HITLAB

MEDSENGINE
Transforming Chronic Disease Control

Patient-Centered, Point of Care, Evidence-based Chronic Disease Control Using MedsEngine

A Summary of Evidence Paper

This report presents HITLAB's independent evaluation of the MedsEngine platform, a clinical decision support solution built by physicians for clinicians, to improve guideline directed treatment, medication adherence, reduce therapeutic variability, and support scalability. The goal is to achieve high-quality chronic disease control, improve outcomes, and decrease the cost of health care.

Shruti Chopra, PhD

Vandana Yadav, MS

Stan Kachnowski, PhD, MPA

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EXECUTIVE SUMMARY

The Chronic Disease Crisis

The scale of the chronic disease burden in the United States is unsustainable. In 2023, 84% of the nation's $4.9 trillion in total healthcare expenditure was consumed by chronic disease management - a figure that continues to climb annually. Sixty percent of American adults live with at least one chronic condition, and 40% are managing two or more. Despite proven pharmacological therapies and detailed evidence-based guidelines from every major professional society, patients living with chronic diseases reach their treatment targets less than half the time. Blood pressure control - defined as achieving readings below 140/90 mmHg - has been stuck below 50% nationally for decades, contributing an estimated $219 billion in annual costs. Under the updated goal of below 130/80 mmHg, the control rate falls further to 21% (NHANES 2021–2023). Heart failure is equally dire: as recently as 2018, only 1.1% of heart failure patients were receiving all three recommended drug classes at maximum dose - a figure that is almost certainly lower today with four classes now recommended. Four common chronic diseases can be controlled at high levels by empowering primary care physicians with guideline-directed medication recommendations at the point of care and by providing information that patients can readily understand. The resulting decrease in clinical inertia and increased medication adherence adds to the ability to control chronic disease at scale.

MedsEngine is a real-time, EHR-integrated clinical decision support (CDS) platform -built for primary care physicians and APPs. It delivers personalized, evidence- based medication recommendations at the point of care for four of the most prevalent and costly chronic conditions in medicine: hypertension, high cholesterol, type 2 diabetes, and heart failure. Crucially, MedsEngine creates value from the abundance of EHR data - it is a precision intelligence layer that integrates on top of existing clinical workflows to produce personalized guideline-directed medication recommendations in seconds, all without disrupting the clinical encounter or requiring additional staff. Single Sign-On (SSO) eliminates any separate login requirement.

MedsEngine's Headline Outcomes

Against this backdrop of persistent underperformance, MedsEngine's outcomes are unparalleled. At primary care deployment sites, the platform has achieved and sustained a blood pressure control rate exceeding 92% for ten consecutive years - more than double the national average of approximately 48%. Control is achieved in fewer than two office visits on average, across all races, compared with months of trial-and-error under standard care.

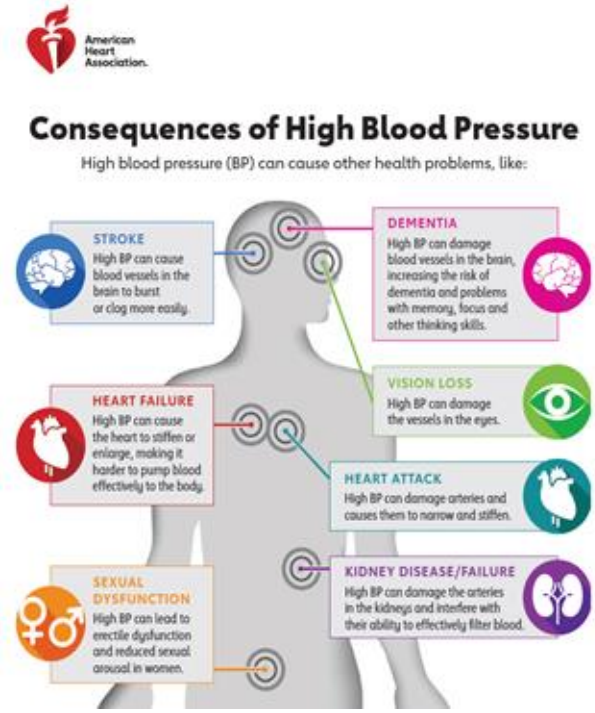
Validated per patient per year cost savings reach $2,500 in hypertension control, $780 in cholesterol, and $1,956 in diabetes. Cardiovascular event rates at MedsEngine sites - MI and stroke - are similar to the benchmarks established by the landmark SPRINT trial. For health system partners and payers, the return on MedsEngine investment has been validated at 20 to 30 times the cost.

MedsEngine’s hypertension personalized hemodynamic approach is not a proprietary hypothesis - it is validated by more than two decades of independent, peer-reviewed science. The evidence base comprises 26 publications, including 6 randomized controlled trials, 2 meta-analyses, a 2024 systematic review, cost-effectiveness analyses, and a real-world primary care cohort of over 14,000 patients.
HITLAB conducted a structured observational heuristic evaluation of the MedsEngine platform in March 2026, encompassing a full platform walkthrough across all four disease modules, clinical workflow integration assessment, usability analysis, and comprehensive evidence review. This document presents HITLAB's independent findings and conclusions.

Background & Clinical Problem

Chronic Disease Burden in the US

The United States faces an escalating chronic disease crisis. In 2023, 84% of the $4.9 trillion in total US healthcare expenditure was consumed by chronic disease management - a figure that continues to rise. Sixty percent of American adults live with at least one chronic condition, and 40% manage two or more. Despite the availability of effective pharmacological therapies and detailed clinical guidelines from leading professional societies, chronic diseases achieve treatment targets less than half the time.



Guideline Adherence Gaps & Provider Workflow Barriers

The persistent gap between guidelines and clinical outcomes is not a knowledge problem - it is an execution problem. Physicians managing patients with hypertension, diabetes, heart failure, and hypercholesterolemia must synthesize more than 855 pages of clinical guidelines (AHA, ACC, HFSA, and ADA), and search for and utilize approximately 160 clinical variables per patient encounter. A cholesterol recommendation alone requires knowing and applying up to 77 patient-specific factors, diabetes management requires 35, and hypertension requires 37. No practitioner can reliably process this volume of data in real time during a clinical visit.

The EHR, for all its value as a data repository, does not help: EHRs surface information but do not synthesize decision logic. Clinical alerts and passive reminders have consistently demonstrated low efficacy because they identify a problem without providing a solution, add cognitive burden without actionable guidance, and irritate clinicians. Studies suggest that US chronic disease guidelines are followed about half the time in real-world practice. Medication adherence follows a similar pattern: roughly 50% of patients with chronic disease are adherent, 25–30% are partially adherent, and 20–25% are poorly adherent or stop therapy altogether. Clinician burnout is, in part, a direct consequence of the cognitive overload of managing complex multi-morbidity patients under current workflow constraints.

Condition	National Control Rate	Annual Savings if Controlled
Hypertension	<50% (<140/90) - decades-long plateau. New BP guideline (<130/80): control drops to 21% (NHANES 2021–2023)	$2,500/patient/year
Type 2 Diabetes	<50% have blood sugar under control (CDC) Personalized A1C goal requires 35 EHR factors - rarely calculated	$1,956/patient/ year
Heart Failure	Only 1.1% on 3-class GDMT max dose (ACC 2018) Likely lower today - 4 drug classes now recommended	$14,000 per avoidable hospitalization
Cholesterol	39M not on recommended statin	$780/patient/ year

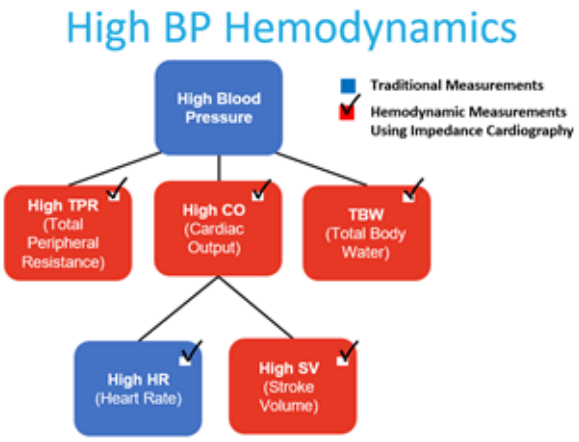
Background & Clinical Problem

The Hemodynamic Blind Spot in Hypertension

A critical and frequently overlooked dimension of hypertension control lies beyond guideline adherence. Standard blood pressure measurement identifies that a patient has high BP - but does not identify why. The hemodynamic causes of hypertension are heterogeneous: approximately 47% of hypertensive patients present with vasoconstriction, making them good candidates for standard first-line agents (ACE inhibitors, ARBs, CCBs, and thiazides). The remaining 53%, however, exhibit elevated cardiac output, fluid overload, or mixed hemodynamic phenotypes - and these patients are less likely to respond to standard therapy. Impedance cardiography (ICG) is a non- invasive, FDA-approved, inexpensive device that accurately measures all three hemodynamic causes of elevated BP.

Epidemiological data from NHANES (Mahajan et al. 2020, n=34,238) and a 45,082-person cross-sectional study (Caraballo et al. 2022) confirm that no demographic feature - not age, race, sex, or BMI - can reliably predict a patient's hemodynamic phenotype. ICG testing determines the cause of high BP, so the correct drug class can be recommended for each patient, and is the foundational scientific argument for MedsEngine's hypertension module. The lack of hemodynamic knowledge may be a contributing factor for population-level BP control remaining below 50% for decades despite the availability of effective medications and detailed guidelines.

The root cause of persistently poor chronic disease control is not the absence of data - it is the near–impossibility of gathering the data manually and utilizing long guidelines during a standard clinical encounter.



Policy, Payer, and Value-Based Care Context

The policy environment is increasingly aligned with the outcomes MedsEngine produces. The shift to value-based care contracts, HEDIS and STAR quality measures, and shared savings models creates direct financial pressure on health systems and practices to improve chronic disease control rates. CMS and insurance programs are tying reimbursement to quality outcomes - meaning poor BP and A1c control is no longer just a clinical failure; it is a financial liability. Clinical decision support is explicitly recognized in federal policy as a key enabler of evidence-based care at scale.

From a reimbursement standpoint, ICG testing is FDA-approved and currently reimbursed by CMS under CPT Code 93701 for specific indications, including heart failure. Routine coverage for hypertension management was provided from 1999 to 2003, but was discontinued due to a lack of primary care data being presented in a 2003 CMS review. The 2025 AHA/ACC Hypertension Guidelines do not yet recommend routine ICG testing, citing the need for a large RCT demonstrating hard cardiovascular endpoints. The many articles published since 2003, combined with MedsEngine's ten-year dataset of more than 14,000 patients, represent both an advocacy opportunity and a policy gap that MedsEngine is uniquely positioned to address. Active trials at Duke University (Tailored to You pilot) and Northwestern University (ICG feasibility study) are actively building the evidence needed for future guideline inclusion of hemodynamic treatment.

Gap & Needs Assessment

Clinical Gaps

The clinical gaps that MedsEngine addresses are directly quantified by the randomized controlled trial literature. Across six RCTs conducted between 2002 and 2021, ICG-guided therapy achieves blood pressure control rates of 56% to 92%, compared with 33% to 57% under standard empiric care.

The CONTROL Trial (Smith et al. 2006), conducted across 11 US primary care clinics, achieved 77% BP control versus 57% in the control arm (OR=2.32) - the most directly relevant external RCT to support MedsEngine's deployment context.
Wide variation in guideline implementation across providers and settings compounds the problem.

Insufficient personalization remains a core barrier: complex and detailed guidelines make it practically impossible to apply all recommended factors during a standard encounter.

