan of treatment can be easily communicated to other clinicians by linking it to the diagnoses for which it is effective.
Even without creating specific protocols, the diagnosis can be used to help locate orders and treatment plans. Guided Exercise 37, earlier in this chapter, demonstrated this with Gary Yamamoto’s encounter. Once you found the diagnosis “413.9 Angina Pectoris,” the Prompt feature was able to find a list of appropriate test orders related to the condition. Now we will further study how the diagnosis aids the clinician in locating appropriate orders.

**History of ICD-9-CM**

ICD stands for International Classification of Diseases, which is a system of standardized codes developed collaboratively between the World Health Organization (WHO) and 10 international centers. The number “9” represents the ninth revision of the coding system, which was revised about every 10 years from 1900 to 1979.

Today’s coding system evolved from the International List of Causes of Death, which was used by physicians, medical examiners, and coroners to facilitate standardized mortality studies. In 1948, WHO expanded and renamed the system to make it useful for coding patient medical conditions as well.

By the time the ninth revision was published, the U.S. National Center for Health Statistics began to modify the statistical study with clinical information. The letters “CM” stand for Clinical Modification. Clinical modifications provided a way to code the clinical information about the health of a patient beyond that needed for statistical reports. With the addition of clinical modifications, the codes became useful for indexing medical records and medical case reviews, and communicating a patient’s condition more precisely.

ICD-9-CM is currently published in three volumes. The first two volumes provide a listing and an index of diagnosis codes; the third volume lists codes for hospital inpatient procedures. Figure 6-33 shows a sample list of codes from volumes 1 and 2.

The diagnosis codes are three characters, followed by a decimal point and up to two numerals. The first three characters of an ICD-9-CM code identify the primary diagnosis; the two digits to the right of the decimal point further refine the diagnosis specificity.

Insurance billing allows for the use of multiple ICD-9-CM codes for a single procedure, indicating one code as the primary diagnosis and additional codes as secondary conditions for which the treatment was done.

The historical intent of the ICD was to classify similar causes of mortality and disease conditions into statistical reportable data. When in 1989 ICD-9-CM codes became required by insurance carriers to process claims, the code set had to be further modified. The problem was that if an ICD-9-CM code was required for an insurance claim, but the patient was perfectly healthy, what code should be used? To solve this problem, ICD-9-CM added a section of codes that start with the letter “V”; these V codes indicate nonillness conditions that can be used for billing. For example, children have regular pediatric checkups, these are coded as “V20.2 Well-Child Checkup.”
Volume 1 also includes “E” codes (listed at the bottom of Figure 6-33). These are not used for diagnosis, but to classify the cause of an injury or poisoning. For example, the billing diagnosis 823.0 indicates the patient had a closed fracture of the tibia. The code E813.1 provides further detail that the broken leg is the result of a motor vehicle crash in which the patient was a passenger.

**Future Developments: ICD-10**

ICD-10 is the latest revision to the International Classification of Diseases. It was released by WHO in 1992 and is used broadly in Europe and Canada. ICD-10 contains about twice as many categories as ICD-9 and uses more alphanumeric codes. Effective January 1, 1999, ICD-10 was officially implemented in the United States for reporting the cause of death on death certificates. It has not been implemented for billing, and should not be used in place of ICD-9-CM for reporting diagnoses on insurance claims. The U.S. Department of Health and Human Services (HHS) has proposed that the ICD-10 code sets be used for billing effective October 1, 2013.
Use Figure 6-34 to compare several ICD-9-CM and ICD-10 codes.

### ICD-9-CM and EHR Nomenclatures

The ICD-9-CM is not an EHR nomenclature. However, most EHR systems contain a “cross-walk” or internal reference table that can produce ICD-9-CM codes automatically. The advantage of using an EHR with a codified nomenclature is that the ICD-9-CM codes will always be in sync with the encounter documentation that is produced. Another advantage is that the EHR allows the clinician to record nuances that are beyond the scope of ICD-9-CM such as “mild” or “improving.” The EHR software will automatically translate the assessment to the correct diagnosis code.

