ID	Formative Ballot Content		Functional Description	See Also	Rationale	Citation
	Function Name	Function Statement				
DC.1	**Care Management**					
DC.1.1	Health information capture, management, and review		For those functions related to data capture, data is captured using standardized code sets or nomenclature, depending on the nature of the data. Data may also be captured from devices.			ISO/TS 18308 - Health Informatics - Requirements for an Electronic Health Record Architecture; ASTM E 1769 Standard Guide for Properties of Electronic Health Records and Record Systems
DC.1.1.1	Identify and locate a patient record	Maintain and identify a single patient record for each patient.	Key identifying information is stored and linked to the patient record. A lookup function uses this information to uniquely identify the patient.		Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	
DC.1.1.2	Manage patient demographics	Capture and maintain demographic information that is reportable and, where appropriate, trackable over time.	Contact information including addresses and phone numbers, as well as key demographic information such as date of birth, sex, and other information is stored and maintained for reporting purposes and for the provision of care.	S.1.4.0; S.1.4.1; S.1.4.2; I.1.4.4; I.1.4.5	Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	
DC.1.1.3	Manage summary lists	Create and maintain patient-specific summary lists.	Patient summary lists can be created and maintained when appropriate for the patient or a particular care setting.	S.1.4.0; S.1.4.1; S.1.4.2; I.1.4.4; I.1.4.5	Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.1.3.1	Manage problem list	Create and maintain patient-specific problem lists.	A problem list may include, but is not limited to: Chronic conditions, diagnoses, or symptoms, Visit- or stay-specific conditions, diagnoses, or symptoms. Problem lists are managed over time, whether over the course of a visit or stay or the life of a patient, allowing documentation of history information and tracking the changing character of the problem and its priority. All pertinent dates, including date noted, dates of any changes in problem specification or prioritization,		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions	

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	Function Name	Function Statement				
			and date of resolution are stored. The entire problem history for any problem in the list is viewable.			
DC.1.1.3.2	Manage medication list	Create and maintain patient-specific medication lists.	Medication lists are managed over time, whether over the course of a visit or stay, or the lifetime of a patient. All pertinent dates, including medication start, modification, and end dates are stored. The entire medication history for any medication is viewable. Medication lists are not limited to medication orders recorded by providers, but may include patient-reported medications.		Supports delivery of effective healthcare, Improves patient safety	
DC.1.1.3.3	Manage allergy and adverse reaction list	Create and maintain patient-specific allergies and reactions.	Allergens and substances are identified and coded (whenever possible) and the list is managed over time. All pertinent dates, including patient-reported events, are stored and the description of the patient allergy and reaction is modifiable over time. The entire allergy history, including reaction, for any allergen is viewable.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Facilitates self-health management, Improves patient safety	
DC.1.1.4	Manage Patient History	Capture, review, and manage medical, procedural, social, and family history including the capture of pertinent negative histories, patient-reported or externally available patient clinical history.	Patient historical data related to previous medical diagnoses, surgeries and other procedures performed on the patient, and relevant health conditions of family members is captured through such methods as patient reporting (for example interview, medical alert band) or electronic or non-electronic historical data. This data may take the form of a positive or a negative such as: "The patient/family member has had..." or "The patient/family member has not had..." When first seen by a health care provider, patients typically bring with them clinical information from past encounters. This and similar information is captured and presented		Supports delivery of effective healthcare, Facilitates management of chronic conditions	

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	Function Name	Function Statement				
			alongside locally captured documentation and notes wherever appropriate.			
DC.1.1.5	Summarize health record	Present a chronological, filterable, comprehensive review of the patient's entire clinical history, subject to confidentiality constraints.	A key feature of an electronic health record is its ability to present, summarize, filter, and facilitate searching through the large amounts of data collected during the provision of patient care. Much of this data is date or date-range specific and should be presented chronologically. Local confidentiality rules that prohibit certain users from accessing certain patient information must be supported.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.1.6	Manage clinical documents and notes	Create, addend, and authenticate transcribed or directly-entered clinical documentation and notes.	Clinical documents and notes may be created in a narrative form, which may be based on a template. The documents may also be structured documents that result in the capture of coded data. Each of these forms of clinical documentation are important and appropriate for different users and situations.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.1.7	Capture key health data	Capture, manage, and review key health data by a variety of users.	Care-setting dependent data is entered by a variety of caregivers. Details of who entered data and when was captured should be tracked.	DC.3.2.5; S.3.1.4	Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety.	
DC.1.1.7.1	Capture external clinical documents	Incorporate clinical documents and notes from external sources.	Mechanisms for incorporating external clinical documentation, such as image documents, and other clinically relevant data are available. Data incorporated through these mechanisms is presented alongside locally captured documentation and notes wherever appropriate.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Facilitates self-health management, Improves patient safety	
DC.1.1.7.2	Capture patient-originated data	Capture patient-provided and patient-entered clinical data.	Patients may provide data for entry into the health record or be given a mechanism for entering this data		Supports delivery of effective healthcare, Improves efficiency,	

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	Function Name	Function Statement				
			directly. Patient-entered data intended for use by care providers will be available for their use.		Facilitates management of chronic conditions, Facilitates self-health management	
DC.1.2	Care plans, guidelines, and protocols					ISO/TS 18308 Final Draft - Health Informatics - Requirements for an Electronic Health Record Architecture. (care plans); HIMSS Electronic Health Record Definitional Model June 2003 (protocols); ASTM E 1769 Standard Guide for Properties of Electronic Health Records and Record Systems
DC.1.2.1	Present care plans, guidelines, and protocols	Present organizational guidelines for patient care as appropriate to support order entry and clinical documentation.	Care plans, guidelines, and protocols may be site specific or industry-wide standards. They may need to be managed across one or more providers. Tracking of implementation or approval dates, modifications and relevancy to specific domains or context is provided.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.2.2	Manage patient-specific care plans, guidelines, and protocols.	Provide administrative tools for organizations to build guidelines and protocols for use during patient care.	Guidelines or protocols may contain goals or targets for the patient, specific guidance to the providers, suggested orders, and nursing interventions, among other items.	DC.1.2.1	Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.2.3	Manage patient-specific instructions	Generate and record patient-specific instructions related to pre- and post-procedural and post-discharge requirements.	When a patient is scheduled for a test, procedure, or discharge, specific instructions about diet, clothing, transportation assistance, convalescence, follow-up with physician, etc. may be generated and recorded, including the timing relative to the scheduled event.			
DC.1.3	Medication ordering and management					HIMSS Electronic Health Record Definitional Model June 2003

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DC.1.3.1	Order medication	Create prescriptions or other medication orders with detail adequate for correct filling and administration by pharmacy and clinical staff.	Different medication orders require different levels and kinds of detail, as do medication orders placed in different situations. The correct details are recorded for each situation. Administration or patient instructions are available for selection by the ordering clinicians, or the ordering clinician is facilitated in creating such instructions. Appropriate time stamps for all medication related activity is generated.	DC.3.2.3	Supports delivery of effective healthcare, Improves efficiency, Facilitates self-health management, Improves patient safety	
DC.1.3.2	Manage medication formularies	Provide information regarding compliance of medication orders with formularies.	When a clinician places an order for a medication, that order may or may not comply with a formulary specific to the patient's location or insurance coverage. Whether the order complies with the formulary should be communicated to the ordering clinician at an appropriate point to allow the ordering clinician to decide whether to continue with the order. Formulary-compliant alternatives to the medication being ordered may also be presented.		Supports delivery of effective healthcare, Improves efficiency	
DC.1.3.3	Manage medication administration	Present to appropriate clinicians the medications that are to be administered to a patient, under what circumstances, and capture administration details.	In a setting in which medication orders are to be administered by a clinician rather than the patient him or herself, the necessary information is presented including: the list of medication orders that are to be administered; administration instructions, times or other conditions of administration; dose and route, etc. Additionally, the clinician is able to record what actually was or was not administered, whether or not these facts conform to the order. Appropriate time stamps for all medication related activity are generated.		Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	

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DC.1.4	Orders, referrals, and results management					HIMSS Electronic Health Record Definitional Model June 2003
DC.1.4.1	Place generic orders	Capture and track orders based on input from specific care providers.	Orders that request actions or items can be captured and tracked. Examples include orders to transfer a patient between units, to ambulate a patient, for medical supplies, durable medical equipment, home IV, and diet or therapy orders. For each orderable item, the appropriate detail, including order identification and instructions, can be captured. Orders should be communicated to the correct recipient for completion if appropriate.	DC.1.3.1	Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	
DC.1.4.2	Order diagnostic tests	Submit diagnostic test orders based on input from specific care providers.	For each orderable item, the appropriate detail and instructions must be available for the ordering care provider to complete. Orders for diagnostic tests should be transmitted to the correct destination for completion or generate appropriate requisitions for communication to the relevant resulting agencies.		Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	
DC.1.4.3	Manage order sets	Provide order sets based on provider input or system prompt.	Order sets allow a care provider to choose common orders for a particular circumstance or disease state according to best practice or other criteria. Recommend order sets may be presented based on patient data or other contexts.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Improves patient safety	
DC.1.4.4	Manage referrals	Enable the origination, documentation and tracking of referrals between care providers or care settings, including clinical and administrative details of the referral.	Documentation and tracking of a referral from one care provider to another is supported, whether the referred to or referring providers are internal or external to the healthcare organization. Guidelines for whether a particular referral for a particular patient is appropriate in a clinical context and with regard to		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions	