The gap is stark across all four conditions:

- Hypertension: US BP control below 140/90 has been less than 50% for decades; under the new 130/80 goal, only 21% are at target (NHANES 2021–2023).
- Cholesterol: Up to 50% of eligible US adults do not receive guideline-recommended therapy; 77 patient factors are required for a complete recommendation.
- Type 2 Diabetes: Fewer than 50% of patients have blood sugar under control (CDC); a personalized A1c goal requires identifying 35 specific factors from the EHR and performing the calculation.
- Heart Failure: Only 1.1% of patients were on three drug classes at GDMT at maximum dose (ACC, 2018); likely lower today with four classes recommended.

Operational Gaps

At the operational level, no EHR-native tool currently utilizes multi-variable, multi-guideline, chronic disease recommendations at the point of care in real time – let alone, in a presentation that rapidly increases patient understanding of their disease, its severity, and why a recommendation has been personalized for them. Existing CDS tools largely rely on identification- surfacing a flag that something may be abnormal, but do not provide a specific patient-tailored recommendation. Clinical alerts have demonstrated low efficacy; flag problems without providing solutions and irritate physicians. Patient activation and shared decision-making are similarly under-supported by current technology. Clinical inertia is high when disease control is difficult to achieve, compounding the problem for both physicians and patients.

Economic Gaps

The economic case for better chronic disease management is straightforward. Uncontrolled hypertension costs in the US are $219 billion annually; the downstream costs of uncontrolled diabetes - heart attack, stroke, kidney disease, blindness - are equally staggering. In value-based care environments, improving hypertension control rates from below 50% to above 90% generates substantial and directly capturable upside. HCPCS billing opportunities represent immediate fee-for-service income for practices: appropriate, valuable, but underutilized cardiovascular risk reduction counseling codes (G0446) alone can generate approximately $25,000 per primary care physician per year. Failure to improve STAR ratings and HEDIS scores suppresses reimbursement rates and forgoes high-quality marketing opportunities. Use of ICG testing itself generates net long-term savings of $476 per patient and 0.109 quality-adjusted life years gained over a ten-year horizon (Ferrario et al. 2006, CONTROL Trial cost analysis), yielding a cost per QALY of negative $4,371. At these economics, MedsEngine is cost-dominant in any value-based care framework - generating both better outcomes and net cost savings simultaneously.

Platform Overview

MedsEngine was developed by physicians for clinicians and iteratively refined in live clinical settings - not in a laboratory - which explains much of its workflow efficiency and clinician usability profile. The platform connects to any FHIR-compliant EHR via SMART-on-FHIR, retrieving pertinent clinical data-labs, vitals, medications, comorbidities, and hemodynamic parameters - in seconds. It processes these inputs against operationalized guideline logic and returns a personalized medication recommendation in <10 seconds. The full cycle requires no additional staff, no separate login (Single Sign-On), and no manual data entry.

MedsEngine is easily integrated and never modifies the EHR build, and improves existing workflows. Implementation is typically completed in three to four weeks, requiring approximately 20–30 hours to deploy, depending on the skill level of the IT team. The system is SOC2 Type II certified (recertified March 2026), HIPAA compliant, and hosted entirely on US-based servers. MedsEngine is available in the Epic Showroom, allowing efficient implementation for Epic-enabled health systems.

MedsEngine is an EHR-integrated clinical decision support application designed specifically for busy primary care practices.

Disease Modules

Condition	Key Capabilities & Benchmarks
Hypertension	Incorporates impedance cardiography (ICG) data to identify the hemodynamic cause of elevated BP. Medication effect on hemodynamic type is KEY to BP control. Achieved >92% BP control rate to the goal of <140/90, sustained for 10 consecutive years; >90% control in <2 office visits on average across all races. Validated savings: $2,500/patient/year per controlled patient.
Cholesterol	Rapid population-level evaluation treatment goals and recommendations per AHA/ACC guidelines. Savings of $780/patient/year per controlled patient. Drives appropriate statin intensity prescribing to reach LDL goals; enables HCPCS billing opportunities ($25,000/PCP/year via G0446).
Type 2 Diabetes	Calculates a personalized A1c goal for every patient, synthesizing 35 patient-specific EHR factors. Recommendations go beyond glycemic goals alone to address comorbidities - heart failure, CKD, CAD, MASH, MASLD, and obesity. Validated savings: $1,956/patient/year for each patient brought to control.
Heart Failure	Enables primary care physicians and APPs to confidently and safely titrate to GDMT maximum- tolerated quadruple therapy. Reduces admissions, 30-day readmissions, and emergency department visits. Real-world example: one Clinician increased patients on triple therapy at max GDMT dose from 0% to 26% within one year of assuming care from cardiology.

Platform Overview

Key Differentiators

MedsEngine is differentiated not by a single feature but by the cumulative combination of capabilities no other platform replicates. Eight dimensions define its competitive moat:

1 Hemodynamic Personalization - Beyond One-Size-Fits-All Guidelines

Most CDS tools apply population-level guideline pathways uniformly, resulting in decades of poor US BP control rates. MedsEngine adds non-invasive impedance cardiography (ICG) data into guidelines to stratify patients by hemodynamic phenotype before recommending medications:

- ~47% of hypertensive patients present with vasoconstriction and respond well to drugs that dilate arteries.
- The remaining ~53% have a different hemodynamic profile - elevated cardiac output from high heart rate or stroke volume - and respond quickly to medication classes having the greatest effect on the hyperdynamic heart.
- Hemodynamic heterogeneity, treated uniformly, is likely a primary reason population-level BP control rates have remained below 50% for decades despite guideline availability.
- New goals of BP <130/80 increase the number of patients with hypertension and reduce the at-goal control rate to 21% - MedsEngine has achieved systolic BP <130 in approximately 50% of patients when targeting a goal of <140.
- MedsEngine identifies the appropriate drug class for each patient based on the hemodynamic cause of high BP, not just BP alone- producing faster control and reducing polypharmacy.
- BP control for all races is achievable in <2 office visits on average vs. months of trial-and-error prescribing under conventional approaches.
- This differentiator is backed by a plethora of published articles. A most notable study of maternal hypertension concluded that utilizing ICG to titrate medications, rates of IUGR and perinatal mortality did not increase even with increased severity of maternal hypertension *(Pregnancy Hypertension. 2022;28:123–7).*

53%

Patients MedsEngine reroutes from standard first-line agents

<2 Visits

Number of visits to achieve BP control using MedsEngine

21%

US BP control rate (<130/80) MedsEngine is built to address

ICG-Guided

MedsEngine's hemodynamic approach

48%

US BP control rate (<140/90) MedsEngine is built to fix

Polypharmacy↓

MedsEngine reduces trial-and-error prescribing

MedsEngine is not asking the market to trust a new idea - it is scaling a 10-year proven concept with superior, real-world results.

Platform Overview

2 Unmatched Guideline Depth & Breadth

MedsEngine codifies the full complexity of clinical guidelines - not simplified excerpts or alert-level rules:

- 855 pages of AHA, ACC, HFSA, and ADA guidelines operationalized across four chronic disease modules.
- ~160 clinical variables processed per patient - a volume no clinician can manually evaluate during a standard encounter.
- Guideline logic is regularly updated as new evidence and revisions are published - ensuring recommendations stay current. Months and years of delayed guideline adoption are no longer necessary.
- Covers not just drug recommendations, but comorbidity-aware sequencing, dose titration, safety rules, contraindications, and monitoring parameters.
- Competitive contrast: most EHR-embedded alerts identify problems but fail to provide guideline recommendations (e.g., a single threshold trigger); MedsEngine applies the full guideline logic to arrive at a recommendation.

3 Glass-Box Model - Explainable, Trustworthy, Overridable

MedsEngine operates as a guideline-directed source of truth through full transparency at every step:

- Every recommendation includes a plain-language explanation of why a recommended medication is appropriate for that specific patient.
- Clinicians can see which variables drove the recommendation, review key information, access notes on use and dosing information.
- Patients receive a personalized summary report - written at an appropriate reading level - so they understand their condition, risk, and why a medication is specific to their needs.
- Transparency increases physician confidence, expands APP skillsets, and decreases clinical inertia.
- Improved patient understanding, increases satisfaction, patient activation, and medication adherence, removing key barriers that opaque tools cannot overcome.
- Designed to increase the time available for high- value, meaningful shared decision-making.

855 Pages

Guidelines: MedsEngine fully operationalizes

160 Variables

Clinical factors MedsEngine processes per patient

4 chronic disease modules

Real-time recommendations

Zero-Lag

Full-Chain

GLASS Box

Zero Black Box

Plain Language

Adherence

Understanding drives patient and clinician trust

Inertia

Reduces hesitation to initiate or intensify therapy recommendations

Platform Overview

4 Real-Time Point-of-Care Clinical Decision Support - No Workflow Disruption

Speed and workflow fit are essential for adoption at scale:

- Full recommendation cycle - data pull, processing, validation, and output - completed in <10 seconds.
- One-button launch from the EHR during the clinical encounter; no separate login, no parallel system, no additional staff.
- FHIR data pull eliminates manual EHR searching - MedsEngine retrieves relevant variables automatically and instantly.
- Does not interrupt the clinical encounter - serves as a visual aid that adds value to the visit.
- Competitive contrast: memorization of multiple guidelines, truncated flow diagrams, or traditional lookup tools require clinicians to leave the encounter, use phone applications, enter data, and manually apply logic. MedsEngine eliminates the time needed to search, apply patient-specific guidelines, and perform calculations - enhancing patient engagement throughout.

5 EHR-Integration via SMART-on-FHIR

MedsEngine's technical architecture is a strategic differentiator for health system adoption:

- Connects to any FHIR-compliant EHR - Epic live deployment confirmed; compatible with other major platforms.
- Never modifies the EHR build - no customization, or workflow changes required.
- Available in the Epic Showroom - allowing efficient implementation for Epic-enabled health systems.
- Implementation typically requires 20–30 hours spread over 3–4 weeks.
- SOC2 Type II certified - enterprise-grade security and reliability standards met.
- All data hosted on US servers; fully HIPAA compliant.

6 Patient Activation, Not Just Clinician Alerting

Most CDS tools are clinician-facing only. MedsEngine is designed as a clinician/patient engagement platform:

- Generates personalized patient summary reports at the point of care - not generic handouts, but individualized explanations tied to the patient's own lab values, clinical factors, risk level.
- Visual red/yellow/green status displays give patients an immediate, intuitive understanding of their condition and risk.
- Patient understanding is a documented driver of medication adherence - MedsEngine addresses the adherence problem at its root cause (comprehension) rather than through reminders alone.
- Supports the transition from passive patient to active participant in their own chronic disease management.
- Clinicians can use the patient report to reinforce shared decision-making and provide comprehensive individualized treatment recommendations.

<10 Seconds
Full recommendation cycle time

One Button
Single EHR launch

Auto-Pull

SMART-on-FHIR

Epic Live

SOC2 Type II

Zero IT Build

HIPAA Compliant

Dual-Sided
Engages both clinician and patient

Red/Yellow/ Green
Intuitive visual risk display

Personalized Reports
Tied to each patient's clinical data

Activation
Patients Transition from passive to active participants

Platform Overview

7

Proven at Scale Across a Decade of Real-World Deployment

MedsEngine's outcomes reflect sustained real-world performance - not a controlled trial or pilot:

- 92% BP control rate to <140/90 maintained for 10 consecutive years at deployment sites.
- Performance sustained across thousands of patients, including high-risk, underserved, and vulnerable populations.
- 90% BP control achieved in <2 office visits - compared to months of trial-and-error under standard care.
- Benchmark: the US national BP control rate has remained below 50% for decades - the gap with MedsEngine users demonstrates the platform's effectiveness and value.
- Presentations: European Society of Cardiology (ESC) Congress, AHA Scientific Sessions 2023, ESC Congress 2024, and European Society of Hypertension 2025. A manuscript has been submitted for peer-reviewed publication.
- Recognitions: AMGA Acclaim Award, AMGA Measure Up-Pressure Down, HIMSS Innovation Award Finalist, Anthem Care Clinician Recognition, CDC Million Hearts, NCQA certification in Heart-Stroke, Diabetes, and Patient Centered Medical Home.

