Chapter 8

Indexes, Registers, and Health Data Collection

Chapter Outline
• Key Terms
• Objectives
• Introduction
• Indexes
• Registers and Registries
• Case Abstracting

• Health Data Collection
• Internet Links
• Summary
• Study Checklist
• Chapter Review

Key Terms
admission/discharge/transfer (ADT) system
admission register
aggregate data
arithmetic mean
automated case abstracting systems
automated MPI
average daily census
average length of stay
bar graph
batched
case abstracting
case mix analysis
case report forms
comparative data
computer interface
continuous quality improvement (CQI)
daily census count
daily inpatient census
data accessibility
data accuracy
data analysis
data application
data collection
data comprehensiveness
data consistency
data currency
data definition
data dictionary
data granularity
data integrity
data mining
data precision
data relevancy
data reliability
data set
data timeliness
data validity
data warehousing
death register
descriptive statistics
discharge data statistics
discharge register
disease index
index
length of stay (LOS) data
line diagram
magnetic stripe card
manual case abstracting systems
manual master patient index (MPI)

master patient index (MPI)
master person index (MPI)
National Center for Health Statistics (NCHS)
online analytical processing (OLAP)
servers
patient-centric data
physician index
pie chart
procedure index
register
registry
relational database
run chart
total length of stay
transformed-based data
vital statistics

Objectives

At the end of this chapter, the student should be able to:

• Define key terms
• Identify indexes, registers, and registries maintained by health care facilities and state and federal agencies
• Explain the uses of indexes, registers, and registries
• Determine case abstracting requirements for patient records
• Discuss the characteristics of health data collection

INTRODUCTION

Indexes and registers (or registries) allow health information to be maintained and retrieved by health care facilities for the purpose of education, planning, research, and so on. According to The American Heritage® Dictionary of the English Language, an index “serves to guide, point out, or otherwise facilitate reference, especially an alphabetized list of names, places, and subjects treated in a printed work, giving the page or pages on which each item is mentioned.” A common use is to locate a term in the index of a textbook and refer to the page number indicated. In health care, a master patient index is maintained, which allows for the retrieval of patient demographic information and the medical record number so the patient’s record can be retrieved.

According to The American Heritage® Dictionary of the English Language, a register is maintained as “a formal or official recording of items, names, or actions.” You may be familiar with church registers that record births, baptisms, marriages, deaths, and burials. Health care facilities also maintain registers to record admissions, discharges, births, deaths, operations, and other events. Registers are organized in chronological order, contain patient data, and are used for reference or control purposes. When used as a reference, they provide information about workload (e.g., number of births). As a control function, registers track patient data (e.g., number control log, which contains numbers assigned to patients). A registry is an organized system for the collection, storage, retrieval, analysis, and dissemination of information on individuals who have either a particular disease, a condition (e.g., a risk factor) that predisposes them to the occurrence of a health-related event, or prior exposure to substances or circumstances known or suspected to cause adverse health effects (e.g., official record book, such as a death register).

Indexes and registers can be automated or manual. Automated indexes and registers are computerized, which allows information to be easily and quickly retrieved for administrative planning, data collection, patient care management, quality of patient care, and the study of diseases and their outcomes. Manual indexes and registers require the
hand posting of information to ledger cards and log books, resulting in a cumbersome process when information retrieval becomes necessary.

**NOTE:** Indexes, registers, and registries are considered secondary sources of patient information. (Primary and secondary sources of information are discussed in Chapter 4.)

**INDEXES**

Health care facilities generally maintain the following indexes:

- Master patient index (MPI)
- Disease index
- Procedure index
- Physician index

**Master Patient Index**

A master patient index (MPI), sometimes called a master person index (MPI), links a patient’s medical record number with common identification data elements (e.g., patient’s complete name, date of birth, gender, mother’s maiden name, and social security number). Because most health care facilities house patient records according to a medical record number, the MPI becomes the key to locating paper-based records in the health information department file system. Thus, the MPI is retained permanently because it serves as the “key” to finding the patient’s record. It can be automated or manual.

**NOTE:** Physician offices often do not assign medical record numbers, which means an MPI is unnecessary because records are filed alphabetically according to patient’s last name, first name, and middle initial.

An automated MPI resides on a computer and consists of a database of identification data about patients who have received health care services from a facility. An admission/discharge/transfer (ADT) system is used to input patient registration information (Figure 8-1), which results in the creation of an automated MPI database that allows for the storage and retrieval of the information. ADT software has the capability of...
generating standard reports for administrative and departmental purposes, including:

- Admission logs or register (list of patients admitted)
- Bed utilization reports (facility occupancy rates)
- Current charges reports (expected accounts receivable)
- Daily census summaries (current inpatients)
- Daily discharge logs or registers (list of patients discharged and transferred to other facilities)
- Patient profiles (based on patient demographics, diagnoses/procedures, and so on)
- Transfer reports (patients transferred to units within the facility)
- User-defined reports (based on user-defined criteria)

A manual master patient index (MPI) (Figure 8-2) requires the typing or hand posting of patient identification information on preprinted index cards, and limited information can be retrieved. MPI cards are housed in a vertical file (discussed in Chapter 7), with one card generated for each patient. When patients return to the facility, the MPI card is retrieved and reviewed to verify demographic information and update the card with new admission information. File guides (Figure 8-3) help users quickly locate MPI cards and file folders by dividing the filing system into smaller subdivisions.

Advantages and disadvantages of automated and manual MPI systems include:

- Manual MPI is relatively inexpensive to purchase as compared with automated MPI, which requires initial purchase of computer equipment and software as well as software upgrades.
• Automated MPI allows for rapid retrieval of patient information, although a manual MPI allows for access when computer systems are unavailable (e.g., power outage).
• Manual MPI limits information that can be entered on each card, while automated MPI can be set up to meet the facility’s specifications for data retrieval.
• Automated MPI usually allows for retrieval of patient information according to phonetic filing system (e.g., Soundex), while manual MPI cards can be lost if the patient’s information was typed or recorded incorrectly.
• Manual MPI requires retrieval of information within the health information department, while automated MPI can be accessed by authorized personnel outside of the health information department.
• Automated MPI captures patient information upon admission and allows for computer interface, which is the exchange of data among multiple software products (e.g., patient billing, case abstracting).

Facilities that convert to an automated MPI system usually enter manual MPI data into the automated system instead of retaining the manual MPI as a separate system. Once the conversion is complete and the health information department has verified that information entered into the automated MPI is accurate, the manual MPI system can be destroyed (e.g., shredded). It is recommended that the manual MPI be maintained for at least six months after a conversion so that inaccurate information can be corrected if necessary.

Identification information entered into an MPI typically includes the following, sometimes referred to as demographic information:

• Patient name (last name, first name, middle initial)
• Address (street, city, state, zip code)
• Social security number (SSN)
• Date of birth (using mmddyyyy format)
• Admission/discharge (or transfer) dates (using mmddyyyy format)
• Medical record number (assigned by the facility)
• Name of facility and/or provider (when multiple facilities/providers are associated with the network)
• Type of care received (inpatient, outpatient, emergency, provider office)

MPI systems can also capture diagnosis/procedure descriptions for each date of service if the facility determines that this information should be collected.

Additional information entered may include race/ethnicity as well as the mother’s maiden name and place of birth, which serves as identifying information for the purpose of verifying a patient (e.g., patients with common first and last names). When patients receive care at a number of facilities within a health care network (e.g., privately owned health care system), the need to maintain current demographic data and synchronize that data is crucial. The MPI allows the health care network to uniquely identify a patient and allows providers to retrieve clinical information from wherever the patient has received care.