### Primary and Secondary Diagnoses

The concept of the primary diagnosis is also important. The primary diagnosis is the reason why the patient came to the office or hospital. Other conditions that are addressed during the visit are listed as secondary diagnoses (also called comorbidity). In a hospital, secondary diagnoses are classified as POA, present on admission, or HAC, hospital acquired condition.

Any conditions that exist concurrently with the primary diagnosis should be reviewed, examined, or treated and documented in the exam note. Often this is facilitated by a “problem list,” which is a summary of ongoing or previous conditions. The problem list helps the clinician keep track of the patient’s needs beyond the scope of the chief complaint for today’s visit. You will see an example of a problem list in Chapter 7.

### Multiple Diagnoses

Multiple diagnoses occur mainly in patients with ongoing or chronic conditions requiring regular visits. It is correct and appropriate to continue to use diagnosis codes from past visits for as long as the patient continues to have the illness or...
condition and that condition is clearly documented in the record. For example, a patient with diabetes mellitus—poorly controlled might be seen regularly. With this disease, on some visits the patient will likely have other problems as well. Therefore, the diagnosis 250.2, “Diabetes Mellitus,” should be included in every visit note and on insurance claims for those visits.

### The Rule-Out Diagnosis

The ICD-9-CM code set has neither specific codes nor modifiers to use with diagnosis codes to communicate the concept of “ruling out” a disease or condition. One inconsistency in the ICD-9-CM guidelines is that services performed during inpatient settings support the concept of “rule-out,” but guidelines for the outpatient setting does not.

The diagnosis for a patient may take more than one visit to be determined or confirmed, but the outpatient visit guidelines do not allow for “possible,” “probable,” “suspected,” “rule-out,” or similar diagnoses. Although the prefix “possible” may be appropriate and necessary in the exam note, the insurance claim for an outpatient visit should not be coded with a diagnosis for the suspected disease.

This creates a dilemma when ordering diagnostic tests from outside facilities. Reference laboratories cannot bill for the test unless they have a diagnosis. Only the clinician ordering the test is allowed to assign the diagnosis; the reference lab cannot. Therefore, the labs require an order for a test to include a diagnosis code, even though the purpose of the test is only to determine if the patient in fact has the disease. Again, Guided Exercise 36 was an example of this in that you practiced ordering tests for Gary Yamamoto, a patient with possible angina pectoris.

### Using Diagnosis to Find Orders and Treatments

In the next two exercises, you will learn to use multiple diagnoses and to create different sets of orders based on established plans associated with each diagnosis. You must complete both Exercise 41 and Exercise 42 in one session. **Do not begin this exercise unless there is enough class time remaining to complete both exercises.**

#### Guided Exercise 41: Orders Based on Diagnosis

**Case Study**

Alena Zabroski is a 53-year-old female who complains of jaw pain. She has been to her dentist, who has found nothing wrong. The clinician initially suspects angina and orders tests to confirm or rule out the diagnosis. However, Alena mentions that she has moved back to her childhood home and has been restoring it. Knowing that the patient was born in 1959 and therefore her home is an old house, the clinician realizes there is a possibility that she is being exposed to lead-based paints. This fact alters the direction of inquiry and of the tests ordered.

**Step 1**

If you have not already done so, start the Student Edition software.

Click Select on the Menu bar, and then click Patient.
In the Patient Selection window, locate and click on **Alena Zabroski** as shown in Figure 6-35.

**Step 2**

Click Select on the Menu bar, and then click New Encounter.

Use the current date and time. Select the reason **Office Visit** from the drop-down list and click on the OK button.

**Step 3**

Enter the Chief complaint by locating the button in the Toolbar labeled “Chief” and clicking on it.

