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An American National Standard

Standard Practice for Description of Reservation/Registration-Admission, Discharge, Transfer (R-ADT) Systems for Electronic Health Record (EHR) Systems[1]

This standard is issued under the fixed designation E1239; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice identifies the minimum information capabilities needed by an ambulatory care system or a resident facility R-ADT system. This practice is intended to depict the processes of: patient registration, inpatient admission into health care institutions and the use of registration data in establishing and using the demographic segments of the electronic health record. It also identifies a common core of informational elements needed in this R-ADT process and outlines those organizational elements that may use these segments. Furthermore, this guide identifies the minimum general requirements for R-ADT and helps identify many of the additional specific requirements for such systems. The data elements described may not all be needed but, if used, they must be used in the way specified so that each record segment has comparable data. This practice will help answer questions faced by designers of R-ADT capabilities by providing a clear description of the consensus of health care professionals regarding a uniform set of minimum data elements used by R-ADT functions in each component of the larger system. It will also help educate health care professionals in the general principles of patient care information management as well as the details of the constituent specialty areas.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E1384 Practice for Content and Structure of the Electronic Health Record (EHR)

E1633 Specification for Coded Values Used in the Electronic Health Record

E1714 Guide for Properties of a Universal Healthcare Identifier (UHID)

E1715 Practice for An Object-Oriented Model for Registration, Admitting, Discharge, and Transfer (RADT) Functions in Computer-Based Patient Record Systems

E1869 Guide for Confidentiality, Privacy, Access, and Data Security Principles for Health Information Including Electronic Health Records

2.2 *ANSI Standards:*[3]

ANS X3.38 Identification of States of the United States for Information Interchange

ANS X3.47 Structure of the Identification of Name Populated Places and Related Entities of the States of the United States

NCCLS LIS-5A Specification for Transferring Clinical Observations Between Independent Computer Systems

NCCLS LIS-8A Guide for Functional Requirements of Clinical Laboratory Information Management Systems

NCCLS LIS-9A Guide for Coordination of Clinical Laboratory Services within the Electronic Health Record Environment and Networked Architectures

[1] This practice is under the jurisdiction of ASTM Committee E31 on Healthcare Informatics and is the direct responsibility of Subcommittee E31.25 on Healthcare Data Management, Security, Confidentiality, and Privacy. This guide was prepared in collaboration with the American Health Information Management Assn.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

2.3 *ISO Standards:*[4]
ISO 639 Names of Languages
ISO 3166 Names of Countries
ISO 5218 Representation of Human Sexes

2.4 *Federal Information Processing Standard Publication:*[5]
FIPSPUB 6-2 Counties of the States of the United States
FIPSPUB 5-1 States of the United States

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *admission*—formal acceptance by a hospital of a patient who is to be provided with room, board, and continuous nursing services in an area of the hospital where patients generally stay overnight.

3.1.2 *basic data set for ambulatory care*—data items which constitute the minimum basic set of data that should be entered in the record concerning all ambulatory medical care encounters.

3.1.3 *clinic outpatient*—admitted to a clinical service of a hospital for diagnosis or therapy on an ambulatory basis in a formally organized unit of a medical or surgical specialty or subspecialty. The clinic assumes overall medical responsibility for the patient.

3.1.4 *discharge*—termination of a period of inpatient hospitalization through the formal release of the inpatient by the hospital.

3.1.5 *disposition*—directing of a patient from one environment/health care delivery mode to another at conclusion of services.

3.1.6 *emergency patient*—admitted to emergency room service of a hospital for diagnosis and therapy of a condition that requires immediate medical, dental, or allied services.

3.1.7 *encounter*—face-to-face contact between a patient and a provider who has primary responsibility for assessing and treating the patient at a given contact, exercising independent judgment.

3.1.8 *inpatient*—an individual receiving, in person, resident hospital-based or coordinated medical services for which the hospital is responsible.

3.1.9 *inpatient episode*—period of time in which the patient is in an inpatient status, beginning with admission and terminating with discharge.

3.1.10 *master patient index*—permanent listing that reveals identity and location of patients treated by a health care facility.

3.1.11 *outpatient*—an individual receiving, in person, nonresident, provider-supplied or coordinated medical services for which the provider is responsible. The types of outpatients recognized are:

3.1.11.1 Emergency

3.1.11.2 Clinic, and

3.1.11.3 Referred.

3.1.12 *patient care record*—legal documented record of health care services provided by a health care facility. Synonymous with: medical record, health record, patient record.

3.1.13 *practitioner specialty*—for a particular practitioner, the subject area of health care or scope of health care services in which the major share of his or her practice is carried out. See National Provider System Taxonomy in Specification E1633.

3.1.14 *registration*—recording the patient demographic and financial data in a unit record for patient care or a billing record for charge capture, respectively.

3.1.15 *referred outpatient*—admitted exclusively to a special diagnostic/therapeutic service of the hospital for diagnosis/treatment on an ambulatory basis. Responsibility remains with the referring physician.

3.1.16 *specialty type*—classification of specialized fields of medical services, such as, for example, Gynecology, General Surgery, Orthopedic Surgery, etc.

3.1.17 *transfer*—change in medical care unit, medical staff, or responsible physician of an inpatient during hospitalization.

3.1.18 *uniform hospital discharge data set*—Those essential data elements which should be recorded to provide a composite picture of the patient's stay.

3.2 *Acronyms:*

CPR	Computer-based Patient Record
EHR	Electronic Health Record
R-ADT	Registration-Admission, Discharge, Transfer
ADT	Admittng, Discharge, Transfer
R-RADT	Registration/Reservation-Admitting, Discharge,Transfer
MPI	Master Patient/Person Index

4. Significance and Use

4.1 *Background:*

4.1.1 Effective health care delivery requires an efficient information base. A standard description is needed regarding the capabilities of Registration-Admission, Discharge, Transfer (R-ADT) Systems in both automated hospital and ambulatory care information systems. This practice is intended not only to provide a common explanation of the minimum information elements required in such systems, thus augmenting those already published[6,7] but also to provide the basis for future patient data interchange formats. This practice has been developed to serve as a uniform minimum description of R-ADT functional components that should be common in all systems and used in both transportable general purpose and custom developed systems. This description requires acceptance of the premise regarding the need for logical integration of concepts in systems development. In the integrated systems concept, the R-ADT function is the foundation module for all patient information and communication among all departments, and it is used in initiating services within the patient care setting. A common R-ADT system in a hospital enables all departments

[4] Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, http://www.iso.ch.