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			administrative factors such as insurance may be provided to the care provider at the time the referral is created.			
DC.1.4.5	Manage results	Route, manage and present current and historical test results to appropriate clinical personnel for review, filtering and comparison.	Results of tests are presented in an easily accessible manner and to the appropriate care providers. Flow sheets, graphs, or other tools allow care providers to view or uncover trends in test data over time. In addition to making results viewable, it is often necessary to send results to appropriate care providers using an electronic messaging systems, pagers, or other mechanism. Results may also be routed to patients electronically or in the form of a letter.		Supports delivery of effective healthcare, Improves efficiency, Facilitates management of chronic conditions, Facilitates self-health management, Improves patient safety	
DC.1.4.6	Order blood products and other biologics	Communicate with appropriate sources or registries to order blood products or other biologics.	Interact with a blood bank system or other source to manage orders for blood products or other biologics. Use of such products in the provision of care is captured. Blood bank or other functionality that may come under federal or other regulation (such as by the FDA in the United States) is not required; functional communication with such a system is.	S.1.1.0	Supports delivery of effective healthcare, Improves efficiency, Improves patient safety	
DC.1.5	Consents and authorizations					American Dental Association Specification No. 1000 for a Standard Clinical Architecture for the Structure and Content of an Electronic Health Record. (consent)
DC.1.5.1	Manage consents and authorizations	Create, maintain, and verify patient treatment decisions in the form of consents and authorizations when required during the ordering process.	Treatment decisions are documented and include the extent of information, verification levels and exposition of treatment options. This documentation helps ensure that decisions made at the discretion of the patient, family, or other responsible party govern the		Facilitates self-health management, Improves patient safety	

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			actual care that is delivered or withheld.			
DC.1.5.2	Manage patient advanced directives	Capture, maintain and provide access to patient advanced directives	Patient advanced directives can be captured as well as the date and circumstances under which the directives were received, and the location of any paper records of advanced directives as appropriate.		Supports delivery of effective healthcare, Facilitates self-health management, Improves patient safety	
DC.2	**Clinical Decision Support**					
DC.2.1	Health information capture and review			D.C. 1.1		
DC.2.1.1	Support for standard assessments	Offer knowledge-based prompts to support the adherence to care plans, guidelines, and protocols at the point of information capture.	When a clinician fills out an assessment, data entered triggers the system to prompt the assessor to consider issues that would help assure a complete/accurate assessment. A simple demographic value or presenting problem (or combination) could provide a template for data gathering that represents best practice in this situation, e.g. Type II diabetic review, fall and 70+, rectal bleeding etc. As another example, to appropriately manage the use of restraints, an online alert is presented defining the requirements for a behavioral health restraint when it is selected.		Supports delivery of effective healthcare, improves patient safety and efficiency, and facilitates management of chronic conditions.	
DC.2.1.2	Support for Patient Context-enabled Assessments	Offer knowledge-based prompts based on patient-specific data at the point of information capture.	When a clinician fills out an assessment, data entered is matched against data already in the system to identify potential linkages. For example, the system could scan the medication list and the knowledge base to see if any of the symptoms are side effects of medication already prescribed. Important but rare diagnoses could be brought to the		Supports delivery of effective healthcare, improves patient safety and efficiency, and facilitates management of chronic conditions	

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			doctor's attention – for instance ectopic pregnancy in a woman of child bearing age who has abdominal pain.			
DC.2.1.3	Support for identification of potential problems and trends	Identify specific problems or trends that may lead to significant problems, which may be based on patient data, providing prompts for consideration at the point of information capture.	When personal health information is collected directly during a patient visit input by the patient, or acquired from an external source (lab results), it is important to be able to identify potential problems and trends that may be patient-specific, given the individual's personal health profile, or changes warranting further assessment. For example: significant trends (lab results, weight); a decrease in creatinine clearance for a patient on metformin, or an abnormal increase in INR for a patient on warfarin.		Supports delivery of effective healthcare, improves patient safety and efficiency, and facilitates management of chronic conditions.	
DC.2.1.4	Patient and family preferences	Capture patient and family preferences at the time of information intake and integrate them into clinical - decision support at all appropriate opportunities.	Decision support functions should permit consideration of patient/family preferences and concerns, such as with language, medication choice, invasive testing, and advanced directives.		Improves patient safety and facilitates self-health management.	Institute of Medicine (IOM). Committee on Health Care in America. Crossing the quality chasm: A new health system for the 21st century. - National Academy Press: Institute of Medicine. 2001. - Laine C, Davidoff F. Patient-centered medicine. A professional - evolution. JAMA 1996 Jan 10;275(2):152-6.
DC.2.2	Care plans, guidelines and protocols			DC 1.2		
DC.2.2.1	Support for condition based care plans, guidelines, protocols					Payne TH. Computer Decision Support Systems. CHEST 2000; 118:47S-52S. - - Hunt DL, Haynes RB, Hanna SE, Smith K. Effects of computer-based clinical decision support systems on physician performance and patient

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	Function Name	Function Statement				
						outcomes: a systematic review. JAMA 1998;280:1339-1346. -
DC.2.2.1.1	Present standard care plans, guidelines, protocols	Identify the appropriate care plans, guidelines and/or protocols for the management of specific conditions.	At the time of the clinical encounter, standard care protocols are presented. These may include site-specific considerations.		Supports delivery of effective healthcare and improves efficiency; supports the management of chronic conditions.	
DC.2.2.1.2	Present context sensitive care plans, guidelines, protocols	Identify the appropriate care plans, guidelines and/or protocols for the management of specific conditions that are adjusted to the patient specific profile.	At the time of the clinical encounter, recommendations for tests, treatments, medications, immunizations, referrals and evaluations are presented based on evaluation of patient specific data, their health profile and any site-specific considerations. These may be modified on the basis of new clinical data at subsequent encounters.		Supports delivery of effective healthcare and improves efficiency.	
DC.2.2.1.3	Capture variances from standard care plans, guidelines, protocols	Identify variances from standard care plans, guidelines, and protocols.	Variances from care plans, guidelines, or protocols are identified and tracked, with alerts, notifications and reports as clinically appropriate.		Supports delivery of effective healthcare and improves efficiency.	
DC.2.2.1.4	Support management of patient groups or populations	Provide support for the management of populations of patients that share diagnoses, problems, demographic characteristics, etc.	Populations or groups of patients that share diagnoses (such as diabetes or hypertension), problems, demographic characteristics, medication orders are identified. The clinician may be notified of eligibility for a particular test, therapy, or follow-up; or results from audits of compliance of these populations with disease management protocols.			
DC.2.2.1.5	Support research protocols	Provide support for the identification of patients for potential enrolment in research protocols and management of patients enrolled in research protocols.	Potential candidates for participation in a research study are identified and the clinician notified of patient eligibility. The clinician is presented with protocol-based care to patients enrolled in research studies.			
DC.2.2.1.6	Support self-care	Provide the patient with decision	Patients with specific conditions need	DC.1.1.7.2;	Supports delivery of	Holman H, Lorig K. Patients as

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	Function Name	Function Statement				
		support for self-management of a condition between patient-provider encounters.	to follow self-management plans that may include schedules for home monitoring, lab tests, and clinical check ups; recommendations about nutrition, physical activity, tobacco use, etc.; and guidance or reminders about medications.	DC.3.2.4	effective healthcare, improves efficiency, supports the management of chronic conditions; and facilitates self-health management.	partners in managing chronic disease. - Partnership is a prerequisite for effective and efficient health care. BMJ - 2000 Feb 26;320(7234):526-7 - Lorig KR, Sobel DS, Stewart AL, Brown BW Jr, Bandura A, Ritter P, Gonzalez VM, Laurent DD, Holman HR. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. Med Care 1999 Jan;37(1):5-14
DC.2.3	Medications and medication management			DC 1.3		
DC.2.3.1	Support for medication ordering					Bates DW et al. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. JAMA 1998;280:1311-1316. - - Bates DW et al. The impact of computerized physician order entry on medication error prevention. JAMIA 1999;6:313-321. - - Raschke RA et al. A computer alert system to prevent injury from adverse drug events. JAMA 1998;280:1317-1320. - - Chertow GM et al. Guided Medication dosing for inpatients with renal insufficiency. JAMA 2001;286:2839-2844. - - Evans RS et al. A computer-assisted management program for antibiotics and other anti-infective agents. NEJM 1998;

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						338:232-238. - - Hunt DL, Haynes RB, Hanna SE, Smith K. Effects of computer-based clinical decision support systems on physician performance and patient outcomes: a systematic review. JAMA 1998;280:1339-1346. - - Mekhjian HS et al. Immediate benefits realized following implementation of physician order entry at an academic medical institution. JAMIA 2002;9:529-539. -
DC.2.3.1.1	Drug, food, allergy interaction checking	Identify drug-drug, drug-allergy and drug-food interaction warnings at the point of medication ordering.	The clinician is alerted to drug-drug, drug-allergy, and drug-food interactions at levels appropriate to the health care entity. These alerts may be customized to suit the user or group.		Improves patient safety and efficiency and supports delivery of effective healthcare.	
DC.2.3.1.2	Patient specific dosing and warnings	Identify drug-condition warnings and present weight/age appropriate dose recommendations	The clinician is alerted to drug-condition interactions and patient specific contraindications and warnings e.g. elite athlete, pregnancy, breast-feeding or occupational risks. The preferences of the patient may also be presented e.g. reluctance to use an antibiotic.			
DC.2.3.1.3	Medication recommendations	Recommend best practice treatment and monitoring on the basis of cost, local formularies or therapeutic guidelines and protocols	Offer alternative treatments on the basis of best practice (e.g. cost or adherence to guidelines), a generic brand, a different dosage, a different drug, or no drug (“watchful waiting”). Suggest lab order monitoring as appropriate.		Improves patient safety and efficiency and supports delivery of effective healthcare.	
DC.2.3.2	Support for medication administration.	Alert providers in real-time to potential administration errors such as wrong patient, wrong drug, wrong dose, wrong route and wrong	To reduce medication errors at the time of administration of a medication, the patient is positively identified; checks on the drug, the		Improves patient safety and efficiency and supports delivery of effective healthcare.	

