The future of healthcare depends on a new architecture for patient identity interoperability

Verato UMPI™

U.S. healthcare expenditures continue to grow much faster than any other cost segment in the economy and are projected to consume 19.9% of U.S. GDP by 2025[1], compared to worldwide average of 9.9%[2]. Despite these world-beating expenditures, burn-out and poor experience have drained patients and clinicians alike.

In response, there is now a national imperative to improve the efficiency of our healthcare system — achieving the notorious "triple aim" of improving the patient experience, improving population health, and reducing per capita cost. This goal requires a dramatic shift away from point-in-time service, and toward coordination of care across care-givers throughout every care episode and throughout each patient's life.

Truly coordinated care demands broad-based access to patient information across the entire care continuum, which will in turn require focus on accurate patient identity as foundational to achieving the triple aim and a push for interoperabillity of data across siloed systems to enable a true 360-degree view of individuals throughout their care journeys.

Thesis

- The future of U.S. healthcare will involve extensive coordination across the full continuum of care.

- The ability to access patient information is the cornerstone of that coordination.

- Resolving patient identities across disparate systems and enterprises is critical to accessing information.

- Existing MPI technologies cannot resolve patient identities consistently enough or well enough to support the emerging needs.

- Verato new patient identity resolution technology will support the new needs as a highly accurate, nationwide patient identity resolution service.

[1] Centers for Medicare & Medicaid Service

[2] World Health Organization Global Health Expenditure Database

verato
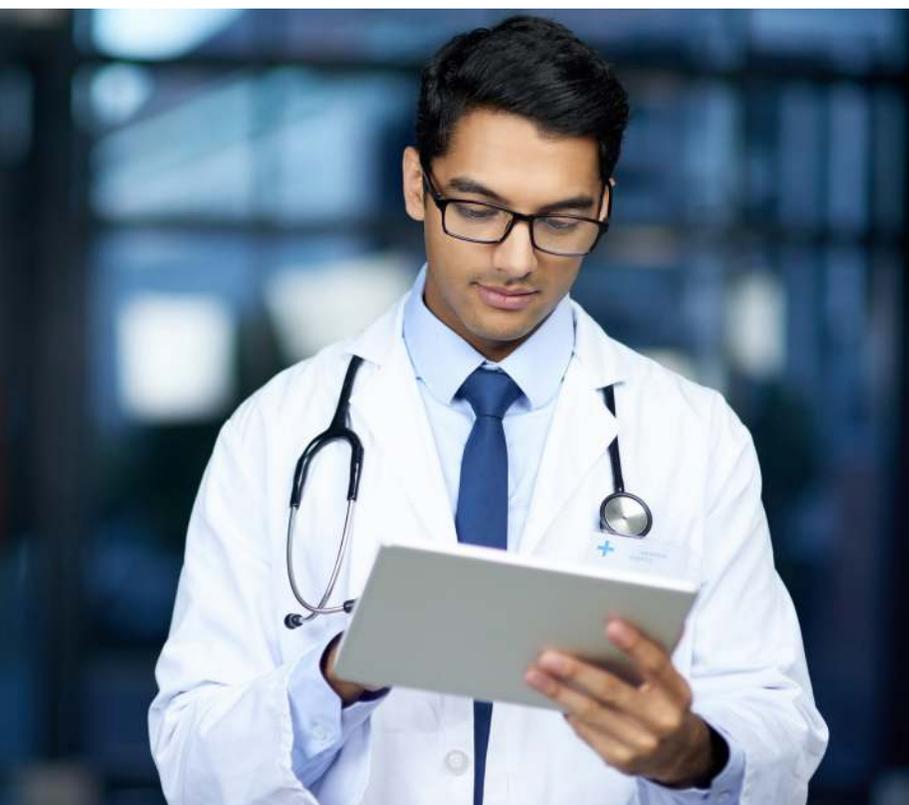
National health expenditures as a percent of gross domestic product
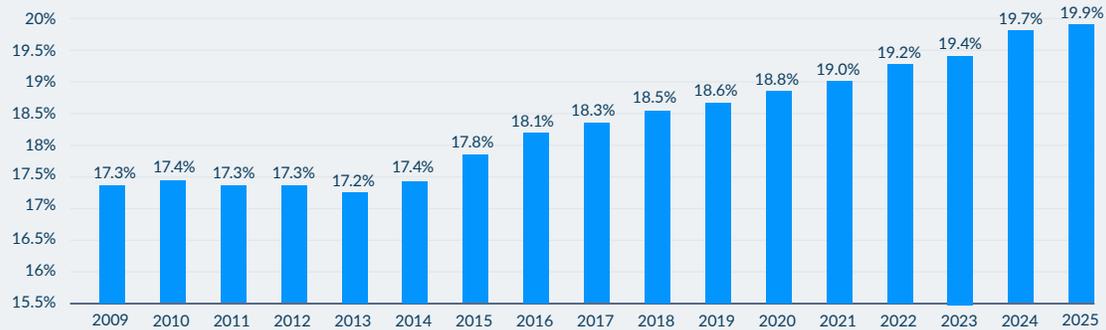
Centers for Medicaid & Medicare Service - National Health Expenditure Tables, 2015
Figure 1: Cost of healthcare: Percentage of GDP compared with life expectancy