8

Multi-Condition Platform with an Expansion Roadmap

MedsEngine is not a single problem solution - it is a platform designed to expand across the full spectrum of chronic disease burden:

- Four live modules - Hypertension, Cholesterol, Type 2 Diabetes, and Heart Failure - all high-cost, high-prevalence conditions in primary care.
- Additional modules on the roadmap (Maternal Hypertension, CKD, Asthma, COPD) each leverage the same FHIR integration and clinical logic infrastructure already deployed.
- For health system adopters, each new module adds clinical and financial value to an existing implementation at near-zero marginal cost - a compounding return model.
- For payers and value-based care organizations, the breadth of condition coverage translates directly to HEDIS/STAR and other metric improvement across a larger member population.
- A Maternal Hypertension module is a focus - expanding into a high-priority area for Medicaid, CMS, and commercial payers.
- Platform architecture positions MedsEngine as an efficient and effective primary care tool for the control of multiple chronic diseases.

>92%
Sustained BP control rate

10 Years
Real-world deployment with a performance track record

50% Gap
National average vs. MedsEngine outcomes

ESC & AHA

NCQA Certified

CDC Recognized

4 Live Modules
Engages both clinician and patient

Near-Zero Cost
Intuitive visual risk display

HEDIS/STAR
Broader coverage drives payer metric

Maternal HTN
High-priority module

Platform Overview

Technology Description

MedsEngine's algorithm-based recommendation engine processes a comprehensive set of clinical inputs - including laboratory values, vitals, impedance cardiography (ICG) hemodynamic measurements, medications, and comorbidities - to generate guideline and evidence-based recommendations at the point of care. Clinical guidelines from the AHA, ACC, HFSA, and ADA have been codified into the algorithm, with a documented update process ensuring ongoing currency. Patient data is retrieved in real time via FHIR (no manual data entry) and utilizes a validation workflow that ensures accuracy of patient factors prior to recommendations. Patient condition and risk are presented in an intuitive red/yellow/green visual display, along with patient-level explanations and culminating with guideline and evidence-based recommendations.

INTENDED USE & TARGET POPULATION

Physicians	Nurse Practitioners	Physician Assistants

PATIENT POPULATION - ADULTS WITH

Hypertension High blood pressure is poorly controlled	**Type 2 diabetes** Poor glycemic control, unaddressed comorbidities, and in need of a calculated Personalized A1c
Dyslipidemia Population-wide guideline directed treatment recommendations	**Heart failure** Not on Quadruple therapy at max-tolerated doses

Primary Setting

Primary Care	Multi-specialty Practices	Health Systems

Empowering Primary Care Physicians To Control Hypertension & Reduce The Need For Referrals

MedsEngine’s evidence-based platform enables primary care physicians to achieve high BP control rates in fewer than two office visits by making medication recommendations based on the hemodynamic cause of high blood pressure and improving medication adherence. These MedsEngine capabilities empower primary care physicians to manage patients with hypertension effectively and significantly reduce referrals to specialists. This not only decreases the costs of care but also expedites BP control and saves patients’ time.

Optimal Setting for Use

Value-based Care	Medicare Advantage	Medicaid
VA	FQHCs	Direct Primary Care

MedsEngine: Clinical Decision Support

01 GUIDELINE-DIRECTED

Guideline-directed recommendations across 4 disease areas

MedsEngine encodes 160 clinical variables across four major disease areas, delivering guideline-directed recommendations in seconds from 855pages of AHA, ACC, HFSA, and ADA guidelines.

160 VARS · 855 PAGES

DELIVERED IN SECONDS

4 DISEASE AREAS

HYPERTENSION	DIABETES	CHOLESTEROL	HEART FAILURE (HFrEF)
37	**35**	**77**	**11**
37 variables 214-page AHA/ACC	35 variables 362-page ADA	77 variables 120-page AHA/ACC	11 variables 159-page AHA/ACC/HFSA

02 ROOT-CAUSE ANALYSIS OF HIGH BLOOD PRESSURE

Eliminates guesswork & polypharmacy

Impedance cardiography identifies the root hemodynamic cause before any medication is recommended - ending the trial-and-error cycle leading to polypharmacy.

EVIDENCE BASED

ICG-GUIDED

REDUCES POLYPHARMACY

03 FHIR DATA INGESTION

Automatic EHR data ingestion via FHIR

FHIR-based data pull eliminates manual re-entry and chart-hunting. Patient data is always current - pulled automatically from the EHR at the point of care.

AUTOMATIC

NO MANUAL ENTRY

NO CHART-HUNTING

04 CLINICIAN VALIDATION

Clinician-controlled validation at every step

All clinical factors related to evaluation and recommendations are presented to the clinician and require validation prior to determining a guideline recommendation. Factors can easily be included or excluded without data entry. Validation of factors also serves an education purpose.

SYSTEM SUGGESTS

CLINICIAN DECIDES

MedsEngine: Clinical Decision Support

05 **PATIENT-LEVEL PERSONALIZATION**

Patient-level personalization across all pathways

Personal clinical factors are used to display the condition, determine risk and goals, and make medication recommendations (900+ for diabetes). A personal A1c goal is calculated from 35 factors; no two patients are treated alike.

- 35 FACTORS
- 900+ ENDPOINT RECOMMENDATIONS

06 **PATIENT REPORT**

Patient-facing summary report in plain language

Plain language with visual aids reviewed at home - improve patient understanding and drive increased medication adherence. Bridges the communication gap between diagnosis and treatment.

- PLAIN LANGUAGE
- VISUAL AIDS
- DRIVES ADHERENCE

07 **EDUCATION TOOL**

Education tool for advanced practice providers (APPs)

Supports APPs and clinicians with embedded guideline reasoning - closing the knowledge gap at point of care across all skill levels.

- NURSE PRACTITIONERS
- CLOSES KNOWLEDGE GAPS
- INCREASED CONFIDENCE

08 **ADMINISTRATION LAYER**

Robust admin layer for clinical vocabulary

Configuration layer to allow rapid and easy clinical updates of ICD-10, CPT, LOINC, RxNorm, and other codes/statuses.

- ICD-10
- CPT
- LOINC
- RxNORM

09 **ENTERPRISE INFRASTRUCTURE**

Hosted on Microsoft Azure

Full tenant data isolation. FHIR-based authentication. SOC 2 Type II and HIPAA compliant - enterprise-ready out of the box.

- MS AZURE
- HIPAA
- FHIR AUTH
- TENANT ISOLATION

Other Specialties: Successful Use Of Hemodynamics And Future Prospects

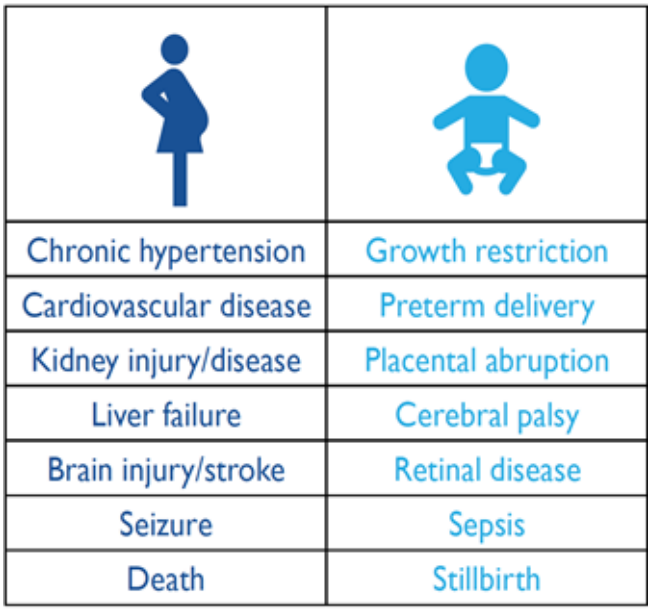
Hypertensive Disorders of Pregnancy

Hypertension in pregnancy represents one of the most clinically urgent and financially significant challenges in maternal healthcare. In the United States, births involving hypertensive disorders cost four times more than standard deliveries, with the average cost of a preterm infant reaching $65,000.

The consequences extend beyond cost - the U.S. ranks among the highest maternal mortality rates across 38 high-income countries, and 33rd for infant mortality, underscoring a critical gap in the management of blood pressure during pregnancy.

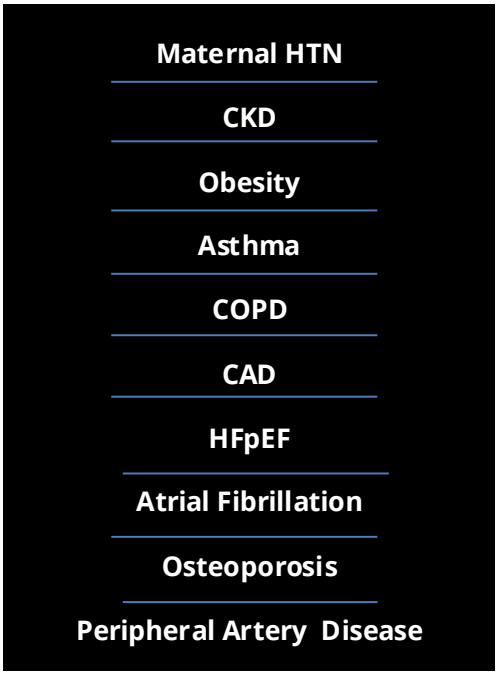
Uncontrolled hypertension in pregnancy carries severe risks for both mother and child, including chronic hypertension, cardiovascular disease, kidney injury, liver failure, brain injury, stroke, seizure, death on the maternal side, growth restriction, preterm delivery, placental abruption, cerebral palsy, retinal disease, sepsis, and stillbirth for the infant. Clinical evidence supports the value of a targeted, evidence-based approach.

Research from Marshall University's Joan C. Edwards School of Medicine, studying 958 mothers, demonstrated that impedance cardiography-directed antihypertensive therapy did not increase rates of intrauterine growth restriction or perinatal mortality, even as maternal hypertension severity increased, concluding that this low-cost, non-invasive approach should be considered for optimizing outcomes in pregnancies complicated by chronic hypertension.



Chronic hypertension	Growth restriction
Cardiovascular disease	Preterm delivery
Kidney injury/disease	Placental abruption
Liver failure	Cerebral palsy
Brain injury/stroke	Retinal disease
Seizure	Sepsis
Death	Stillbirth

Future possibilities



The MedsEngine Team

Douglas E. Romer, MD
CMO & COO

With nearly four decades of clinical and leadership experience in family medicine, Dr. Douglas E. Romer brings deep expertise in chronic disease management, holding NCQA recognition in Patient Centered Medical Home, Heart/Stroke, and Diabetes. As Chief Medical Officer of PriMED Physicians, the group was recognized as a CDC Million Hearts Champion and #1 in the AMGA Measure Up/Pressure Down campaign. As CMO at MedsEngine LLC, he has focused on developing and implementing evidence-based, real-time clinical solutions for multiple chronic diseases – including hypertension, diabetes, dyslipidemia, and heart disease - always from within the primary care setting where it matters most.

Mike Gearhardt
CEO

Mike brings more than 40 years of financial and operational executive leadership to MedsEngine. His involvement grew from his tenure as a board member of MediSync, where he witnessed the platform's impact on chronic disease management and recognized its commercial potential. He has served as CFO of publicly traded companies, led public equity offerings, held senior operating roles driving strategic growth, and owned and operated multiple small businesses. He currently serves on several for-profit boards, holds an MBA from the University of Dayton, and is a licensed CPA in Ohio.