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		time in support of medication administration management and workflow.	dose, the route and the time are facilitated. Documentation is a by-product of this checking; administration details and additional patient information, such as injection site, vital signs, and pain assessments, are captured. In addition, access to online drug monograph information allows providers to check details about a drug and enhances patient education.			
DC.2.4	Orders, referrals, results and care management					
DC.2.4.1	Support for non-medication ordering	Identify necessary order entry components for non-medication orders that make the order pertinent, relevant and resource conservative at the time of provider order entry; and flag any inappropriate orders based on patient profile. -	Possible order entry components include, but are not limited to: missing results required for the order, suggested corollary orders, notification of duplicate orders, institution-specific order guidelines, guideline-based orders/order sets, order sets, order reference text, patient diagnosis specific recommendations pertaining to the order. Also, warnings for orders that may be inappropriate or contraindicated for specific patients (e.g. X-rays for pregnant women) are presented.		Improves patient safety and efficiency and promotes the delivery of effective healthcare.	Payne TH. Computer Decision Support Systems. CHEST 2000; 118:47S-52S. - - - Stair TO. Reduction of Redundant Laboratory Orders by Access to Computerized Patient Records. Computers in Emergency Medicine 1998;16:895-897. - - Sanders DL, Miller RA. The effects on clinician ordering patterns of a computerized decision support system for neuroradiology imaging studies. Proc AMIA Symp 2001;:583-587. - - Hunt DL, Haynes RB, Hanna SE, Smith K. Effects of computer-based clinical decision support systems on physician performance and patient outcomes: a systematic review. JAMA 1998;280:1339-1346. - - Chin HL, Wallace P. Embedding guidelines into direct physician order entry: simple methods, powerful results. Proc AMIA Symp

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	Function Name	Function Statement				
						1999:;221-225.
DC.2.4.2	Support for result interpretation	Evaluate results and notify provider of results within the context of the patient's clinical data.	Possible result interpretations include, but are not limited to: abnormal result evaluation/notification, trending of results (such as discrete lab values), evaluation of pertinent results at the time of provider order entry (such as evaluation of lab results at the time of ordering a radiology exam), evaluation of incoming results against active medication orders.		Improves patient safety, efficiency, and supports the delivery of effective healthcare.	Poom EG, Kuperman GJ, Fiskio J, Bates DW. Real-time notification of laboratory data requested by users through alphanumeric pagers. JAMIA 2002;9:217-222. - - Kuperman GL et al. Improving response to critical laboratory results with automation. JAMIA 1999;6:512-522. - - Bates DW et al. Reducing the frequency of errors in medicine using information technology. JAMIA 2001;8(4):299-308. - -
DC.2.4.3	Support for referrals			DC 1.4		
DC.2.4.3.1	Support for referrals	Evaluate referrals within the context of a patient's clinical data.	When a healthcare referral is made, pertinent health information, including pertinent results, demographic and insurance data elements (or lack thereof) are presented to the provider. Protocols for appropriate workup prior to referral may be presented.		Supports delivery of effective healthcare, improves efficiency, and facilitates management of chronic conditions.	
DC.2.4.3.2	Support for referral recommendations	Evaluate patient data and suggest appropriate referrals.	Entry of specific patient conditions may lead to recommendations for referral e.g. for smoking cessation counseling if the patient is prescribed a medication to support cessation.		Supports delivery of effective healthcare, improves efficiency, and facilitates management of chronic conditions.	
DC.2.4.4	Support for Care Delivery					
DC.2.4.4.1	Support for safe blood administration	Alert providers in real-time to potential blood administration errors such as wrong blood, wrong cross match, wrong source, wrong date and time, and wrong patient.	To reduce blood administration errors at the time of administration of blood products, the patient is positively identified and checks on the blood product, the amount, the route and the time are facilitated. Documentation is a by-product of this checking.		Supports delivery of effective healthcare and improves patient safety and efficiency	

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DC.2.4.4.2	Support for accurate specimen collection	Alert providers in real-time to potential specimen collection errors, such as wrong patient, wrong specimen type, wrong collection means, and wrong date and time.	To ensure the accuracy of specimen collection, when a provider obtains specimens from a patient, the clinician can match each specimen collection identifier and the patient's ID bracelet. The provider is notified in real-time of potential collection errors such as wrong patient, wrong specimen type, wrong means of collection, wrong site, and wrong date and time. Documentation of the collection is a by-product of this checking.		Supports delivery of effective healthcare and improves patient safety and efficiency	
DC.2.5	Support for Health Maintenance: Preventive Care and Wellness					
DC.2.5.1	Alerts preventive services and wellness	Identify patient specific suggestions/reminders, screening tests/exams, and other preventive services in support of routine preventive and wellness patient care standards.	At the time of an encounter, the provider or patient is presented with due or overdue activities based on protocols for preventive care and wellness. Examples include but are not limited to, routine immunizations (adult and well baby care), age and sex appropriate screening exams (such as PAP smears).		Supports the delivery of effective healthcare and improves efficiency.	U.S. Preventive Services Task Force. http://www.ahrq.gov/clinic/uspstfix.htm - - Reference: Hunt DL, et. al. Effects of Computer-based Clinical Decision Support on Physician Performance and Patient Outcomes. JAMA.1998:280;1339-1346.
DC.2.5.2	Notifications for preventive services and wellness	Notify the patient and/or appropriate provider of those preventive services, tests, behavioral actions that are due or overdue between patient-provider encounters.	The provider can generate notifications to patients regarding activities that are due or overdue and these communications can be captured. Examples include but are not limited to time sensitive patient and provider notification of: follow-up appointments, laboratory tests, immunizations or examinations. The notifications can be customized in terms of timing, repetitions and administration reports. E.g. a Pap test reminder might be sent to the patient a 2 months prior to the test being due, repeated at 3 month intervals, and		Supports the delivery of effective healthcare, improves efficiency; and facilitates self-health management.	U.S. Preventive Services Task Force. http://www.ahrq.gov/clinic/uspstfix.htm - Reference: Hunt DL, et. al. Effects of Computer-based Clinical Decision Support on Physician Performance and Patient Outcomes. JAMA.1998:280;1339-1346. - -

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			then reported to the administrator or clinician when 9 months overdue.			
DC.2.6	Support for population health					
DC.2.6.1	Support for clinical health state monitoring within a population.	Support clinical health state monitoring of aggregate patient data for use in identifying health risks from the environment and/or population.	Standardized surveillance performance measures that are based on known patterns of disease presentation can be identified by aggregating data from multiple input mechanisms. For example, elements include, but are not limited to patient demographics, resource utilization, presenting symptoms, acute treatment regimens, laboratory and imaging study orders and results and genomic and proteomic data elements. Identification of known patterns of existing diseases involves aggregation and analysis of these data elements by existing relationships. However, the identification of new patterns of disease requires more sophisticated pattern recognition analysis. Early recognition of new patterns requires data points available early in the disease presentation. Demographics, ordering patterns and resource use (e.g., ventilator or intensive care utilization pattern changes) are often available earlier in the presentation of non-predictable diseases. Consumer-generated information is also valuable with respect to surveillance efforts.		Supports the delivery of effective healthcare and improves efficiency.	
DC.2.6.2	Support for notification and response	Upon notification by an external, authoritative source of a health risk within the cared for population, alert relevant providers regarding specific potentially at-risk patients with the appropriate level of notification.	Upon receipt of notice of a health risk within a cared-for population from public health authorities or other external authoritative sources, identify and notify individual care providers or care managers that a risk has been identified and requires attention		Supports the delivery of effective healthcare and improves efficiency.	

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			including suggestions on the appropriate course of action. This process gives a care provider the ability to influence how patients are notified, if necessary.			
DC.2.6.3	Support for monitoring and appropriate notifications regarding an individual patient's health	In the event of a health risk alert and subsequent notification related to a specific patient, monitor if expected actions have been taken, and execute follow-up notification if they have not.	Identifies that expected follow-up for a specific patient event (e.g., follow up to error alerts or absence of an expected lab result) has not occurred and communicate the omission to appropriate care providers in the chain of authority. Of great importance to the notification process is the ability to match a care provider's clinical privileges with the clinical requirements of the notification.	S.3.4.1	Supports the delivery of effective healthcare and improves patient safety and efficiency.	
DC.2.7	Support for knowledge access					
DC.2.7.1	Access clinical guidance	Provide relevant evidence-based information and knowledge to the point of care for use in clinical decisions and care planning	Examples include but are not limited to: evidence on treatment of conditions and wellness, as well as context-specific links to other knowledge resources. For example, when a condition is diagnosed provider is directed to relevant online evidence for management.		Supports the delivery of effective healthcare, improves patient safety and efficiency, and facilitates management of chronic conditions.	See also S.3.7.1, S.3.7.3
DC.2.7.2	Patient knowledge access	Enable the accessibility of reliable information about wellness, disease management, treatments, and related information that is relevant for a specific patient.	An individual will be able to find reliable information to answer a health question, follow up from a clinical visit, identify treatment options, or other health information needs. The information may be linked directly from entries in the health record, or may be accessed through other means such as key word searching.	DC.3.2.4; S.3.7.2	Facilitates self-health management and supports the delivery of effective healthcare.	U.S. Department of Health and Human Services, Healthy People 2010, Health Communication Focus Area. (USDHHS 2000) http://www.healthypeople.gov/document/HTML/Volume1/11HealthCom.htm - ; Science Panel on Interactive Communication and Health. Wired for Health and Well-Being: the Emergence of Interactive Health Communication. Washington,

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						DC: US Department of Health and Human Services, US Government Printing Office, April 1999 . http://www.health.gov/scipich/pubs/finalreport.htm
DC.3	**Operations Management and Communication**					
DC.3.1	Clinical workflow tasking	Schedule and manage clinical tasks with appropriate timeliness.	Since the electronic health record will replace the paper chart, tasks that were based on the paper artifact must be effectively managed in the electronic environment. Functions must exist in the EHRS that support electronically any workflow that previously depended on the existence of a physical artifact (such as the paper chart, a phone message slip) in a paper based system. Tasks differ from other more generic communication among participants in the care process because they are a call to action and target completion of a specific workflow in the context of a patient's health record (including a specific component of the record). Tasks also require disposition (final resolution). The initiator may optionally require a response. For example, in a paper based system, physically placing charts in piles for review creates a physical queue of tasks related to those charts. This queue of tasks (for example, a set of patient phone calls to be returned) must be supported electronically so that the list (of patients to be called) is visible to the appropriate user or role for			