# Legislation supports move from episodic to value-based care

The most important policy shift enacted to push this care delivery transformation is not, as you might imagine, the passage of the Affordable Care Act. It's a lesser-known, sweeping and vigorously bipartisan-backed bill, The Medicare Access and CHIP Reauthorization Act of 2015 (MACRA).

MACRA legislation is ending the fee-for-service model as the U.S. has known it. The biggest impact of MACRA is the creation of the Quality Payment Program (QPP) by the Centers for Medicare & Medicaid Services (CMS). The QPP fundamentally changes the way physicians are paid by Medicare by rewarding value-based care. Value-based care is based

on improving outcomes rather than on delivering services. To incentivize this shift, QPP includes massive monetary penalties for underperforming providers, so providers are incentivized more than ever to make improved quality and absolute priority.

Medicare is the largest payer in the country, so these CMS Medicare payment changes are having a massive impact on the overall national approach to payment. Similar accountable care business models, in the form of Accountable Care Organizations (ACOs) are springing up all over the country across lines of business.

Estimated ACO penetration by state

Health Affairs Accountable Care Organizations in 2016

- >20%
- 15-20%
- 10-15%
- 7-10%
- 5-7%
- 3-5%
- 0-3%
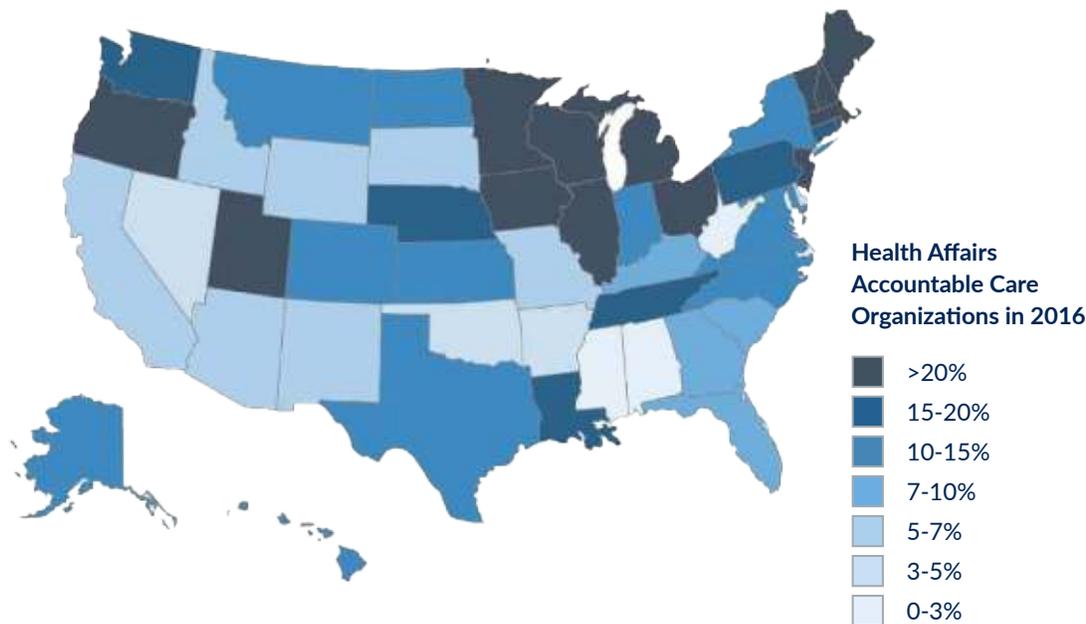
These incentive shifts between providers and payers are now causing fundamental shifts throughout the healthcare industry: health systems are merging with community hospitals and other health systems, physician groups are aligning with accountable care organizations, and health systems and payers are sharing financial risk on a patient population.