Ray Kaiser, MBA
Chief Technology Officer

With over 20 years of experience spanning enterprise software development and healthcare technology, Ray Kaiser brings the technical vision and leadership behind MedsEngine - a Microsoft Azure-based, EHR-integrated chronic disease management platform that has achieved 92% at-goal blood pressure outcomes against a nationwide average of 48%, with 97% positive physician feedback and 99.95% system uptime. Holding an MBA from Wright State University and a BS in Chemistry from The Ohio State University, he combines strategic business acumen with deep technical expertise to drive MedsEngine's evidence-based, real-time approach to chronic disease control in primary care.

HITLAB Evaluation Framework

Evaluation Methodology Steps

HITLAB's evidence assessment spans five domains, each essential to a complete evaluation of MedsEngine as a clinical decision support platform for chronic disease control:

01: Usability and Workflow Impact
Provider experience, time savings, and encounter quality as assessed through platform walkthrough

02: Patient Engagement and Activation
Patient understanding, shared decision-making, satisfaction, treatment rationale, and medication adherence

03: Clinical Outcomes
Control rates, population health assessment, guideline adherence, personalized data, scalable, sustainable, uniform and consistent process

04: Independent Scientific Literature
Peer-reviewed evidence, data analyses, systematic reviews, and analyses supporting the hemodynamic evaluation of high blood pressure

05: Economic Value
Cost savings per condition, avoided cardiovascular events, revenue impact - HCPCS billing, HEDIS, STAR, CAHPS and other performance metrics

MedsEngine's personalized hemodynamic approach is validated by decades of independent, peer-reviewed science. The evidence base comprises 26 publications, including 6 randomized controlled trials, 2 meta-analyses, a 2024 systematic review, cost-effectiveness analyses, and a real-world primary care cohort of over 14,000 patients. Noteworthy publications demonstrate high control rates in nephrology patients and pregnant women with maternal hypertension.

HITLAB conducted a structured observational heuristic evaluation of the MedsEngine platform and all supporting evidence in March 2026. This document presents HITLAB's independent findings and conclusions.

Usability And Workflow Impact

HITLAB conducted a structured observational heuristic evaluation of the MedsEngine platform. The independent assessment and evaluation included a full walkthrough of platform capabilities across the disease modules, clinical workflow integration assessment, usability analysis using the Nielsen heuristic framework, and a comprehensive evidence review.

HITLAB Heuristic Evaluation

USER PERSONAS

Personas provide insights into human experience, pain points, motivations, and realities. They are a research-based empathy tool to understand the needs and barriers of a population. For the MedsEngine platform, we developed the persona of a 42-year-old Family Physician working in a busy urban clinic setting.

Persona: 42-year-old Family Physician

Dr. Emily Carter

Occupation: Family Physician | Age: 42

"In a fast-paced environment with limited time, multiple long guidelines, and data buried in a chart, having real-time, guideline-based support helps me make confident, consistent decisions and deliver care that truly benefits my patients"

Background

Dr. Carter works in a busy urban clinic managing a high volume of patients with chronic conditions, including diabetes, hypertension, cholesterol, and heart failure. She uses an EHR daily but often finds it fragmented, clumsy, and time-consuming, limiting her ability to make eye contact and simply focus on her patients.

Goals

- Deliver accurate, evidence-based care in less time.
- Improve outcomes by controlling specific metrics - A1c, BP, cholesterol level and others.
- Reduce cognitive burden during patient encounters.
- Find time for meaningful patient engagement.

Challenges

- Improve work life balance in a fast-paced, busy practice, and provide exceptional patient care.
- Utilize multiple excellent guidelines to make accurate recommendations without the need to memorize.
- Searching the EHR for hundreds of clinical factors necessary to follow guidelines.

Motivations

- Empowered to make quick, consistent, and confident decisions with complex patients.
- Driven to deliver high-quality care under pressure.
- Committed to making a difference by truly caring for patients and controlling their many chronic diseases.

Frustrations

- Fear of being overwhelmed with workload demands
- Wasting time using multiple apps, tools, and a clumsy EHR.
- Too many clicks to navigate within the EHR.
- Keeping up with extensive and detailed guidelines that often change, and are very difficult to apply in real time.

Needs

- Intuitive platform developed by physicians who practice in the real world.
- Point of care real time guideline-based treatment recommendations.
- Patient facing interface that helps increase understanding of their disease and my recommendation.

HITLAB Heuristic Evaluation

USER PERSONAS

Personas provide insights into human experience, pain points, motivations, and realities. They are a research-based empathy tool to understand the needs and barriers of a population. For the MedsEngine platform, we developed the persona of a 58-year-old, long-haul truck driver suffering from type 2 diabetes and hypertension.

Persona: 58–year old patient with high BP and diabetes

Michael Johnson

Occupation: Truck Driver | Age: 58

"I'm trying to manage my health, but between confusing instructions, too many medications, and my daily routine, I just need someone to simply help me understand why, what to do, and how to stick to it."

Background

Michael is a long-haul truck driver who has been living with type 2 diabetes and hypertension for over 8 years. His job involves long hours, irregular meals, and limited physical activity. He visits his primary care physician every few months but struggles to consistently follow treatment plans.

Goals

- Check and keep blood sugar and blood pressure under control.
- Avoid hospitalizations and long-term complications.
- Maintain the ability to work and support family.
- Find ways to take medications every day and at the right time.

Challenges

- Improve work-life balance with limited health literacy.
- Lifestyle constraints (diet, exercise on the road).
- Not understanding the importance of tight control of his diabetes and high blood pressure.
- Difficulty getting home BP and blood sugar readings.
- Poor medication adherence.

Motivations

- Fear of complications like his father experienced with a heart attack and stroke.
- Just tired of not feeling well
- Desire to stay healthy for his wife, children, and grandchildren.
- Reduce medical expenses, emergency room visits, and days not being able to work.

Frustrations

- Doesn't really understand why he needs to check his BP and blood sugars.
- Gets overwhelmed and wants to know why it's important to take so many medications.
- Limited time with the doctor and unanswered questions.
- Inconsistent advice from different providers in the same office.

Needs

- Meaningful communication with his provider.
- Understanding his diseases and level of risk.
- Clear explanation of why and how medications will help
- Feeling cared for and receiving consistent, personalized treatment.

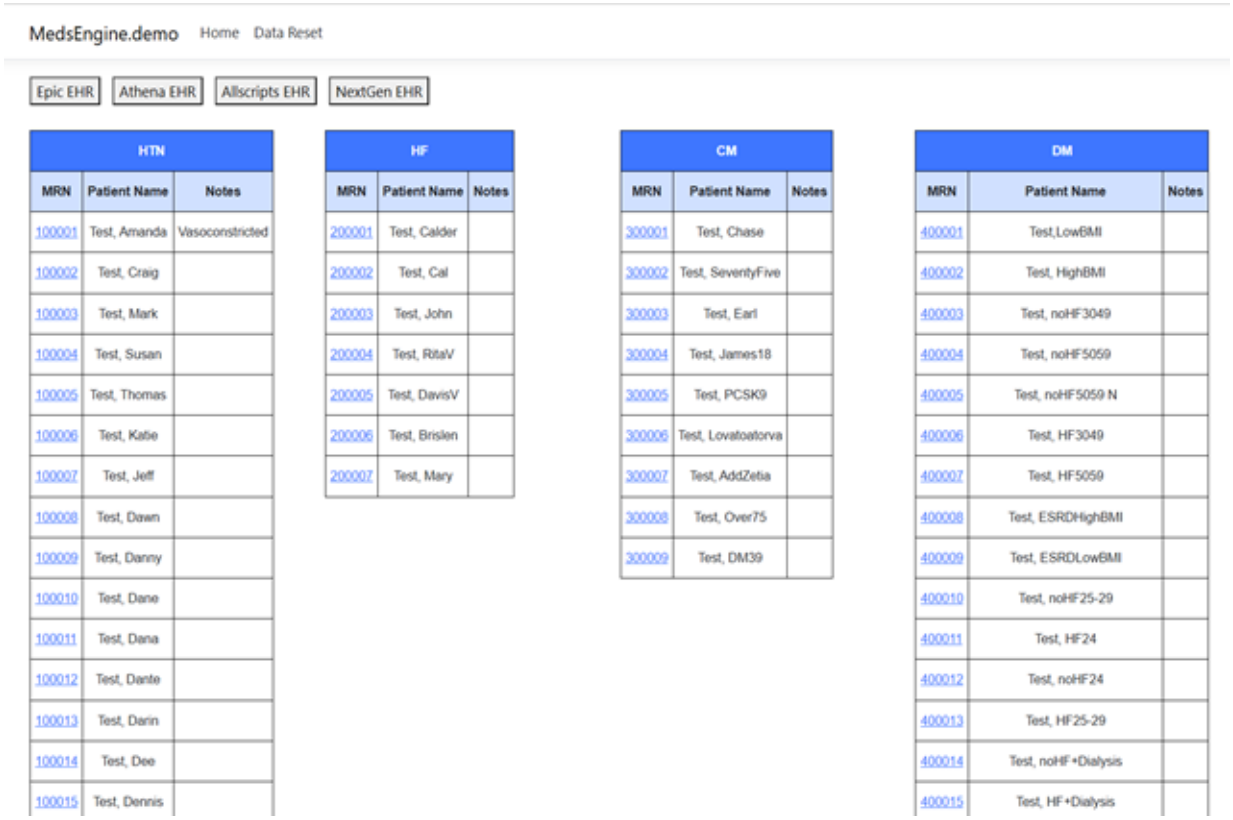
HITLAB Heuristic Evaluation

HITLAB conducted a structured observational heuristic evaluation of the MedsEngine platform. The independent assessment and evaluation included a full walkthrough of platform capabilities across the disease modules, clinical workflow integration assessment, usability analysis using the Nielsen heuristic framework, and a comprehensive evidence review.

Key Observations

Demo Home - EHR Integration & Patient List

- Supports integration with multiple EHRs, including Epic, Athena, Altera, NextGen, eClinicalWorks, Cerner, and others.
- The MedsEngine demo page is organized by chronic disease modules:
  HTN - Hypertension, HF – Heart Failure reduce Ejection Fraction, CM – Cholesterol Management, DM - Type 2 Diabetes.
- MedsEngine is integrated with the EHR using FHIR and Smart on FHIR. Clinicians simply click a “MedsEngine” button from the patient's EHR. No separate login required.
- Launching MedsEngine opens a new browser instance while authentication and FHIR API data retrieval happen automatically in the background.