[5] Available from US Dept. of Commerce, Government Printing Office, Washington, DC.

[6] *Uniform Ambulatory Medical Care: Minimum Data Set*,, DHHS Publication PHS 81-1161, DHHS National Center for Health Statistics, 1981.

[7] *Uniform Hospital Discharge Data Set*, DHHS Publication HSM 74-1451, Health Information Policy Council DHHS, 1984.

to streamline the initiation and tracking of the services they provide to patients; it also provides an opportunity for accurate tracking of patient movement throughout a hospital stay, for instance, and the linkage of inpatient and outpatient services. It is also the system which provides all inpatient census-related administrative reports. Likewise, an R-ADT component in an Enterprise Architecture captures the initial patient demographic profile for the EHR and is subsequently accessed in posting an individual's clinical data, for inquiry regarding that clinical data and for linkage to financial records. It is an integral part of the EHR function. It may also be linked to other systems which provide patient care information management capabilities.

4.1.2 A registration system is capable of providing the initial information capture for all health care facilities; an ADT subsystem can provide common admitting data for all departments in hospitals and other inpatient facilities. Establishing a standard description of a logical R-ADT process model is useful because that standard will become a reference for other documents describing the other functional subsystems used in patient care information systems. It is understood that a minimum set of information elements must be initially captured upon registration and then used for all subsequent ambulatory or inpatient care; the subsequent minimum set of admitting elements is then used to drive or initiate additional services for patients through each subsystem. With a standard minimum R-ADT component definition, standards for constituent subsystems can now be coordinated and developed through reference to this model. This description should be used by vendors and subsystem designers who need to develop their systems in a coordinated and integrated way so that each subsystem will contribute modularly with overall systems planning for the user organization. Such modularity will aid management who are assigned to evaluate each system and subsystem in order to assess the potential of existing technology to provide the needed patient care information management systems capabilities.

4.2 *Use*—This practice is written assuming that the health care facility will have several options for gaining the R-ADT capability and may either acquire a system from a commercial vendor or design an integrated in-house system which may be a component of an ambulatory care practice or a hospital information system. Many of the characteristics of existing vendor systems are conventional and can interoperate; the care facility may simply need to identify whether or not the offered features meet its needs. Beyond the general capabilities, the unique systems capabilities can then be identified and structured to meet the special needs of that individual enterprise. A more accurate selection can therefore be made from the features offered by vendors if each health care facility/hospital carefully identifies its own R-ADT functional requirements with the aid of this guide prior to evaluating candidate systems or development approaches and specifying that these requirements be met.

4.3 *Role of R-ADT Systems in Integrated Delivery Systems*—Registration/Reservation-Admission, Discharge. Transfer functions in integrated delivery systems need to provide a uniform enterprise view with data accessible across the IDS. Typical functions in this environment may include registration to an enterprise master patient index, reporting capabilities on R-ADT functions, enterprise scheduling and enterprise capabilities for eligibility and utilization management. Patient data collected should be transferable to medical record abstract applications and contribute to clinical repositories to maintain longitudinal focus to evolve toward electronic health records. IDS networks provide infrastructure and should conform to enterprise technical security requirements that meet legal and accreditation requirements.

5. System Description

5.1 *General Principles and Purpose*—The purposes of an R-ADT system are to:

5.1.1 Identify or verify patients, or both, via a facility master patient index created and maintained through the registration process.

5.1.2 Establish an initial record of the patient entry into the system by creating the demographic segment of the EHR (registration).

5.1.3 Maintain the registration record and demographic data as a common node for patient care record systems so that it can be used by all ancillary support systems.

5.1.4 Augment the registration record by addition of those data required for any inpatient admission.

5.1.5 Initiate services for all inpatients admitted to the facility by providing notification of the start of services.

5.1.6 Track movements of the inpatient throughout hospitalization.

5.1.7 Facilitate scheduling of ancillary and clinical services through a bed control and transfer function.

5.1.8 Produce the inpatient census data and the corresponding census and statistical reports.

5.1.9 Identify movement, location, status, and discharge of each in-patient and the times and dates of these events, this helps coordinate efficient support services for treating that patient during hospitalization. This is achieved by means of census reporting and afterwards during follow-up care by means of linkage to the care record.

5.1.10 Offer all departments of the health care facility common information about each registered/admitted patient through maintenance of a single registration record, thus eliminating duplicative patient data capture by those departments.

5.1.11 Produce the initial portion of a uniform hospital discharge abstract and the initial data set used for clinical and financial analysis.

5.1.12 Identify the roles of all responsible practitioners for each patient.

5.2 *Background*—In the past, the functions comprising typical R-ADT system services have included:

5.2.1 Provide a means to build, update, correct, and maintain an existing master patient index, or the current portion thereof.

5.2.2 Provide patient identification through a master patient index to identify all care recipients.

5.2.3 Maintain a registry of all patients who have received care; the registration record on each patient should contain all

general demographic data on the patient and identify membership in all special classes of patients, such as oncology, cardiac, trauma, etc.

5.2.4 Create admission lists for notification of hospital departments including: nursing units, business office, dietary, information desk, surgery, utilization review, housekeeping, laboratory, radiology, etc.

5.2.5 Create the hospital census report listing the current location of all inpatients, daily admissions, discharges, and transfers.

5.2.6 Create administrative reports on hospital occupancy derived from the census-taking process.

5.2.7 Validate inpatients by name, unit number, and physical location.

5.2.8 Create discharge and transfer lists for dissemination to medical records, business office, housekeeping, pharmacy, admissions, outpatient, or other departments that conduct activities related to patient discharge.

