



Module 2 – Patient Identification and Master Patient (Person) Index

This unit is designed to provide the participant with information related to Master Patient/Person Indices, or MPIs as they are commonly known, whether they are on paper or in an electronic format. MPIs are a foundational element of any healthcare delivery system. Historically, small index cards or the log books held the basic demographic information (discussed later herein) to allow identification of an individual to facilitate filing and retrieval of paper records. Logs may also have been used to record the basic data that allowed patient identification. Today this same principle applies, but the mediums and scope are much broader than decades ago.

OBJECTIVES:

At the conclusion of this unit, the participant should be able to:

1. Have a working understanding of a Master Patient Index (MPI)
2. Understand how such a system is created and maintained
3. Describe how an MPI is a foundational piece of health information management
4. Describe how an MPI contributes to the delivery of care
5. Apply principles and concepts of MPI management to a health care environment
6. Understand the linkage of an MPI with Unique Patient Identifiers
7. Understand the various data elements that make up an MPI

I. MPI Purpose

MPIs support all care delivery settings from small, single site practices to a large, geographically and enterprise diverse organizations. The organizations may be privately or publicly funded, or sponsored by governments, private organizations, or any combination of these. *Basically, any care organization who delivers care or wellness services to individuals should have an MPI.*

- The fundamental MPI purpose has evolved to address the broader use of health data, with the following goals:

- Index in one place the individuals/persons/patients/citizens who have received healthcare or wellness services
- Provide a means to accurately tabulate who is or has received services
- Serve as a platform to assist integrating patient demographic data to other financial, clinical, or operational in today's evolving digital age that seeks to answer and research broader initiatives
- Serve as the key repository for a unique identifier that supports the many uses of a person's clinical, demographic, and sometimes financial or privacy preference data.
- Serve as the core unique patient data interoperability index supporting data exchange, data sharing, and the multitude of reasons data may be used in sites beyond its point of origin
- Provide statistics to support care, finances, WHO reporting, public health and aid grant reporting, and evolving health priorities

II. MPI Methods and Design

MPI cards that for decades captured the foundational demographic data are still used in small, less developed areas or delivery sites, but they have largely been replaced by computer databases. Similarly, logs are less commonly seen. However, both of these methods may still be viable in appropriate, limited circumstances or areas. The procedure for creating and maintain a MPI card file may be found in Appendix 1.

The move to an electronic MPI should precede the adoption of electronic health records, since the MPI is the foundation to all associated data. Best practices for designing an MPI and accurately identifying a patient can be found in various resources including HIMSS, NAHAM (discussed later), ESRI, and some standards bodies such as ASTM or HL7

The MPI design may take many different forms, with the most common use discussed below.

MPI within the electronic health record.

Most EHR vendors provide MPI functionality within their product as a distinct function or product module, with the function generally associated with the registration or billing system. In this design, some of the MPI related data underpins the electronic transactions in the various EHR modules including lab, radiology, nursing notes, orders, etc. The data flows seamlessly between the modules and little computer integration design or computer coding is required.

Standalone MPIs

Standalone MPIs that connects multiple systems, commonly known as enterprise master person index (EMPI) are found in larger health systems or organizations, or when multiple EHR vendors are trying to connect each of their respective populations. An enterprise master person/patient (EMPI) may be

used to discern if patients exist across the organizations or jurisdictions, and then link records using virtual keys that will allow integration of records across the disparate systems. In fact, some countries and their national health systems will have a goal of a national health record, either from the inception of a computerized record, or an evolving governmental strategy. This standalone software will likely integrate the demographic data within the health record (or across multiple EHR systems) using an integration bus/interface engine, with the core data elements being propagated to the EMPI from each of the respective registration systems.

Citizen registry.

Jurisdictions may create citizen registries, sometimes with unique identifiers, to facilitate creating a single view of citizen data whether that be health/wellness, social services, education, or perhaps broader. Such registries will generally rely on software similar to an EMPI to help identify individuals across the jurisdictional systems. Integrating core demographic data and any identifiers, as well as the systems across governmental agencies, will likely require special considerations for privacy, security, and data retention.

Mobile.

With the rapid adoption of internet based mobile devices (phones, tablets) the above MPI approaches may not only apply to personal computer (PC) or server-based technology that was prevalent before 2010, but also to mobile devices. These devices will likely have the same or similar functionality as a PC or server-based technology. The mobile devices can readily be used in smaller areas and communities in real-time fashion, or the data that is being collected may be input on the mobile device while it is off-line, and then uploaded when individuals again have computer access in larger communities or urban areas.

III. Identifiers take many forms

The goal of an MPI is to house and manage the data quality for a unique healthcare identifier. As already discussed, this identifier, and data that helps establish or improve the accuracy of the identifier, can take many forms to support diverse use cases.