In the dialog window which will open, type: **“Patient reports jaw pain.”**

Compare your screen to Figure 6-36 before clicking on the button labeled “Close the Note form.”

**Step 4**

In this exercise, the medical assistant will begin the visit by taking Alena’s vital signs.

Use the form labeled “Vitals,” which you will select from the Forms Manager, invoked on the Active Forms tab (as you have done in previous exercises).
Enter Alena’s vital signs in the corresponding fields on the Form as follows:

- Temperature: 99
- Respiration: 21
- Pulse: 70
- BP: 114/70
- Height: 70
- Weight: 150

When you have finished, compare your screen to Figure 6-37 and, when it is correct, click on the Encounter tab at the bottom of the screen.

**Step 5**

Locate and click on the Lists button in the Toolbar at the top of your screen. The List Manager window will be invoked.

As you learned in the previous chapter, the List Manager displays the various Lists available to providers in the practice. Two fields at the top of the screen organize the display of List names, filtering them by Owner and Group.

The Group field allows a user to quickly find a list by limiting the display to a desired group. The Student Edition has two groups: “All” and “Student Edition.” In this step, you are going to change the lists displayed from All to Student Edition.

Locate and click on the button with a down arrow in the Group field; a drop-down list will be displayed. Select Student Edition. Compare your List Manager window to Figure 6-38.

Locate and highlight the list labeled “Orders By Dx” and then click on the button labeled “Load List.”

The Orders By Dx List has been especially created for this exercise. It demonstrates the use of protocols of orders and treatments by associating them with particular diseases. In this exercise there is one list for several diseases. In an actual medical office, there would likely be many separate lists.

**Step 6**

The list will load and automatically change to the Dx tab. If the left pane is not on the Dx tab, click on the tab labeled “Dx.”

Locate the list size button in the Toolbar at the top of your screen and click it until it is set to 2.

Locate and click on the finding:

- (red button) ANGINA PECTORIS
Compare your screen to Figure 6-39.

Locate and click on the Prompt button in the Toolbar at the top of your screen.

**Step 7**

Click on the Sx tab.
Locate the ROS button in the Toolbar at the top of your screen and click it. It should change color (as shown in Figure 6-40).

Locate and click on the following findings (you will need to scroll the left pane to find them all):
- (red button) jaw pain (in jaw bone)
- (blue button) chest pain or discomfort
- (blue button) palpitations
- (blue button) abdominal pain
- (blue button) excessive sweating
- (blue button) dizziness
- (blue button) fainting (syncope)

![Figure 6-41 Hx tab with Dx: Angina Pectoris List Size 2.](image)

**Step 8**

Click on the Hx tab.

Locate and click on the following findings:
- (blue button) current smoker
- (red button) Family history of Angina Pectoris

Locate and expand the tree for “exercise habits.”

Locate and click on the following finding:
- (red button) Sedentary

Compare your screen to Figure 6-41.
Step 9
Click on the Px tab. Notice that the physical findings from Vitals are already recorded.

Locate and click on the following findings:
- (blue button) Heart Sounds S3
- (blue button) Heart Sounds S4
- (blue button) Heart Sounds Gallop
- (blue button) Abdomen Tenderness Direct
- (blue button) Pallor, Generalized

Compare your screen to Figure 6-42.

Step 10
Locate the List Size button in the Toolbar and click it until it is set to 1.

Click on the Tx tab.

Locate the Order button in the Toolbar at the top of your screen (highlighted in Figure 6-43).

Highlight each of the following findings and then click on the Order button.
- (order) Comprehensive Metabolic Chem Panel
- (order) Lipids Test Panel
- (order) Electrocardiogram
- (order) Cardiovascular Stress Test

Compare your screen to Figure 6-43.
Step 11

Click on the Rx tab.

Locate and click on the following findings (you do not need to use the order button):

- (red button) ordered Institute Prescribed Exercise Program
- (red button) ordered Low Cholesterol Diet
- (red button) ordered Patient Education Dietary Low Fat Cooking

Compare your screen to Figure 6-44.