Purpose of the Master Patient Index

The master patient index (MPI) is used administratively, for continuity of care (or continuum of care), and externally. Administratively, the MPI serves as a “customer database” for the health care organization and allows for the production of a variety of reports that can be used as business planning and marketing tools. For continuity of care (or continuum of care), the MPI assists in determining whether a patient has been previously treated by a health care facility. This alerts the provider to request previous patient records to be sent to the inpatient unit, emergency department, outpatient clinic, and other departments. The review of previous records allows the provider to most appropriately treat the patient. Externally, the MPI allows the facility to link patient services received outside of the organization with community-wide ancillary services (e.g., services provided by a stand-alone laboratory). As a result, the facility avoids providing duplicate services to patients, improves provider productivity (e.g., by making computerized test results available), and increases the possibility of detecting government medical program fraud or abuse.

EXAMPLE OF ADMINISTRATIVE USE

The public relations (PR) department has been requested to perform an analysis of its health care facility’s target patient care market. The PR department submits a request to computing services to generate a zip code distribution report of patients treated by the facility during the past five years. This report can be analyzed to determine additional markets that the facility should target for advertising purposes.

EXAMPLE OF CONTINUITY OF CARE

A patient comes to the emergency department (ED) complaining of severe headaches. The emergency physician instructs the ED clerk to determine whether the patient
has previously been treated. The ED clerk obtains the patient’s previous records, and upon review the ED physician notes that the patient underwent a head X-ray one week ago. Thus, the physician selects a diagnostic workup and treatment modality that does not duplicate previous care provided.

**EXAMPLE OF EXTERNAL USE**

The board of directors of a health care facility based in an urban area researches whether building a satellite facility in the suburbs of a major city is justified. In addition to a zip code distribution report of patients treated by the facility, the board should also review reports that contain data including patient age, diagnosis, procedures, and so on.

**Avoiding Duplicate Records**

It is important to avoid the creation of duplicate records, which means information should be entered into the MPI by one department that has control over the assignment of medical record numbers. Usually the admissions department generates or updates the MPI record for each patient in cooperation with the facility’s health information department. Specialized consultants (Figure 8-4) can analyze a facility’s MPI data and conduct on-site assessments to identify duplication issues and problems related to patient identification, including:

- Analysis of the MPI file to identify duplicate medical record numbers
- Evaluation of patient identification issues, including review of administrative policies and existing procedures as well as risk assessment associated with duplicate record problems
- Summary information regarding MPI data integrity, description of patient identification issues, and recommendations for solutions and cost-benefit justification.

Often, problems with duplicate MPI records occur when health care facilities merge: the MPIs are also merged, creating duplicate patient entries, medical record numbers, and so on. It is crucial to establish a merger plan to avoid the duplication of MPI records, and it is equally important to audit (or “clean”) the MPI using a variety of mechanisms from the simple (e.g., perform a manual alphabetic search to identify duplicate patient files) to the complex (e.g., use sophisticated software to correct duplicates, overlaps, and other errors in the MPI).

**Caution!** Don’t confuse a master patient index card with a smart card (Figure 8-5), which is a portable updatable card used to store personal identification, medical history, and insurance information (or as a security device, as discussed in Chapter 1). It has its own microprocessing chip and can store thousands more bits of information than a magnetic stripe card, although the smart card requires a special card-reading device. A **magnetic stripe card** (Figure 8-6) is similar to a plastic credit card that contains an electromagnetic surface capable of holding a small amount of information.

**Disease, Procedure, and Physician Indexes**

Disease, procedure, and physician indexes contain data abstracted (selected) from patient records and entered into a computerized database from which the respective index is generated. The **disease index** (Figure 8-7) is organized according to ICD-9-CM disease codes. The **procedure index** (Figure 8-8) is organized according to ICD-9-CM and/or CPT/HCPCS procedure/service codes. The **physician index** (Figure 8-9) is organized according to numbers assigned by the facility to physicians who treat inpatients and outpatients. Elements routinely entered into the database include the following:

- Demographic information (age, ethnicity, gender, inpatient admission/discharge or outpatient treatment date, and zip code)
- Financial information (third-party payer type and total charges)
- Medical information (attending physician, consulting physician, surgeon, medical service classification (e.g., obstetrics), disease and/or procedure/services code(s), date(s) of surgery, and type of anesthesia)

Indexes are used to complete applications for accreditation prior to survey (e.g., The Joint Commission, documents required by licensing and regulatory agencies (e.g., CMS), medical and statistical reports (e.g., New York’s Statewide Planning and Research Cooperative System or SPARCS), and facility-wide quality review studies of patient care.
Figure 8-4  Duplicate Records Can Turn into a Big Problem! (Permission to reprint granted by The MediBase Group, Inc.)
Exercise 8–1 Indexes

Short Answer: Briefly respond to each question.

1. State the purpose of a disease index.

2. The master patient index is organized according to ______ so that patient records can be easily retrieved.

3. The director of medical education wants to determine the average length of time it takes a particular surgeon to perform surgery. Which index would best allow access to the surgeon’s cases for the purpose of this study?

4. Identify the types of codes entered in a procedure index.

5. State the advantages and disadvantages of an automated MPI and a manual MPI.

6. What term describes a computer system used to input patient registration information?
### Alfred State Medical Center

#### Disease Index

<table>
<thead>
<tr>
<th>Primary Dx</th>
<th>Other Diagnoses</th>
<th>Attending Dr</th>
<th>Age</th>
<th>Gender</th>
<th>Payer</th>
<th>Patient #</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMAN IMMUNODEFICIENCY VIRUS [HIV] DISEASE</td>
<td>112.0</td>
<td>138</td>
<td>24</td>
<td>M</td>
<td>BC</td>
<td>236248</td>
</tr>
<tr>
<td></td>
<td>136.3</td>
<td>024</td>
<td>35</td>
<td>M</td>
<td>BC</td>
<td>123456</td>
</tr>
<tr>
<td></td>
<td>176.0</td>
<td>036</td>
<td>42</td>
<td>F</td>
<td>BC</td>
<td>213654</td>
</tr>
<tr>
<td>ACUTE POLIOMYELITIS</td>
<td>250.00</td>
<td>236</td>
<td>80</td>
<td>M</td>
<td>MC</td>
<td>236954</td>
</tr>
<tr>
<td></td>
<td>401.9</td>
<td>235</td>
<td>60</td>
<td>F</td>
<td>MD</td>
<td>562159</td>
</tr>
</tbody>
</table>

Figure 8-7  Disease Index (Courtesy Delmar/Cengage Learning.)

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### Alfred State Medical Center

#### Procedure Index

<table>
<thead>
<tr>
<th>Primary Px</th>
<th>Other Procedures</th>
<th>Attending Dr</th>
<th>Age</th>
<th>Gender</th>
<th>Payer</th>
<th>Patient #</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOSED BIOPSY OF BRAIN</td>
<td></td>
<td>248</td>
<td>42</td>
<td>F</td>
<td>01</td>
<td>562359</td>
</tr>
<tr>
<td>CRANIOTOMY NOS</td>
<td></td>
<td>235</td>
<td>56</td>
<td>F</td>
<td>03</td>
<td>231587</td>
</tr>
<tr>
<td></td>
<td></td>
<td>326</td>
<td>27</td>
<td>M</td>
<td>02</td>
<td>239854</td>
</tr>
<tr>
<td></td>
<td></td>
<td>236</td>
<td>08</td>
<td>F</td>
<td>05</td>
<td>562198</td>
</tr>
<tr>
<td></td>
<td></td>
<td>236</td>
<td>88</td>
<td>M</td>
<td>05</td>
<td>615789</td>
</tr>
<tr>
<td>DEBRIDEMENT OF SKULL NOS</td>
<td></td>
<td>326</td>
<td>43</td>
<td>M</td>
<td>03</td>
<td>653218</td>
</tr>
</tbody>
</table>

Figure 8-8  Procedure Index (Courtesy Delmar/Cengage Learning.)
7. What term describes the exchange of data among multiple software products?