Unique healthcare identifier. A unique healthcare identifier may only serve the purpose of linking or connecting healthcare data within a province/state, country, or jurisdiction. Generally speaking, the identifier will be issued and managed by a governmental agency as discussed in the next section. Or, this identifier may have financial implications and help establish financial responsibility, or payment limitations or considerations. Many advocate that a unique healthcare identifier is the best way to address accurate patient identification, providing the identifier has data quality provisions, a methodology to ensure keying or scanning of the identifier does not introduce errors, and perhaps most importantly, can be secured to support privacy requirements or concerns. Countries such as Canada

have made a decision not to issue a unique healthcare identifier, but do have unique payment identifiers at the provincial level.

Unique citizen identifier. Some jurisdictions and countries will issue a citizen identifier at birth, or at some point in the lifetime of a citizen. This identifier may support health, social services, education, criminal justice, and any other public services. Countries such as Singapore, China, etc

Given the potential impact that may ensue from inaccurate capture of a unique identifier or fraudulent use of the identifier, considerable resources will be expended in designing, issuing, and maintaining either of the above scenarios of unique identifiers. Also, a unique health or citizen identifier is not without error, thus curation of the identifier after issuance is still essential.

IV. National/Unique Healthcare Identifier, the Process Implications

As a part of an MPI, a country may use a national (or citizen) identifier in order to help confirm a patient's identity. While there might be some variation between countries, the national identifier is usually a series of numbers and/or letters that is uniquely assigned to a person. It has a certain number of characters (for instance, ranging between eleven and thirteen alphanumeric characters), and it may also incorporate certain codes to indicate the person's gender, date of birth, or geographic area of birth.

A variety of different organizations and agencies can be involved in issuing national identifiers. Here is a list of a few samples:

Nigeria: National Identity Management Commission (www.nimc.gov.ng)

Argentina: Registro Nacional de las Personas (National Registry for People) (www.argentina.gob.ar/registro-nacional-de-las-personas)

Thailand: Department of Provincial Administration, Ministry of Interior (<https://www.dopa.go.th>)

There can also be different triggers and milestones that are associated with a person getting a national identifier. The earliest is associated with birth, where the national identifier may be placed on a child's birth certificate. In some countries, it is typical to request a national identifier for a child at the time that he/she begins to attend school. Other countries may assign national identifiers during the childhood or teenage years. It can also be associated with voting or paying taxes.

There are certainly potential benefits to use a patient identifier on a national basis, although the complexity and required investment also increase. Benefits can include: improved continuity of care, easier transfer between facilities, better portability of health information, and clearer analysis of health data/de-duplication of records.

V. Registration Process and MPIs

To register patients into a Master Patient Index, there should be a consistent process to gather the patient's information in order to support data quality (completeness, consistency, validity, and accuracy). The person taking the relevant information must balance various complicating factors.

Depending on the format of the MPI (paper or electronic), the information can be recorded directly into the index. Alternately, it could be captured in one form (paper, for instance) and then captured into the MPI (electronic, cards, etc.) at a later time. It is useful for the health facility to make estimates of how many patients it expects to receive (daily, weekly, monthly). By doing so, it can plan appropriately for the growth of its MPI. Space will not be as much of an issue if an MPI is stored electronically. However, if it is stored on paper, then the appropriate number of drawers, shelves, etc. to store the paper media should be allocated.

There are also several methods to capture this information. In some cases, the patient or a family member may be able to fill out a form (or even an electronic form) by themselves. In other cases, the *literacy* of these people can be a barrier, so they might require the assistance of registration staff, community volunteers, or clinicians to "interview" the patient and to complete the information successfully on the patient's behalf. *Language* may also serve as an obstacle to receiving the data clearly. If possible, it is recommended to have the forms/questions available in the most common languages spoken in that geographic area. It is also beneficial to have staff at the facility who are fluent in these languages, although the sheer number of local dialects may be a challenge.

Another factor to consider is how the patient can be legally identified. In a more formal setting, a form of identification may be generated by one of the entities or governmental organizations referenced in the National Patient Identifier section above. In more rural areas, patient identification may take the form of a letter from a local official.

To make the process positive for its patients, a health facility should also consider planning these registration efforts to match the patient arrivals. Depending on how near/far the facility is located from where patients live/work, arrival times may be early or later in the day. The timing and availability of transport (bus, taxi, train, car, bicycle) can also greatly impact the flow of patients to a facility.

It is quite common for health facilities to receive patients on a walk-in basis. This approach is an effective use of clinical resources, though it can result in long patient wait times. When practical, an organization might also consider scheduling clients for services. In some cases, scheduling can take the form of a

specific appointment time (10.30hrs or 10:30am). In other cases, the appointment may be as general as requesting patients to come in the morning or in the afternoon on a certain day.

There are several basic data elements that should be part of any Master Patient Index. In 2016, the National Association of Healthcare Access Management (NAHAM) – a professional association in the US – published a white paper – “Best Practice Recommendations for the Collection of Key Patient Data Attributes¹” and identified the following elements as key patient data attributes:

- Patient Name
- Date of Birth
- Address
- Phone number
- Sex/Gender

While NAHAM’s focus tends to be on best practices within the United States, there are some key points of guidance that can be applied in a broad environment. We will discuss the above five key elements as well as several others for consideration when implementing an index system for healthcare records.