Continue with Guided Exercise 42. Do not exit the Student Edition software or you will lose your work.

Guided Exercise 42: Multiple Diagnoses

It is not unusual during the course of an office visit for a patient to bring up additional problems or provide a piece of information to the clinician that suddenly brings focus on another area of the patient’s health.

When Alena Zabroski mentions that she has been scraping a lot of old layers of paint off the walls of her childhood home, the clinician realizes that the patient was born in 1959 and there is a possibility that she is being exposed to lead-based paints.

Step 12

Locate the List button in the Toolbar at the top of your screen and click it to invoke the List Manager window.

Reload the List “Orders By Dx” by selecting it and clicking the button labeled “Load List.” If you have difficulty, see Figure 6-38 and review step 5 above.
Step 13

The list will be reloaded and the Dx tab will be displayed.

Verify the List Size is 1. If it is not, then locate and click on the button labeled “List Size” in the Toolbar until it is set to 1.

Locate and highlight the finding “Poisoning Heavy Metals Lead.”
Locate the field labeled “Prefix” in the Entry Details section of your screen. Click the button with the down arrow in the Prefix field (circled in red in Figure 6-45). A drop-down list of Prefix terms will be displayed.

Scroll the list of prefixes. Locate and click on the term “Possible.”

The finding will automatically be recorded and the text of the finding will change to “Possible poisoning by lead.”

Locate the list size button in the toolbar at the top of your screen; if it is not currently set to 1, click it until it is set to 1.

With the finding “Possible Poisoning by Lead” still highlighted, locate and click on the Prompt button in the Toolbar at the top of your screen.

**Step 14**

The clinician is going to first record this new piece of information. Click on the Hx tab. Locate and click on the following finding:

- (red button) house has peeling paint which is lead based

Compare your screen to Figure 6-46.

**Step 15**

Click on the Sx tab. Verify the ROS button in the Toolbar at the top of your screen is still depressed. If it is not, then click it.

Locate and click on the following findings:

- (blue button) headache
- (blue button) nausea
- (blue button) vomiting
- (blue button) confusion
- (blue button) disorientation
- (blue button) convulsions, generalized

Compare your screen to Figure 6-47.

**Step 16**
Click on the Px tab. Note some findings are already selected (from the previous exercise).

Locate and click on the following finding:
- (blue button) Gums Gingival Line

Compare your screen to Figure 6-48.

**Step 17**
Click on the Tx tab.

Locate the Order button in the Toolbar at the top of your screen.
Locate and highlight each of the following findings and then click on the Order button. Do not click on the red or blue buttons next to these findings.

- (order) Hepatic Function Panel
- (order) Serum Lead Level
- (order) Urine Lead, 24 hr

Compare your screen to Figure 6-49.

Step 18
The clinician is also concerned about others who might be in the home and will need to be screened for lead poisoning as well.

Click on the Rx tab.

Locate and click on the following findings (you do not need to use the Order button):

- (red button) Screen Family

Compare your screen to Figure 6-50.

Step 19
Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.

Be certain there is a check mark in the box next to “Current Encounter” and then click on the appropriate button to either print or export a file, as directed by your instructor.

Compare your printout or file output to Figure 6-51. If your work is correct, hand it in to your instructor. If there are any differences (other than encounter date or patient’s age), review the previous steps in the exercise and find your error.

This exercise has shown how a diagnosis can be used to find and display lists of orders and treatments for particular conditions.
Student: your name or id here
Patient: Alena Zabroski: F: 9/27/1959: 5/15/2012 01:30PM
Chief complaint
The Chief Complaint is: Patient reports jaw pain.

Personal history
Behavioral: Not a current smoker.
Habits: Sedentary.
Home Environment: Housing has peeling lead-based paint.

Family history
Angina pectoris.

Review of systems

Chief Complaint
Patient reports jaw pain.