8. Why is it important to manage duplicate (MPI) records when two facilities merge?

**REGISTERS AND REGISTRIES**

Registers and registries contain information about a disease (e.g., cancer) or event (e.g., birth) and are maintained by individual health care facilities, federal and state government agencies (e.g., DOH, local law enforcement), and private organizations (e.g., American Hospital Association). **Case report forms** (Figure 8-10) are submitted by health care facilities (e.g., health information department) and providers to report data to sponsoring agencies, facilities, and organizations.

**Remember!** A register is a collection of information, such as a hospital’s admission/discharge register, while a registry is a structured system for collecting and maintaining information about a defined population so that analyses and reviews can be performed. Use a register to verify information (e.g., adoption, birth, death, divorce, marriage) and a registry to collect (and sort) data and perform statistical analysis and study (e.g., cure for cancer). An **admission register** is usually maintained by the admissions office, and it is organized by admission date; contents include patient’s name, patient number, admitting physician, admission date, admission diagnosis, and room number. A **discharge register** is usually maintained by the health information department, and it is organized according to discharge date; contents include the patient’s name, patient number, attending physician, admission date, discharge date, disposition, and service (e.g., medical, surgical, obstetrics, and so on). The discharge register is used by the health information department to account for records of patients discharged on a particular date to ensure that all have been processed (assembled, analyzed, coded, and abstracted). A **death register** is usually maintained by the health information department, and it is organized according to date of death; contents include patient’s name, patient number,
**Indexes, Registers, and Health Data Collection**

Data Reporting Form

To be used in conjunction with the Birth Defects Registry Data Reporting Manual

**NOTICE:** Information on this form is confidential and exempt from the provisions of section 119.07(1). Reporting of notifiable congenital anomalies is mandatory pursuant to section 381.0031, Chapter 405, and Rules 64D-3.002 and 64D-3.027. The data will be used for birth defects prevention, research, and epidemiologic investigations with the goals of reducing morbidity and mortality. It is not a violation of the confidential relationship between practitioner and patient to report data on this form.

Return Completed Forms by Mail or FAX to:

Birth Defects Registry
P.O. Box 100
Anywhere, US 12345-1234
101-555-1333 (Fax)

**Licensed Physician and Hospital Information**

a) First and Last Name of Licensed Physician: ____________________________

b) License Number: __ __ - __ __ __ __ __ __ __ __

c) Specialty: ____________________________

d) Physician’s Phone No.: __ __ __ - __ __ __ - __ __ __ __ __ __

e) Date Form Completed: __ __ / __ __ / __ __ __ __

f) Street Address: ____________________________

g) City: ____________________________

h) Zip Code: __ __ __ __ __ - __ __ __ __

i) Birth Facility Number: ____________________________

j) Treatment Hospital Number(s): ____________________________

(Select numbers for items i) and j) can be found in the Data Reporting Manual.)

k) First and Last Name of Person Completing Form: ____________________________

l) Phone No. of Person Completing Form: __ __ __ - __ __ __ - __ __ __ __

Mother Information

m) First, Maiden, and Last Name: ____________________________

n) Date of Birth: __ __ / __ __ / __ __ __ __

o) SSN: __ __ __ - __ __ - __ __ __ __

**For Birth Defects Registry Office Use Only:**

Date Received: __ __ / __ __ / __ __ __ __

Date Keyed: __ __ / __ __ / __ __ __ __

Keyer: ____________________________

LB FD Certificate Number: ____________________________

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Infant or Fetus Information

p) First and Last Name: ____________________________

(Complete for live births and fetal deaths if known.)

q) SSN: __ __ __ - __ __ - __ __ __ __

r) Medical Record Number: ____________________________

s) Date of Birth: __ __ / __ __ / __ __ __ __

t) Date of Death: __ __ / __ __ / __ __ __ __

(Complete only for a live birth.)

(Complete only if infant was live born and subsequently deceased.)

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**Figure 8-10** Birth Defects Registry Case Reporting Form (Courtesy Delmar/Cengage Learning.)
attending physician, admission date, date of death, and service (e.g., medical, surgical, obstetrics, and so on).

Facilities and providers are required to submit information to federal and state agencies for inclusion in registries, and the information is used for disease study (e.g., etiology, prognosis, and cures) and to generate statistical reports (e.g., statewide hospital mortality, or deaths, rates). In public health and medicine, there are many uses for the information collected in registries, such as:

1. Estimating the magnitude of a problem

**EXAMPLE**

Registries of blind persons help determine the extent of blindness within a population that is due to preventable or treatable conditions (e.g., cataracts).

2. Determining the incidence of disease

**EXAMPLE**

Cancer registries calculate tumor-specific cancer rates—information that can be used for investigating suspected cancer clusters.

3. Examining trends of disease over time

**EXAMPLE**

Cancer registry data has documented rapid increases in the occurrence among women of lung cancer, now the most frequent cause of cancer in this group.

4. Assessing service delivery and identifying groups at high risk

**EXAMPLE**

Immunization registries document the extent of vaccine coverage within a community and identify groups with suboptimal coverage who are at increased risk for disease outbreak and transmission.

5. Documenting types of patients served by a health provider

**EXAMPLE**

Hospitals often establish several registries to collect data about their patient population (e.g., cancer registry, trauma registry, and so on).

6. Conducting research

**EXAMPLE**

Cancer registries track patient survival analysis and rates.

7. Serving as a source of potential donors

**EXAMPLE**

The National Bone Marrow Registry maintains information on individuals willing to serve as bone marrow donors if a suitable recipient is identified.

8. Serving as a source of potential participants in clinical trials

**EXAMPLE**

Commercial services register persons with certain medical conditions who wish to be considered for enrollment in clinical trials.

### Characteristics of Registers and Registries

Registers and registries represent a secondary source of patient information, which provides facilities, providers, and public health officials with information needed to assess and monitor the health of a given population.

**NOTE:** State and federal legislation mandates the reporting of data to public health surveillance systems. This data is called reportable diseases (e.g., communicable disease) and reportable events (e.g., gunshot wounds). (Mandatory reporting is discussed in Chapter 9.)

The characteristics that distinguish registries from these other sources of data include:

- Focus on a particular disease (e.g., hemophilia), group of similar diseases (e.g., cancer), or specific exposure (e.g., toxin such as PCB found at hazardous waste sites)
- Collection of data on individuals from multiple sources (e.g., physician records, hospital summaries, pathology reports, vital statistics)
- Actively ascertaining cases by reviewing likely sources for referrals (e.g., examining hospital discharge records for evidence of birth defects)
- Conducting follow-up investigation and data collection on persons enrolled in the registry (determining the status of cancer registrants by examining vital records)
• Incurring high costs (actively seeking and linking data from multiple sources over time is expensive)

Vital Statistics

Vital statistics are compiled for events, which include births, deaths, fetal deaths, marriages, and divorces. The National Center for Health Statistics (NCHS) is the federal agency responsible for maintaining official vital statistics, while registration of vital events (e.g., births) is a state function. To facilitate uniform registration of events, the NCHS prepares standard certificates, which can be modified by individual states. When a birth or death occurs, a certificate is filed in the local (e.g., county) vital statistics office, which maintains a record and sends the original certificate to the state office of vital statistics. The state forwards vital statistic information to the NCHS, which publishes statistical reports (e.g., Vital Statistics of the United States).

**NOTE:** Birth certificates are often completed and submitted by hospital health information departments, and death certificates (including fetal death certificates) are usually initiated by hospital nursing staff and/or the patient’s attending physician and then completed and submitted by funeral homes.