VI. MPI Data Elements/Attributes

PATIENT NAME was previously broken into in several separate fields or components – first name, last name – also called *surname*, previous name, middle name and suffix. The individual components may or may not be relevant in every international setting based on cultural naming conventions. It is important in the design phase to make sure the selected name components are workable within the patient population’s conventions.



- a. For example, in some cultures children will use both their parents’ last names, while in other cultures someone’s surname, reflects their father’s last name singularly.

For purposes of this discussion, commonly a *first name* and *last name* should be collected. There can be value in terms of data integrity to take names from official or legal references if available, recognizing that in some countries issuance of said documents can be problematic.

- b. For example, a patient named Michael Adams may respond when asked that his name is Mike Adams. While this is a



slight variation, it can cause difficulties in subsequent registration if the next time the patient is asked he uses Michael instead of Mike. It is not considered best practice to assume that every “Mike” is really a Michael.

Consider in some nations the naming of an offspring after a parent results in the designation of Senior (Sr) or Junior (Jr), and further expands to numerical components like the Third (III). These are more formally referred as *generational names*. This example is to illustrate the need to accommodate variations that may be country or ethnically specific. From a consistency stand point, generational names should be considered part of the last name.

The composition of the name(s) can include non-alphabetic characters, such as hyphens (-), spaces () and alike. These characters can complicate naming convention decisions. As long as this variable is addressed and applied consistently, negative impacts can be minimized. Within a computerized MPI, these characters can be particularly problematic when performing patient searches.

For example, a name like Maria Garcia-Chavez can also be represented as Maria Garcia Chavez or Maria GarciaChavez or Maria Garcia or Maria Chavez. Each of these variations can impact the indexing of the data.

Maria Garcia-Chavez
Maria Garcia Chavez
Maria GARCIAHAVEZ
Maria Garcia
Maria Chavez

Some cultures utilize a single name or moniker. For every name component included in your design, the *lack* of the component must be addressed. Blank fields in key components can cause significant difficulties in indexing if the field is a primary key. Should a single name be placed in both common name fields? Or only in the last name field or only in the first name field? Depending on the frequency of this name variation, the indexing system should have a defined guideline for addressing it.

For example, the single name Cher can become Cher Cher or exist singly in either first name or last name field.

Cher
Cher,Cher
Cher (No last name)
(No first name) Cher

Names – first or last – with spelling variations can pose a challenge in indexing systems. As stated earlier, assumptions should not be made when collecting

name information. Spelling variations can be as slight as one letter but can negatively impact an indexing system.

For example, a letter change in the body of the name would be less of an impact vs. a letter variation in the first position of the name. Some computerized systems are designed to compensate for such variations in search elements, while a paper based system may be less sophisticated.

Johnson	Chan	Ann
Johnsen	Chang	Anne
Jonson	Chen	Anna

Mohammed	Hasan
Muhammad	Hassan
Mohamad	Hasan

Other naming components like *middle name(s)* – commonly referred as *second name(s)*, can be relevant in some settings. If middle name is part of the naming convention selected then the lack of a middle name needs to be addressed as well. Some cultures also include multiple second names. In design phase, there should be inquiry as to the prevalence of multiple second names to determine if it will be addressed as an exception or routine.

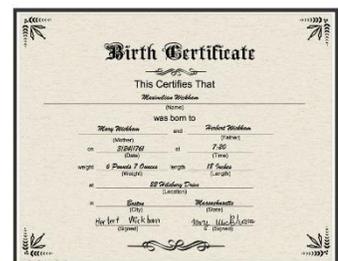
One of the separate name components is PREVIOUS NAME. In some cases, this can be referencing a maiden name (single woman’s last name prior to marriage) or a name changed because of adoption or divorce, or various other legal reasons. Previous names can have great significance when identifying prior patient encounters. If the previous name field is considered significant and collected, the ability to collect *multiple* previous names should be addressed.

Titles are typically removed from consideration in indexing, however there are times with the title represent significance in class or caste. Titles that may be encountered include Mister (Mr.), Missus (Mrs.), Miss, Ms., Physician (MD), PhD, Father (Fr.) and alike. There may be a need to address designations such as King, Queen, Prince, Princess, Duke, Duchess, Lady, Earl, Chief, etc. Part of the consideration for the way names are formatted is based on how the patient themselves expect to “see” their name represented. This can be particularly problematic in the use or non-use of titles.



A name regardless of the components (first, last/surname, middle/second, title) should not be used as THE single designation of identity when indexing medical record. Additional elements should be added to name matching.

DATE OF BIRTH (DOB) is another key patient data attribute that seems initially to be fairly straight forward,



however, there are several considerations to be addressed depending on this environment it is being used. DOB is commonly the second – following patient name – used in a basic MPI search. Date of Birth is one of the key identifiers within the United States used in conjunction with the patient name to meet the highly regulated patient safety regulations.