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			disposition. Tasks are time-limited (or finite). The state transition (e.g. created, performed and resolved) may be managed by the user explicitly or automatically based on rules. For example, if a user has a task to signoff on a test result, that task should automatically be marked complete by the EHR when the test result linked to the task is signed in the system. Patients will become more involved in the care process by receiving tasks related to their care. Examples of patient related tasks include acknowledgement of receipt of a test result forwarded from the provider, or a request to schedule an appointment for a pap smear (based on age and frequency criteria) generated automatically by the EHRS on behalf of the provider.			
DC.3.1.1	Clinical task assignment and routing	Assignment, delegation and/or transmission of tasks to the appropriate parties.	Tasks are at all times assigned to at least one user or role for disposition. Whether the task is assignable and to whom the task can be assigned will be determined by the specific needs of practitioners in a care setting. Task-assignment lists help users prioritize and complete assigned tasks. For example, after receiving a phone call from a patient, the triage nurse routes or assigns a task to return the patient's call to the physician who is on call. Task creation and assignment may be automated, where appropriate. An example of a system-triggered task is when lab results are received electronically; a task to review the result is automatically generated and assigned to a clinician. Task assignment ensures that all tasks are		Support delivery of effective healthcare; patient safety; improve efficiency	

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			disposed of by the appropriate person or role and allows efficient interaction of entities in the care process.			
DC.3.1.2	Clinical task linking	Linkage of tasks to patients and/or a relevant part of the electronic health record.	Clinical tasks are linked to a patient or to a component of a patient's medical record. An example of a well defined task is "Dr. Jones must review Mr. Smith's blood work results." Efficient workflow is facilitated by navigating to the appropriate area of the record to ensure that the appropriate test result for the correct patient is reviewed. Other examples of tasks might involve fulfillment of orders or responding to patient phone calls.		Support delivery of effective healthcare; improve patient safety; improve efficiency	
DC.3.1.3	Clinical task tracking	Track tasks to guarantee that each task is carried out and completed appropriately.	In order to reduce the risk of errors during the care process due to missed tasks, the provider is able to view and track un-disposed tasks, current work lists, the status of each task, unassigned tasks or other tasks where a risk of omission exists. For example, a provider is able to create a report to show test results that have not been reviewed by the ordering provider based on an interval appropriate to the care setting.		Support delivery of effective healthcare; patient safety;	
DC.3.1.3.1	Clinical task timeliness tracking	Track and/or report on timeliness of task completion.	Capability to track and review reports on the timeliness of certain tasks in accordance with relevant law and accreditation standards.		Support delivery of effective healthcare; patient safety	
DC.3.2	Clinical communication		Healthcare requires secure communications among various participants: patients, doctors, nurses, chronic disease care managers, pharmacies, laboratories, payers, consultants, etc. An effective EHRS supports communication across all relevant participants, reduces the			

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			overhead and costs of healthcare-related communications, and provides automatic tracking and reporting. The list of communication participants is determined by the care setting and may change over time. Because of concerns about scalability of the specification over time, communication participants for all care settings or across care settings are not enumerated here because it would limit the possibilities available to each care setting and implementation. However, communication between providers and between patients and providers will be supported in all appropriate care settings and across care settings. Implementation of the EHRS enables new and more effective channels of communication, significantly improving efficiency and patient care. The communication functions of the EHRS will eventually change the way participants collaborate and distribute the work of patient care.			
DC.3.2.1	Inter-provider communication	Support secure electronic communication (inbound and outbound) between providers to trigger or respond to pertinent actions in the care process, document non-electronic communication (such as phone calls, correspondence or other encounters) and generate paper message artifacts where appropriate.	Communication among providers involved in the care process can range from real time communication (for example, fulfillment of an injection while the patient is in the exam room), to asynchronous communication (for example, consult reports between physicians). Some forms of inter-practitioner communication will be paper based and the EHRS must be able to produce appropriate documents.		Support delivery of effective healthcare; patient safety; management of chronic conditions; improve efficiency;	
DC.3.2.2	Pharmacy communication	Provide features to enable secure bidirectional communication of	When a medication is prescribed, the prescription is routed electronically to		Support delivery of effective healthcare;	

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		information electronically between practitioners and pharmacies.	the pharmacy. This information is used to avoid transcription errors and facilitate detection of potential adverse reactions. Upon filling the prescription, information is sent back to the practitioner to indicate that the patient received the medication. If there is a question from the pharmacy, that communication can be presented to the provider with their other tasks.		improve efficiency; management of chronic conditions	
DC.3.2.3	Provider and patient or family communication	Trigger or respond to electronic communication (inbound and outbound) between providers and patients or patient representatives with pertinent actions in the care process.	The clinician is able to communicate with patients and others, capturing the nature and content of electronic communication, or the time and details of other communication. For example: when test results arrive, the clinician may wish to email the patient that test result was normal (details of this communication are captured); a patient may wish to request a refill of medication by emailing the physician; patients with asthma may wish to communicate their peak flow logs/diaries to their provider; or a hospital may wish to communicate with selected patients about a new smoking cessation program.		Support delivery of effective healthcare; management of chronic conditions; improve efficiency; facilitate self health management	
DC.3.2.4	Patient, family and care giver education	Identify and make available electronically or in print any educational or support resources for patients, families, and caregivers that are most pertinent for a given health concern, condition, or diagnosis and which are appropriate for the person (s).	The provider or patient is presented with a library of educational materials and where appropriate, given the opportunity to document patient/caregiver comprehension. The materials can be printed or electronically communicated to the patient.		Support delivery of effective healthcare; management of chronic conditions; improve efficiency; facilitate self health management	
DC.3.2.5	Communication with medical devices	Support communication and presentation of data captured from medical devices.	Communication with medical devices is supported as appropriate to the care setting. Examples include: vital signs/pulse-oximeter, anesthesia machines, home diagnostic devices		Support delivery of effective healthcare; Management of chronic conditions Improve efficiency	

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			for chronic disease management, laboratory machines, bar coded artifacts (medicine, immunizations, demographics, history, and identification).			
S.1	**Clinical Support**					
S.1.1	Notifiable Registries	Enable the automated transfer of formatted demographic and clinical information to and from local disease specific registries (and other notifiable registries) for patient monitoring and subsequent epidemiological analysis.	The user can export personal health information to disease specific registries, other notifiable registries, and add new registries through the addition of standard data transfer protocols or messages.	I.2.4 I.4.7	1. Support delivery of effective healthcare - 2. Improve patient safety - 3. Facilitate management of chronic conditions	Disease specific registries are exemplified by the long-standing cancer registry system that exists in each state and supported by institution-based tumor registries in many health care institutions. See http://www.cdc.gov/cancer/npcr/index.htm for more information.
S.1.2	Donor management support	Provide capability to capture or receive, and share needed information on potential organ and blood donors and recipients.	The user is able to capture or receive information on potential organ and blood donors and recipients. The user can make this information available to internal and external donor matching agencies.	I.2.4; I.4.7	2. Improve patient safety - 4. Improve efficiency	Organ donor transplant management is a complex interaction of many coordinated bodies that extends beyond the institutions involved in organ harvesting and transplantation. This system is described at http://www.optn.org/about/transplantation/matchingProcess.asp.
S.1.3	Provider directory	Provide a current directory of provider information in accordance with relevant laws, regulations, and conventions.	Maintain or access current directory of provider information in accordance with relevant laws, regulations, and conventions, including full name, address or physical location, and a 24x7 telecommunications address (e.g. phone or pager access number) for the purposes of the following functions	I.1.3; I.4	1. Support delivery of effective healthcare - 4. Improve efficiency	Unique identification of providers along with appropriate demographics is already being done in healthcare and will form an essential component of the National Provider Identifier in the US under HIPAA (http://aspe.hhs.gov/admnsimp/nprm/npinprm.pdf). Role based access to systems is an essential component of any security system. An example of role

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						based access as it applies to the EHR by the Open Architecture for Secure Internetworking Services (OASIS) may be found at(http://www.cl.cam.ac.uk/~km/MW2001-talk.pdf). OASIS is a not-for-profit global consortium that drives the development, convergence and adoption of e-business standards (http://www.cl.cam.ac.uk/~km/MW2001-talk.pdf). - While current provider location is a convenience item that relates mostly to customer satisfaction it elevates to a level of vital importance when com-municating critical test results (http://www.macoalition.org/documents/CTRPractices.pdf)
S.1.3.1	Provider demographics	Provide a current directory of practitioners that, in addition to demographic information, contains data needed to determine levels of access required by the EHR security system.				
S.1.3.2	Provider's location within facility	Provide provider location or contact information on a facility's premises.				
S.1.3.3	Provider's on call location	Provide provider location or contact information when on call.				
S.1.3.4	Provider's general location	Provide locations or contact information at which the provider practices, in order to direct patients or queries.				
S.1.4	Patient directory	Provide a current directory of patient information in accordance with relevant privacy and other applicable laws, regulations, and	Provide a current directory of patient information in accordance with relevant privacy and other applicable laws, regulations, and conventions,	DC.1.1.1; I.1.4	1. Support delivery of effective healthcare - 2. Improve patient safety - 3. Facilitate	Patient location is an essential part of the patient record, which, by IOM definition in their 1991 report forms the basis of an

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		conventions.	including, when available, full name, address or physical location, alternate contact person, primary phone number, and relevant health status information for the purposes of the following functions.		management of chronic conditions - 4. Improve efficiency - 5. Facilitate self-health management	EHR (http://books.nap.edu/books/0309055326/html/index.html).
S.1.4.1	Patient demographics	Maintain, archive and update demographic information in accordance with realm-specific recordkeeping requirements.	The minimum demographic data set must include the data required by realm-specific laws governing health care transactions and reporting. This may also include data input of death status information.	S.1.4; I.1.5.1; S.3.7.3		Patient demographics is an essential part of the patient record, which, by IOM definition in their 1991 report that forms the basis of an EHR (http://books.nap.edu/books/0309055326/html/index.html).
S.1.4.2	Patient's location within a facility	Provide the patient's location information within a facility's premises.	Example: The patient census in a hospital setting			
S.1.4.3	Patient's residence related to the provision and administration of services	Provide the patient's residence information solely for purposes related to the provision and administration of services to the patient, patient transport, and as required for public health reporting.				Personal health information disclosure is required for pubic health purposes, see http://www.cdc.gov/mmwr/preview/mmwrhtml/su5201a1.htm. -
S.1.4.4	Optimize patient bed assignment	Enable interaction with a bed management system to ensure that the patient's bed assignments within the facility optimize care and minimize risks e.g. of exposure to contagious patients.		S.1.7		Information on the recommended isolation of patients with certain infectious diseases may be found at http://www.cdc.gov/ncidod/sars/isolationquarantine.htm with a current list of possible infectious agents at http://www.cdc.gov/ncidod/sars/executiveorder040403.htm. - Information on an instructional role in emergency situations has been developed by JCAHO and maybe found at http://www.jcaho.org/about+us/public+policy+initiatives/emergency+preparedness.pdf.