Operation of Registers and Registries

Registers and registries (Table 8-1) are operated by a variety of entities, including:

• Federal government agencies (e.g., Center for Disease Control’s Agency for Toxic Substances and Disease Registry maintains the National Exposure Registry)
• Individual and groups of hospitals (e.g., registry of persons diagnosed with primary pulmonary hypertension, assembled by researchers to understand the risk factors and causes of this rare medical condition)
• Nonprofit organizations (e.g., United States Eye Injury Registry)

Table 8-1 Partial List of Registers and Registries Maintained in the United States

<table>
<thead>
<tr>
<th>Register/Registry</th>
<th>Sponsor</th>
<th>Description</th>
</tr>
</thead>
</table>
| Adoption Information Registry | State agencies | Helps adoptees obtain available non-identifying information about birth parents
| | | Enables the reunion of registered adoptees with birth parents and biological siblings
| | | Provides a place for birth parents to file medical information updates that may be shared with registered adoptees
| Alzheimer Registry | State agencies | Collects data to evaluate prevalence of Alzheimer’s disease and related disorders
| | | Provides non-identifying information and data for policy planning purposes and to support research
| | | Maintains statewide surveillance for collecting information on birth defect incidence
| | | Monitors annual trends in birth defect occurrence and mortality
| | | Conducts research studies to identify genetic and environmental risk factors for birth defects
| | | Promotes educational activities for the prevention of birth defects
| Birth Defects Registry or Congenital Anomaly Register (CAR) or Congenital Malformations Registry (CMR) | Health care facilities and state agencies | Repository for case reports on children diagnosed before age 2 who have suspected or confirmed congenital anomalies, which are structural, functional, or biochemical abnormalities determined genetically or induced during gestation and not due to birthing events

(Continues)
Table 8-1 Partial List of Registers and Registries Maintained in the United States (Continued)

<table>
<thead>
<tr>
<th>Register/Registry</th>
<th>Sponsor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Facilities and state agencies identify ICD codes to use for case reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong> Minor anomalies may be excluded from reporting (e.g., inguinal hernias, skin tags, and so on)</td>
</tr>
<tr>
<td>Cancer Registry</td>
<td>Health care facilities, groups of health care facilities (that form central registries), and state and federal agencies</td>
<td>• Collects information about all cancers diagnosed (except basal and squamous cell carcinoma of the skin and carcinoma in situ of the cervix, unless required by the registry)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develops strategies and policies for cancer prevention, treatment, and control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allows researchers to analyze geographic, ethnic, occupational, and other differences to identify cancer risk factors</td>
</tr>
<tr>
<td>Cardiac Registry</td>
<td>Health care facilities</td>
<td>• Captures cardiac surgery information as a research tool for assessing cardiac patient outcomes and pinpointing how patient care can improve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develops strategies and policies for cancer prevention, treatment, and control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allows researchers to analyze geographic, ethnic, occupational, and other differences to identify cancer risk factors</td>
</tr>
<tr>
<td>Immunization Registries</td>
<td>Federal and state agencies, such as the National Committee on Health and Vital Statistics (NCHVS), the statutory public advisory body to the Secretary of HHS</td>
<td>• Computerized systems that consolidate vaccination histories as provided by individual health care providers</td>
</tr>
<tr>
<td>Implant Registries (or Medical Devices Registries)</td>
<td>Various organizations, depending on type of implant (e.g., National Breast Implant Registry, National Joint Registry, and so on)</td>
<td>• Tracks successful implants and assesses failures through retrieval analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improves patient care through improvement of implants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitors device performance in vivo (inside the body) to permit early corrective therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong> Medical implant devices have a minimum life span of three months, penetrate and have a physiologic interaction with living tissue, and can be retrieved.</td>
</tr>
<tr>
<td>Inpatient Discharge Database</td>
<td>State and federal agencies</td>
<td>• Contains hospital inpatient discharge data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Collected to study patterns and trends in the availability, use, and charges for inpatient services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consists of core data elements, as defined by state and federal agencies (e.g., Uniform Hospital Discharge Data Set, UHDDS)</td>
</tr>
<tr>
<td>Insulin-Dependent Diabetes Mellitus Registries</td>
<td>National Institutes of Health (NIH)</td>
<td>• Determine incidence of IDDM in defined populations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identifies persons for subsequent enrollment in case-control studies and other research projects</td>
</tr>
<tr>
<td>Metropolitan Atlanta Congenital Defects Program</td>
<td>Centers for Disease Control and Prevention (CDC)</td>
<td>• Monitors occurrence of serious malformations in Atlanta metropolitan area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tracks changes in trends and unusual patterns that may suggest avoidable risk factors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintains a case registry for epidemiologic and genetic studies</td>
</tr>
</tbody>
</table>

(Continues)
Table 8-1 Partial List of Registers and Registries Maintained in the United States (Continued)

<table>
<thead>
<tr>
<th>Register/Registry</th>
<th>Sponsor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Exposure Registry</td>
<td>CDC Agency for Toxic Substances and Disease Registries (ATSDR)</td>
<td>Identifies, enrolls, and monitors persons who may have been exposed to a hazardous environmental substance</td>
</tr>
<tr>
<td>National Registry of Cardiopulmonary Resuscitation (NRCPR)</td>
<td>Sponsored by American Hospital Association, and managed by Digital Innovation, Inc.</td>
<td>Collects and analyzes in-hospital resuscitation data</td>
</tr>
<tr>
<td>National Registry of Myocardial Infarction (NRMI)</td>
<td>Organizations (e.g., The Living Bank), State agencies</td>
<td>Allows health care facilities to evaluate equipment, resources, and training, and to improve practices</td>
</tr>
<tr>
<td>Organ (or Tissue) Donor Registry</td>
<td></td>
<td>Examines trends in treatment, length of hospital stay, mortality, and variations among specific patient populations</td>
</tr>
<tr>
<td>Rare Disease Registries (e.g., Li-Fraumeni Syndrome International Registry, Bloom’s Syndrome Registry, and so on)</td>
<td>National Organization for Rare Disorders</td>
<td>Computerized database that documents an individual’s plan to be an organ donor</td>
</tr>
<tr>
<td>Surveillance, Epidemiology, and End Results (SEER) Program</td>
<td>National Cancer Institute (NCI)</td>
<td>NOTE: Donors should inform family and friends of organ donor plans because enrollment cards and signing the reverse of driver’s licenses are not legally binding documents.</td>
</tr>
<tr>
<td>National Trauma Data Bank</td>
<td>American College of Surgeons (ACoS)</td>
<td>Collect clinical and genetic data</td>
</tr>
<tr>
<td>United States Eye Injury Registry (USEIR)</td>
<td>Helen Keller Eye Research Foundation</td>
<td>Provide referrals to genetic counseling and other services</td>
</tr>
<tr>
<td>Vital Records (births, deaths, fetal deaths, divorces, and marriages)</td>
<td>Health care facilities, and county and state agencies</td>
<td>Conduct ongoing research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collects cancer data on a routine basis from designated population-based cancer registries in nine areas of the United States</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improves quality of patient care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provides established information system for evaluation of injury care and preparedness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develops injury scoring and outcome measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provides data for clinical benchmarking, process improvement, and patient safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provides prospective, population-based, epidemiologic data to improve the prevention and control of eye injuries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Records of births, deaths, fetal deaths, induced abortions, teen pregnancies, and teen suicides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Files certificates for births, deaths, divorces, and marriages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collects mortality (death), fetal death (e.g., weight of 350 grams or more or, if weight is unknown, of 20 completed weeks gestation or more), natality (birth) data, and prepares reports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distributes certificates to eligible persons (e.g., in NYS, birth certificates are distributed to person named on birth certificate; parent of person named on birth certificate—requesting parent’s name must be on birth certificate); spouse, child, or other persons by order of a New York State Court)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOTE: No birth or death certificate is issued for induced abortions. Fetal death definition varies state to state.</td>
</tr>
</tbody>
</table>
• Private groups (e.g., transplant registries, registries that examine use of drugs during pregnancy)
• State government agencies (e.g., departments of health maintain registries of persons diagnosed with sexually transmitted diseases, such as gonorrhea)
• Universities (e.g., Surveillance, Epidemiology, and End Results (SEER), cancer registries, supported by funds from the federal government)

NOTE: Reportable diseases and events are discussed in Chapter 9.