Personal history
Behavioral: Not a current smoker.
Habits: Sedentary.
Home Environment: Housing has peeling lead-based paint.

Family history
Angina pectoris.

Review of systems

Oropharyngeal: Jaw pain.

Cardiovascular: No chest pain or discomfort and no palpitations.

Gastrointestinal: No nausea, no vomiting, and no abdominal pain.

Endocrine: No excessive sweating.

Neurological: No dizziness, no fainting, no confusion, no disorientation, and no
generalized convulsions.

Physical findings

Vital Signs:

Vital Signs/Measurements             Value                    Normal Range
Oral temperature                     99 F                     97.6 - 99.6
RR                                   21 breaths/min           18 - 26
PR                                   70 bpm                    50 - 100
Blood pressure                       114/70 mmHg              100-120/56-80
Weight                               150 lbs              98 - 183
Height                               70 in       59.84 - 68.11

Oral Cavity:
Gums: ° Showed no gingival line.

Cardiovascular:
Heart Sounds: ° No S3 heard. ° No S4 heard. ° No gallop was heard.

Abdomen:
Pallation: ° No direct tenderness in the abdomen.
Skin:
° No generalized pallor.

Assessment
• Angina pectoris
• Possible poisoning by lead

Plan
• A comprehensive metabolic panel
• A hepatic function panel
• A lipid profile
• Serum lead level
• Urine lead, 24 hr
• An ECG
• A cardiac stress test
• Institute prescribed exercise program
• Low cholesterol diet
• Low fat cooking
• Family screening

Figure 6-51 Printed encounter note for Alena Zabroski.
Chapter Six Summary

This chapter introduced several new buttons on the Medcin Toolbar. In this chapter you learned to use the Search and Prompt features and one way of recording a clinician’s order. You also learned to use more icons on the Medcin Toolbar.

**Search** provides a quick way to locate a desired finding in the nomenclature. Medcin addresses semantic differences in medical terms in three ways:

1. Search performs automatic word completion, so if you search for knee but the finding is for knees, it will still find it.

2. Medcin includes an extensive list of synonyms that are used in an alternate word search. For example, if you search for knee injury, the search results will also include findings for knee burns, knee trauma, and fractured patella, among others.

3. Search identifies related findings in other tabs so that when you search for a word or phrase in a particular tab, related findings are automatically available in the other tabs. This means that when you are using search while documenting a patient exam, as you continue through the exam, the other tabs may already have findings that you will use.

Search is not designed to find every instance that contains the words being searched because the search results will often have too many findings. Instead, Search finds and displays the highest level match but does not list all the expanded findings below it.

**Prompt** is short for “prompt with current finding.” Prompt generates a list of findings that are clinically related to the finding currently highlighted.

The prompt list that is displayed is shorter than the full nomenclature, containing only relevant findings, making it easier to read and navigate. The list generated by the prompt feature populates all the tabs, creating shorter lists of any relevant findings in each tab (Sx, Hx, Px, Tx, Dx, and Rx).

The **Order** button orders a test. Clicking on the red button for a test records the test as performed. Highlighting the name of the test and clicking the order button records the test as ordered.

The **Rx** button on the Toolbar is available only on the Rx tab and only when the highlighted finding is a drug or medication. Clicking the Rx button invokes the prescription writer.

ICD-9-CM codes are an international standard for coding diseases and death. A supplemental section of ICD-9-CM also provides codes for reasons that patients come to the doctor other than illness or injury. These codes are called “V Codes” and start with the letter “V.” They are used for checkups, physicals, vaccinations, maternity care, screening for diabetes, and so on.

Another supplemental section of the ICD-9-CM codes is titled “External Causes of Injury and Poisoning.” These codes begin with the letter “E.” E codes cover injuries ranging from bee stings to war; other examples include falling and vehicle crash injuries. E codes are used in addition to the numeric ICD-9-CM codes.
codes, never alone. E codes are used to codify the cause of an injury or adverse event.