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S.1.5	De-identified data request management	Provide patient data in a manner that meets local requirements for de-identification.	When an internal or external party requests patient data and that party requests de-identified data (or is not entitled to identify patient information, either by law or custom), the user can export the data in a fashion that meets local requirements for de-identification. An audit trail of these requests and exports is maintained. For internal clinical audit, a re-identification key may be added to the data.	I.1.8; I.3; I.6.1		Deidentification of data requires removing patient demographic information to the point that the individual patient can not be identified. Actual requirements for deidentification will vary based on location and specific need. In the US regulations for that are viewed as acceptable for complete deidentification can be found at http://privacyruleandresearch.nih.gov/pr_08.asp#8a.
S.1.6	Scheduling	Provide the necessary data to a scheduling system for optimal efficiency in the scheduling of patient care, for either the patient or a resource/device.	The system user can schedule events as required. Relevant clinical or demographic information can be linked to the task.	DC.3.1; DC.3.2.1; I.2.3; I.4.1; I.7	1. Support delivery of effective healthcare - 2. Improve patient safety - 3. Facilitate management of chronic conditions - 4. Improve efficiency	IOM Rpt, page 10, "Electronic scheduling systems for admissions, procedures and visits not only increase efficiency, but also provide better service to patients (Everett, 2002; Hancock and Walter, 1986; Woods, 2001) - http://www.iom.edu/report.asp?id=14391
S.1.7	Healthcare resource availability	Support the distribution of local healthcare resource information in times of local or national emergencies.	In times of identified local or national emergencies and upon request from authorized bodies, provide current status of healthcare resources including, but not limited to, available beds, providers, support personal, ancillary care areas and devices, operating theaters, medical supplies, vaccines, and pharmaceuticals. The intent is for the authorized body to distribute either resources or patient load to maximize efficient healthcare delivery.	S.1.4.4; I.1.6; I.5.1	1. Support delivery of effective healthcare - 2. Improve patient safety - 4. Improve efficiency	The Public Health response to biological and chemical terrorism: interim planning guidance for state public health officials. http://www.bt.cdc.gov/Documents/Planning/PlanningGuidance.PDF -

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S.2	**Measurement, Analysis, Research and Reports**					
S.2.1	Measurement, monitoring, and analysis	Support measurement and monitoring of care for relevant purposes.		DC.2.6.1; I.2.4	1. Support Delivery of Effective Healthcare - 2 Improve Patient Safety - 3 Facilitate management of chronic conditions - 4 Improve efficiency	AHIMA Practice Brief: Data Quality Management Model: http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_000066.html
S.2.1.1	Outcome Measures	Support the capture and reporting of information for the analysis of outcomes of care provided to populations, in facilities, by providers, and in communities.		S.3.6.2		
S.2.1.2	Performance and accountability measures	Support the capture and reporting of quality, performance, and accountability measures to which providers/facilities/delivery systems/communities are held accountable including measures related to process, outcomes, and/or costs of care – may be used in 'pay for performance' monitoring and adherence to best practice guidelines.		DC.2.6.3; DC.2.6.2; S.3.6		
S.2.2	Report generation	Provide report generation features for the generation of standard and ad hoc reports.	A user can create standard and ad hoc reports for clinical, administrative, and financial decision-making, and for patient use - including structured data and/or unstructured text from the patient's health record. Reports may be linked with financial and other external data sources (i.e. data external to the entity).; Such reports may include patient-level reports, provider/facility/delivery system-level reports, population-level reports, and reports to public health agencies.	DC.2.6.3; S.3.6	1. Support Delivery of Effective Healthcare - 2 Improve Patient Safety - 3 Facilitate management of chronic conditions - 4 Improve efficiency - 5 Facilitate self-health management	"Claims and encounter data are used to monitor and improve outcomes for numerous preventive services, including prenatal care, childhood immunization, and cancer screenings." p. 8 - Promoting Prevention Through Information Technology: - Assessment of Information Technology in Association of Health Center Affiliated Health Plans http://www.ahcahp.org/publicati

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			Examples of patient-level reports include: administratively required patient assessment forms, admission/transfer/discharge reports, operative and procedure reports, consultation reports, and drug profiles. Examples of population-level reports include: reports on the effectiveness of clinical pathways and other evidence-based practices, tracking completeness of clinical documentation, etcetera. Examples of reports to public health agencies include: vital statistics, reportable diseases, discharge summaries, immunization data including adverse outcomes, cancer data, and other such data necessary to maintain the publics' health (including suspicion of newly emerging infectious disease and non-natural events).			ons/Working%20Papers/Final%20Report%20from%202003%20AHCAHP%20IT%20Assessment.pdf -
S.2.2.1	Health record output	Enable system user to define the records and/or reports that are considered the formal health record for disclosure purposes, and provide a mechanism for both chronological and specified record element output.	Provide hardcopy and electronic output that can fully chronicles the healthcare process, supports selection of specific sections of the health record, and allows healthcare organizations to define the report and/or documents that will comprise the formal health record for disclosure purposes.	I.2.4; DC.1.15	1. Support Delivery of Effective Healthcare - 3 Facilitate management of chronic conditions - 4 Improve efficiency	
S.3	**Administrative and Financial**					
S.3.1	Encounter/Episode of	Manage and document the health	Using data standards and technologies		1. Support Delivery of	AHIMA Practice Brief:

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	care management	care needed and delivered during an episode of care.	that support interoperability, encounter management promotes patient-centered/oriented care and enables real time, immediate point of service, point of care by facilitating efficient work flow and operations performance to ensure the integrity of (1) the health record, (2) public health, financial and administrative reporting, and (3) the healthcare delivery process.; This support is necessary for direct care functionality that relies on providing user interaction and workflows, which are configured according to clinical protocols and business rules based on encounter specific values such as care setting, encounter type (inpatient, outpatient, home health, etc), provider type, patient's EHR, health status, demographics, and the initial purpose of the encounter.		Effective Healthcare - 2 Improve Patient Safety - 3 Facilitate management of chronic conditions - 4 Improve efficiency - 5 Facilitate self-health management	Definition of the Health Record for Legal Purposes: http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_009223.html
S.3.1.1	Specialized views	Present specialized views based on the encounter-specific values, clinical protocols and business rules	The system user is presented with a presentation view and system interaction appropriate to the context with capture of encounter-specific values, clinical protocols and business rules. This “user view” may be configurable by the user or system technicians. As an example, a mobile home health care worker using wireless laptop at the patient's home would be presented with a home health care specific workflow synchronized to the current patient's care plan and tailored to support the interventions appropriate for this patient, including chronic disease management protocols.	DC.2.2.1.2;		Remarks by Tommy G. Thompson, Secretary of HHS, NHII Conference 7/1/03: "Why is it that retailers such as L.L. Bean have been able to personalize my shopping experience and yours - automatically providing the correct sizes and suggestions of other items based on what I bought last year - but my doctor and pharmacist cannot quickly refer to a list of my prescriptions or see when I had my last physical?"(http://www.hhs.gov/news/speech/2003/030701.html) Key Capabilities of an Electronic Health Record

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						System, p. 9 (http://www.iom.edu/report.asp?id=14391) Standards Insight - An Analysis of Health Information - Standards Development Initiatives - July 2003(http://www.himss.org/content/files/StandardsInsight/2003/07-2003.pdf)
S.3.1.2	Encounter specific functionality	Provide assistance in assembling appropriate data, supporting data collection and processing output from the encounter.	Workflows, based on the encounter management settings, will assist in determining the appropriate data collection, import, export, extraction, linkages and transformation. As an example, a pediatrician is presented with diagnostic and procedure codes specific to pediatrics. Business rules enable automatic collection of necessary data from the patient's health record and patient registry. As the provider enters data, workflow processes are triggered to populate appropriate transactions and documents. For example, data entry might populate an eligibility verification transaction or query the immunization registry.			The CPR in Eleven Paperless Physicians' Offices; http://www.himss.org/content/files/proceedings/slides/sessions/ses048s.pdf; http://www.himss.org/content/files/proceedings/2000/sessions/ses048.pdf -
S.3.1.3	Automatic generation of administrative and financial data from clinical record	Derive administrative or financial data from the patient's clinical data and include this in administrative and financial reports.	A user can generate a bill based on health record data. Maximizing the extent to which administrative and financial data can be derived or developed from clinical data will lessen provider reporting burdens and the time it takes to complete administrative and financial processes such as claim reimbursement. This may be implemented by mapping of clinical terminologies in use to administrative and financial terminologies.	S.3.2.2		Paperless Success: The Value of E-Medical Records - http://www.himss.org/content/files/proceedings/2001/sessions/ses045.pdf - http://www.himss.org/content/files/proceedings/2001/sessions/ses081.pdf - - "Having clinical data represented with a standardized terminology and in a machine-readable format would reduce the significant data collection burden at the

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						provider level, as well as the associated costs, and would likely increase the accuracy of the data reported ." IOM Key Capabilities of an Electronic Health Record System , pg 14 (http://www.iom.edu/report.asp?id=14391) - - "1. Real-time status reports linking performance measures with health outcomes. 2. Rapid adjustments for problem resolution. 3. Community awareness of their local health institutions quality of care." Reference, *Improving Health in the Community*. IOM, NAS. -
S.3.1.4	Support remote healthcare services	Support remote health care services such as telehealth and remote device monitoring by integrating records and data collected by these means into the patient's EHR for care management, billing and public health reporting purposes.	Enables remote treatment of patients using monitoring devices, and two way communications between provider and patient or provider and provider. - Promotes patient empowerment, self-determination and ability to maintain health status in the community. Promotes personal health, wellness and preventive care. For example, a diabetic pregnant Mom can self-monitor her condition from her home and use web TV to report to her provider. The same TV-internet connectivity allows her to get dietary and other health promoting information to assist her with managing her high-risk pregnancy.	DC.3.2.1; DC.3.2.3; DC.3.2.5; DC.1.1.7.2		Recent examples of: device monitoring (http://www.hi-europe.info/files/2003/9974.htm); remote monitoring(http://www.devicelink.com/mddi/archive/03/06/012.html); and telehealth (http://www.mcg.edu/Telemedicine/Index.html) - -
S.3.2	Information access for supplemental use	Support extraction, transformation and linkage of information from structured data and unstructured text in the patient's health record for care management, financial, administrative, and public health	Using data standards and technologies that support interoperability, information access functionalities serve primary and secondary record use and reporting with continuous record availability and access that		1. Support delivery of effective healthcare - 2. Improve patient safety - 3. Facilitate management of chronic conditions - 4. Improve	AHIMA Practice Brief: Definition of the Health Record for Legal Purposes: http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_009223.html - - IOM

