



3M™ Enterprise Master Person Index—Advanced Matching Logic

- Helps prevent duplicate patient records from entering the 3M Enterprise Master Person Index, creating a cleaner and more manageable index
- Reduces need to re-enter patient information by providing the most recent demographic information
- Helps reduce errors created by different data entry practices and multiple registration systems

A costly problem

Duplicate patient records pose one of the most difficult problems a healthcare enterprise faces when integrating patient records from various legacy information systems. Experts estimate a duplicate patient record creates an additional \$100–\$400 in administrative and clinical costs (e.g., duplicate lab tests); the cost to clean up a duplicate record averages \$6–\$10 per record.¹

Besides the financial costs, duplicate records can cause patient care to suffer. When a clinician does not have access to a complete patient record, vital data from previous encounters or the long-term history can be missed. The duplicate record problem is worse for enterprises using multiple information systems to register patients and relying on various methods to reconcile patient identification.

The three most common causes of duplicate records are human error, identity fraud, and attempts to merge data sets from individual systems.² But by using probabilistic logic rules and attribute weighting, the **Advanced Matching Logic (AML)** in the 3M Enterprise Master Person Index (3M EMPI) can help medical record and information systems personnel by limiting the number of duplicate records entering or already existing within the system. The end result? A cleaner, more manageable index.

Clearing up the gray areas

When it comes to identifying a patient, data is rarely black and white. Registration personnel try to reconcile the gray areas during the admissions process, but consider these possibilities for misidentifying one person:

NAME:	ID #	SYSTEM
Benjamin J. Smith	48801	ADT
B. Smith	A9987	Laboratory
Ben Smith	67832	ADT
Benjamin Smith	155092	Clinic
B. J. Smith	44976	Radiology

Expanding the power of the 3M EMPI

The 3M EMPI's Advanced Matching Logic uses probabilistic matching logic rules to analyze multiple data fields and calculate the probability that multiple medical records really belong to one individual. Thanks to these rules, the software can:

- More intelligently compare a multitude of data elements, anticipating possible mistakes and variations
- Match patient records even when their individual data elements are not exactly the same
- Help overcome inconsistencies created by variations in data-entry practices

^{1,2} Carnese DJ, Just BH. "Solving the Identity Management Problem." From the proceedings of Windows on Healthcare IV, Microsoft Healthcare Users Group, Oct. 13, 1998.

3M™ EMPI—Advanced Matching Logic

More importantly, the matching logic can quickly calculate the probability of a record match and present the user with the information needed to determine if two records belong to one patient. In the case of Mr. Smith, AML can resolve whether Ben Smith and Benjamin J. Smith are the same person by comparing information like the Social Security number and date of birth on both records. AML automatically identifies and logs suspected duplicates for later resolution, and can help prevent duplicate records from entering the index in the first place.

How the matching logic works

A patient's data can be accessed actively (from a legacy application), or passively transmitted over an interface from another legacy information system. In either active or passive mode, a record search is completed whenever unique identification criteria (e.g., an enterprise ID number or facility ID/medical record number) are available.

However, if a unique identifier for a record is not available, or no exact match for the identifier can be found, the AML is called into play. Before a new record is added to the 3M EMPI, the matching logic searches for and compares incoming data with existing demographic data already contained in the 3M EMPI. Matching one patient record to another consists of:

- Normalizing all incoming data elements to help facilitate reliable comparisons
- Querying the 3M EMPI patient records and building a candidate list
- Comparing each candidate's data with incoming data and assigning a score that reflects the probability of a match between the two
- Sorting the candidates by their scores and arranging them from highest to lowest probability for the user
- Returning the best candidate(s) to the user

Data is normalized to facilitate searches and comparisons. How data is normalized depends on the data type. For example, a last name has rules that convert the name to uppercase and create a phonetic version of the name, while a first name will convert to uppercase, produce a phonetic version of the name and link to possible aliases. An administrative user can select which rules are applied to each field.

When querying, the incoming fields are first normalized and then used to retrieve candidates from the database. Candidates are then scored based on how well they match the query data. Exact matches receive more points than normalized matches.

Each field is given a weight based on how unique that kind of data is in the database, and administrative users can adjust those weights

Duplicate checking log and tool

In the example below, records scoring in the 95–50 percent range are considered suspicious enough to warrant further examination. Records in this range are logged to a file for a user to review and reconcile with a client application tool provided for viewing and merging possible matches. In that tool, the new patient record and existing patient record are displayed side by side, helping the user resolve whether they are the same individual and merge the records if they are.

% (SCORE)	ACTION TO TAKE
100–95%	Modify the 3M EMPI by updating the existing record of the "best matching candidate" (i.e., the candidate with the highest score).
< 95–50%	Create a new patient record in the 3M EMPI, but log the records as possible duplicates to the duplicate checking report file (where users resolve them using the duplicate record resolution tool).
< 50%	Create a new patient record in the 3M EMPI.

An identity management solution

A wide variety of enterprises can potentially use the 3M EMPI for identity management; after all, it is a master *person* index, not just a master *patient* index. For example, it can be used in other public safety or public health settings (such as prisons, provider registries, etc.) and manage identity information of next-of-kin, guarantors, providers, etc.

Currently, the 3M EMPI is largely used to reconcile the very common and costly problem of duplicate patient records. AML's probabilistic logic rules and attribute weighting are the keys to detecting duplicates, resulting in a cleaner, more manageable index. The 3M EMPI is a tool that can help organizations reduce the time and money spent on reconciling duplicates and sustaining their information systems.

Call today

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