Access to patient information is essential to the success of value-based care and the future of U.S. healthcare

The very success of value-based care relies entirely on one critical concept–broad-based access to patient information. Without it, each new caregiver must rediscover the medical history and demographic indicators of every new patient; each member of a care delivery team won't know what the other members have learned or accomplished; and no one will be able to measure the outcomes improvement.

Information lies at the heart of all the efficiencies we hope to gain, all the improvements in care we

hope to deliver, and our fundamental ability to measure both. Every other major industry has already embarked on its transition to the 'information economy' where big data is part of the standard formula for success. Healthcare is poised to take that same step. Information is both the fuel to change processes and the grease that makes all moving parts move smoothly together. Although we are often uncomfortable in talking about health information as 'data', that's exactly the approach we need to take.

verato

Access to patient data relies on patient identity resolution – in person and in medical records

Access to patient information relies on three things: 1) agreed-upon business rules and policies for sharing patient data, 2) standardized access protocols and content in Electronic Medical Record (EMR) systems that house the information, and 3) patient identity matching. There has been significant progress to establish rules by which organizations can agree to share data. Similarly, EMR vendors and Health Level Seven International (HL7) committees have established an initial base of standards for "interoperability" so that one system can query information from other systems. But, all of these solutions assume that both parties can unambiguously refer to the same patient when sharing.

This task would be easy today if we had assigned a unique national patient ID number to everyone at birth or upon entry into the U.S. starting 20 years ago. But most everyone agrees that issuing and maintaining a national patient ID for every single person in the U.S. is both logistically impossible and politically untenable because of the privacy implications. Moreover, distributing a new national patient ID now would do nothing to help link people to the trove of pre-existing medical records that exist in hundreds of systems for every given person. In fact, it would probably make the problem worse for a long while.

Instead we have demographic identifiers like name, address, birthdate, gender, phone, email, and social security number to use to identify a person and their medical records. The problem with those identifiers, is that they are stubbornly error-prone when captured at reception and they change over time.

Information lies at the heart of all the efficiencies we hope to gain, all the improvements in care we hope to deliver, and our fundamental ability to measure both.

The best estimates available indicate that 8-12% of us have more than one identity in any given hospital system, with our actual medical history spread randomly across those seemingly different people. These are called "duplicates" and represent one of the most vexing problems in healthcare information.

All of our medical records are "identified" to individuals using some combination of name-address-birthdate-SSN-phone number. Verato benchmarks with customers across healthcare show that more than 30% of that information is either incorrect or out-of-date in any given patient record database. What's worse is that when databases are combined, as when EMRs are consolidated or when new clinical/lab systems are connected into the care stream, the error rate increases.

Master patient index (MPI) technology was introduced into the healthcare ecosystem to address the identifier problem. The MPI's job is to match identities of patients and their records, even when the identifying data contains some degree of error (including non-errors like nicknames). The problem is, these conventional MPIs are simply not doing the job well enough, and they are not equipped to handle the patient identity resolution challenges in value-based care.

Why don't conventional MPIs work well enough?

The current generation of MPIs were created in the late 1990s and broadly deployed over the last 10 years. They are based on an algorithmic approach that was first described in 1969, called "probabilistic matching." Probabilistic matching works by comparing all demographic attributes (i.e., names, addresses, birthdates, SSN) to decide if there are enough similarities to make a match. This means that MPIs cannot "see through" common situations like maiden names, old addresses, second home addresses, misspellings, default entries (like 1/1/1900 for a birthdate), twins, junior/senior ambiguities, and other ambiguities like hyphenated names. Probabilistic matching guesses that demographic differences are "probably" just typing errors or that a combination of name and birthdate is "probably" unique enough that it doesn't represent someone else.