MedsEngine.demo Home Data Reset

Epic EHR | Athena EHR | Allscripts EHR | NextGen EHR

HTN		
MRN	Patient Name	Notes
100001	Test, Amanda	Vasoconstricted
100002	Test, Craig	
100003	Test, Mark	
100004	Test, Susan	
100005	Test, Thomas	
100006	Test, Katie	
100007	Test, Jeff	
100008	Test, Dawn	
100009	Test, Danny	
100010	Test, Dane	
100011	Test, Dana	
100012	Test, Dante	
100013	Test, Darin	
100014	Test, Dee	
100015	Test, Dennis	

HF		
MRN	Patient Name	Notes
200001	Test, Calder	
200002	Test, Cal	
200003	Test, John	
200004	Test, RitaV	
200005	Test, DavisV	
200006	Test, Brislen	
200007	Test, Mary	

CM		
MRN	Patient Name	Notes
300001	Test, Chase	
300002	Test, SeventyFive	
300003	Test, Earl	
300004	Test, James18	
300005	Test, PCSK9	
300006	Test, Lovatoatorva	
300007	Test, AddZetia	
300008	Test, Over75	
300009	Test, DM39	

DM		
MRN	Patient Name	Notes
400001	Test,LowBMI	
400002	Test, HighBMI	
400003	Test, noHF3049	
400004	Test, noHF5059	
400005	Test, noHF5059 N	
400006	Test, HF3049	
400007	Test, HF5059	
400008	Test, ESRDHighBMI	
400009	Test, ESRDLowBMI	
400010	Test, noHF25-29	
400011	Test, HF24	
400012	Test, noHF24	
400013	Test, HF25-29	
400014	Test, noHF+Dialysis	
400015	Test, HF+Dialysis	

Image 1: MedsEngine Demo Platform - EHR Integration Examples & List of Different Patient Types

Key Observations

Action Center - Multi-Disease Overview Dashboard

- The Action Center provides a single-glance overview of chronic conditions: Cholesterol, Hypertension, Type 2 Diabetes, and HFrEF (Heart Failure reduced Ejection Fraction).
- Active disease modules are highlighted while undiagnosed disease modules are greyed out
- One or several disease modules can be selected at the same time.
- Each disease module displays real-time status flags (e.g., 'BP not at goal,' 'Lab past due,' 'Risk never assessed,' 'At Goal', etc.) - proactively alerting clinicians to disease status.
- Important clinical factors are presented for quick review. Those not at goal, at abnormal levels, needing measurement, others are highlighted in RED.
- Dates of last recommendation and other important normal results are also present.
- Valuable reminders are provided when there is a need for reevaluation due to changes in clinical factors. Example: If only 1 of 77 clinical factors needed to evaluate cholesterol has changed since the last instance of MedsEngine, a reminder is provided to suggest re-evaluation.

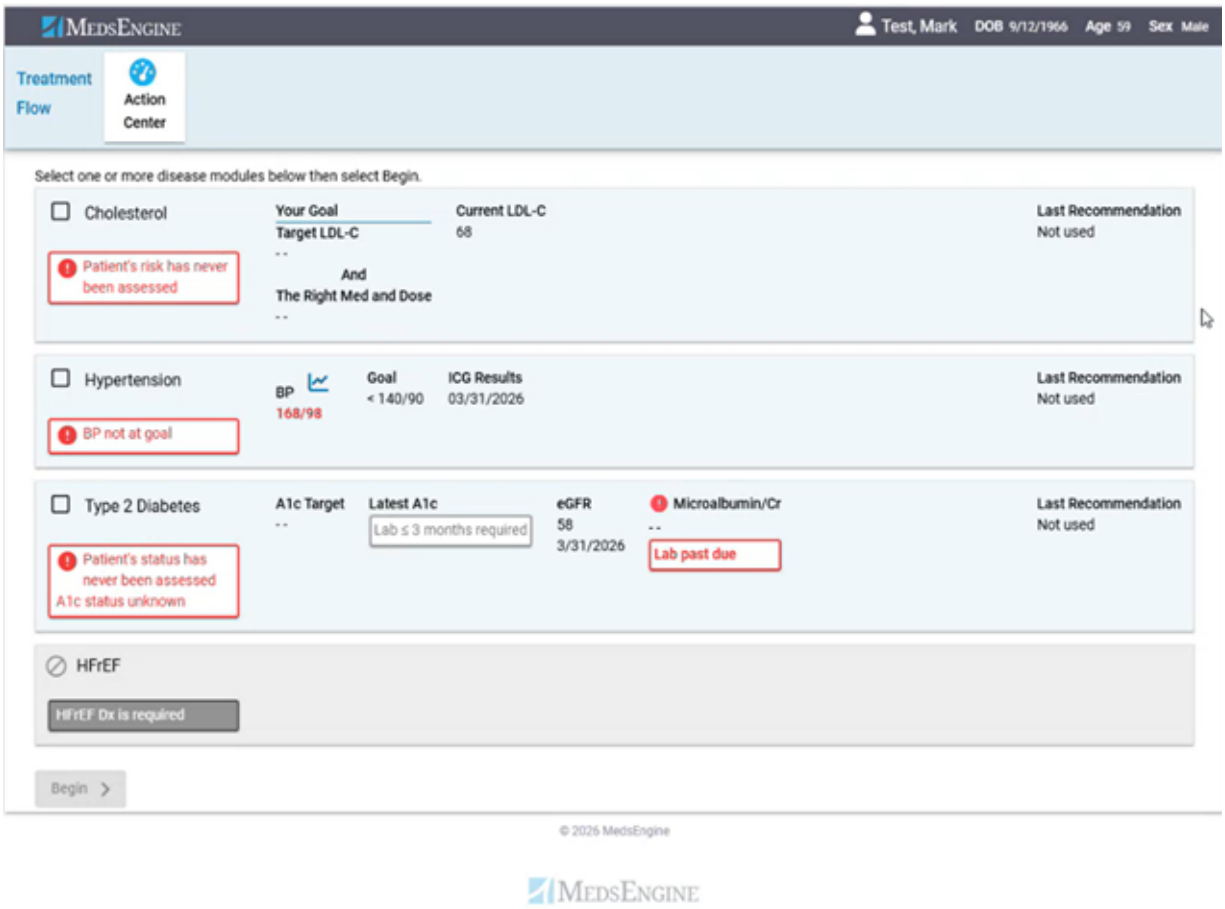


Image 2: MedsEngine Platform showing Action Center - Multi-Disease Overview Dashboard

Key Observations

Hypertension Validation - Patient Factor Review

- Patient Factors: EHR data automatically populates BP, Heart Rate, Height, Weight, BMI, Age, and Race - eliminating manual data entry.
- Disease Factors: chart diagnoses, labs, etc., needed to utilize guidelines, are extracted from the EHR and displayed in a structured format for review and validation.
- Pertinent Positives: diagnosed diseases and active factors. Example: Chart ICD codes for DM and Gout, plus labs indicating CKD Stage 3.
- Pertinent Negatives: undiagnosed diseases and inactive factors are in a separate panel for physician review to ensure a recent or uncharted condition does not exist.
- Clinicians can move disease factors between panels so only pertinent positives that are identified will be used to determine guideline recommendations.
- Orange warning icons suggest diagnoses that are identified by abnormal labs but not included in the EHR patient problem list. Example: Multiple labs suggest CKD is present, but not on the problem list, prompting clinician consideration of adding a CKD diagnosis.
- Flexible and clinician-controlled: all pertinent disease factors can be considered and moved to a Negative or Positive status, providing an opportunity for education.

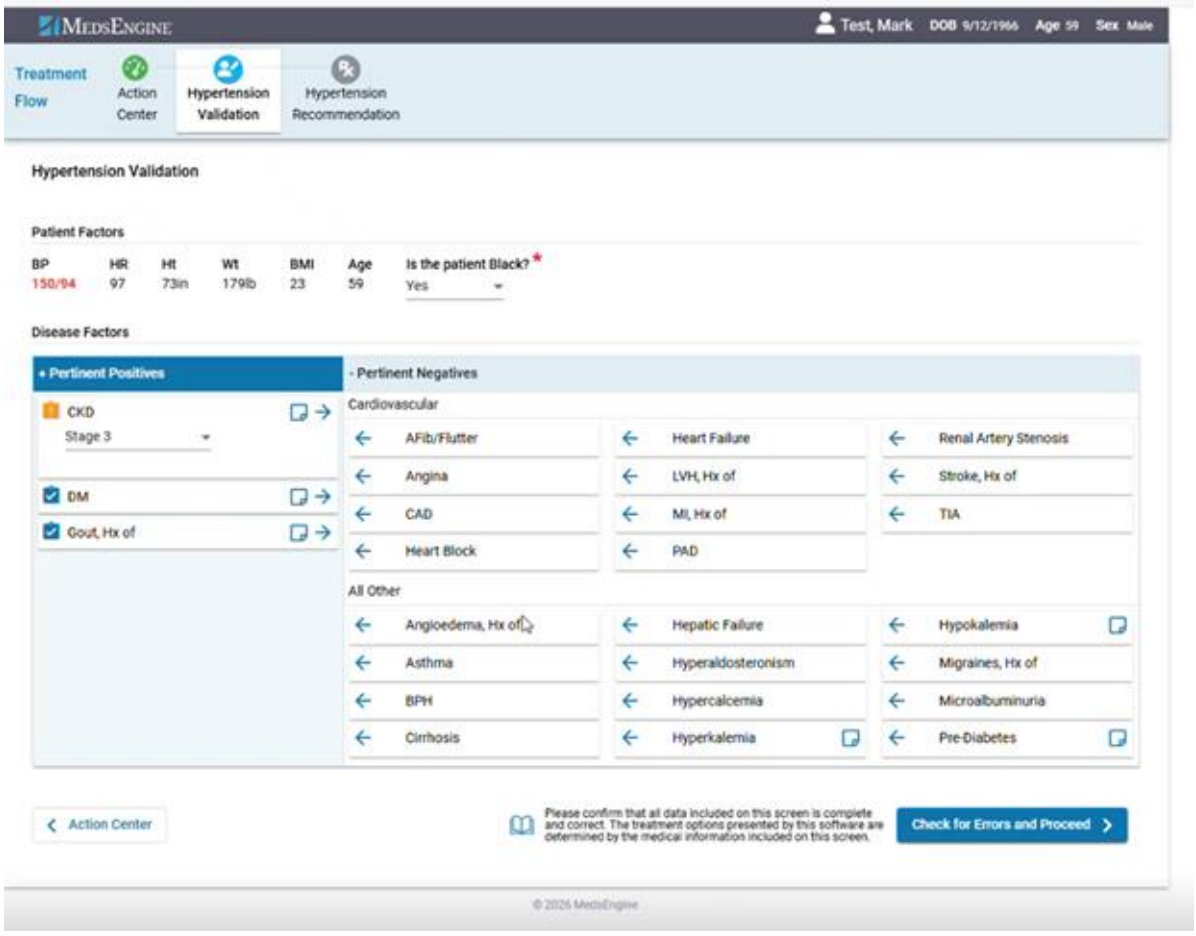


Image 3: MedsEngine Platform showing Hypertension Validation - Disease Factors Review

HITLAB Heuristic Evaluation

Key Observations

Hypertension Recommendation - Patient Disease Status and Risk Review

- Unique differentiator: MedsEngine integrates ICG (Impedance Cardiography) data to identify the hemodynamic root cause of hypertension - Vasoconstriction, Mixed Hemodynamic, or Hyperdynamic.
- Visual bar chart clearly displays patient-specific values for: Total Peripheral Resistance (Arteries), Cardiac Power Index (Heart), Stroke Index, Heart Rate, and Total Body Water % (Fluid Level). Medical terms are also in patient-friendly language.
- Red bars indicate out-of-range values; green bars indicate normal ranges - making root cause instantly interpretable by clinicians and easily understood by patients.
- Blood pressure history graph shows SBP and DBP trends across multiple visits, with target range shaded - enabling historical review.
- On the recommendation page, Arteries and Fluid Level are normal (green), but the Heart is not. Cardiac Power Index and Heart Rate are elevated (red), directly identifying root causes of high blood pressure.
- ICG measurements are added to BP measurements - to identify the underlying hemodynamic cause of the patient's elevated BP.