Exercise 8–2 Registers
1. Identify a government agency that requires the reporting of information about diseases or events.
2. What is the name of the form used to submit reportable data to sponsoring agencies?
3. What is the difference between a register and a registry?
4. What are the uses for information collected in registries?
5. Do registers and registries represent a primary or secondary source of patient information? Explain.
6. Provide two examples of vital statistics.
7. Name the federal agency responsible for maintaining official vital statistics.
8. Identify three registers/registries, and name the sponsor and a brief description of each.

CASE ABSTRACTING

Case abstracting is an automated or manual process performed by health information department staff (e.g., abstractor) to collect patient information to determine prospective payment system (PPS) status, generate indexes (e.g., disease index), and to report data to quality improvement organizations and state and federal agencies. Automated case abstracting systems allow health care facilities to:
• Calculate PPS reimbursement (e.g., diagnostic-related groups, DRGs)
• Create and maintain patient abstracts (Figure 8-11) within the software system
• Generate case abstract statistics (e.g., error reports)
• Generate reports and statistics for case mix analysis (study of types of patients treated by the facility)

Manual case abstracting systems require health information department staff to enter patient data on a case abstract form (Figure 8-12) and submit batched (predetermined groups) forms to a vendor for data entry and report generation. While hospital health information departments no longer routinely manually abstract patient cases, smaller facilities (e.g., home health agencies) may elect to implement a manual case abstracting system.

Before the case abstracting process can begin, a standard method for collecting and reporting individual data elements must be established (so data can be easily compared). This is called a data set. In addition, the organization should develop a data dictionary, which is a collection of data element definitions (Table 8-2). The data set (Table 8-3) used for collection and reporting purposes depends on patient type, and includes the following:
• Data Elements for Emergency Department Systems (DEEDS)
• Essential Medical Data Set (EMDS)
• Health Plan Employer Data and Information Set (HEDIS®)
• Minimum Data Set (MDS)
• National Cancer Data Base (NCDB)
• Outcome and Assessment Information Set (OASIS)
• Uniform Ambulatory Care Data Set (UACDS)

• Generate special reports according to user-defined criteria
• Review patient charges concurrently (while patients are being treated)
• Submit mandatory reporting data to appropriate state and federal agencies

EXAMPLE

MEDITECH software offers a registration, medical records, and billing/accounts receivable application that allows for data capture and reporting of patient and financial data. The application also offers coding of inpatient and outpatient cases using ICD-9, CPT, and HCPCS Level II (national) codes and modifiers, connectivity to other encoding products via HL7 compliant interface, customer-defined edit checks to guarantee all necessary fields of information are completed before finalizing an abstract, the ability to combine abstracting information for all patient classes in one abstracting (ABS) database, queries that can be utilized to display information from other applications, standard fields that can accept APG and APC information via encoding interfaces, and CPT modifiers that can be entered or captured through an encoding interface.
• Uniform Clinical Data Set (UCDS)
• Uniform Hospital Discharge Data Set (UHDDS)

Two other data sets are associated with health care, as follows:

• Medical Information Bureau (MIB)
• National Practitioner Data Bank (NPDB)

The Medical Information Bureau (MIB) is a clearinghouse of medical and avocation information about people who apply for insurance. When an insurance underwriter has an applicant with a condition considered significant to his or her risk classification (e.g., high blood pressure), this information is reported to the MIB. MIB does not receive the applicant’s entire medical record; the MIB record contains information that serves as an alert for an underwriter to review the background of an applicant more closely. MIB records include medical conditions (e.g., height and weight, blood pressure, ECG readings, and laboratory test results if considered significant to health or longevity) and nonmedical information that might affect insurability (e.g., adverse driving record, participation in hazardous sports, or aviation activity). MIB, Inc. is the not-for-profit sponsoring association of United States and Canadian life insurance companies whose goal is to protect insurers, policyholders, and applicants from insurance fraud.

The National Practitioner Data Bank (NPDB) was legislated by the Health Care Quality and Improvement Act of 1986 due to an increasing occurrence of medical
<table>
<thead>
<tr>
<th>Hospital Number</th>
<th>Patient Date of Birth</th>
<th>Patient Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>02 Patient Date of Birth</td>
<td>03 Patient Gender</td>
<td>04 Race</td>
</tr>
<tr>
<td>04A Living Arrangement</td>
<td>05A Marital Status</td>
<td>06 Patient Number</td>
</tr>
<tr>
<td>07 Admission Date and Hour</td>
<td>08 Type of Admission</td>
<td>09 Discharge Date and Time</td>
</tr>
<tr>
<td>09 Birth Weight of Neonate</td>
<td>10 Attending Physician Number</td>
<td>11 Operating Physician Number</td>
</tr>
<tr>
<td>12 Principal Diagnosis Code</td>
<td>13 Other Diagnosis Code(s)</td>
<td>14 Qualifiers for Other Diagnoses</td>
</tr>
<tr>
<td>15 External Cause of Injury Codes</td>
<td>16 Procedures, Dates, and Operating Physician UPIN</td>
<td>17 Disposition</td>
</tr>
<tr>
<td>18 Patient's Expected Payment Source</td>
<td>19 Total Charges</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 8-12** Manual Case Abstracting Form (Based on case abstract developed by state of California. Permission to reprint granted by the California Office of Statewide Health Planning and Development.)
### Table 8-2 Portion of Data Dictionary Containing Elements and Definitions

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account #</td>
<td>Nine-digit number assigned upon patient admission. Patient receives a new account number upon each admission (or visit) to the facility.</td>
</tr>
<tr>
<td>Patient Record #</td>
<td>Medical record number assigned to the patient upon his or her first admission (or visit) to the facility. The patient retains the same patient record number for all subsequent admissions (or visits).</td>
</tr>
<tr>
<td>Zip Code</td>
<td>Five-digit number that identifies a specific geographic delivery area. The patient’s home address zip code is collected.</td>
</tr>
<tr>
<td>Diagnosis Code #</td>
<td><em>International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM)</em> codes for patient’s conditions, diagnoses, and problems are collected.</td>
</tr>
</tbody>
</table>

### Table 8-3 Data Sets

<table>
<thead>
<tr>
<th>Data Set</th>
<th>Health Care Setting</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| Data Elements for Emergency Department Systems (DEEDS) | Providers responsible for maintaining record systems in 24-hour, hospital-based emergency departments (EDs) throughout the United States (participation is voluntary) | • Develops uniform data element specifications for describing single emergency department (ED) patient encounters  
• Maintained by Centers for Disease Control and Prevention (CDC)  
• Facilitates exchange of critical past medical history information among health care providers  
• Improves management of critical health care information in ED settings by identifying, defining, and standardizing data elements  
• Complements DEEDS  
• Formerly known as the Essential Emergency Data Set (EEDS)  
• Maintained by the National Information Infrastructure Health Information Network Program (NII-HIN), sponsored by the Defense Advanced Research Projects Agency of the United States government |
| Essential Medical Data Set (EMDS) (pronounced E-MEDS) | Health care facilities that provide emergency services (participation is voluntary) |                                                                                                                                                                                                    |
| Health Plan Employer Data and Information Set (HEDIS®) | Managed care organizations (MCOs) (participation is voluntary) | • Standardized performance measures used to compare performance of managed health care plans  
• Maintained by National Committee for Quality Assurance (NCQA)  
• Core set of screening elements for comprehensive assessment of LTCF residents; used to create resident assessment protocols (RAPs)  
• Resident Assessment and Validation and Entry (RAVEN) data entry system is used  
• Standardizes communication about resident problems and conditions  
• Facilitates quality monitoring and improvement  
• Maintained by CMS |
| Minimum Data Set (MDS) | Long-term care facilities (LTCFs) (participation is mandatory for LTCFs that participate in Medicare and Medicaid) |                                                                                                                                                                                                    |