5.2.9 Capture inpatient rooming charges on a daily basis.

5.2.10 Communicate the demographic information captured at registration on each patient by R-ADT systems to all suborganizations within an enterprise. Such information serves as a resource for all departments and is generally indexed and maintained by the medical records unit by means of the master patient index. Some of the same information is also used in all clinical orders transmitted to the ancillary service departments, such as radiology and laboratory departments to request services and to post results to the patient's record. Discharge orders will also use for discharge planning that initial information required at registration. Registration data will be the foundation for retrospective discharge analyses of all patients after they are discharged from the facility.

5.2.11 The American Hospital Association (AHA),[8] has identified the following functions to be included in admission/discharge transfer (ADT) operations:

5.2.11.1 Registration,
5.2.11.2 Creation of reservations,
5.2.11.3 Pre-admission of patients,
5.2.11.4 Admission,
5.2.11.5 Rooming,
5.2.11.6 Census,
5.2.11.7 Transfers,
5.2.11.8 Discharges,
5.2.11.9 Room charge capture,
5.2.11.10 Management reports, and
5.2.11.11 Other.

6. Functions and System Capabilities

6.1 *Master Patient Index (MPI) Maintenance*—All patient care facilities, not just hospitals, must maintain a MPI that is a subset of the data elements gathered at registration for any type of care at the facility and which enables patient identification and points to the location of his record (see NCCLS LIS-9A). Depending upon the record system in effect, these elements may vary slightly. Basically, the name (last, first, middle initial), date of birth, sex, and identity number provide a unique minimum set of identifiers for an individual who is not trying to conceal his/her identity. Name may also be cross-indexed by one of the general phonetic (such as soundex) algorithms to assist in identifying a list of candidates from which a unique individual may be selected. While the MPI function is frequently thought of separately from registration, it is really a subfunction of registration and pertains to all patients in the system and not just inpatients, as some currently use these terms, reserving registration for outpatients.

6.2 *Registration/Reservation for Patient Entry:*

6.2.1 Registration consists of capturing the patient's demographic data for the MPI and for the EHR and establishing the financial data for charge capture. Most ADT systems are presently activated through the patient's admission into the hospital as an inpatient. Many subsystems presently available are based only on ADT functions and the registration functions needed to support those components. These systems do not include a full reservation or registration component. This guide proposes that all ADT systems must incorporate a full registration/reservation component in their description in order to conduct the required registration function as a precursor to admission. When this information is captured at a registration prior to the time of admission, it need not be recaptured at admission, thereby saving time. It can, however, be reviewed for verification during admission and any additional information can be entered. Registration information is also common to outpatient care conducted prior and subsequent to inpatient episodes. This attribute makes registration common to all phases of health care. The reservation function enables a bed to be reserved for a pending admission but it does not "control" the management of that bed. The reservation function, when used as a part of the overall management policy, allows clinical departments and services to allocate beds under their control.

6.2.2 Registration of patients must also precede ambulatory care whether this care is delivered in a comprehensive care facility or in a private practitioner's office. In order to establish a record of the patient's encounter or visit, identifying information must be obtained. This minimum information "registers" the patient and becomes the root from which all other information grows. Though not always the case currently, the identity and record number subset of this registration data set should become an entry in the practitioner or hospital MPI portion of the system and be used to establish unique patient identity in a wide variety of subfunctions in the health care delivery process (see Guide E1714).

6.3 *Patient Admission to Inpatient Facility*—When a patient is ordered to be admitted to an inpatient acute or long term resident care facility, the original registration data is reviewed and augmented in the Encounter Segment by data characterizing the inpatient stay (see Practice E1715). This information changes with each inpatient episode and contains both administrative and clinical data elements. The administrative element characterizes at the start of the episode the location and services to be utilized. Transfers characterize changes in these data during the episode. The clinical element includes the reasons for admission, the providers, and the planned major treatments to be utilized. Patient status is also contained so that

[8] *Hospital Computer Systems Planning: Preparation of an RFP*, American Hospital Association, Chicago, IL, 1980 p. 20.

the administrative staff can communicate the patient's general state to outsiders while additional elements provide the care staff with indices regarding the patient's clinical condition. The admission segment is the common data segment regarding the encounter and episode. Upon discharge, the conditions causing the patient's admission, the procedures undertaken, the services rendered, and the disposition and destination of the patient are recorded in the disposition subsegment, including a narrative summary. This segment becomes a synopsis of that inpatient episode. In comprehensive care facilities reference to this segment may be made elsewhere in the record to call attention to the contribution of the episode to the patient's long term care. This encounter segment also becomes the root upon which all other clinical data relating to the episode may be organized.

6.4 *Ancillary Departments/Subsystems Notification* —This function serves to notify ancillary departments of the healthcare enterprise directly through the communication component so that notification of registration/admission is conducted by the system as soon as it is completed at the admitting desk, using the terminals or printers, or both, located in key departments. These devices, in turn, can be used to initiate any subsequent scheduling activities required by these departments.

6.5 *General Inpatient Admission Report Preparation:*

6.5.1 A daily listing of admission is required by all hospital services/departments in order to determine those general work schedules which are based on patient census. The first product provided by the ADT subsystem is the admissions report. The report consists of the names and locations of all new patients admitted since the last census. Additional amplifying data may be included such as clinical services or department, attending physician, etc., as required. In integrated EHR environments, these lists may appear as electronic displays.

6.5.2 When patients are admitted to an inpatient facility their names appear in the census (usually conducted as of midnight for the previous day), which is a daily listing of in-house patients, sorted by nursing unit. In manual systems this tally is accurate as of that midnight and is incorporated into a daily census report that is available by six or seven o'clock the following morning. In electronic information architectures, the current status may be viewed at any time. In order to coordinate the contribution of each medical specialty and ancillary service, each printed census report or electronic display should show patient name, identification number, birthdate, room and bed number, date of admission, and attending physician. One common associated report or display is an alphabetical listing of all patients currently in the hospital. Another is a printed report or online display showing distribution of patients sorted by nursing unit or service, or both. In automated systems, this information may also be available by inquiry.