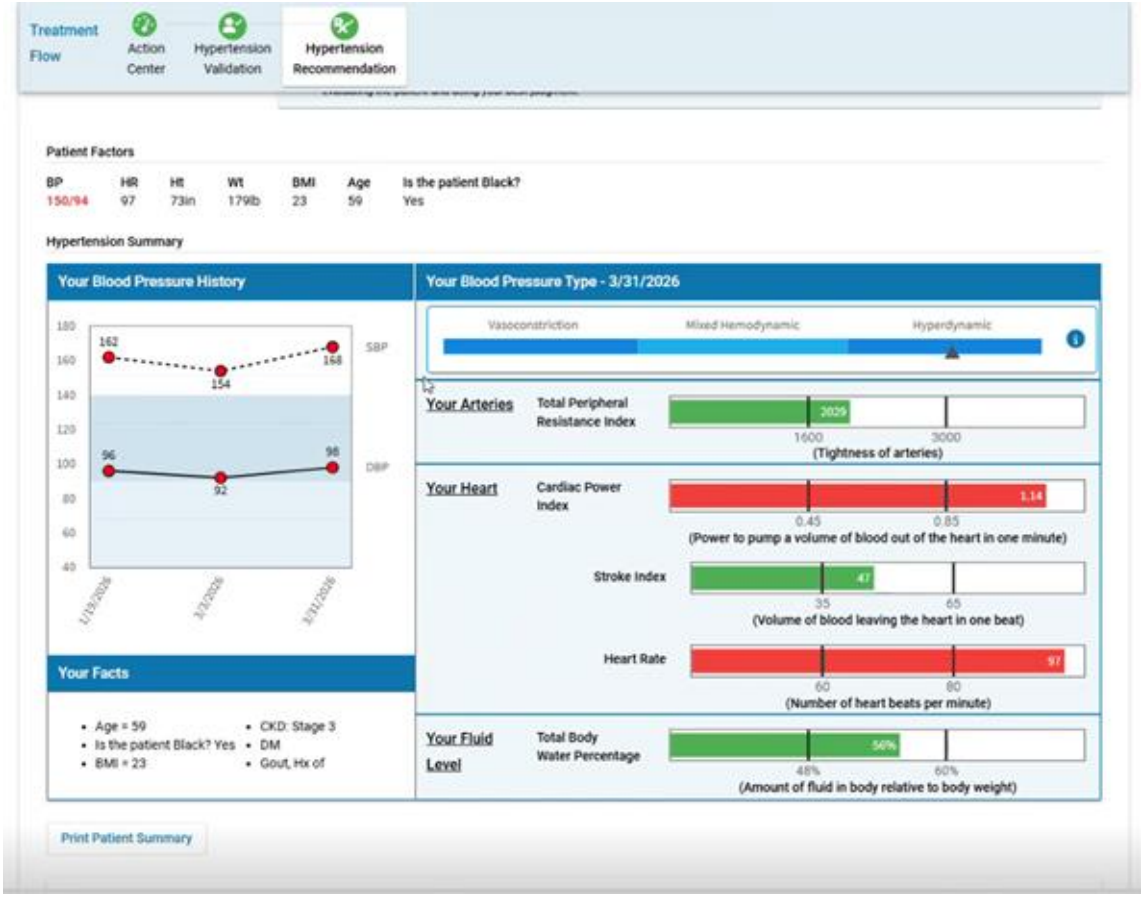


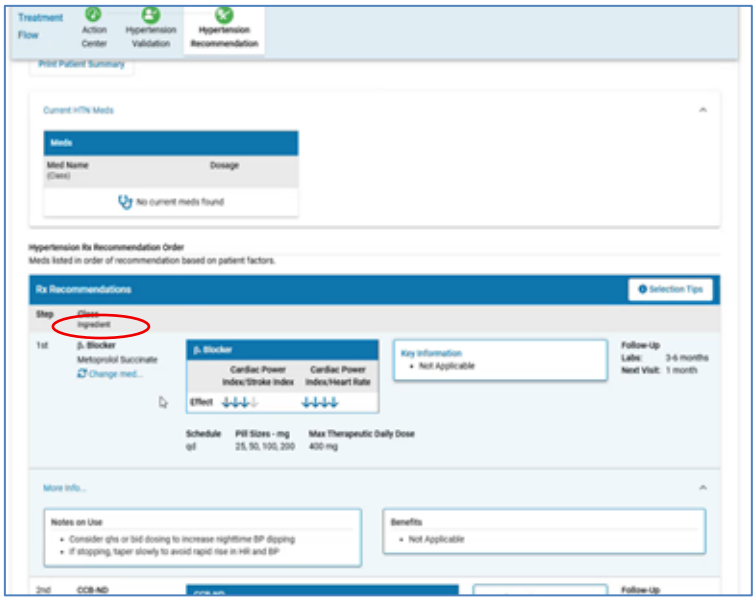
Image 4: MedsEngine Platform showing ICG hemodynamic measurements - blood pressure root cause analysis

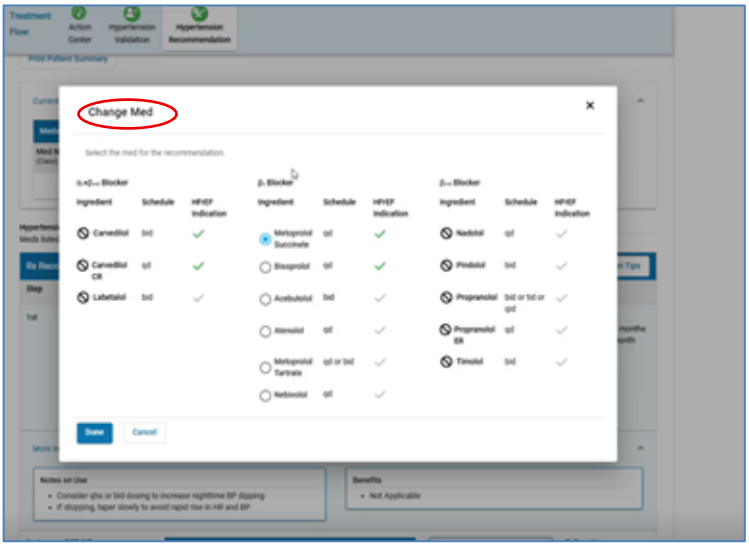
HITLAB Heuristic Evaluation

Key Observations

Hypertension Rx Recommendations and Ability to Change Med Within Class

- Drug class recommendations are in order of ability to affect the hemodynamic (ICG data) root cause of high BP and consideration of age, race, and positive disease factors.
- Drug class information includes: generic name, effect on hemodynamics, Key Information, Follow-up reminders, dosing Schedule, Pill sizes, Max Therapeutic Daily Dose, Notes on Use, and Benefits.
- Key Information is very important to know and share with patients.
- Notes on Use include prescribing information and clinical "pearls."
- Benefits facilitate point-of-care education and information sharing with patients.
- Up to 5 drug classes are listed according to the most effective clinical escalation pathway.
- Contraindications and Allergies are listed.
- Formulary flexibility: if the default recommendation isn't on the formulary or is not affordable, the clinician can quickly select an alternative without leaving the workflow.
- A Change Med option is available if clinicians prefer an alternate drug in class. An update of dosing is then provided.
- For drugs with sub-classes (beta blockers), additional information and indications are provided. Example: certain beta blockers have a green check mark indicating a guideline recommendation to treat HFrEF - increasing optimal prescribing.





Images 5 and 6: MedsEngine Platform showing personalized, ordered medication guidance, Change Med option- vast drug class information

Key Observations

Cholesterol Validation - Lab History & Baseline LDL-C Requirements

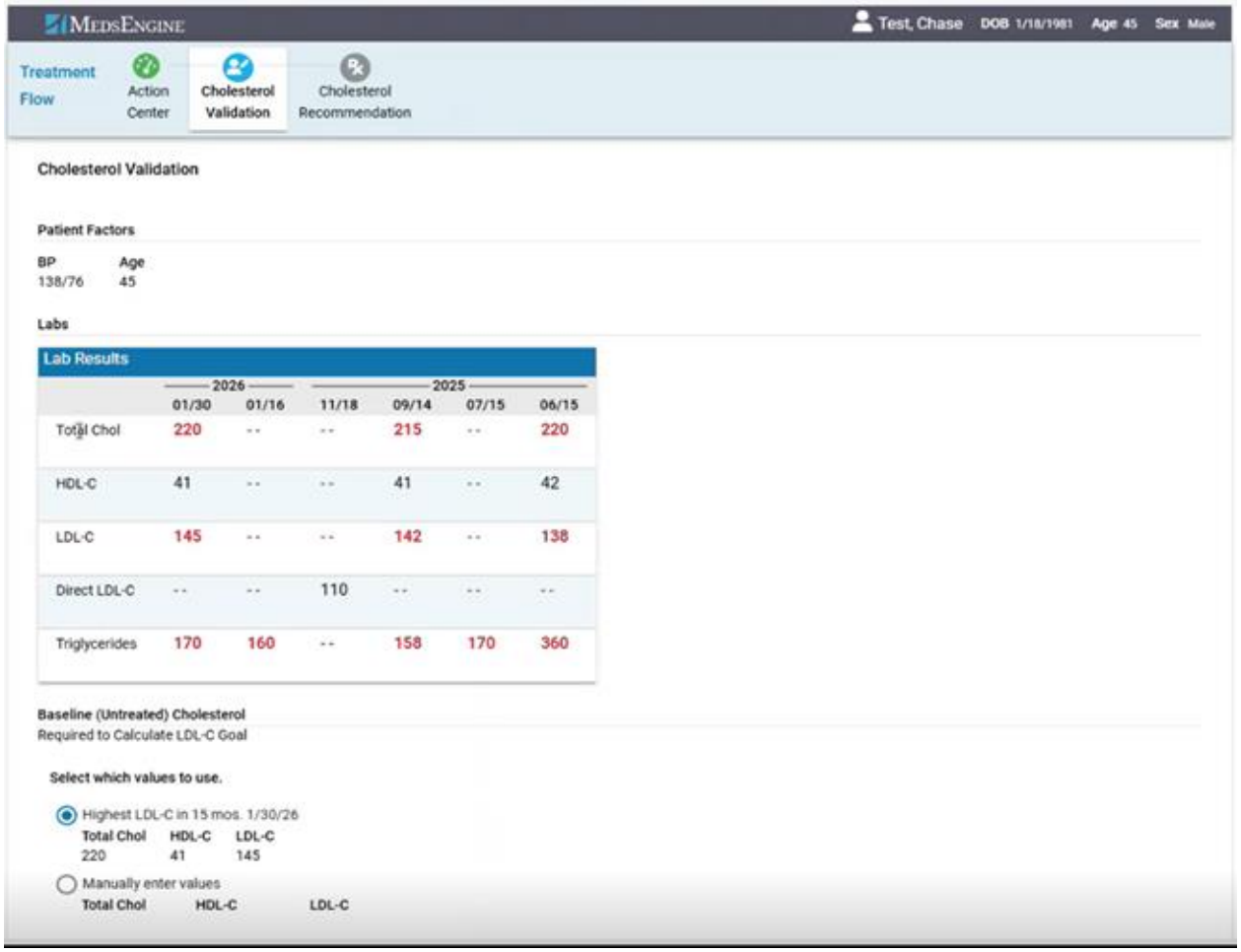


Image 7: MedsEngine Platform showing Cholesterol Validation - Lab History & Baseline LDL-C Requirements

- Automatically pulls cholesterol relevant labs from the EHR and displays them across multiple timepoints: Total Cholesterol, HDL-C, LDL-C, Direct LDL-C, and Triglycerides.
- Abnormal values are highlighted in red for instant visual identification.
- System intelligently selects the highest LDL-C value in 15 months as the 'Baseline (Untreated) Cholesterol' for goal calculation - per guideline requirements - while also allowing manual entry.