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		purposes.	ensure the integrity of (1) the health record, (2) public health, financial and administrative reporting, and (3) the healthcare delivery process.		efficiency	Key Capabilities of an Electronic Health Record System, p.14 - http://www.iom.edu/report.asp?id=14391
S.3.2.1	Rules-driven clinical coding assistance	Make available all pertinent patient information needed to support coding of diagnoses, procedures and outcomes.	The user is assisted in coding information for clinical reporting reasons. For example, a professional coder may have to code the principle diagnosis in the current, applicable ICD as a basis for hospital funding. All diagnoses during the episode may be presented to the coder, as well as the applicable ICD hierarchy containing these codes.	I.7		Remarks by Tommy G. Thompson, Secretary of HHS, NHII Conference 7/1/03: We need a health information system that automatically gives health professionals access to the patient-specific medical knowledge required for diagnosis and treatment - the latest research results from medical journals, the most up-to-date guidelines, the appropriate public health notifications. Our doctors then will not have to depend on their great memories any more. - http://www.hhs.gov/news/speech/2003/030701.html -
S.3.2.2	Rules-driven financial and administrative coding assistance	Provide financial and administrative coding assistance based on the structured data and unstructured text available in the encounter documentation.	The user is assisted in coding information for billing or administrative reasons. For example, the HIPAA 837 Professional claim requires the date of the last menstrual cycle for claims involving pregnancy. To support the generation of this transaction, the clinician would need to be prompted to enter this date when the patient is first determined to be pregnant, then making this information available for the billing process.	I.7; S.3.1.3		NHII03 Standards and Vocabulary Groups A&B: http://aspe.hhs.gov/sp/nhii/Conference03/StandardsVocabA.ppt, http://aspe.hhs.gov/sp/nhii/Conference03/StandardsVocabB.PPT
S.3.2.3	Integrate cost/financial information	Enable the use of cost management information required to guide users and workflows.	The provider is alerted or presented with the most cost-effective services, referrals, devices etc. to recommend to the patient. This may be tailored to			Medical Informatics for Better and Safer Health Care. http://www.ahrq.gov/data/informatics/informatria.pdf

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			the patient's health insurance/plan coverage rules. Medications may be presented in order of cost, or the cost of specific investigations may be presented at the time of ordering.			
S.3.3	Administrative transaction processing	Support the creation (including using external data sources, if necessary), electronic interchange, and processing of transactions listed below that may be necessary for encounter management during an episode of care	Support the creation (including using external data sources, if necessary), electronic interchange, and processing of transactions listed below that may be necessary for encounter management during an episode of care. - - The EHR system shall capture the patient health-related information needed for administrative and financial purposes including reimbursement. - - Captures the episode and encounter information to pass to administrative or financial processes (e.g. triggers transmissions of charge transactions as by-product of on-line interaction including order entry, order statusing, result entry, documentation entry, medication administration charting.) - - Automatically retrieves information needed to verify coverage and medical necessity. - As a byproduct of care delivery and documentation, captures and presents all patient information needed to support coding. Ideally performs coding based on documentation. - - Clinically automated revenue cycle - examples of reduced denials and error rates in claims. - - Clinical information needed for billing is available on the date of service. - - Physician and clinical teams do not perform additional data entry / tasks exclusively to support administrative or financial processes.	DC.1.3	1. Support Delivery of Effective Healthcare - - 4. Improve efficiency -	IOM Key Capabilities of an Electronic Health Record System: "Use of communication and content standards is equally important in the billing and claims management area - close coupling of authorization and prior approvals can, in some cases, eliminate delays and confusion. Additionally, immediate validation of insurance eligibility will add value for both providers and patients through improved access to services, more timely payments and less paperwork. "http://www.iom.edu/report.asp?id=14391 - HIMSS Electronic Health Record Definitional Model - Version 1.0 - - AHIMA Practice Brief: Definition of the Health Record for Legal Purposes: http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_009223.html - - AHIMA Practice Brief: Health Informatics Standards and Information Transfer: Exploring the HIM Role: http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_000024.html - - AHIMA Practice Brief: Defining the Designated Record Set:

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						http://library.ahima.org/xpedio/groups/public/documents/ahima/pub_bok1_017122.html -
S.3.3.1	Enrollment of patients	Support interactions with other systems, applications, and modules to enable enrollment of uninsured patients into subsidized and unsubsidized health plans, and enrollment of patients who are eligible on the basis of health and/of financial status in social service and other programs, including clinical trials;	Expedites determination of health insurance coverage, thereby increasing patient access to care. The provider may be alerted that uninsured patients may be eligible for subsidized health insurance or other health programs because they meet eligibility criteria based on demographics and/or health status. For example: a provider is notified that the uninsured parents of a child enrolled in S-CHIP may now be eligible for a new subsidized health insurance program; a provider of a pregnant patient who has recently immigrated is presented with information about eligibility for subsidy. Links may be provided to online enrollment forms. When enrollment is determined, the health coverage information needed for processing administrative and financial documentation, reports or transactions is captured.			Enrolling and Retaining Low Income families http://cms.hhs.gov/schip/outreach/progress.pdf - To a Streamlined Approach to - Public Health Insurance Enrollment - http://www.healtheapp.org/ -
S.3.3.2	Eligibility verification and determination of coverage	Support eligibility verification for health insurance and special programs, including verification of benefits and pre-determination of coverage;	Automatically retrieves information needed to support verification of coverage at the appropriate juncture in the encounter workflow. Improves patient access to covered care and reduces claim denials. When eligibility is verified, the EHRS would capture eligibility information needed for processing administrative and financial documentation, reports or transactions - updating or flagging any inconsistent data. In addition to health insurance eligibility, this function would support verification of			Immunization registries are having continual success in increasing vaccination rates of children (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5001a2.htm). - - Electronic determination of insurance coverage is a required HIPAA transaction in the US. See the 270/271 Implementation Guide available at http://www.wpc-edi.com/hipaa/HIPAA_40.asp. - -

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			registration in programs and registries, such as chronic care case management and immunization registries. An EHRS would likely verify health insurance eligibility prior to the encounter, but would verify registration in case management or immunization registries during the encounter.			
S.3.3.3	Service authorizations	Support the creation of requests, responses and appeals related to service authorization, including prior authorizations, referrals, and pre-certification;	Automatically retrieves information needed to support verification of medical necessity and prior authorization of services at the appropriate juncture in the encounter workflow. Improves timeliness of patient care and reduces claim denials.			Plans reported that their electronic connections to various types of providers enable numerous functions to be completed over the Internet, including claims submission, online eligibility verification, and referral approvals. P.9 - Promoting Prevention Through Information Technology: Assessment of Information Technology in Association of Health Center Affiliated Health Plans http://www.ahcahp.org/publications/Working%20Papers/Final%20Report%20from%202003%20AHCAHP%20IT%20Assessment.pdf
S.3.3.4	Support of service requests and claims	Creation of health care attachments for submitting additional clinical information in support of service requests and claims;	Automatically retrieves structured data, including lab, imaging and device monitoring data, and unstructured text based on rules or requests for additional clinical information in support of service requests or claims at the appropriate juncture in the encounter workflow			Electronic transmission of clinical data for claims is a required HIPAA transaction in the US that is under development. See http://www.hl7.org/library/committees/ca/hipaa%20and%20claims%20attachments%20white%20paper%2020030920.pdf for details.
S.3.3.5	Claims and encounter reports for	Support the creation of claims and encounter reports for reimbursement	Automatically retrieves information needed to support claims and			Electronic submission of claims data is a required HIPAA

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	reimbursement		encounter reporting at the appropriate juncture in the encounter workflow.			transaction in the US. See the 837 Implementation Guide available at http://www.wpc-edi.com/hipaa/HIPAA_40.asp. - - - -
S.3.3.6	Health service reports at the conclusion of an episode of care.	Support the creation of health service reports at the conclusion of an episode of care. Support the creation of health service reports to authorized health entities, for example public health, such as notifiable condition reports, immunization, cancer registry and discharge data that a provider may be required to generate at the conclusion of an episode of care.	Effective use of this function means that clinicians do not perform additional data entry to support health management programs and reporting.	S.2.2		IOM Key Capabilities of an Electronic Health Record System p. 14 http://www.iom.edu/report.asp?id=14391 - HIMSS Electronic Health Record Definitional Model - Version 1.0
S.3.4	Manage Practitioner/Patient relationships	Identify relationships among providers treating a single patient, and provide the ability to manage patient lists assigned to a particular provider.	This function addresses the ability to access and update current information about the relationships between caregivers and the subjects of care. This information should be able to flow seamlessly between the different components of the EHRS, and between the EHRS and other systems. Business rules may be reflected in the presentation of, and the access to this information. The relationship among providers treating a single patient will include any necessary chain of authority/responsibility. Example: In a care setting with multiple providers, where the patient can only see certain kinds of providers (or an individual provider), allow the selection of only the appropriate providers. Example: The user is presented with a list of people assigned to a given practitioner and may alter the assignment as required - to a group, to	DC.2.6.3; S.2.2	1. Support delivery of effective healthcare - 3. Facilitate management of chronic conditions - 4. Improve efficiency	IOM Rpt, page 9, "Effective communication - among health care team members and with patients - is critical to the provision of quality health care (Bates and Gawande, 2003; Wanlass et. Al. 1992) - http://www.iom.edu/report.asp?id=14391