As with most data elements, structure and format need to be addressed for the sake of consistency and data integrity. The two most common formats for DOB are: Month – Day – Year or Day – Month – Year. These formats are commonly referenced as MM-DD-YYYY or DD-MM-YYYY which indicated two digits for month and day and four digits for year. The use of zero (vs. a blank) to fill a single digit month or day is crucial in the design of a computerized MPI. Years should be referenced using four (4) digits to avoid events related to century changes or cross overs. This is particularly crucial when using dates like DOB in a computerized index to avoid issues similar to the Y2K change when 1999 became 2000. This is less of an issue when a manual index is maintained though addressing it upfront is best.

While the structure and format are relatively straight forward with this data element, the source and ultimately accuracy of it is not. In some countries, the issuance of official birth records is highly complex, and in others non-existent. What should be done if a person doesn't know their exact birth date? In some situations, someone's birth is not recorded using a traditional calendar – rather referenced as a season. It may also be common for someone to know their approximate date but not their exact date of birth. In most computerized indexes the “age” field is derived from the date of birth field.

With the complication of unknown or estimated dates of birth, it is recommended that there be way to identify that the date was approximated. In design it could also be an option to have a computerized age derivative field be directly editable to accommodate approximations.

While date of birth is key to identification and searches, it should be noted that capturing date of death can assist in patient identification rule outs.

SEX/GENDER

Sex is the third of the patient identity attributes. The designation of sex becomes important in patient identification when the prevailing local naming conventions have names that can be routinely applied to either sex. Additionally, the scope of healthcare services in some instances is driven by conditions that pertain to one sex or another.

The following designations are universally used:

Male (M)

Female (F)

Unknown (U)



The unknown classification is limited in its use to when there is a biological lack of differentiation, or if confirmation of sex is unable to occur. There are some instances when the alphabetic designation is converted into numeric values in a computerized index. This is not usually an issue in design, rather a generalized practice in computerization.

Within a computerized index, a system should be flexible enough to accommodate modifications to sex, while providing adequate warnings during the modification process. While there are clinical advances that have made for the physical changing of sex, the practice is still comparatively rare.

ADDRESS/HOMESTEAD/LOCATION

The fourth key patient attribute is ADDRESS, which is commonly reference as the location designation of where someone resides. Depend on the setting – rural or urban – and the organization of formal government functions like mail delivery/management, the designation of address can vary greatly.

In some instances, like in the United States, there are very specific postal addressing standards – House Number and Street Name, City, State, and Zip Code. While in other instances, there is no formal location structure. Regardless of structure, it is important to have adequate space – in a computerized index referred to a field length – to collect the location information in as consistent manner as possible.

Depending on the geographic size of a country, there may be additional need for country data or regional information. The habits of the population can also come into play in planning for the address attribute. If the culture as a nomadic component, some thought needs to be given to the variability of an address designation. This element should also take migrant or displaced populations into consideration as there may be a need for a temporary versus permanent address designation. Similar to the name field, some consideration should be given to the retention of previous addresses as a means of identity verification.

In terms of being a key patient data attribute, an address can determine payment source or funding in some countries with a nationalize healthcare payment system.

TELEPHONE NUMBER

The last key patient attribute is telephone number – however – the criticality of this element can vary depending on the availability of telecommunication services and the prevalence of telecommunication use. If telephone number can be captured and be considered valid and useful, then its collection should be in a uniform format. In some cases, the use of country codes and region/area codes

- A -		- C -		- F -	
Alghanistan	93	Cambodia	855	Falkland Islands	500
Albania	355	Cameroon	237	Fiji Islands	679
Algeria	213	Cape Verde Islands	238	Finland	358
Angola	244	Cayman Islands* (area code 345)		France	33
Anguilla* (area code 264)		Central African Republic	236	French Antilles	596
Antigua* (area code 268)		Chad	235	French Guiana	594
Argentina	54	Chatham Island	64	French Polynesia	689
Armenia	374	Chile	56	- G -	
Aruba	297	China	86	Gambia	220
Ascension	247	Cocos-Keeling Islands	61	Georgia	995
Australia	61	Colombia	57	Germany	49
Australian External Territories	672	Comoros	269	Ghana	233
Austria	43	Congo	242	Gibraltar	350
Azerbaijan	994	Congo, Dem. Rep. of	243	Greece	30
- B -		Cook Islands	682	Greenland	299
Bahamas* (area code 242)		Costa Rica	506	Grenada* (area code 473)	
Bahrain	973	Croatia	385	Guadeloupe	590
Bangladesh	880	Cuba	53	Guam* (area code 671)	
Barbados* (area code 246)		Cyprus	357	Guantanamo Bay	5399
Barbuda* (area code 268)		Czech Republic	420	Guatemala	502
Belarus	375	- D - E -		Guinea	224
Belgium	32	Denmark	45	Guyana	592
Belize	501	Diego Garcia	246	- H - I -	
Benin	229	Djibouti	253	Haiti	509
Bermuda* (area code 411)		Dominican Republic* (area codes 809, 829, 849)		Honduras	504
Bhutan	975	East Timor	670	Hong Kong	852
Bolivia	591	Easter Island	56	Hungary	36
Bosnia/Herzegovina	387	Ecuador	593	Iceland	354
Botswana	267	Egypt	20	India	91
Brazil	55	El Salvador	503	Iran	98
British Virgin Islands* (area code 284)		Eritrea	291	Iraq	964
Brunei Darussalam	673	Estonia	372	Ireland	353
Bulgaria	359	Ethiopia	251	Israel	972
Burkina Faso	226			Italy	39
Burundi	257			Ivory Coast	225