(Continues)
<table>
<thead>
<tr>
<th>Data Set</th>
<th>Health Care Setting</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Cancer Data Base (NCDB)</td>
<td>Acute care facility (hospital) cancer registries (participation is required)</td>
<td>• Nationwide oncology (study of cancer) outcomes database</td>
</tr>
<tr>
<td></td>
<td>(participation is required for cancer registries accredited by the American College</td>
<td>• Assesses patterns of care and outcomes relative to national norms</td>
</tr>
<tr>
<td></td>
<td>of Surgeons’ Commission on Cancer, ACoS COC)</td>
<td>• Maintained by American College of Surgeons (ACoS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Core set of comprehensive assessment for adult home care patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Home Assessment and Validation and Entry (HAVEN) data entry software is used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Measures patient outcomes for outcome-based quality improvement (OBQI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Patient assessment and care planning, and internal HHA performance improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Agency-level case mix reports that contain aggregate statistics such as demographic, health, or functional status at start of care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintained by CMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Program developed by The Joint Commission that integrates outcomes and other performance measurement data into the accreditation process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Requires accredited facilities to track and submit clinical performance measures as part of accreditation process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two measurement sets include core performance measures (specific indicators related to disease or process of care; e.g., acute myocardial infarction, or AMI) and non-core measures (general indicators; e.g., mortality rate for AMI patients)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintained by The Joint Commission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Standard data set for ambulatory health records</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Goal is to improve data comparison for ambulatory and outpatient care settings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintained by CMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HCFA (now called CMS) initiative that involves collection of approximately 1,800 data elements that describe patient demographic characteristics, clinical history, clinical findings, and therapeutic intervention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Data is obtained from medical records of Medicare beneficiaries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintained by CMS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sponsored by National Center for Health Statistics (NCHS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Standard for collecting data for the Medicare and Medicaid programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maintained by CMS</td>
</tr>
</tbody>
</table>
malpractice litigation and the need to improve the quality of medical care. The NPDB contains information about practitioners who engage in unprofessional behavior, and its purpose is to restrict the ability of incompetent physicians, dentists, and other health care practitioners to move to another state without disclosure or discovery of previous medical malpractice payment and adverse action (e.g., exclusion from Medicare and Medicaid participation) history. When a practitioner applies for health care privileges, the medical staff coordinator (and/or credentials committee) can contact the NPDB to inquire about the practitioner’s licensure, medical malpractice payment history, professional society memberships, and record of clinical privileges.

Exercise 8–3 Case Abstracting

1. Define case abstracting.
2. Discuss the importance of case abstracting as related to case mix analysis.
3. List the advantages and disadvantages of automated and manual abstracting systems.
4. What is the significance of the term “batched” case abstracts?
5. Define “data set,” and list and describe at least three data sets.
6. What is the purpose of the Medical Information Bureau (MIB) and the National Practitioner Data Bank (NPDB)?

HEALTH DATA COLLECTION

Health data collection is performed by health care facilities for administrative planning and to report statistics to state and federal government agencies (and other organizations). This section of the chapter introduces the following health data collection concepts:

- Descriptive health care statistics
- Data quality
- Hospital-based statistics


Descriptive Health Care Statistics

Health information managers are responsible for collecting, reporting, and retrieving descriptive health care statistics, which are used internally by facilities to describe the types and numbers of patients treated (patient population). Descriptive statistics summarize a set of data using charts, graphs, and tables. Health care data is reported to state and federal agencies, and those agencies quantify the data (e.g., health care illnesses, activities, births, and deaths for specific periods of time) and release summary descriptive statistics. Regardless of the type of health care statistics collected, their primary purpose is to provide factual numerical information that can be used for decision making. Health care data is classified into the following categories:

- **Aggregate data** is based on performance, utilization, and resource management.
- **Comparative data** is used for health services outcomes measurement and research.
- **Patient-centric data** is directly related to patients.
- **Transformed-based data** is used for clinical and management decisions, support, and planning.

EXAMPLE

Sunny Valley Medical Center’s health information department collects statistics (Table 8-4) to prepare an annual report for the board of directors. This report is used to make decisions that impact hospital operations.

Calculating health care statistics is a responsibility of the health information department, and while most statistics are collected using automated computer systems, it is important to understand how the statistics are calculated so accuracy can be verified. It is common for facilities to generate monthly and annual reports that describe the number of patients treated and the types of services delivered. In addition to reporting the number of patients treated, facilities will also calculate rates and percentages of deaths, autopsies, infections, and so on.

EXAMPLE

Sunny Valley Medical Center collects statistics for the birthing unit. The information below is interpreted as 130 total newborns, of whom three died. Of the 130 total newborns, 25 were premature newborns. The three newborn deaths were premature newborns.
### Table 8-4 Sunny Valley Medical Center Annual Report Statistics

<table>
<thead>
<tr>
<th>Hospital Statistics</th>
<th>YTD Total</th>
<th>Previous Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Patient Discharges</td>
<td>55,322</td>
<td>45,211</td>
</tr>
<tr>
<td>Newborns</td>
<td>3,452</td>
<td>3,432</td>
</tr>
<tr>
<td>Children (&lt; age 18)</td>
<td>6,236</td>
<td>6,198</td>
</tr>
<tr>
<td>Adults</td>
<td>45,634</td>
<td>35,581</td>
</tr>
<tr>
<td>Average Length of Stay</td>
<td>5.6</td>
<td>6.2</td>
</tr>
<tr>
<td>Newborns</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Children (&lt; age 18)</td>
<td>7.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Adults</td>
<td>6.5</td>
<td>6.8</td>
</tr>
<tr>
<td>Daily Census of Hospital Patients (154 beds)</td>
<td>152</td>
<td>151</td>
</tr>
<tr>
<td>Newborns (10 bassinets)</td>
<td>8.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Children (&lt; age 18) (22 beds)</td>
<td>21.4</td>
<td>21.8</td>
</tr>
<tr>
<td>Adults (122 beds)</td>
<td>119</td>
<td>116</td>
</tr>
<tr>
<td>Inpatient Surgical Procedures Performed</td>
<td>3,695</td>
<td>3,457</td>
</tr>
<tr>
<td>Newborns</td>
<td>54</td>
<td>67</td>
</tr>
<tr>
<td>Children (&lt; age 18)</td>
<td>104</td>
<td>96</td>
</tr>
<tr>
<td>Adults</td>
<td>3,537</td>
<td>3,294</td>
</tr>
<tr>
<td>Outpatient Surgical Procedures Performed</td>
<td>3,984</td>
<td>3,024</td>
</tr>
<tr>
<td>Newborns</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>Children (&lt; age 18)</td>
<td>957</td>
<td>844</td>
</tr>
<tr>
<td>Adults</td>
<td>2,980</td>
<td>2,145</td>
</tr>
</tbody>
</table>

The health information department calculates the newborn death rate as

\[
\frac{\text{Number of newborn deaths}}{\text{Number of newborn patients}} \times 100
\]

or,

\[
\frac{3}{130} \times 100 = 2.3\% \text{ newborn death rate}
\]

The health information department calculates the premature newborn death rate as

\[
\frac{\text{Number of premature newborn deaths}}{\text{Number of premature newborn patients}} \times 100
\]

or,

\[
\frac{3}{25} \times 100 = 12\%
\]

Sunny Valley Medical Center has a newborn death rate of just 2.3%, but the premature newborn death rate is 12%. (Note: The non-premature newborn death rate is 0%.)