6.6 *Bed Control*—While census reporting and notification or tracking functions are communication functions, bed control is a management tool to ensure that the bed, which is the prime revenue-producing resource of the hospital for conducting inpatient care, is efficiently managed and used. Each bed is served by several specialties and is maintained for residential purposes by a hostelry. The activities that keep the bed in a ready status depend upon the clinical care events. These events are coordinated by the nursing staff, but the hostelry is conducted by the housekeeping staff. Hospital Food Service Management, closely coordinated with Clinical Dietetics Services, are also a part of the hostelry. All of these activities must be forecasted and scheduled on a daily basis. The R-ADT system maintaining the patient record must be coordinated with a database that allows the bed control organization to produce work schedules for housekeeping and food service management.

6.7 *Census Report Preparation*—The census reporting function includes the daily census report and the statistical reports derived from that census report which track and project occupancy rates and census activity for the health care facility/hospital. This is a daily administrative report widely used in hospitals. It consists of a listing of each nursing unit and patient location, with associated names and patient attributes. In manual systems, census information is often compiled by the medical record department and assembled into routine statistical reports hospital occupancy. In electronic environments, these reports can be prepared as systematic products of the R-ADT process.

6.8 *Discharge/Transfer Tracking:*

6.8.1 Another function provided by the R-ADT system is discharge and transfer processing. A daily notice of discharges and transfers is required by all hospital services to identify conclusion of services for hospital inpatients. Actual discharge/transfer processing takes place in two ways. First, in the discharge/transfer function, nursing personnel identify all discharge and transfer orders from the patient record and may enter them into the ADT subsystem via the clinical order entry subsystem.[9] These orders are then used by the ongoing census reporting and room charge capture activities. A second product of an R-ADT system is a discharge list which includes names, identifying numbers, discharge location, status, and attending physician. This report is used as a control to monitor required processing activities for business and records.

6.8.2 Second, when patients are transferred from one bed or nursing unit to another, nursing units are responsible for notifying all departments that need to know the new location. This includes completing a transfer notification which may relay data to admitting, business office, housekeeping, and ancillary departments such as laboratory, etc., as determined by the hospital structure. Electronic R-ADT components enable this function to be carried out from the originating nursing unit via data communications and the data are displayed on the appropriate devices in the appropriate departments as electronic services of those components.

6.8.3 Third, the system shall have a specified protocol for cancelling an admission, a transfer, or a discharge, permitting systems with which it is interfaced to deal with such instances

[9] If a clinical order entry system is not in place, the information may be transferred to bed-control in admissions where all discharge and transfer orders are entered in to the R-ADT system through a central point.

in an appropriate manner. For example, a cancelled discharge would not create a new admission.

6.9 *Content of Patient Record:*

6.9.1 In order to be effective, the registration/inpatient reservation process must capture sufficient initial information about the patient so that either ambulatory care can be delivered or the needed inpatient services can be started, even before the patient arrives, using that already established set of data. This scenario has the appropriate data required described in Practice E1715. The registration should include, but not necessarily be limited to, the information given in Table 1. Guide E1384 contains the detail for data elements.

6.9.2 The capture of this basic information should result in entry of the initial patient registration and of the MPI stored within the computer system. Once established, this minimum patient file can subsequently be used by ancillary departments,

TABLE 1 Patient Registration Information

Patient Data Element	
Patient name[A, B]	Next of kin name
Aliases (AKA also-known-as)	Relationship
Former name[C]	Street address, city, state, zip code
Mother's maiden name	Home phone
Father's name	Business phone
Mother's name	Current employment status
Multiple birth marker	Patient/parents occupation[D]
Family Birth order	Date completed occupation
Adopted (y/n)	Previous occupations[C]
Patient identification number (hospital unit number)[B]	Job hire date[C]
Chart location	Job title
Archive data	Job code
Date-time of birth[A ,B]	Job classification
Place of birth[B]	Employee number
Social security account number	Job process/activity
Universal health identifier	Termination date
Sex[A,B]	Current workplace
Race[A]	Street address, city, state, zip code
Ethnic group	Phone
Primary language spoken by the patient	Date-time record initiated/updated[C]
Religion[D]	Initiated/modified by person's name
Patient/parent marital status	Date record transferred to storage
Citizenship	Billing account number, as per facility policy
Veterans status/military service	Clergyman's name
Education level	Street address, city, state, zip code
Number persons in household (dependents)	Phone
Family member name[C]	Patient's preferred mortuary
Social Security Account Number (SSAN)	Date-time of admission/planned admission[A,C,E]
Relationship	Facility admitting the patient[A,E]
Head of household status	Patient type
Primary care giver status	Type of admission[D]
Sex of family member	Admitting service[D]
Date of birth of family member	Accommodation type/location[D]
Permanent street address, city, state, zip code[A,D]	Warnings
Country	Admitting physician
Census tract	Referring physician
Home phone[A]	Attending physician[A,E]
Business phone	Operating physician[A,E]
Temporary street address, city, state, zip code	Admitting diagnoses/injuries[A,C]
Temporary address phone	Consulting service[C,E]
Previous address	Physician
Date began	Anticipated discharge disposition
Date ended	Discharge date and time[A,E]
Emergency contact name	Disposition type[A,E]
Relationship	Principal diagnosis[A,E]
Street address, city, state, zip code	Other diagnoses[A,C]
Home phone	Principal procedure[A,E]
Business phone	Other Operative procedures[A,C]
Legal guardian name	Date
Relationship	Expected source of payment[C,E]
Street address, city, state, zip code	Medicare number
Home phone	Name and address of insurance carrier
Business phone	Narrative summary
Confidentiality status	

[A] Minimum essential.
[B] Master-Patient Index (MPI) elements.
[C] Multiple occurrences.
[D] Inpatient desirable elements, Uniform Hospital Discharge Data Set (UHDDS).
[E] Inpatient required elements, Uniform Hospital Discharge Data Set (UHDDS).

such as laboratory, radiology, etc. This can be done either by accessing the R-ADT file or producing a copy of the information after verification. Once the demographic information is captured during registration, it can be stored online and held for retrieval when the patient is actually admitted or presents himself for ambulatory care. Once the patient is either preadmitted by means of a reservation or admitted to an inpatient facility, additional elements can be incorporated into that initial patient record, including type of admission, admitting diagnosis, ward, bed, and room number. Additional qualifying information such as smoking or nonsmoking, isolation, or other special attribute flags can be stored.