as a standard part of a phone number become necessary to make the information useable. In some countries, a telephone number can almost be considered a unique patient identifier, while in others, it is not a captured data element because it is not a frequently access when of communication.

There are two consistent considerations with this attribute as with the others – using a standardize format to ensure data integrity and the retention of historical numbers. At Cedars-Sinai Medical Center in Los Angeles, California, the phone number is considered one of the key attributes (above patient name) In a patient search on their computerized MPI system.

The culture use of cellular phone in a given country may also impact the collection and use of phone numbers. For example, if disposal phones are prevalent then the permanency of a specific phone number to the patient may reduce the value of it as means of communication. Or consider the possible impact of cellular fees – potentially high – or cost prohibitive based on talk time vs. data use – on a patient’s willingness to provide a phone number for communications (talk vs. data). One last point that will impact phone number as a usable and valuable data element is access to a phone network – cellular or otherwise, and its reliability.



ADDITIONAL ATTRIBUTES

The above key patient attributes should be considered the very minimum in terms of MPI data collection. The following items are other common elements that can provide useful in information gathering on patient care encounters.

RELIGION

Collecting data about a patient’s religion or preferred spirituality can be important when the belief guides specific medical interventions. For example, some religious prohibit the use of blood products to treat a medical condition. Care should be given with regard to the collection and use of religious preference to any culture biases that may negatively impact the care received.

OCCUPATION

The linking of occupation to the prevalence of a specific disease has been useful in several industrialized countries. Collecting a patient’s occupation can be complicated in terms of data uniformity and reporting. Commonly if this information is collected there are a limited set of options to choose from with the addition of *other* and *unknown*.

EMPLOYER

As with occupation, the specific employer being linked to a patient or a patient care episode can be useful in disease linkage, as well as liability. An employer’s liability can range from being the primary payor of the medical bills or to determine payor source, as well as legal assignment of fault in a work-related injury.

NEXT OF KIN (FAMILY)

Depending on the privacy or legal consent regulations in place or not in place, in a given setting/country, identifying the next of kin can be very important. In its simplest definition the next of kin are the person's (patient) closest living relative or relatives. In some countries, there are legal definitions of next of kin and in others there are not. There are instances where a next of kin is considered a blood relative and times when they are not. For the sake of its use in the context of an MPI, the next of kin is:

Someone you would contact either to locate or communicate with a patient – for example for an appointment reminder – if the primary means of contact was not successful, or

Someone that is authorized to make care decisions for a patient unable to do so for themselves – for example the patient is deaf or unconscious or a child, or

Someone who is taking responsibility to provide home care or follow up care for a patient – for example giving medication as regular intervals for a child or changing bandages.

Depending on the design or usability of other data elements like address or telephone number, the information collected on the next of kin generally includes their name, relationship to the patient, and some form of contact information. In some instances, more than one person may be considered next of kin, and there may be some governing principles around the sequencing of any legal or assumed responsibility for the designee.

OTHER CONSIDERATIONS

Once again, each country or organization developing an MPI may have some unique characteristics not specifically addressed above common elements. Consideration should be given to the ease of collection and the accuracy of additional data, as well as any stigma surrounding it. The following elements come to mind as examples of some unique data needs:

- C. Affiliation
- D. Tribe
- E. Region
- F. Ethnicity
- G. Race

As with any data collected on a patient receiving services, any inclusion of other data elements should be protected as private patient information.

VII. VISIT/ENCOUNTER ELEMENTS

A clinical encounter is defined by ASTM as² “(1) an instance of direct provider/practitioner to patient interaction, regardless of the setting, between a

¹ Definition of an encounter.

<https://ushik.ahrq.gov/ViewItemDetails?system=mdr&itemKey=74379000>

patient and a practitioner vested with primary responsibility for diagnosing, evaluating or treating the patient's condition, or both, or providing social work services; (2) A contact between a patient and a practitioner who has primary responsibility for assessing and treating the patient at a given contact, exercising independent judgment". A patient visit or encounter serves as a focal point linking clinical, administrative and financial information and can occur in many different settings – ambulatory care, inpatient care, emergency care, home health care, long term care, field and virtual (telemedicine).