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			another individual or by sharing the assignment.			
S.3.5	Subject to Subject relationship	Capture relationships between patients and others and facilitate access on this basis (e.g. parent of a child) if appropriate.	A user may assign the relationship of parent to a person who is their offspring. This relationship may facilitate access to their health record as parent of a young child.	S.1.4.1; I.1.3; I.1.5; I.2.2	1. Support Delivery of Effective Healthcare - 3 Facilitate management of chronic conditions	An EHR used at a professional site should support personal health information (http://www.connectingforhealth.org/resources/phwg_final_report.pdf). Why Keeping Family Health Records is a Good Idea http://www.health-minder.com/articles/benefits.htm
S.3.5.1	Related by genealogy	Provide information of Related by genealogy (blood relatives)				
S.3.5.2	Related by insurance	Provide information of Related by insurance (domestic partner, spouse, guarantor)				
S.3.5.3	Related by living situation	Provide information of Related by living situation (in same household)				
S.3.5.4	Related by other means	Provide information of Related by other means (e.g. epidemiologic exposure or other person authorized to see records – Living Will cases)				Contact tracing is an essential and required feature of public health and has usefulness outside of public health when evaluating non-reportable infectious disease or genetically related conditions. (http://biotech.law.lsu.edu/Books/lbb/x578.htm)
S.3.6	Acuity and Severity	Provide the data necessary for the capability to support and manage patient acuity/severity of illness/risk adjustment		S.2.1.2	1. Support Delivery of Effective Healthcare - 2 Improve Patient Safety - - 4 Improve efficiency	An Integrated Analysis of Staffing and Effects on Patient Outcomes http://www.nursingworld.org/OJIN/KEYNOTES/speech_3.htm
S.3.7	Maintenance of supportive functions	Update EHR supportive content on an automated basis.			1. Support Delivery of Effective Healthcare - 2. Improve Patient Safety - 3. Facilitate management of chronic	

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					conditions - 4. Improve efficiency - 5. Facilitate self-health management	
S.3.7.1	Clinical decision support system guidelines updates	Receive and validate formatted inbound communications to facilitate updating of clinical decision support system guidelines and associated reference material		DC.1.2.1; DC.2.6.3; DC.2.7.1		Nearly all plans (92 percent) reported having one or more IT databases that reference clinical criteria, guidelines or protocols. While plans reported a variety of methods used to communicate clinical criteria, guidelines and protocols to providers, e-mail and electronic newsletters are seldom used and only one of the most widely used methods is related to IT. p 3 - Promoting Prevention Through Information Technology: Assessment of Information Technology in Association of Health Center Affiliated Health Plans http://www.ahcahp.org/publications/Working%20Papers/Final%20Report%20from%202003%20AHCAHP%20IT%20Assessment.pdf
S.3.7.2	Patient education material updates	Receive and validate formatted inbound communications to facilitate updating of patient education material		DC.3.2.4		Patient Provider Communication Tools http://www.chcf.org/documents/ihealth/PatientProviderCommunicationTools.pdf Informing Patients A Guide for Providing Patient Health Information - http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=61336 - - Promoting Prevention Through Information Technology: Assessment of Information Technology in Association of Health Center Affiliated Health

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						Plans - http://www.ahcahp.org/publications/Working%20Papers/Final%20Report%20from%202003%20AHCAHP%20IT%20Assessment.pdf
S.3.7.3	Patient reminder information updates	Receive and validate formatted inbound communications to facilitate updating of patient reminder information from external sources such as Cancer or Immunization Registries		I.5.2; S.1.4.1		Plans reported using IT systems to support numerous activities and processes, such as utilization management, disease management and targeted mailings to members. P. 3 Promoting Prevention Through Information Technology: Assessment of Information Technology in Association of Health Center Affiliated Health Plans http://www.ahcahp.org/publications/Working%20Papers/Final%20Report%20from%202003%20AHCAHP%20IT%20Assessment.pdf -
S.3.7.4	Public health related updates	Receive and validate formatted inbound communications to facilitate updating of public health reporting guidelines		I.5.2		Public health response information changes continually and the ability to access the latest data by EHR users is essential (http://www.cdc.gov/phin/components/PHIN%20Brochure%20HAN%20.ppt). -
I.1	**Security**	Secure the access to the EHR-S and EHR information. Prevent unauthorized use of data, data loss, tampering and destruction.	To enforce security, all EHR-S applications must adhere to the rules established to control access and protect the privacy of EHR information. Security measures assist in preventing unauthorized use of data and protect against loss, tampering and destruction.			ISO 9735-7:2002 - - Electronic data interchange for administration, commerce and transport - (EDIFACT) -- Application level syntax rules (Syntax version number: 4, - Syntax release number: 1) -- Part 7: Security rules for batch

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						EDI - (confidentiality)
I.1.1	Entity Authentication	Authenticate EHR-S users and/or entities before allowing access to an EHR-S. Manage the sets of access-control permissions granted within an EHR-S	Both users and application are subject to authentication. The EHR-S must provide mechanisms for users and applications to be authenticated. Users will have to be authenticated when they attempt to use the application, the applications must authenticate themselves before accessing EHR information managed by other applications or remote EHR-S'. In order for authentication to be established a Chain of Trust agreement is assumed to be in place. Examples of entity authentication include: • Username/ password; • Digital certificate; • Secure token; • Biometrics			
I.1.2	Entity Authorization.	Manage the sets of access-control permissions granted to EHR-S users. An EHR-S grants authorizations to users, for roles, and within contexts. A combination of the authorization levels may be applied to control access to EHR-S functions or data.	EHR-S Users are authorized according to identity, role, work-assignment, present condition and/or location. • User based authorization refers to the permissions granted or denied based on the identity of an individual. An example of User based authorization is patient defined denial of access to all or part of a record to a particular party for reasons such as privacy. • Role based authorization refers to the responsibility or function performed in a particular operation or process. Example roles include: nurse, dietician, administrator, legal guardian, and auditor. • Context-based Authorization is defined by ISO as security-relevant			

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			properties of the context in which an access request occurs, explicitly time, location, route of access, and quality of authentication. In addition to the standard, context authorization for EHR-S is extended to satisfy special circumstances such as, assignment, consents, or other healthcare-related factors. A context-based example might be a right granted for a limited period to view those—and only those—EHR records connected to a specific topic of investigation.			
I.1.3	Entity Access Control	Verify and enforce access control to EHR information and functions for end-users, applications, sites, etc., to prevent unauthorized use of a resource, including the prevention or use of a resource in an unauthorized manner.	This is a fundamental function of EHR-S applications. To ensure access is controlled, the EHR-S applications will perform an identity lookup of users or application for any operations that require it (authentication, authorization, secure routing, querying, etc.) and enforce the system and information access rules that have been defined.			
I.1.3.1	Patient Access Management	Enable a healthcare professional to manage a patient’s access to the patient’s personal health information. Patient access-management includes allowing access to patient/subject-of-care information and restricting access to information that is potentially harmful to the patient/subject.	A healthcare professional will be able to manage a patient’s ability to view his/her EHR. Typically, a patient has the right to view much of his/her EHR. However, a healthcare provider may sometimes need to prevent a patient (or guardian) from viewing parts of the record. For example, a patient receiving psychiatric care might harm himself (or others) if he reads the doctor's evaluation of his condition. Furthermore, reading the doctor's therapy-plan might actually cause the plan to fail.			
I.1.4	Non-repudiation	Limit an EHR-S user’s ability to deny (repudiate) an electronic data-exchange originated or authorized	Non-repudiation ensures that a transferred message has been sent and received by the parties claiming to			

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		by that user.	have sent and received the message. Non-repudiation is a way to guarantee that the sender of a message cannot later deny having sent the message and that the recipient cannot deny having received the message. Non-repudiation can be achieved through the use of a: • Digital signature -- which serves as a unique identifier for an individual (much like a written signature). • Confirmation service -- which utilizes a message transfer agent to create a digital receipt (providing confirmation that a message was sent and/or received). • Timestamp -- which proves that a document existed at a certain date and time.			
I.1.5	Secure Data Exchange	Send and receive EHR data securely.	Exchange of EHR information requires appropriate security and privacy considerations, including data obfuscation and both destination and source authentication when necessary. For example, it might be necessary to encrypt data sent to remote destinations. This function requires that there is an overall coordination regarding what information is exchanged between EHR-S entities and how that exchange is expected to occur. The policies applied at different locations must be consistent or compatible with each other in order to ensure that the information is protected when it crosses entity boundaries within the EHR-S or external to the EHR-S.			
I.1.6	Secure Data Routing	Route electronically-exchanged EHR data only to/from known,	EHR-S applications need to ensure that they are exchanging EHR	I.1.1; I.1.2		

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		registered, and authenticated destinations/sources (according to applicable healthcare-specific rules and relevant standards).	information with the entities (applications, institutions, directories) they expect. This function depends on entity authorization, and authentication to be available in the system. For example, a physician practice management application in the EHR-S, might send claim attachment information to an external entity. For this, the application must use a secure routing method which ensures that both the sender and receiving sides are authorized to engage in the information exchange.			
I.1.7	Document Attestation	Manage electronic attestation of documents including the retention of the signature of attestation (or certificate of authenticity) associated with an incoming or outgoing document.	The purpose of attestation is to show authorship and assign responsibility for an act, event, condition, opinion, or diagnosis. Every entry in the health record must be identified with the author and should not be made or signed by someone other than the author. (Note: A transcriptionist may transcribe an author's notes and a senior clinician may attest to the accuracy of another's statement of events.) Attestation is required for (paper or electronic) entries such as narrative/progress notes, assessments, flow sheets, and orders. Digital signatures may be used to implement document attestation. For an incoming document, if included, the record of attestation is retained. Attestation functionality must meet applicable legal, regulatory and other applicable standards or requirements.			
I .1.8	Enforcement of Confidentiality	Enforce patient privacy rules as they apply to various parts of the EHR-S through the implementation of privacy mechanisms.	A patient's privacy may be adversely affected when EHRs are not held in confidence. Privacy rule enforcement decreases unauthorized access and	I.6.1		