6.10 *Linking the R-ADT Functions to the EHR within the System*—The full EHR Structure is dealt with in Guide E1384, but the following issues, which depend upon local policies and procedures, must be considered in extending the R-ADT system to encompass the EHR:

6.10.1 Determine the maximum number of patient files the system needs to be capable of holding.

6.10.2 Determine how the system will check to see if a record already exists for a patient being registered. This should be correlated with the MPI unit number from the Medical Record Department. Without this verification, duplicate numbers can be assigned and create an inaccurate record system.

6.10.3 Determine how unidentifiable emergency patients will be assigned a temporary unit number, and the initial record will be merged with an existing one if, after positive identification, a prior record is found.

6.10.4 Identify how the system is to be used for reservation and registration; determine how far in advance of admission the reservation should be accepted and in what fashion it should be held in the file. Define minimal registration common data set.

6.10.5 Determine how and when newborn infants become separate files with new identifying numbers and how they are to be admitted into the R-ADT system. Suggest a standard minimum protocol.

6.10.6 Identify how anonymous and also-known-as (AKA) patients can be treated by the system. Suggest a standard minimal protocol.

6.10.7 Determine if the system should allow a patient to be registered without generating a bill.

6.10.8 Identify the conditions, limitations, and security that cover this courtesy category.

6.10.9 Specify the required response time for the R-ADT function. This is a critical issue in systems satisfaction and efficiency for the facility staff.

6.10.10 Determine how the system will (or if it will) allow a patient record to be created without a unit number and how that situation will later be rectified.

6.10.11 Determine any restrictions that may exist when a new file is created, including who is authorized to create a patient record or register a new patient into the system, who is authorized to access that data, and who is authorized to change or revise that information. Typically, corrections and additions can be made by the admissions or the registration/reservation operations personnel at either point in the system.

6.10.12 Identify how, when diagnoses are entered, permission to access that data by ancillary departments is clearly identified and protected in the system. See Guide E1869.

6.10.13 In cases where the R-ADT component interfaces with other subsystems and creates additional data structures, such as billing files or laboratory system files, identify the required data validation checks to be sure that the information transferred is complete, up to date, and accurate. Determine whether information will be transferred regularly as transactions occur or if they should be added to departmental files which will be updated at stated intervals.

6.10.14 Determine system backup requirements.

6.10.15 Determine the impact of prospective payment systems' data requirements on the data captured by the system.

6.11 *Common Data Element Types*—Certain data elements conform to a common form across many data elements in a patient record system containing the reservation, registration, admitting, discharge and transfer component.

6.11.1 *Dates and Times*—Dates and times shall be expressed as defined in NCCLS LIS-5A. In summary, YYYYMMDDHHmm where Y is year, M is month, D is day, H is hour and m is minute. Reference to other time zones is conducted by appending an optional "+" or "–" and HHMM offset from Universal Coordinated Time Zone (for example, New York Eastern Standard Time Zone would be – 5000).

6.11.2 *Person Names*—Names of persons shall be expressed as defined in Specification E1633, paragraph 4.2.1. In summary, the parts of a name are last, first, middle or initial, and suffix-title/degree (such as Jr. or Sr.), and prefix or title (such as Dr., Mr., The Honorable, etc.). Each part should be separated by delimiter character.

6.11.3 *Addresses*—Addresses shall be represented as defined in Specification E1633, paragraph 4.2.1. In summary, addresses are represented as one line, with the street address, city, state, zip code, and country (if present). The separate parts of a street address shall be separated by delimiter characters.

6.11.4 *Telephone Numbers*—Telephone numbers shall be represented as defined in NCCLS LIS-5A. In summary, telephone numbers are represented as (NNN)NNN-NNNNXNNNNBNNNNN where X and B are literal uppercase, alphabetic characters and N represents a digit. For international numbers, a country code is prefixed before the "(" character.

7. R-ADT Process Model

NOTE 1—In order to systematically describe the common R-ADT process that embodies the best recommended patient record management practices, the following models have been defined that utilize the data structures defined in Practice E1715.

7.1 *Constituent Processes of the R-ADT Function*—As noted in 6.9, the established data is captured in the scenario shown in Fig. 1 using the process flow shown in Fig. 2, which is a standard IDEF0 model (IEEE 1320.1-1998). The following Processes will be described in the sections below. They are related to the noted subsections given in Section 5 and in Figs. 1 and 2.

Process	Section 5	Fig. 2
Identify Patient	5.1.1	EHR03MPI
Collect Demographic Data	5.1.2	EHR031