The ICD-9-CM codes are from three to five digits long. The fourth and fifth digits add specificity. Insurance billing rules require that clinicians code to the most specific level. EHR systems automatically reference ICD-9-CM codes at the fourth or fifth digit specificity. EHR systems based on Medcin can automatically resolve the assessment to the most specific level of diagnosis code.

ICD-9-CM codes also are used as a key to problems and protocols in healthcare. Examples of protocols might be a specific set of tests used to monitor a particular disease or a list of antibiotics known to be effective for a certain type of infection. Creating protocols and finding them based on the assessment can help the clinician write orders and document the exam quickly.

Multiple diagnoses codes can be assigned to a single encounter. This occurs mainly because patients with ongoing or chronic conditions require regular visits. It is correct and appropriate to continue to use diagnosis codes from past visits for as long as the patient continues to have that illness or condition.

ICD-10 is the latest revision to the International Classification of Diseases. HHS has proposed that ICD-10 codes should begin being used in the United States effective October, 2013.

As you continue through the course, you can refer to the Guided Exercises in this chapter when you need to remember how to perform a particular task.

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Testing Your Knowledge of Chapter 6

You may run the Medcin Student Edition software and use your mouse on the screen to answer the following questions:

1. Describe how to record a test that was ordered and describe how to record a test that was performed.
2. How do you indicate a “possible” diagnosis?

Describe the function of each of the following buttons on the Toolbar:

3. Exit
4. Browse
5. Chief
6. Search
7. Order
8. Print
9. Prompt
10. When you click the Prompt button, what List will be generated?
11. How do you change the numbers on the List Size button and what do the numbers do?

Circle True or False for the following statements:

12. Orders are an essential component of any patient chart.
   True False
13. Nurses and medical assistants sometimes enter verbal orders into an EHR on behalf of the ordering clinician.
   True False
14. The use of CPOE, in conjunction with an EHR, also improves clinician productivity.
   True False
15. You should have produced five narrative documents of patient encounters, which you printed. If you have not already done so, hand these in to your instructor with this test. The printed encounter notes will count as a portion of your grade.
This comprehensive evaluation will enable you and your instructor to determine your understanding of the material covered so far. Complete both the written test and the two exercises provided below. Depending on the time provided, it may be necessary to do this in two separate sessions. Your instructor will advise you. Do not begin the critical thinking exercise if there will not be enough class time to complete it.

**Part I—Written Exam**

You may run the Student Edition software and use your mouse on the screen to answer the following questions. You will also need access to the Internet to answer some of the questions.

Give a brief description of the purpose of each of the following coding systems:

1. Medcin ________________________
2. ICD-9-CM ________________________
3. Explain the difference between an EHR nomenclature and a billing code set.
4. Which screen do you use to set the reason for the visit?
5. How do you enter vital signs?
6. How do you load a list?

Write the meaning of each of the following medical abbreviations:

7. ROS ________________________
8. Hx ________________________
9. HPI ________________________
10. Dx ________________________
11. HEENT ________________________
12. URI ________________________
13. Describe how to record a test that was performed.
14. What Entry Details field is used with a finding to indicate a “possible” diagnosis?
15. What month and year is the United States scheduled to begin using ICD-10?
16. Describe the closed loop of medication administration.
17. Compare the advantages of codified EHR data over scanned document data.
18. Name at least three things that are checked by a DUR alert system.
Describe the purpose of the following buttons on the Medcin Toolbar:

19. List Size ________________________
20. Rx ________________________
21. Search ________________________
22. Negs ________________________
23. ROS ________________________
24. Prompt ________________________
25. Order ________________________

Part II—MyHealthProfessionsKit Questions

Use the document image simulation program on the MyHealthProfessionskit.com web site to answer the next five questions.

Case Study

Raj Patel is an 80-year-old male who arrives in the emergency department accompanied by his daughter. His daughter informs the triage nurse that Mr. Patel was previously an inpatient at this hospital.