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			promotes the level of EHR confidentiality.			
I.2	**Health record information and management**	Manage EHR information across EHR-S applications by • Ensuring that clinical information is valid according to clinical rules; • Ensuring that clinical information is accurate and complete according to clinical rules; and • Tracking amendments to clinical documents.	Since EHR information will typically be available on a variety of EHR-S applications, the EHR-S must provide the ability to access, manage and verify accuracy and completeness of EHR information, and provide the ability to audit the use of (and access to) EHR information.			
I.2.1	Data Retention and Availability	Retain, ensure availability, and destroy health record information according to organizational standards. This includes: • Retaining all clinical documents for the time period designated by policy or legal requirement; • Retaining inbound documents as originally received (unaltered); • Ensuring availability of information for the legally proscribed period of time; • Providing the ability to destroy EHR data/records in a systematic way according to policy and after the legally proscribed retention period.	Discrete and structured EHR data, records and reports must be: • Made available to users in a timely fashion; • Stored and retrieved in a semantically intelligent and useful manner (for example, chronologically, retrospectively per a given disease or event, or in accordance with business requirements, local policies, or legal requirements); • Retained for a legally-proscribed period of time; • Destroyed in a systematic manner in relation to the applicable retention period. The system must also allow an organization to identify data/records to be destroyed, and to review and approve destruction before it occurs.	I.1.7		
I.2.2	Audit trail	Provide audit trail capabilities for resource access and usage indicating the author, the modification (where pertinent), and the date/time at which a record was created, modified, viewed,	Audit functionality extends to security audits, data audits, audits of data exchange, and the ability to generate audit reports. Audit trail settings should be configurable to meet the needs of local policies. Examples of			

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		extracted, or deleted. Audit trails extend to information exchange. Audit functionality includes the ability to generate audit reports and to interactively view change history for individual health records or for the EHR-S.	audited areas include: • Security audit - logs access attempts and resource usage including user login, file access, other various activities, and whether any actual or attempted security violations occurred. • Data audit - records who, when, and by which system an EHR record was created, updated, translated , viewed, extracted, or (if local policy permits) deleted. Audit-data may refer to system setup data or to clinical and patient management data. • Information exchange audit – record data exchanged between EHR-S applications (for example, sending application; the nature, history, and content of the information exchanged; and information about data transformations (for example, vocabulary translations), reception event details, etc.). • Audit reports – should be flexible and address various users' needs. For example, a legal authority might want to know how many patients a given healthcare provider treated while the provider's license was suspended. Similarly, in some cases a report detailing all those who modified or viewed a certain patient record might be needed. Security audit trails and data audit trail are used to verify enforcement of business, data integrity, security, and access-control rules.			
I.2.3	Synchronization	Maintain synchronization involving: • Interaction with entity directories; • Linkage of received data with	The EHR-S may consist of a set of components or applications; each application manages a subset of the health information. Therefore it is			

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		existing entity records; • Location of each health record component; • Communication of changes between key systems.	important that, through various interoperability mechanisms, the EHR-S maintains all the relevant information regarding the health record in synchrony. For example, if an MRI is ordered by a physician, a set of diagnostic images and a radiology report will be created. The patient demographics, the order for MRI, the diagnostic images associated with the order, and the report associated with the study must all be in synch in order for the clinicians to view the complete record.			
I.2.4	Extraction of health record information	Manage data extraction in accordance with analysis and reporting requirements. The extracted data may require use of more than one application and it may be pre-processed (for example, by being de-identified) before transmission. Data extractions can be used to exchange data and provide reports for primary and ancillary purposes.	The EHR-S enables an authorized user (such as a clinician) to access and aggregate the distributed information that corresponds to the health record or records which are needed for viewing, reporting, disclosure, etc. The EHR-S must be able to support data extraction operations across the complete data set that constitutes the health record of an individual and provide an output that fully chronicles the healthcare process. Data extractions are used as input to continuity of care records. In addition, data extractions can be used for administrative, financial, research, quality analysis and public health purposes.			

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I.3	**Unique identity, registry, and directory services**	Enable secure use of registry services and directories to uniquely identify, link and retrieve records and identify the location of subjects of care and providers for health care purposes; payers, health plans, sponsors, employers and public health agencies for administrative and financial purposes; health care resources and devices for resource management purposes.	Unique identity, registry, and directory service functions are critical to successfully managing the security, interoperability, and the consistency of the health record data across the EHR-S.			
I.3.1	Distributed registry access	Enable system communication with registry services through standardized interfaces and extend to services provided externally to the EHR-S.	The EHR-S will rely on a set of infrastructure services, directories, and registries (organized hierarchically) that support communication between EHR-Systems. For example, a patient treated by a primary care physician for a chronic condition may become ill while out of town. The new provider's EHR-S will interrogate a local, regional, or national registry to find the patient's previous records. From the primary care record, the remote EHR-S will retrieve relevant information (in conformance with applicable patient privacy and confidentiality rules). An example of local registry usage is an EHR-S application sending a query message to the Hospital Information System to retrieve a patient's demographic data.			

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I.4	**Health Informatics and Terminology Standards**	Ensure consistent terminologies, data correctness and interoperability by complying with standards for health care transactions, vocabularies, code sets, and artifacts such as templates, interface, decision support algorithms, and clinical document architecture.	Examples that EHR-S applications need to support are a consistent set of terminologies such as: LOINC, SNOMED, ICD-10 and messaging standards such as HL7. Vocabularies may be provided through a terminology service internal or external to the EHR-S.			
I.4.1	Maintenance and versioning of health informatics and terminology standards.	Enable version control according to customized policies to ensure maintenance of utilized standards.	Version control allows for multiple sets/versions of the same terminology to exist and be distinctly recognized over time. Terminology versioning supports retrospective analysis and research, as well as interoperability with systems that comply with different releases of the standard. Similar functionality exists for messaging and other informatics based standards. It should be possible to retire deprecated versions when applicable business cycles are completed while maintaining obsolescent code sets for possible claims adjustment throughout the claim's lifecycle.			
I.4.2	Mapping local terminology, codes, and formats	Map or translate local terminology, codes and/or formats to standard terminology, codes, and/or formats to comply with health informatics standards.	An EHR-S application which uses local terminology, must be capable of mapping and/or converting the local terminology into a standard terminology. For example, a local term or code for "Ionized Calcium" must be mapped to an equivalent, standardized (LOINC) term or code when archiving or exchanging artifacts.			

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	Function Name	Function Statement				
I.5	**Interoperability Standards**	Provide automate health delivery processes and seamless exchange of key clinical and administrative information.	Interoperability standards enable an EHR-S to operate as a set of applications.			
I.5.1	Interchange Standards	Support the ability to operate seamlessly with complementary systems by adherence to key interoperability standards. Systems may refer to EHR systems, applications within an EHR-S, or other authorized entities that interact with an EHR-S.	Interoperable EHR-S applications require infrastructure components that adhere to standards for connectivity, information structures, and semantics ("interoperability standards"). Standard EHR Infrastructure components, which may exist locally or remotely, must support seamless operations between complementary systems. Standard infrastructure components include: • HL7 Messages, Clinical Document Architecture (CDA), X12N healthcare transactions, Digital Imaging and Communication in Medicine (DICOM). • Common semantic representation to support information exchange. EHR-Systems may use different standardized or local vocabularies. In order to reconcile the semantic differences across vocabularies, the EHR-S must be able to adhere to standard vocabulary or leverage vocabulary lookup and mapping capabilities that are included in the Health Informatics and Terminology Standards. • Support of multiple interaction modes to respond to differing levels of immediacy and types of exchange. For example, messaging is effective for many near-real time, asynchronous data exchange scenarios but may not be appropriate if the end-user is requesting an immediate response from a remote application. In addition,	I.4.2		

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ID	Formative Ballot Content		Functional Description	See Also	Rationale	Citation
	Function Name	Function Statement				
			even in the case where store-and-forward, message-oriented interoperability is used, the applications may need to support the appropriate interaction mode. For example: Unsolicited Event Notifications, Query/Response, Query for display, Unsolicited summary, structured/discrete, and unstructured clinical documents.			
I.5.2	Application Integration Standards	Provide integration with complementary applications and infrastructure services (directory, vocabulary, etc.) using standard-based application programming interfaces (for example, CCOW).	Similar to standard-based messaging, standard-based application integration requires that the EHR-S application use standardized programming interfaces, where applicable. For example, CCOW may be used for visual integration and WfMC for workflow integration.			
I.5.3	Interchange Agreements	Support interaction with entity directories to determine the recipients' address profile and data exchange requirements and use these rules of interaction when exchanging information with partners.	An EHR-S will use the entity registries to determine the security, addressing, and reliability requirements between partners and use this information to define how data will be exchanged between the sender and the receiver.	I.3		

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	Function Name	Function Statement				
I.6	**Business Rules Management**	Manage the ability to create, update, delete (or disable) and version business rules including institutional preferences. Apply business rules from necessary points within the EHR-S to control system behavior. Audit changes made to business rules, and audit compliance to and overrides of applied business rules.	Business Rule implementation functions include: decision support, diagnostic support, workflow control, access privileges, and system and user defaults and preferences. The EHR-S should support the ability for providers and institutions to customize decision support components such as triggers, rules or algorithms, and the wording of alerts and advice, to meet local requirements and preferences. Examples of applied business rules include: • Suggesting diagnosis based on the combination of symptoms (flu-like symptoms combined with widened mediastinum suggesting anthrax • Classifying a pregnant patient as high risk due to factors such as age, health status, and prior pregnancy outcomes. • Sending an update to an immunization registry when a vaccination is administered • Limiting access to mental health information to a patient's psychiatrist/psychologist • Establishing system level defaults such as for vocabulary data sets to be implemented. • Establishing user level preferences such as allowing the use of health information for research purposes.			
I.7	**Workflow**	Workflow management functions include both the management and set up of work	Workflow management functions include: • Distribution of information to			

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	Function Name	Function Statement				
		queues, personnel, and system interfaces as well as the implementation functions that use workflow-related business rules to direct the flow of work assignments.	and from internal and external parties; • Support for task-management as well as parallel and serial task distribution; • Support for notification and task routing based on system triggers; and • Support for task assignments, escalations and redirection in accordance with business rules. Workflow definitions and management may be implemented by a designated application or distributed across EHR-S applications.			

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