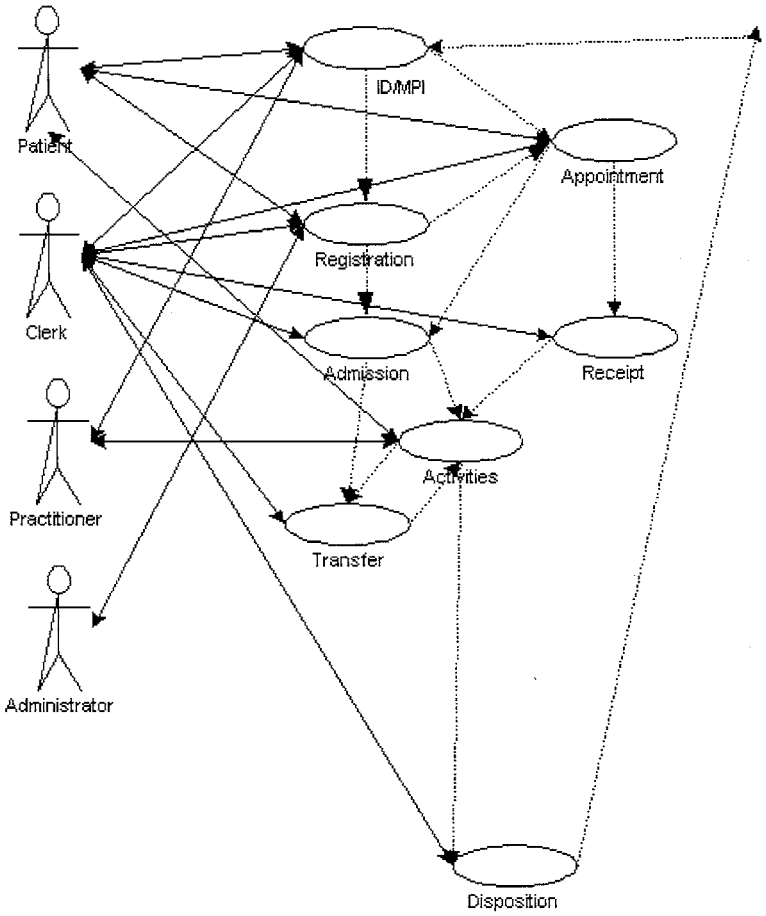

FIG. 1 R-ADT Scenarios

Collect Admission Data	5.1.4	EHR032
Provide Demographic Data to Ancillary Services	5.1.3, 5.1.5	EHR033
Track Inpatients	5.1.6	EHR033
Schedule Encounters and Services	5.1.7	EHR031
Provide Resident and Ambulatory Patient Care-Status Data	5.1.8, 5.1.9	EHR032
Identify Practitioners and Their Roles and Privileges for Each Patient	5.1.12	EHR031
Collect and Manage Encounter/Resident Stay Disposition Data	5.1.11	EHR032
Produce Resource Management/Statistical Reporting Data Constellations for Transmission to Required Recipients	5.1.10, 5.1.11	EHR033

7.2 *Patient Identification*—As noted in 6.1, and further detailed here, this function is a key step in all patient encounters and related services (such as those provided by the clinical laboratory and detailed in NCCLS LIS-8A) by ensuring unique identification of the individual patient for the subsequent functions of the accessing architectural component. Fig. 2(c) depicts the role of the included subfunctions.

7.3 *Demographic Data Collection*—6.2 discusses the context of the next steps for the initial encounter of the individual with this enterprise architecture. This process and Fig. 2(b) depicts the value of this process in the preparation for healthcare services. The data given in Practice E1715 and the nature of the enterprise will guide exactly which data elements are needed. A Tag Value outline of the data element groups needed for the R-ADT function is given in Fig. 3, which is drawn from both Practices E1384 and E1715 (which has commonality with NCCLS LIS-8A). A Tag-Value representation is a textual notation for describing relationships of Objects and their attributes by bounding each conceptual object with a set of "tags" that are unique labels that bound the tagged item. This encapsulated process must be used at the initial encounter and may be invoked subsequently to update the data element appropriate to individual encounters, such as when transition to resident healthcare settings from ambulatory settings takes place.

7.4 *Additional Admission Data Collection*—When the ambulatory to resident setting transition occurs for the information domain (such as an ancillary service serving both a resident setting and an ambulatory one) that has previously only served the ambulatory setting, then the Admitting Data Collection Process must be invoked to capture the data characterizing that care setting. As noted in 6.3, these data will ensure that the information domain has the needed attributes associated with the Clinical Order requesting services from this Domain for conducting the requested service as noted in Fig. 2(b).

7.5 *Demographic Data Provision to Clinical/Ancillary Services*—In addition to the data captured as described in 7.3 and 7.4, subsets of these data must be provided in appropriate

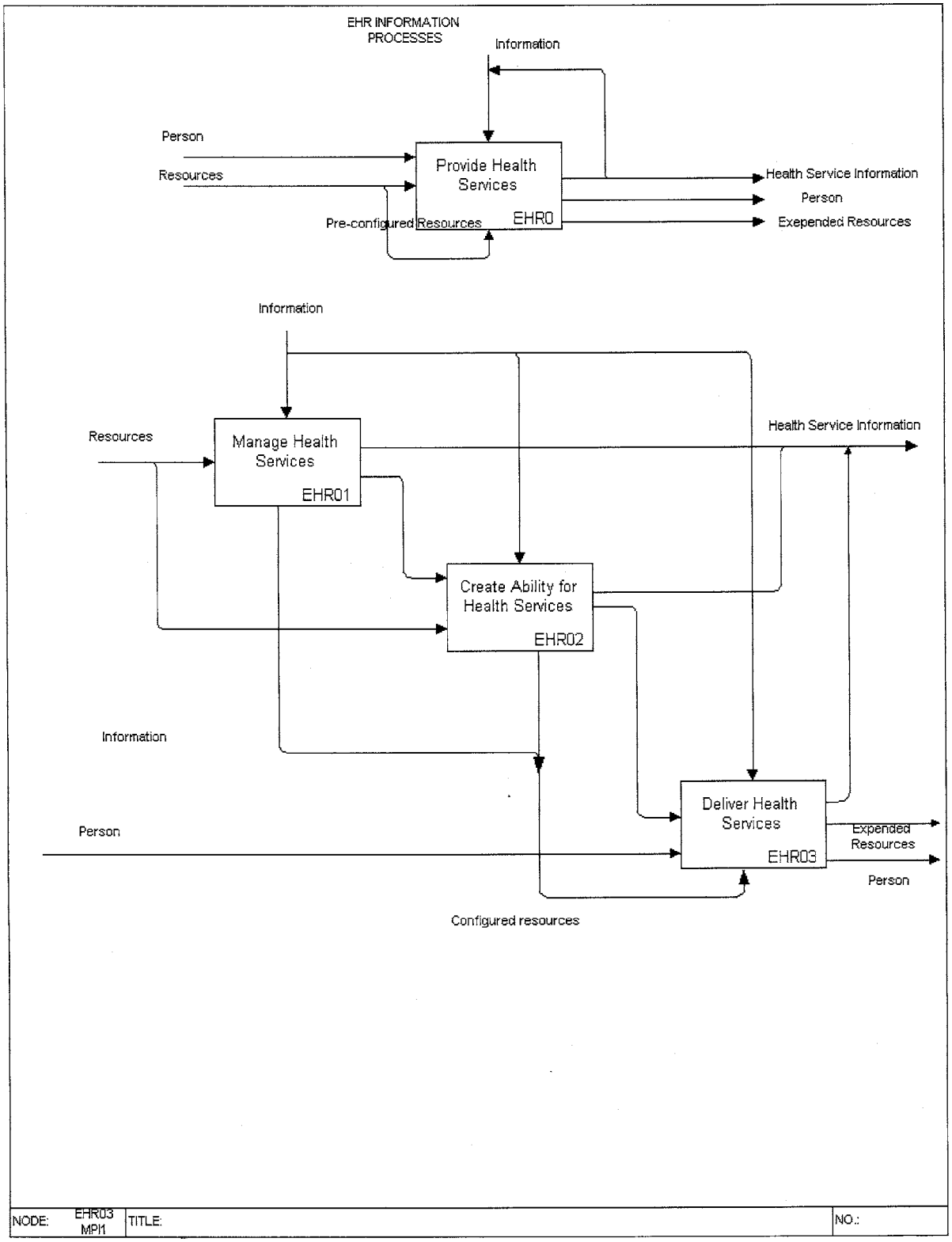

FIG. 2 R-ADT Processes/Activities (a)