Using what you have learned in Guided Exercise 5, find the information the triage nurse needs about Mr. Patel’s previous stay.

Step 1

Start your web browser, go to the MyHealthprofessionskit.com web site and log in as you did in Guided Exercise 5.

Locate and click the link “Document/Image System program.”

Step 2

Select patient Raj Patel.

Step 3

Locate and click on the catalog entry for his Admission Face Sheet.

26. What was the date of admission?
27. What was the date of discharge?
28. What was the principle diagnosis?
29. What was the name of the attending physician?

Step 4

Locate and click on the catalog entry for his Discharge report.

30. Where was the patient discharged to?

Part III—Hands-on Exercise

The following exercise will use features of the software with which you have become familiar. Complete each step in sequential order using the instructions and other information provided.
When you have finished the complete exercise, print out the exam note and hand it to your instructor. Do not begin the hands-on exercise if there will not be enough class time to complete it.

**Critical Thinking Exercise 43: Examination of a Patient with Asthma**

In this exercise, you use the skills you have acquired to document this exam.

**Case Study**

Carl Brown is a 30-year-old established patient with possible mild asthma who comes to the office complaining of awakening in the night short of breath. Carl does not smoke, but he is exposed to second-hand smoke and has pets in the house.

**Step 1**

If you have not already done so, start the Student Edition software.

Click Select on the Menu bar, and then click Patient.

In the Patient Selection window, locate and click on Carl Brown.

**Step 2**

Click Select on the Menu bar, and then click New Encounter.

Select the date **May 16, 2012**, the time **4:30 PM**, and the reason **10 Minute Visit**.

Make certain that you set the date and reason correctly. Compare your screen to the date, time, and reason printed in bold type before clicking on the OK button.

**Step 3**

Enter the Chief Complaint by locating the button in the toolbar labeled “Chief” and clicking on it.

In the dialog window that will open, type **Patient reports waking at night short of breath.**

When you have finished typing, click on the button labeled “Close the note form.”

**Step 4**

Begin the visit by recording Carl’s vital signs and medical history.

Use the form labeled “Vitals,” which you will select from the Forms Manager.
Enter Carl’s vital signs in the corresponding fields on the form as follows:

Temperature: 98.6
Respiration: 18
Pulse: 68
BP: 120/80
Height: 71
Weight: 175

When you have finished, check your work. If it is correct, proceed to step 5.

**Step 5**

Remain on the Forms tab. Take the patient’s medical history by using the Short Intake form, which you will load by invoking the Forms Manager window again.

When the Short Intake form is displayed, locate and click on the tab labeled “Medical History.”

**Step 6**

Enter the Dx History and Family History by clicking on the Y (yes) check box or the N (no) check box for the following items:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Dx Hist</th>
<th>Family Hist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Asthma</td>
<td>✓ Y</td>
<td>✓ N</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>✓ Y</td>
<td>✓ N</td>
</tr>
<tr>
<td>Cancer</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Diabetes</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Hypertension</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Migraine Headache</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Peptic Ulcer</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Reflux</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
<tr>
<td>Stroke</td>
<td>✓ N</td>
<td>✓ N</td>
</tr>
</tbody>
</table>
Complete the rest of his medical history on the right side of the form by locating and clicking on the check boxes as follows:

<table>
<thead>
<tr>
<th></th>
<th>✓</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently Taking Medication</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Recent Exposure (Contagious Disease)</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Recent History of Travel</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Recent Medical Examination</td>
<td>✓</td>
<td>Y</td>
</tr>
<tr>
<td>Recent X-Ray</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Recent ECG</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Allergies</td>
<td>✓</td>
<td>Y</td>
</tr>
<tr>
<td>Allergy to Drugs</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Tobacco</td>
<td>✓</td>
<td>N</td>
</tr>
<tr>
<td>Alcohol</td>
<td>✓</td>
<td>Y</td>
</tr>
</tbody>
</table>

When you have finished, check your work. If it is correct, click on the Encounter tab at the bottom of the screen.