Key Observations

Cholesterol Validation - Active Meds Drug Class and Total Daily Dose

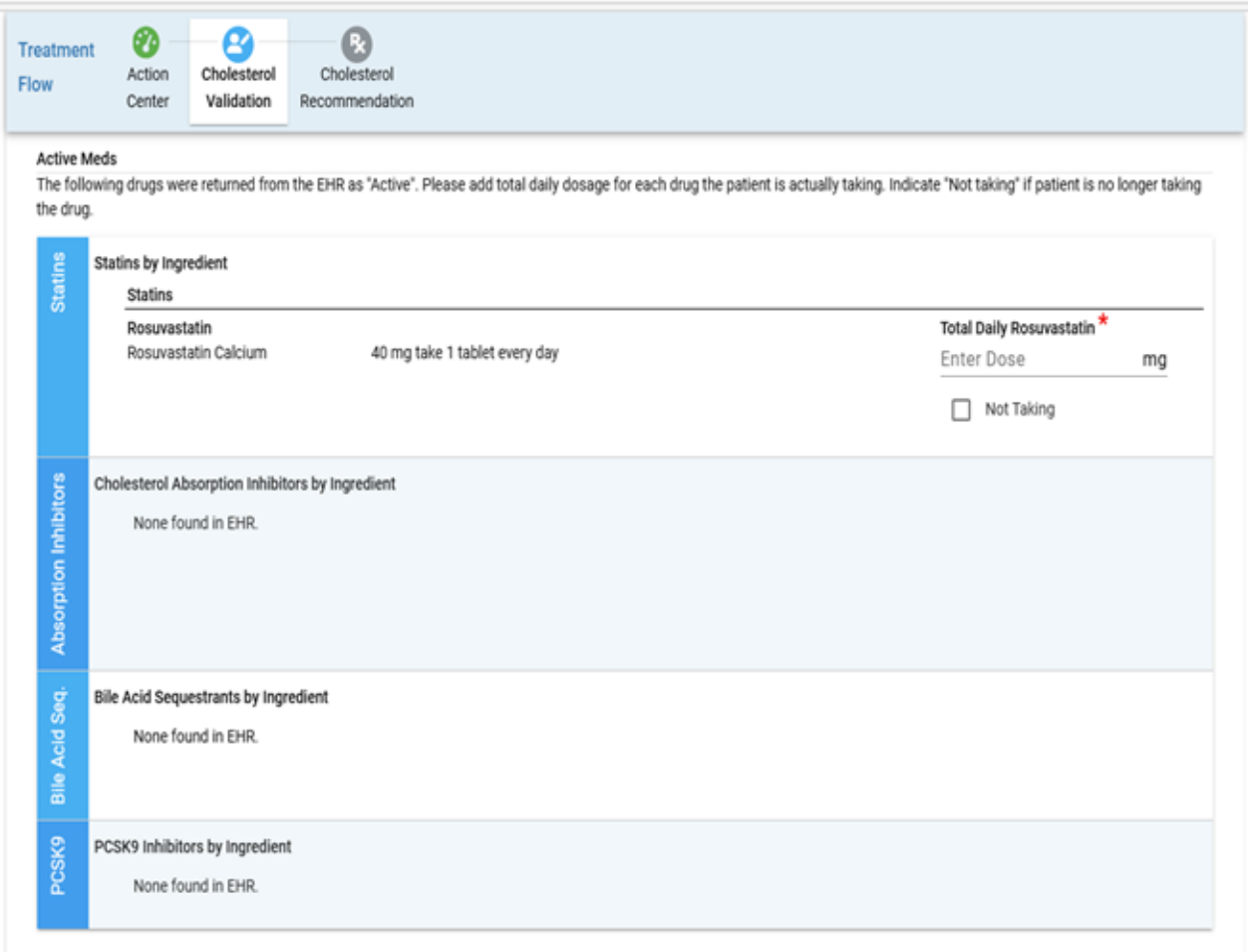


Image 8: MedsEngine Platform showing validation that the Total Daily Dose of Rosuvastatin is being taken or Not Taken

- Four drug classes are searched for in the HER.
- If a drug is found in the EHR, it is listed with the last prescribed dose.
- Entering the total daily dose being taken (or Not Taken) is required so a guideline recommendation to increase, decrease, stop, or add a new drug class can accurately be recommended.
- Active medication use is to determine the appropriate medication class, dose intensity, need to increase/decrease, add, continue, or stop a drug class.

Key Observations

Cholesterol Validation - Determine Primary or Secondary Prevention and Need for Diabetic Risk Enhancers if Patient is Primary Prevention

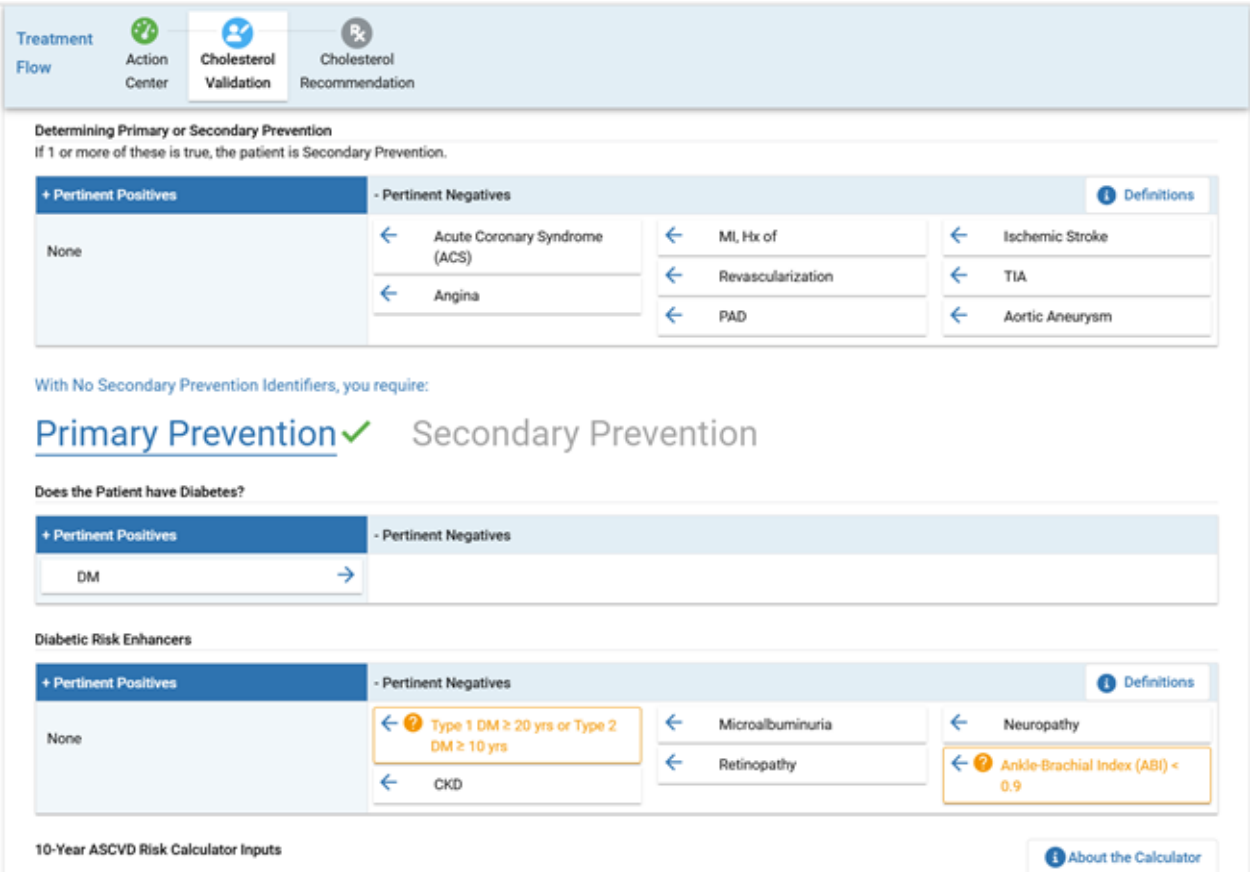


Image 9: MedsEngine Platform showing validation of Primary or Secondary Prevention and presence of Diabetes, so Diabetic Risk Enhancers can be validated

- Pertinent Positives (diagnosed diseases and active factors in the chart) and Pertinent Negatives (diseases and factors not in the chart) require validation to determine Primary or Secondary Prevention (preventing a first heart attack or second heart attack).
- With no Secondary Prevention Pertinent Positive disease factors identified, this patient is Primary Prevention.
- The first step in Primary Prevention is to determine if the patient has Diabetes. If diagnosed with Diabetes, the presence or absence of Diabetic Risk Enhancers must be validated.

Key Observations

Cholesterol Validation - 10-Year ASCVD Risk Calculator and Risk Enhancers

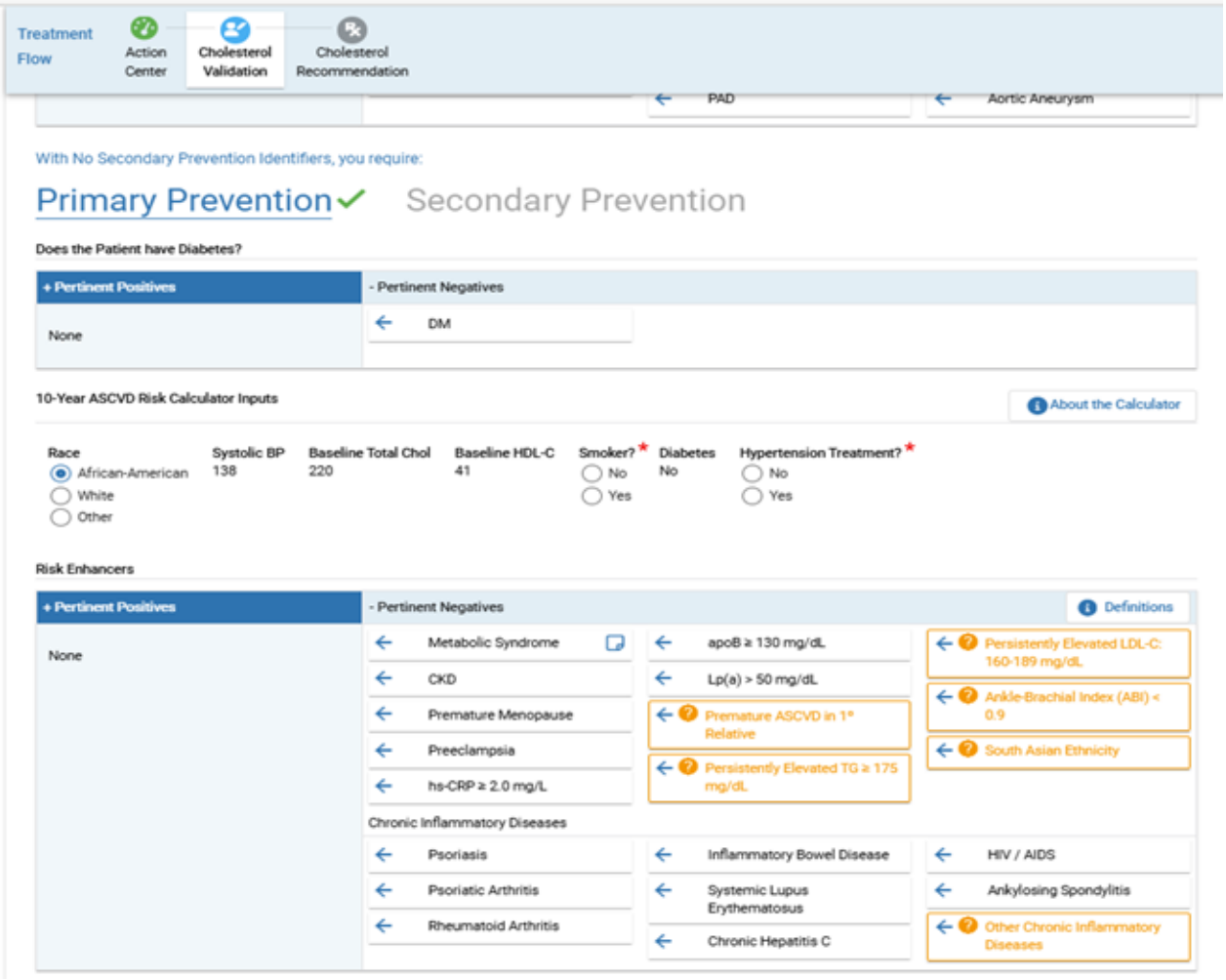


Image 10: MedsEngine Platform showing embedded 10-Year ASCVD Risk Calculator (when required) and Risk Enhancers

- Embeds the 10-Year ASCVD Risk Calculator with pre-populated values from the EHR (Race, Systolic BP, Baseline Total Cholesterol, Baseline HDL-C, and presence of Diabetes) – and requires point of care confirmation of active smoking status and BP medication compliance, since each affects the systolic BP taken on the day of care.
- Risk Enhancers panel captures 21 additional clinical factors that require validation as positive or negative. Those in orange are usually not entered discreetly in the chart (e.g., Premature ASCVD in a Primary Relative, South Asian Ethnicity) and indicate the need for point-of-care review. Awareness of South Asian Ethnicity as a risk enhancer improves equity in risk stratification.
- Built-in Definitions feature explains each risk enhancer in plain language - a learning resource for clinicians.