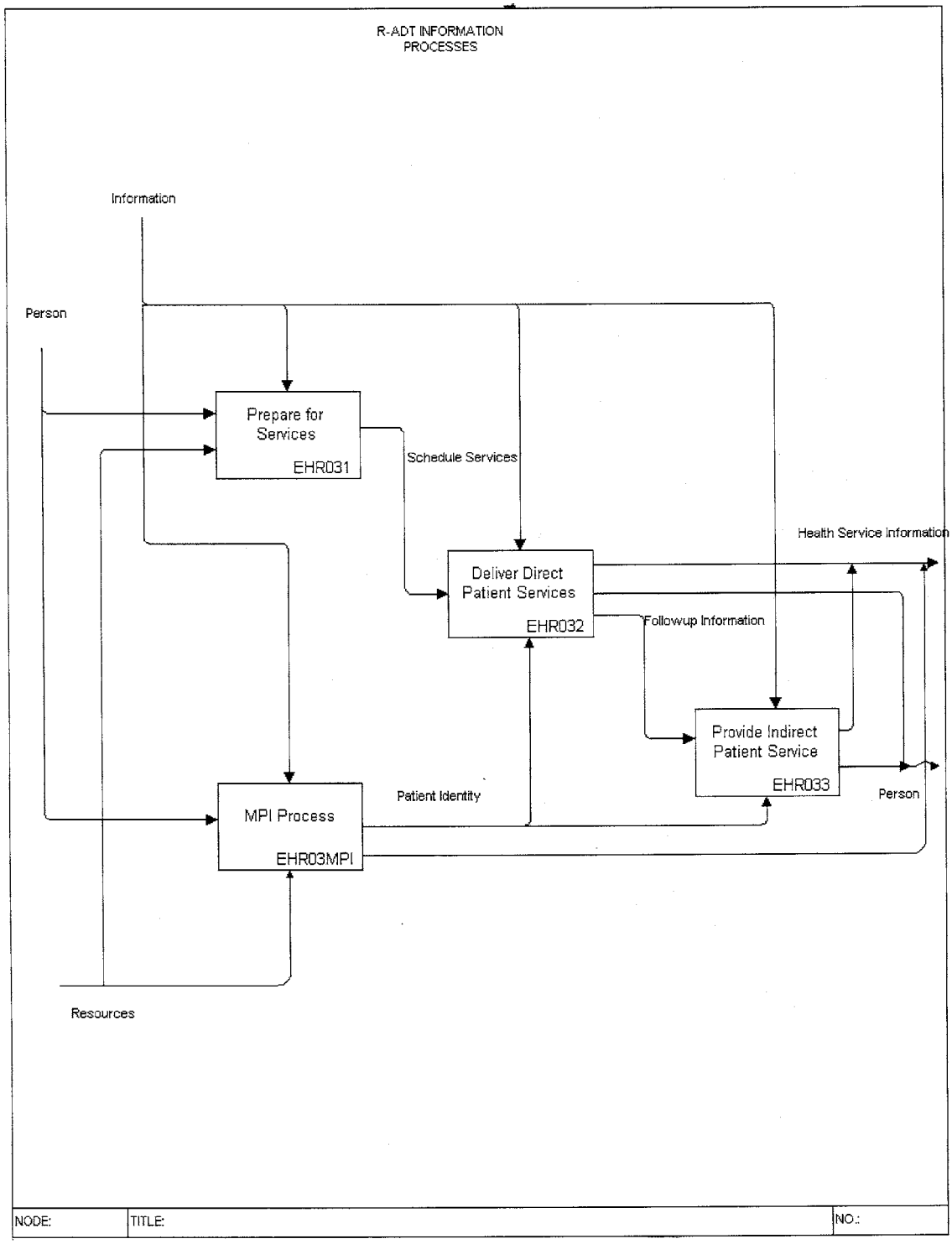

FIG. 2 R-ADT Processes/Activities (b) *(continued)*

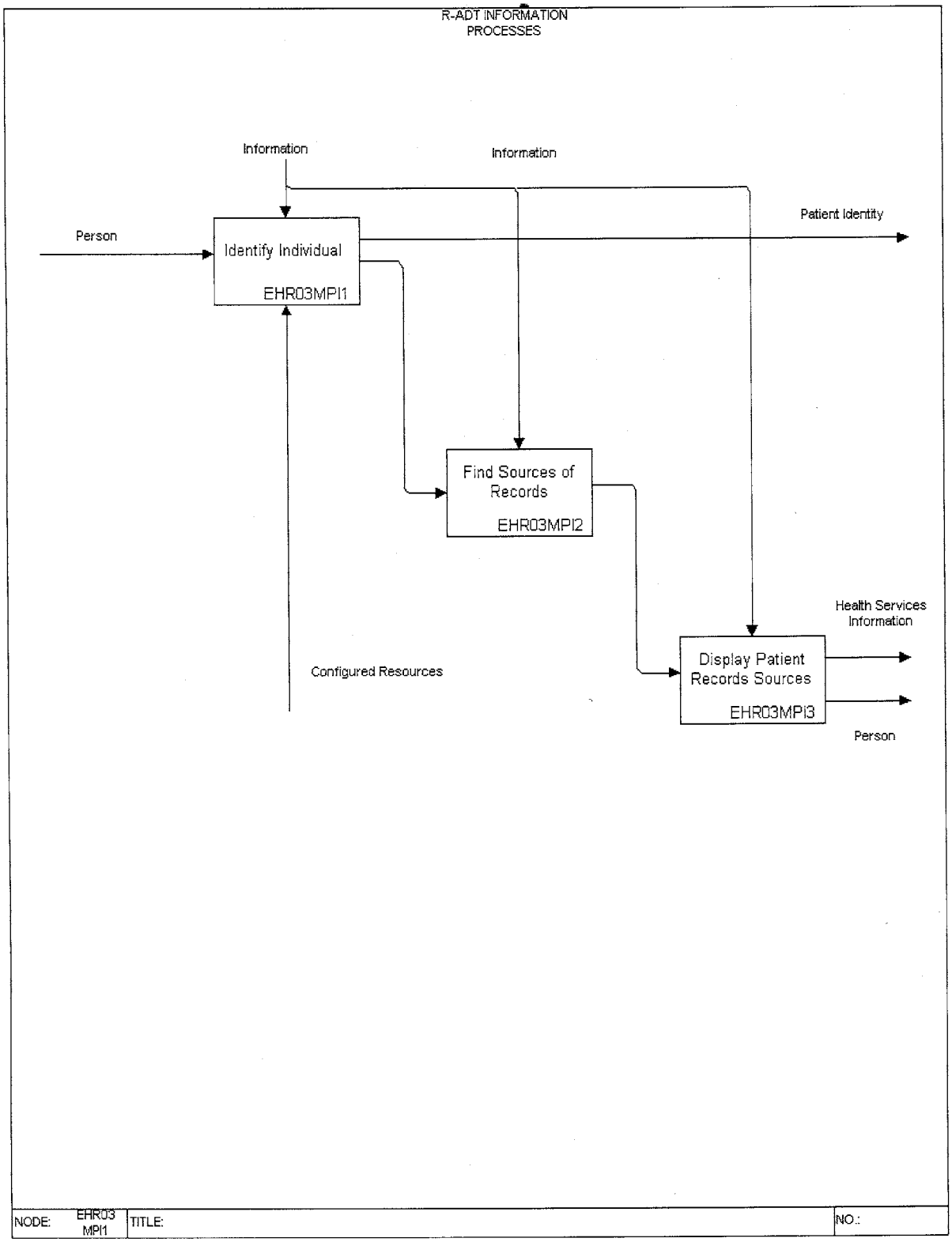

FIG. 2 R-ADT Processes/Activities (c) *(continued)*

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    <Encounter-Etiol></>
    <Encounter-Disp-Op-Proc></>  (Encounter F/G Subsegments)
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  </Encounter Disposition>
  <Encounter-Chg-Item></>
</Encounter>
</Patient>
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FIG. 3 R-RADT TAG VALUE MODEL OF EHR (GLOBAL VIEW)

form to the clinical service settings and ancillary services that support the patient's care. This process recognizes that, depending upon the enterprise and its supporting information architecture, this process must be designed and implemented to serve those information domains with common system components that can be economically tailored for each of those settings.

7.6 *Track Inpatients*—The term "track" with respect to patient care processes is intended to mean: "the provision of both scheduled and completed event times and places to relevant practitioners at permitted information access points within the enterprise information architecture." What information is provided, and to whom it is given, will depend upon both the patient attributes given by the MPI component/process and those attributes that are associated with the practitioner, his/her role at that access point, and the nature of the tracking information. These criteria are all influenced by the enterprise and its information architecture, both as noted in 6.10 and as discussed from the point of view of clinical laboratory services in NCCLS LIS-9A.

7.7 *Conduct Scheduling of Encounters and Services*—Each care event may occur ad hoc (such as emergency visits) or be scheduled beforehand. These schedules enable pre-allocation of space, personnel and equipment. This Process conducts the gathering of the characterizing attributes of these scheduled events as stated in Practice E1384 and stores them in the appropriate EHR segment for organization and display with respect to tracking events as noted in 7.6 and Process EHR033 in Fig. 2(b).