A patient encounter should contain the following data elements:

Account visit number
Date(s) of service
Encounter service type
Encounter service location
Encounter physician/provider name
Patient disposition

ACCOUNT/VISIT NUMBER

The first data element associated with a clinic encounter is an **account or visit number**. An account or visit number is a number assigned by the facility billing or record keeping office at the time a patient's appointment is scheduled or medical services are received and includes all charges and payments for a specific encounter or visit. The account/visit number is not the same as the Medical Record Number, which is unique and captured in the MPI. Account numbers may reflect a specific numbering methodology to determine the volume of patients being seen. Numbering systems can be either be issued in a sequential form, or be comprised of meaningful digits either assigned manually or electronically.

Purposes of tracking patient care and their account numbers include clinic management, reporting, supply chain management, and disease surveillance. A clinic that relies on funding for research and/or treatment of specific diseases may be required to record the number of visits whether the visit is to establish a diagnosis or a visit to manage a known diagnosis. Tracking of patient visits is also necessary to meet the demands of providing pharmaceuticals and supplies to insure availability for patient care. The account number is essential when being used for billing purposes as each visit is typically separated.

DATE OF SERVICE

The second visit or encounter data element is date of service, also known as DOS, and is a fundamental component of an encounter. The date of service is the date treatment was provided to the patient. (Refer to the Master Patient Index Date of Birth Data Element for the structure of this data field.) An encounter can

be created for a **single date of service** or a span of dates. A single date of service is appropriate for patients who are seen on an outpatient basis e.g., emergency care, home health care, outpatient clinic, etc.

A **span of dates** is applicable for patients who are admitted to a hospital for a period of more than twenty-four hours with the admission date representing the earliest date and discharge representing the latter date. The dates in between the admission date and discharge date are included in the span of dates that the patient was receiving medical services. A span of dates can also be appropriate for recurring accounts (multiple encounters that occur over several weeks or over the course of a month) which are typically outpatient accounts.

ENCOUNTER SERVICE/TREATMENT TYPE

Treatment types are essential for statistical data including number of laboratory tests ordered, type of laboratory tests ordered or drawn, number of prescription medications dispensed, type of prescription medications dispensed. This data can be used for justification of staffing, resource management, inventory control, and space allocation.

ENCOUNTER SERVICE/TREATMENT LOCATION

Treatment location is the fourth data element of the patient encounter and is considered the location of the treatment received. It should include the name of the organization e.g., hospital, clinic, etc., address, and telephone number of the hospital or clinic. (Refer to the Master Patient Index

Address/Homestead/Location Data Element for guidance specific to address standards.) Treatment locations may be defined as a specialty clinic with an associated name e.g., HIV Clinic, Laboratory, etc. Any unique identifiers that are specific to an organization should be reflected as well.

ENCOUNTER PHYSICIAN/PROVIDER NAME

The fifth data element is the patient encounter's physician or clinical provider's name; this individual can also be the admitting and/or attending physician's name. It is essential, and in most places, a legal requirement of providing medical care, to indicate the physician or practitioner who provided the medical services to the patient. The provider's name can be tracked for multiple reasons to include volume of workload, funding, statistical data, and continuity of care. Provider information should be included on each clinical care encounter.

Physician extenders are defined as nurse practitioners, midwives, physician assistants, community health workers, or similar job roles that can assist with expanding the services that physicians can offer. If a physician extender is providing patient care, their name should be listed on the patient encounter and in any patient care related documentation.

Though a physician directory is not included in the Master Patient Index process, it is considered a best practice to maintain a log, manual or electronic, to include each provider's last name, first name, title, specialty (if applicable), practice address, phone number, and signature. The country of origin of a physician or physician extender should be documented to insure any licensing requirements

are fulfilled; different countries may have different requirements specific to physician or physician extender licensing and credentials. This data can also be useful for statistical purposes.

DIAGNOSIS

A medical diagnosis is the process of determining which disease or condition explains a person's signs and symptoms. The information required for a diagnosis is typically collected from a history and physical examination and often include diagnostic tests. Diagnosis is a major component of the procedure of a doctor's visit and is necessary to the medical billing process; it may also be a data element as part of the Master Patient Index. Diagnosis can be indicated in many sections of the medical record and is most always found as part of a physician's order.

Health information is private and should be protected whether it is being used for treatment, research, or billing. With the patient's consent, sharing of health information may be permitted for treatment, payment, or operations associated with the care provided to the patient. Caution should be taken to protect the privacy of patient' health information by providing safeguards to ensure that only those who are directly involved with the patient's care have access to the medical record, both manual or electronic. Conversations amongst healthcare workers should be held in private to respect the privacy of the patient. Awareness should be given to the stigma associated with sensitive diagnosis e.g., HIV and tuberculosis. If the diagnoses are included as part of the Master Patient Index, be it manual or electronic, security of the index should be addressed and measures should be in place to protect the patient's privacy.