MPIs are tuned to only make safe guesses because the consequence of making a wrong match (called a false positive) can mean mixing the health information of two different people. Organizations must do a lot of work to help their MPIs make good safe guesses. They must establish and enforce strict data governance standards to improve the quality and completeness of the identity data that enters their systems. They must perform yearly cleanups of their MPIs to ferret out poor quality data and uncover duplicate identities. They must spend months tuning and testing the MPI's algorithms when they initially deploy it, then re-tuning and retesting it any time they want to integrate a new EHR or other IT system.

Most critically, organizations must employ teams of data stewards to manually review and resolve identities that the MPI has flagged as potential duplicates. Whenever an MPI cannot definitively and automatically say two identities are the same person, it creates a task for a data steward to resolve. Some organizations wind up with thousands or millions of potential duplicates in backlog that their data stewards must sequentially work through — never able to work through the backlog as fast as new tasks are created.

On top of the data governance requirements, tuning exercises, and heroic efforts of data stewards, MPIs are costly and time intensive tools. They take months or years to deploy and cost potentially millions of dollars — not including the labor costs of stewardship efforts and periodic cleanup activities. And they require more effort, time, and cost with each new integration of additional EHRs or IT system.

If nothing were changing in U.S. healthcare, we would probably be content with the state of patient matching. But value-based care will require dramatically more accurate and flexible patient matching to support true "identity interoperability" between systems and enterprises.

Conventional patient matching solutions will fail to meet the demands of value-based care

Conventional MPI technologies are expensive to implement and operate, difficult to set up and run, and cannot be easily changed once working. Despite these conditions, most healthcare organizations would agree that they are indispensable. They integrate the patient data from the core hospital systems, so that at least within the four walls of a healthcare system, there is a semblance of consolidated view of the patient.

But the needs for patient matching will grow very dramatically in the next few years. Every healthcare organization will implement new systems including: patient portals, personal health apps, patient outreach systems, and care coordination systems. They will implement new analytics for physician performance, patient outcome measurement, population health analysis, and other risk measures. They will incorporate claims data from CMS and payers, from pharmacies, and from demographic data providers whose data are increasingly indicative of outcome. They will incorporate genomic data and personally-generated health data (PGHD), and will adopt new precision-medicine protocols based on genotype and phenotype data. Most of this new data, new analysis, new measures depend on will come from a myriad of new sources — all of which must be tied to common patients in to the MPI system.

All the challenges faced by an MPI to match and link patient identities within the four walls of an organization are magnified and multiplied when it must match patient identities from other organizations — especially when each organization has different standards around the quality, completeness, format, and governance of its patient

data. This is a huge drag on medical record exchange and care coordination — organizations cannot be sure they are exchanging information about the same person, and that they are exchanging that person's complete clinical history.

Even without the new value-based care requirements, the weakness of conventional MPIs is seen in the average duplicate record rate of 8-12%, which leads to incomplete clinical histories, redundant rests, and patient frustration. This results in $17 million average annual cost to a healthcare facility in denied claims and lost revenue due to misidentification[1]. It results in the 86% of healthcare systems who say they know of a medical error resulting from poor patient matching[2].

The fundamental matching technique used in conventional MPIs was invented in 1969 and has advanced only in its implementation details since then. It's safe to say that probabilistic matching algorithms reached the mathematical limit of their matching ability in the mid 2000s, and that no real innovation remains with this model. Something radically new is needed, and that something is Verato UMPI architecture.

All the challenges faced by an MPI to match and link patient identities within the four walls of an organization are magnified and multiplied when it must match patient identities from other organizations — especially when each organization has different standards around the quality, completeness, format, and governance of its patient data.

[1] 2016 National Patient Misidentification Report, Ponemon Institute

[2] 2016 National Patient Misidentification Report, Ponemon Institute

verato

A next-generation MPI technology is needed to meet next-generation needs

Verato UMPI architecture is a groundbreaking new approach to the problem of patient identity resolution. Unlike conventional MPI technologies that must be laboriously deployed and populated with patient data, the UMPI is a pre-built, cloud-based, nationwide master patient index that enterprises can simply "plug into" — without the need for extensive algorithm tuning, data standardization, data governance, data cleansing, or data stewardship processes.

The UMPI is pre-populated with pre-mastered and continuously-updated demographic data spanning the entire U.S. population. It incorporates a powerful new matching technology called Referential Matching™ that leverages this pre-mastered database as an "answer key" to match and link identities that even world-class probabilistic algorithms can never match. Because of its greater accuracy and ease of implementation, it can support the rapidly emerging patient matching needs that conventional MPIs cannot.