7.8 *Resident and Ambulatory Patient Care Status Information*—Particularly in resident care settings, it is desired to know the Health and Administrative status of admitted patients both for care and resource management purposes in Process EHR032 of Fig. 2(b). Several attributes in both the Receipt and Activities phases of an Encounter as described in Practice E1715 can provide this information. Attributes of the Disposition Phase provide retrospective characterization of the outcome of the Encounter as described in 7.10. This status information needs both ad hoc display to the practitioners identified in 7.9 for tracking of care events and scheduled display to resource management staff for optimal resource management for the care process.

7.9 *Identifying Practitioner Assignments and Roles/Privileges*—Part of the EHR031 Prepare for Services Process noted in Fig. 2(b) involves uniquely identifying practitioners and their characterizing attributes such as licenses, certifications and specialty disciplines that are used not only for patient care purposes but also for the attendant resource management functions that draw on the R-RADT Function. Such resource management functions include those defined in the US by the HIPAA legislation as well as those of other healthcare systems which might be part of an episode of care for an individual patient. Such characterizing attributes should be collected when the practitioners first associate with the healthcare enterprise and updated at defined subsequent events. Depending upon the setting and the access arrangements for the enterprise information architecture, these data may come from external domains such as professional specialty associations or other sources. The enterprise must define the criteria by which these data are kept current.

7.10 *Disposition Data Collection*—When the decision is reached to terminate the encounter, particularly in resident care settings, data items that have been detailed in both Practices E1384 and E1715 must be collected to conclude the encounter. This Process manages that data collection and stores the collected data in a defined structure of the care record.

7.11 *Transmission of Reporting Data Constellations* —Each geographic area and local and state jurisdiction will have requirements for reportable healthcare data to designated

agencies. These reports usually attend the termination of defined health events, as described in 7.10, but contain data primarily from both the Receipt and Disposition phases of the Encounter. Each Enterprise must identify those reportable events and the source data structure for the data to be included in reports. Close understanding of the Structure of the EHR, as described in Practice E1384, will allow designation of the source of each reportable data item and the trigger criteria for the report.