CODING

The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) is the global standard for reporting and categorizing diseases, health related conditions, and external causes of disease and injury. As of this date, the eleventh modification – ICD-11 – is soon to be released by the World Health Organization, and will be available for implementation by countries around the globe.

While the use and application of ICD-10 (and soon ICD-11) in progressive countries is dependent on complete clinical documentation, many developing countries may capture only the admitting diagnoses (ICD coded data) and discharge status e.g., dead or discharged. These diagnoses represent the common diseases being treated and are usually extracted from the documentation in the medical record and applied to each encounter, be it manually or electronically. The encounter data is linked to the MPI data by the unique identifier discussed earlier.

PATIENT DISPOSITION

The patient disposition is the sixth data element of the patient encounter. To better track patient outcomes, the patient disposition is defined as the

consequent arrangement or event ending a patient's encounter in a facility, should be recorded on each patient encounter. Patient dispositions include:

- Discharge: include the date of discharge
- Transferred: reflect the date and the facility or place the patient was transferred to
- Died: the date and location the patient expired should be documented.

VIII. Developing Nation's Perspective

Developing nations have the opportunity to apply industry best practices (see appendices for samples) using the latest technology from the inception. They may not be encumbered by poor system design, antiquated workflow, and resistance to change and innovation that many mature health systems face. These best practices as applied do not need to require 15+ data elements to facilitate patient identification, require copious storage of computer data, or exhaustive training and system design—all items that can be the bane of funding and acceptance. As discussed later in this Module, a few key data elements, when well managed, can be effective in meeting the goals of an accurate MPI while supporting primary use cases (care delivery, data sharing) as well as secondary uses such as research.

IX. Future MPI Options

Advances in digital technology are changing the way MPI data is stored and shared and hold even greater promise for higher data quality and more interoperability in the future. These advances include:

Biometrics. The many types of biometrics that can be used to support accurate patient/person identification include palm vein (reads the unique structure of the veins in the palm), retinal (scans the retinal blood vessels which has unique traits for each individual), iris (measures the Unique patterns using a mathematical approach of the coloring of the eye) , facial (reads the entire facial structure, gaining popularity across many commercial platforms) , and fingerprint (probably used the longest, widely used for variety of use cases in government), to mention a few. Each of these biometric approaches has positives and negatives and will likely be used to authenticate a person and supplement the identity data stored in an MPI. Some countries have also made progress in registering patients into a biometric system, which records one or more of the following: fingerprint, face, iris of the eye, palm of the hand, etc.). In these instances, once the patient has completed a one-time registration into such a system, then the person can prove his identity by presenting himself for the appropriate biometric scan.

Smart Cards. These cards will likely not only hold the MPI level data, but also overview data from a clinical record, perhaps also payment or financial data. This approach could support portability of data as patients seek care in a variety

of settings and geographies, but scanners or readers must be available unless the card is integrated to a cloud-based data source.

Cloud-based approaches. Almost any of the current or future approaches to an MPI or EMPI can be supported in a cloud storage environment and many organizations today will have a “cloud first” strategy. “Cloud storage is a service model in which data is maintained, managed, backed up remotely and made available to users over a network (typically the Internet)”.³

In a cloud storage strategy, whether a private cloud that is paid for and controlled by a specific entity, or a public cloud that contains data from many sources (yet secured and manages the privacy), the goal will be to reduce MPI costs, improve data sharing, and have more effective use of limited technical resources. This approach can be very effective for developing nations if consistent internet access is available.

REVIEW QUESTIONS

1. What are some of the uses of a Master Patient Index?
2. What are the key data elements/attributes of a Master Patient Index?
3. What are three optional data elements of an MPI?
4. Name three different types of systems that might generate a unique identifier for the MPI.
5. How long should a Master Patient Index data be retained?

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Appendix 1

Manual Master Patient Index Procedure, Supplies

- a. For inpatients, the procedure for a manual master patient index could be as follows:
 - 1) Each day the admission registration staff notifies the health record department of all patients registered in the facility. This may be done by sending copies of the admission slips for all patients admitted to hospital, which are usually the carbon copies or computer printouts of the registration forms or face sheets.
 - 2) The MPI is checked to see if any of the patients whose names appear on the admission slips have been previously admitted and if they have an index card. If yes, these cards are pulled out and the current admission information is recorded. The demographic information on the index card must also be checked for any changes in name, address, etc.
 - 3) If the patient has had no previous admission, and therefore no card in the MPI, a new index card is prepared.
 - 4) In some hospitals the completed cards of inpatients are filed in a separate file, called the "in-hospital" or "in-house" file, and remain there until the patient is discharged.
 - 5) At discharge, the MPI card is removed from the "in-hospital box" and the discharge date is recorded. If a death occurred the date may be recorded in red. The patients' index cards are then filed into the MPI. Given the importance of the integrity and accuracy of this index, many hospitals have a second person check the filed card for accuracy.
- b. Organization of the MPI

In the absence of a computerized MPI, special index cards or books or may be used for the listing of patients' names, with index cards being the most preferred.