**Step 7**
Locate and click on the Lists button in the Toolbar at the top of your screen. The List Manager window will be invoked.

Two fields at the top of the List Manager window organize the display of List names, filtering them by Owner and Group.

Click on the down arrow in the Group field and select the Group “Student Edition,” as you have done in Chapter 6.

Locate and highlight the list named **Asthma**. Click your mouse on the button labeled “Load List.”

**Step 8**
The left pane should be on the Sx tab and the title of first line should be “Templates (Symptoms).”

Locate and click on the following symptom findings:

- (red button) awaking in night short of breath

The text will change to Paroxysmal Nocturnal Dyspnea.

**Step 9**
Locate and click on the ROS button in the Toolbar at the top of your screen.

Verify that the ROS button is orange.

Locate and click on the button labeled “Negs” in the Toolbar at the top of your screen.

All unselected symptoms findings will be set by Auto Negative.
**Step 10**
Next, click on the Hx tab to enter the patient’s history. Note that “No family history of Asthma” was already set via the Short Intake form.

Locate and click on the following findings:
- (blue button) previous hospitalization for pulmonary problem
- (red button) exposure to secondhand cigarette smoke
- (red button) exposure to dust mites
- (red button) exposure to animal dander
- (blue button) current smoker

**Step 11**
Click on the Px tab to document the physical exam. Notice that the findings from the vitals form are already displayed.

Locate and highlight the finding: **IntranasalMass Polyp** (note the finding may currently display either cm or mm; you will set this unit field after the finding is selected.)

In the Entry Details section of your screen, locate the field labeled “Value,” and enter the numeric value **0.2** (two tenths).

Locate the unit field and verify it is set to **cm**. If it is not, click on the down arrow in the unit field and select cm.

The finding text should change to read “0.2 cm intranasal polyp.”

**Step 12**
Locate the button labeled “Negs” in the Toolbar and click it once.

Px findings not previously set will be set by Auto Negative.

**Step 13**
Click on Tx tab.

Locate “Pulmonary function tests” and expand the tree of findings for Pulmonary Function Tests.

Locate, highlight the finding, and click on the order button for each of the following tests:
- (order button) CBC with Differential
- (order button) Spirometry

Verify that both tests appear in the plan before proceeding.

**Step 14**
Click on the Dx tab.

Locate and click on the following finding:
- (red button) Asthma mild persistent
Click the down arrow button in the prefix field. Select the prefix “possible” from the drop-down list displayed.

**Step 15**
Click on the Rx tab.

Expand the tree for Environmental Control Measures.

Locate and click on the following finding:
- (red button) Frequent vacuuming
- (red button) Avoid Allergens
- (red button) Patient Education – Asthma
- (red button) Follow-up Visit

**Step 16**
Enter a prescription.

Expand the tree for Bronchodilators.

Locate and highlight **Albuterol**.

Click on the Rx button in the Toolbar. The prescription writer window will be invoked.

**Step 17**
In the Rx Dosage Inquiry window, locate and click on the following Sig:

90 microgram puffs 1 inh prn DSP1

When the Rx Brand Inquiry window is displayed, position your mouse over the brand **Proventil** and click your mouse button.

Locate the field labeled “Generic Allowed.”

Click your mouse in the white circle next to Yes. It should then be filled in.

Review the completed prescription. If anything is incorrect, click on the button labeled “Rx Inquiry” to correct it.

When the prescription is correct, locate and click on the button labeled “Save Rx.”

**Step 18**
Click on the Print button on the Toolbar at the top of your screen to invoke the Print Data window.

Be certain there is a check mark in the box next to “Current Encounter” and then click on the appropriate button to either print or export a file, as directed by your instructor. Your print out or file should consist of two pages. Hand them into your instructor.