Health information managers review statistics to ensure that calculations are accurate and interpret (or explain) statistical rates. Health care professionals analyze and use statistics in the treatment and prevention of diseases (e.g., cancer data), and analysis of statistics is enhanced when statistics are presented in a visual format. Various presentation techniques and tools (e.g., bar graphs, pie charts, line diagrams, and so on) help give meaning to statistics.

**Remember!** A picture is worth a thousand words or, in this case, a thousand numbers!

### EXAMPLE

The United States National Center for Health Statistics collects data on a wealth of health-related issues and displays it visually (Figure 8-13).

- **Bar graph** displays data along an X-axis and a Y-axis.
- **Pie chart** displays component parts of data as it relates to the whole.
- **Line diagram** (or run chart) displays data over a period of time.

### BAR GRAPH

The bar graph in Figure 8-13 has three sets of bars: motor vehicle traffic deaths, firearm suicides, and firearm homicides. Each set of bars includes five bars that show
the percent distribution of injury deaths by external cause and body region of injury for 2003 and 2004.

**PIE CHART**
The pie chart in Figure 8-13 shows the percent distribution of injury deaths by intent of injury for 2003 and 2004.

**LINE DIAGRAM**
The line diagram (or line chart) in Figure 8-13 contains four lines that display age-adjusted death rates by intent (all injury, unintentional injury, suicide, and homicide) for 1985–2004.

**Data Quality**
Health care statistics are useful only if developed from quality data. The phrase “garbage in, garbage out” that is associated with computer data also applies to health care information. If inaccurate data is entered into a computer system, then incorrect information will be retrieved. This is also true of manual data systems. Inaccurate and incorrect data can result in serious and harmful errors being made, especially if the error involves patient health information. General data quality characteristics include:

- **Data integrity.** Data has integrity if it is accurate, complete, consistent, up-to-date, and the same no matter where the data is recorded.
- **Data reliability.** Data is reliable if it is consistent throughout all systems in which it is stored, processed, and/or retrieved.
- **Data validity.** Data is valid if it conforms to an expected range of values.

**EXAMPLE**
Nancy Nurse is responsible for monitoring and recording patients’ weight gain or loss on a unit that treats patients with eating disorders. She weighs each patient, records the information on a small notepad, and enters the information onto each patient’s record. When she enters the information on the patient records, she mistakenly reverses the weights for patient A and patient B (who both reside in room 404). Patient A’s weight is recorded as 105, and patient B’s weight as 95. Because the patients’ physicians use weight data to prescribe treatment, this incorrect information will adversely impact development of the patients’ treatment plans and patients may receive incorrect treatment.

Health care data must be monitored to ensure that it is of the highest quality possible. In 1998, the American Health Information Management
Association (AHIMA) developed a data quality management model that outlines the characteristics of data quality achieved by managing data application, collection, warehousing, and analysis. These four areas of data quality management are defined by AHIMA as follows:

- **Data application**—purpose for which the data are collected
- **Data collection**—processes by which data elements are accumulated
- **Data warehousing**—processes and systems used to archive data and data journals
- **Data analysis**—process of translating data into information utilized for an application

Continuous quality improvement (CQI) plays a role in data quality for the organization and should include data application, collection, warehousing, and analysis. According to N. O. Graham’s *Quality in Health Care* (1995), continuous quality improvement (CQI) is “an approach to quality management that builds upon traditional quality assurance methods by emphasizing the organization and systems; focuses on ‘process’ rather than the individual; recognizes both internal and external ‘customers’; and promotes the need for objective data to analyze and improve processes.” The characteristics of ensuring data quality include:

- **Data accessibility**—ease with which data can be obtained
- **Data accuracy**—error free and correct
- **Data comprehensiveness**—presence of all required data elements in the patient record
- **Data consistency**—reliability of data regardless of the way in which data are stored, displayed, or processed
- **Data definition** (defined meanings and values of all elements so all present and future users understand the data) (*Note: Facilities create a data dictionary to facilitate this process.*)
- **Data granularity** (definition of each attribute and value of data at the correct level of detail)
- **Data precision** (accurate data collection by defining expected data values)
- **Data relevancy**—( compilation of data that is valuable for the performance of a process or activity)
- **Data timeliness** (or data currency)—(collection of up-to-date data and availability to the user within a reasonable amount of time)

Data mining is a technique that uses software to search for patterns and trends and to produce data content relationships. According to *Healthcare Informatics*, data mining allows an organization “to acquire, store, analyze and compare data across many parts of the enterprise, by many individuals.” Organizations traditionally retain relational databases, which have a limited two-dimensional structure that does not allow for complete trend analysis. Newer online analytical processing (OLAP) servers store data in multiple dimensions and facilitate trend analysis and forecasting, allowing health care organizations to make informed, proactive decisions. The server at [http://deming.eng.clemson.edu](http://deming.eng.clemson.edu) is a valuable resource for quality improvement information. Features include CQI software and tutorials and a teachers’ exchange.

**Hospital-Based Statistics**

All hospitals compile statistics regarding admission, discharge, and length of stay of patients, which are used to analyze and monitor operations. Hospital statistics provide a benchmark upon which decisions are made to operate and manage the facility. Health information professionals play a vital role in collecting and verifying the statistics generated by facilities. Even though most hospitals have automated the statistical process, HIM professionals are responsible for overseeing the process.

*NOTE: A brief overview of hospital-based statistics is presented in this chapter. Comprehensive coverage of health care statistics can be found in Delmar Cengage Learning’s *Basic Allied Health Statistics & Analysis*, by Gerda Koch, 3rd edition.*

**Admission Data**

Admission data are collected by facilities on a daily basis, and commonly include:

- **Daily census count**—number of inpatients present at census-taking time (*Note: Census-taking time is usually midnight.*)
- **Daily inpatient census**—official count of inpatients present at midnight, which is calculated each day
- **Average daily census**—average number of inpatients treated during a given time period. It is calculated for varying time periods, such as weekly, monthly, and annually) (*Note: An average is also known as an arithmetic mean.*)
The average daily census is used by hospital administration to plan for needed hospital services, and the formula is
\[
\text{Average daily census} = \frac{\text{Total number of inpatients for a given period}}{\text{Total number of days in the period}}
\]
or,
\[
\frac{634}{30} = 21.13
\]
The hospital admitted 634 patients during June. There are 30 days in June. After calculating the average daily census, it is determined that an average 21 patients were treated in the facility each day during the month of June.

**NOTE:** To easily determine the number of days in a month, remember the rhyme, *Thirty days has September, April, June, and November. All the rest have thirty-one, but in leap years February has twenty-nine.* Or, use the knuckles of your closed fist. Each knuckle month (e.g., January, March) has 31 days. Months falling between knuckles (e.g., September, November have 30 days). February still has 28 days, or 29 if it is a leap year.

### Length of Stay Data

Facilities calculate length of stay (LOS) data, which represents the number of calendar days that a patient was an inpatient. The total length of stay for all discharged patients is calculated for a given time period. Facilities also calculate the average length of stay by dividing the total LOS by the number of patients discharged.