Verato created the UMPI over four years, investing over 50,000 man-hours of data science and engineering efforts, spending millions of dollars to curate over a billion commercially-available demographic records sourced from three different industries, and inventing a totally new matching approach to harness its big-data technology. The Verato UMPI is the country's most comprehensive and sophisticated MPI, that any organization can use at a fraction of the cost and effort it would take to deploy and populate a conventional MPI.
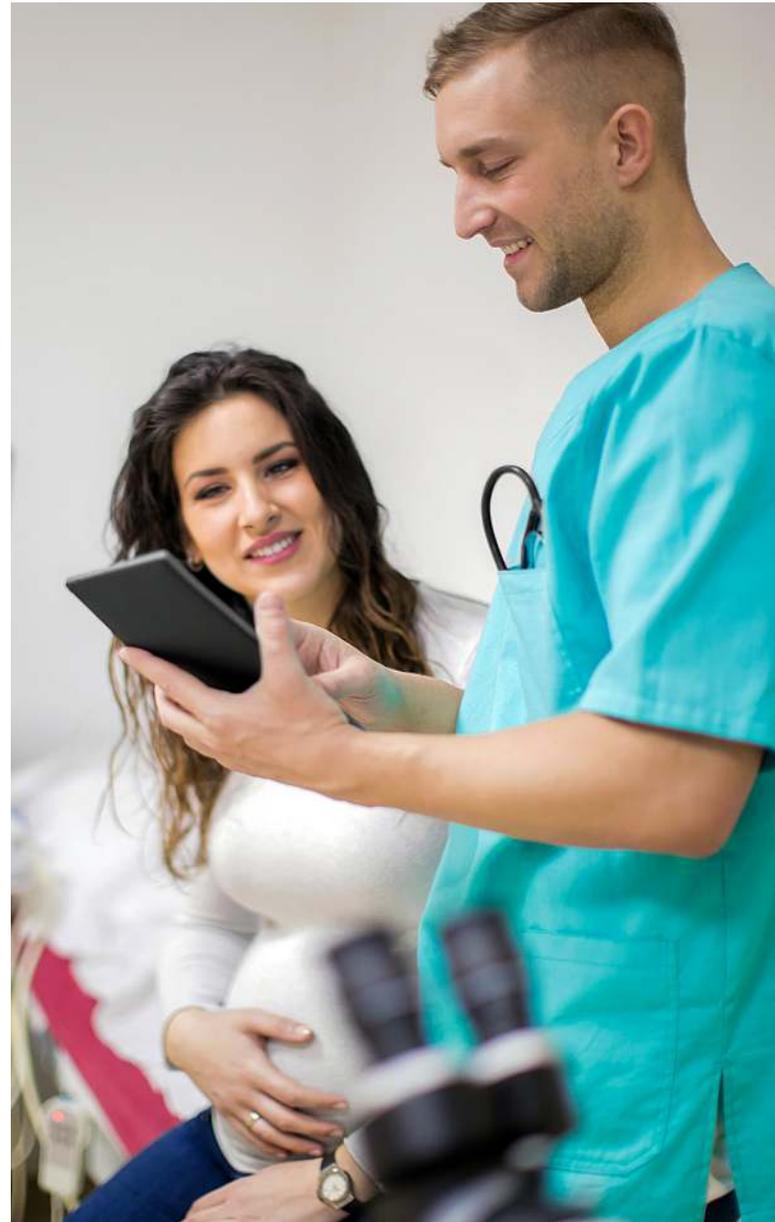
Verato, the identity experts for healthcare, enables smarter growth, improved care quality and efficiency, and better population health by solving the problem that drives everything else — knowing who is who. Over 70 of the most respected brands in healthcare rely on Verato for a complete and trusted 360-degree view of the people they serve to accelerate the success of their digital health initiatives and fully understand consumers' preferences, risks, and needs from the beginning and throughout their care journey. Only the Verato HITRUST-certified, next generation cloud identity platform enables interoperability across the complex digital health ecosystem with unprecedented accuracy, ease, and time-to-value. With an enterprise-wide single source of truth for identity, Verato ensures that you get identity right from the start.

For more information, visit **verato.com**.

verato