The most popular and efficient method of maintaining the MPI is on index cards arranged alphabetically in a vertical file with a separate card for each patient. Using this method a single index card can be located readily in one search.

If using a book, it is divided into alphabetical sections. Names are listed under the first letter of the surname in chronological order by date of admission. This method is only feasible for a small facility, but retrieval becomes cumbersome and increasingly difficult for large hospitals, or where the volume of patient admissions or encounters is great, because a strict alphabetical order is maintained. This method is NOT generally recommended for a MPI.

It is not recommended to maintain the master patient index by year of admission or encounter. This is not a good method as patients often forget the date of their last visit, or if they were ever admitted to a particular hospital at all. Much time is lost searching through several sections of the index for the appropriate index card. Nor is it recommended to separate the MPI by sex, that is, to file the cards of male patients in one file and the cards of female patients in another.

c. Methods used for filing

1) Alphabetical - The MPI cards are arranged in the file like the words in a dictionary, following letter by letter of the family name first, then by the given name, and last by the middle name or initial.

- If there are two or more patients with the same family name, cards should be filed alphabetically by the given name. If given names are the same, the middle name or initial should be used to arrange the cards. If the entire name is identical the cards are filed by date of birth, filing the earliest birth date first (the card of the patient who was born first is filed first).
- If an initial is given for a patient's first or middle name, the rule is to "file nothing before something" (Huffman, 1994). Thus, SMITH, P. would come before SMITH, PETER.
- Last names beginning with a prefix or containing an apostrophe are filed in strict alphabetical order, ignoring any spaces or apostrophes. For example, the name O'Leary would be filed as Oleary, and the name Mac Dougal would be filed as Macdougall.
- Compound or hyphenated names are filed letter by letter, as one word; thus Ai-Min would be filed A-I-M-I-N.

- 2) Phonetic - in phonetic filing systems the patients' master index cards are arranged in the file by the first letter of the surname, and then according to sound rather than spelling. Thus all surnames that sound alike, but are spelled differently, are filed together. For example:

SMITH P.	LEA S.	GREENE, JAMES EDGAR
SMYTH P.	LEE S.	GREEN, JAMES EDWARD
SMYTHE P.	LEIGH S.	GREENE, JAMES EDWIN

- While an alphabetical filing system uses 26 letters the "Soundex" system uses only six code numbers.
- Names, which sound alike, but are spelled differently are grouped together in a phonetic patient index, rather than filed letter by letter as in an alphabetical patient index.
- Grouping similar sounding names together lessens the chance of lost index cards due to misspellings and index cards having misspelled names can be more easily located.

d. General filing rules for a Master Patient Index

- 1) Rules for filing MPI cards must be very detailed. It is not easy to locate medical records if you cannot locate the correct MPI card. Filing rules should be posted near the patients' master index for easy reference.
- 2) Use of the MPI and filing of the cards should be by authorized personnel only. Careful orientation of new employees to the proper filing procedures is necessary, as is periodic follow-up on the accuracy of these procedures.
- 3) The MPI should be a continuous file, that is, not divided into years.
- 4) A MPI card should be removed from the file only for updating or placing in the in-hospital box.
- 5) Occasional auditing of the MPI is recommended to monitor filing accuracy. This can be done by having the file clerk place a slightly higher card of a different colour behind each individual card at the time it is filed. A second person, known as the auditor or checker, removes the audit card after checking that each card has been

correctly filed. It is useful to audit the filing done by new personnel to ensure that they are applying the rules correctly.

- 6) A patient whose name has changed since a previous admission will need a new index card. The new index card should be cross-referenced to the original index card. All information recorded on the original card should be entered on the new card. The original card should be cross-referenced to the new card.

Supplies and equipment for a manual Master Patient Index

Index cards, index guides and filing equipment are needed for maintaining a manual MPI.

- a) Index cards - 3 x 5 inch cards (7.5 x 12.5 cms) are generally used, but the size may vary depending on the amount of information to be recorded.

Since the MPI is a permanent file, the card must be durable to withstand much handling. Remember, however, that the heavier the card, the more space required in the file.

- b) Index guides - Index guides for an alphabetical or phonetic MPI file facilitate the location of an individual patient's card. Being slightly larger than the patient's card, the top of the guide with an initial letter of a common surname is extended above the other cards, thus serving as a guide. Phonetic index guides will require, in addition to guides with initial letters or surnames, subguides indicating basic code numbers. The size and activity of the index will determine the number of guides needed. Sturdy construction of guides is also essential.
- c) Filing equipment - Patients' index cards may be filed in cabinets suitable to the card's size. If 3 x 5 inch (7.5 x 12.5 cms) cards are used, they are usually filed in vertical, eight-drawer, triple compartment file cabinets. A power file is considered feasible when the MPI has more than 500,000 actively used cards. At the touch of a button, a power file delivers the required section of the index to the front of the file for easy access.

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