**EXAMPLE**

Sunny Valley Medical Center calculates the total LOS for the following six patients as follows:

<table>
<thead>
<tr>
<th>Patient</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>James, H</td>
<td>7</td>
</tr>
<tr>
<td>Jones, B</td>
<td>5</td>
</tr>
<tr>
<td>Smith, M</td>
<td>9</td>
</tr>
<tr>
<td>Tyler, W</td>
<td>2</td>
</tr>
<tr>
<td>West, A</td>
<td>5</td>
</tr>
<tr>
<td>White, T</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total LOS</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

**EXAMPLE**

Sunny Valley Medical Center calculates the average length of stay for June as

\[
\text{Total length of stay for June} = \frac{\text{Total number of discharges, including deaths for June}}{\text{Number of hospital discharges for June}}
\]

or,
\[
\frac{412}{98} = 4.2 \text{ days}
\]

In June, the hospital had a total of 412 days length of stay, and there were 98 discharges (including deaths). This means that each inpatient stay averaged 4.2 days. (If fewer patients had been discharged, the LOS would have increased. If more patients had been discharged, the LOS would have decreased.)

### Discharge Data

Health care facilities calculate discharge data statistics (e.g., death rate, infection rates, and so on) to measure health status and outcomes, health care utilization, and access to health care. (Discharge data statistics are often reported to federal and state agencies.) To easily remember how to calculate discharge rates, *divide the number of times something happened by the number of times something could have happened.*

**EXAMPLE**

The hospital-acquired infection (or nosocomial infection) rate for June is calculated as

\[
\text{Hospital-acquired infection rate} = \left( \frac{\text{Number of nosocomial infections for June}}{\text{Number of hospital discharges for June}} \right) \times 100
\]

or,
\[
\frac{5}{98} = 0.0510 \times 100 = 5.1\%
\]

In June, five patients out of 98 discharges acquired hospital-based (or nosocomial) infections. This means that the hospital has a 5.1% hospital-acquired infection rate for the month of June.

Hospitals use discharge data for planning and report this information to agencies outside of the facility (e.g., state health departments, federal public health agencies, and so on).

**NOTE:** The National Center for Health Statistics, a department in the Centers for Disease Control and Prevention, is responsible for maintaining health statistics at the federal level.

### Exercise 8–4  Health Data Collection

**Short Answer:** Briefly respond to the following.
1. What is the purpose of descriptive health care statistics?
2. What are the three general data characteristics? Explain each.
3. What four areas of data quality management does AHIMA define? Explain each.
4. What role does CQI play in data quality?
5. How do you ensure data quality?
6. What three areas are associated with hospital-based statistics? Give an example of each.

INTERNET LINKS
Go to http://www.ahima.org and click HIM RESOURCES, PRACTICE BRIEFS/TOOLS, and PRACTICE BRIEFS. Click on All Current Practice Briefs in chronological order by publication date. Here you will find the following:

- Data Quality—2/15/96, click on updated version
- Data Quality Management Model—6/15/98
- Designing a Data Collection Process—5/15/98
- Maintenance of Master Patient Index—Single Site or Enterprise and Merging Master Patient Indexes—10/2/97

Go to http://www.cdc.gov/nchs to learn more about the NCHS and its National Vital Statistics System.

SUMMARY
Indexes and registries allow health information to be maintained and retrieved by health care facilities for the purpose of education, planning, research, and other informational purposes. A master patient index (MPI), disease index, procedure index, and physician index are commonly maintained by facilities. Registries contain information about a disease or an event and are maintained by individual health care facilities, federal and state government agencies, and private organizations. The National Center for Health Statistics (NCHS) is the federal agency responsible for maintaining official vital statistics, while registration of vital events is a state function.

Case abstracting is an automated or manual process performed by health information department staff to collect patient information to determine prospective payment system (PPS) status, generate indexes, and report data to quality improvement organizations and state and federal agencies. Health data collection is performed by health care facilities for administrative planning and to report statistics to state and federal government agencies and other organizations.

STUDY CHECKLIST
- Read the textbook chapter, and highlight key concepts. (Use colored highlighter sparingly throughout the chapter.)
- Create an index card for each key term. (Write the key term on one side of the index card and the concept on the other. Learn the definition of each key term, and match the term to the concept.)
- Access chapter Internet links to learn more about concepts.
- Answer the chapter Exercises and Review Questions, verifying answers with your instructor.
- Complete the chapter StudyWare activities.
- Complete WebTutor assignments, and take online quizzes.
- Complete lab manual assignments, verifying answers with your instructor.
- Form a study group with classmates to discuss chapter concepts in preparation for an exam.

CHAPTER REVIEW
Multiple Choice: Select the most appropriate response.

1. Indexing allows for
   a. computer interfacing of data with other software systems.
   b. health information to be maintained and retrieved for education and research.
   c. patient records to be quickly retrieved when a patient is readmitted.
   d. automation of case abstracting, which results in cost and time savings.

2. Health care facilities maintain a master patient index (MPI)
   a. according to state retention laws.
   b. permanently.
3. Disease, procedure, and physician indexes are generated as the result of case
   a. abstracting.
   b. indexing.
   c. mix analysis.
   d. reporting.

4. The master patient index (MPI) links a patient’s medical record number with
   a. common identification data elements.
   b. disease and procedures indexes.
   c. hospital-assigned physician numbers.
   d. vital statistics reporting agencies.

5. An admission/discharge/transfer system interfaces with an automated MPI to
   a. input patient registration information.
   b. conduct facility case mix analysis.
   c. report diseases/events to state agencies.
   d. generate case report forms.

6. Which is an example of an MPI’s continuity of care (or continuum of care) use?
   a. Attending physician contacts the health information department to request old records on a readmitted patient.
   b. Hospital’s administrator requests a report to determine whether a nursing unit should be reopened.
   c. Public relations director requests a review of statistical mortality report of patients for the last year.
   d. State department of health requests access to patient records to perform a drug utilization study.

7. It is important to avoid the creation of duplicate MPI records, which means
   a. a consulting firm that specializes in MPI duplication should be hired to restructure the system.
   b. both an automated and manual master patient index should be maintained to avoid problems with duplicate records.
   c. the state does not allow health care facilities that are located in the same community to merge.
   d. information should be entered by the department that has control over the assignment of medical record numbers.

8. Disease, procedure, and physician indexes contain data abstracted (selected) from
   a. computerized databases.
   b. data sets.
   c. patient records.
   d. registers and registries.

9. Case report forms are used by health care providers to report data to
   a. sponsoring agencies.
   b. facilities.
   c. organizations.
   d. all of these.

10. Registers and registries are ______ sources of patient information.
    a. primary
    b. secondary

11. The NCHS responsible for maintaining official vital statistics is a ______ agency.
    a. federal
    b. state

12. Case abstracting is an automated or manual process performed by a health information department staff to collect patient information.
    a. True
    b. False

13. Which is the study of types of patients treated by a facility?
    a. case abstracting
    b. case indexing
    c. case mix analysis
    d. case reporting

14. A standard method for collecting and reporting individual elements is called a data
    a. dictionary.
    b. register.
    c. registry.
    d. set.

15. Registers and registries contain information about a disease or event and are maintained by
    a. federal and state governmental agencies.
    b. individual health care facilities.
    c. private organizations.
    d. all of these.
Matching I: Match the term with its description.
   a. Data integrity
   b. Data reliability
   c. Data validity

16. Data conforms to an expected range of values.
17. Data is the same no matter where the data is recorded.
18. Data is consistent throughout all systems.

Matching II: Match the term with its description.
   a. Data analysis
   b. Data application
   c. Data collection
   d. Data warehousing

19. Purpose for which the data are collected
20. Processes by which data elements are accumulated

21. Processes and systems used to archive data and data journals
22. Process of translating data into information utilized for an application

Matching III: Match the term with its description.
   a. Average daily census
   b. Daily census count
   c. Daily inpatient census

23. Number of inpatients present at census-taking time
24. Official count of inpatients present at midnight
25. Arithmetic mean of inpatients treated during a given time period