HITLAB Heuristic Evaluation

Key Observations

Cholesterol Validation - Secondary Prevention

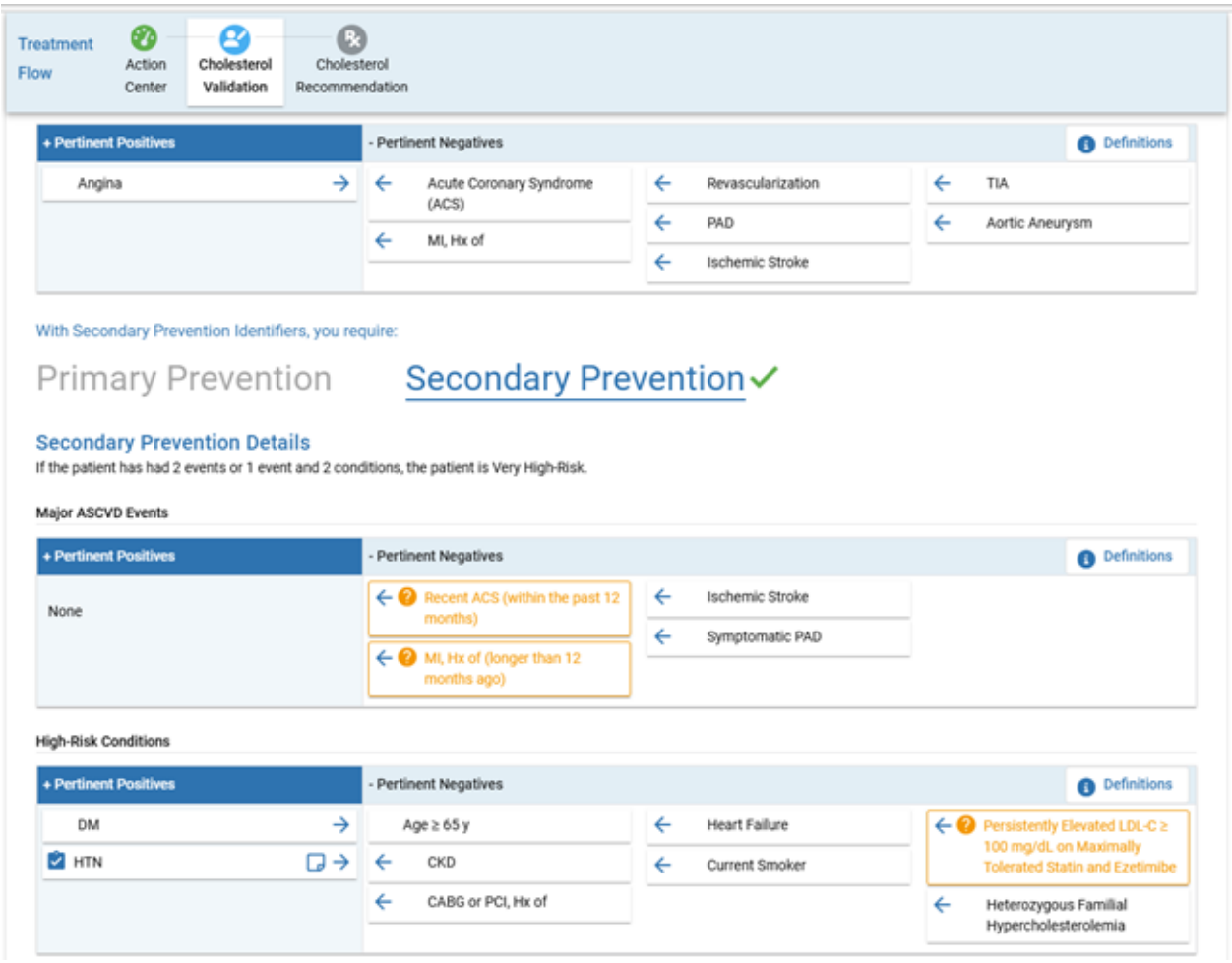


Image 11: MedsEngine Platform showing Secondary Prevention due to Angina as a Pertinent Positive. Major ASCVD Events and High-Risk Conditions panels are required to determine the level of risk and treatment intensity.

- Pertinent Positives (diagnosed diseases and active factors in the chart) and Pertinent Negatives (disease factors not in the chart) require validation to determine Primary or Secondary prevention. If Angina is validated as present, the goal is Secondary Prevention.
- Major ASCVD Events and High-Risk Condition panels each have a different weight in determining the level of risk.
- Those in orange are usually not entered discreetly in the chart (e.g., Recent ACS - within the past 12 months) and indicate the need for point of care review.

HITLAB Heuristic Evaluation

Key Observations

Cholesterol Recommendation - Disease Status, Risk, and Goals

- Displays a three-panel summary: LDL-C chart, important Facts, and Goals. A single personalized picture of color-coded zones is intended to immediately increase patient understanding of normal levels of LDL-C.
- Your LDL-C: a graph (Red/Yellow/Green) indicates LDL-C risk history and a guideline-recommended LDL-C goal, effectively communicating with clinician and patient.
- Your Facts: displays a calculated 10-Year ASCVD Risk Score & Risk Level (color-coded for risk) and utilized Factors. Space below is used to enter a Coronary Artery Calcium (CAC) score if advised by guidelines.
- Your Goals: clearly indicate Target LDL-C and the Right Medication and Dose intensity.
- Level of Recommendation: a unique scale (Expert Opinion→Best Clinical Evidence) rapidly indicates the quality of evidence behind the recommendation - promoting informed decision making.
- Cholesterol Management Recommendations: Start, Stop, Increase, Decrease, Change, or add a medication are per guideline recommendations.

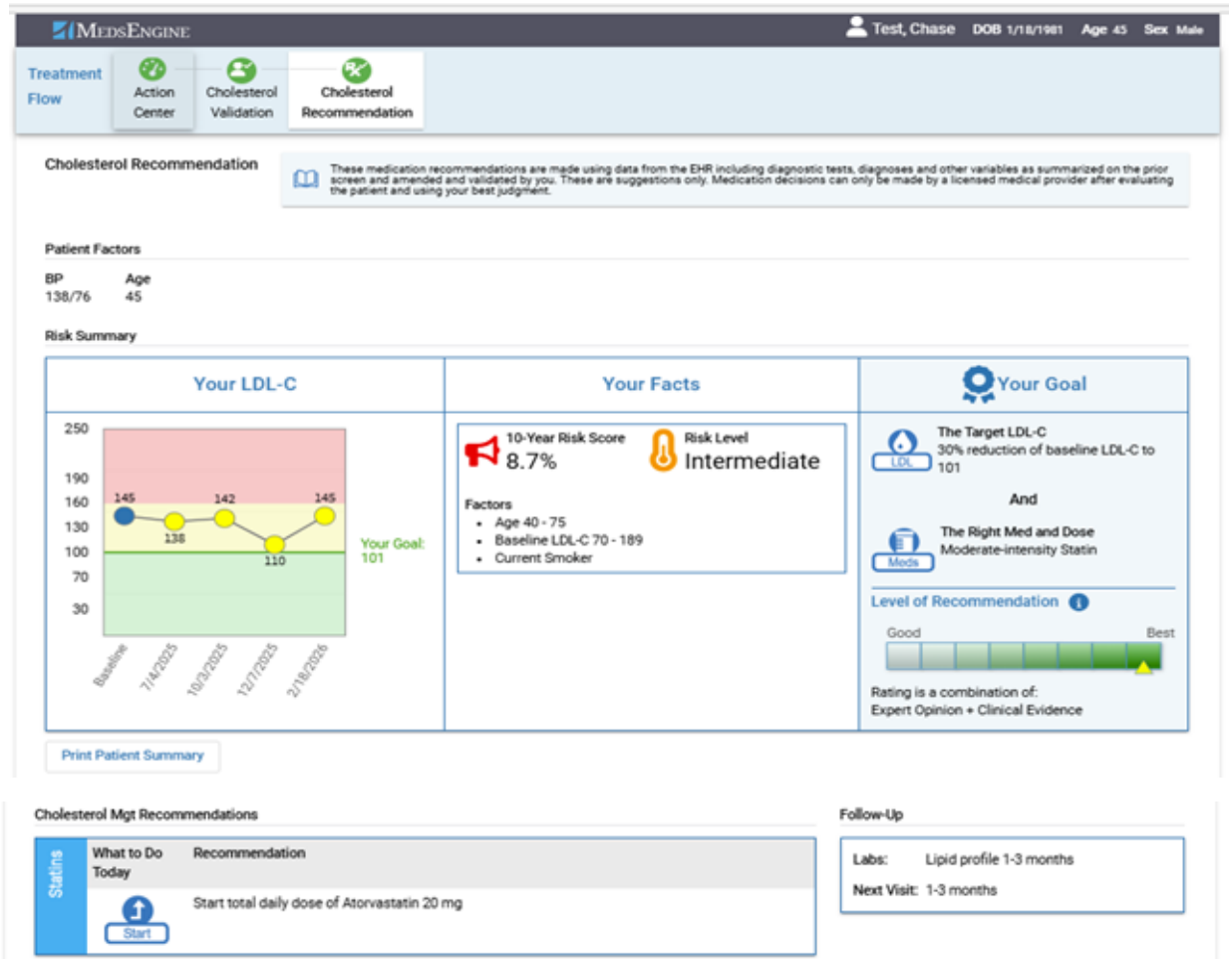


Image 12: MedsEngine Platform showing Cholesterol Recommendations - LDL-C history, Facts to determine risk, and Goals for target LDL-C plus Right Med & Dose, and Level of Recommendation

Key Observations

Patient Cholesterol Summary Report - A Personalized Take-Home Report

- A single-page personalized Patient Summary report can be printed: LDL-C, Facts, and Goals are identical to what was reviewed and discussed by the patient and physician.
- Patient Facts and Goals are elaborated upon to increase patient understanding and medication adherence.
- Language is written at a standard patient education reading level - increasing comprehension among diverse patient populations.
- Red/Yellow/Green color coding is used again to emphasize risk levels - an additional attempt to improve patient engagement and medication adherence.
- Recommendations section is explicit and specific (e.g., 'No Change total daily dose of Rosuvastatin 40mg') - leaving no ambiguity for the patient.
- Follow-up section specifies both lab frequency ('Lipid profile 3-12 months') and next visit timing - supporting care continuity.

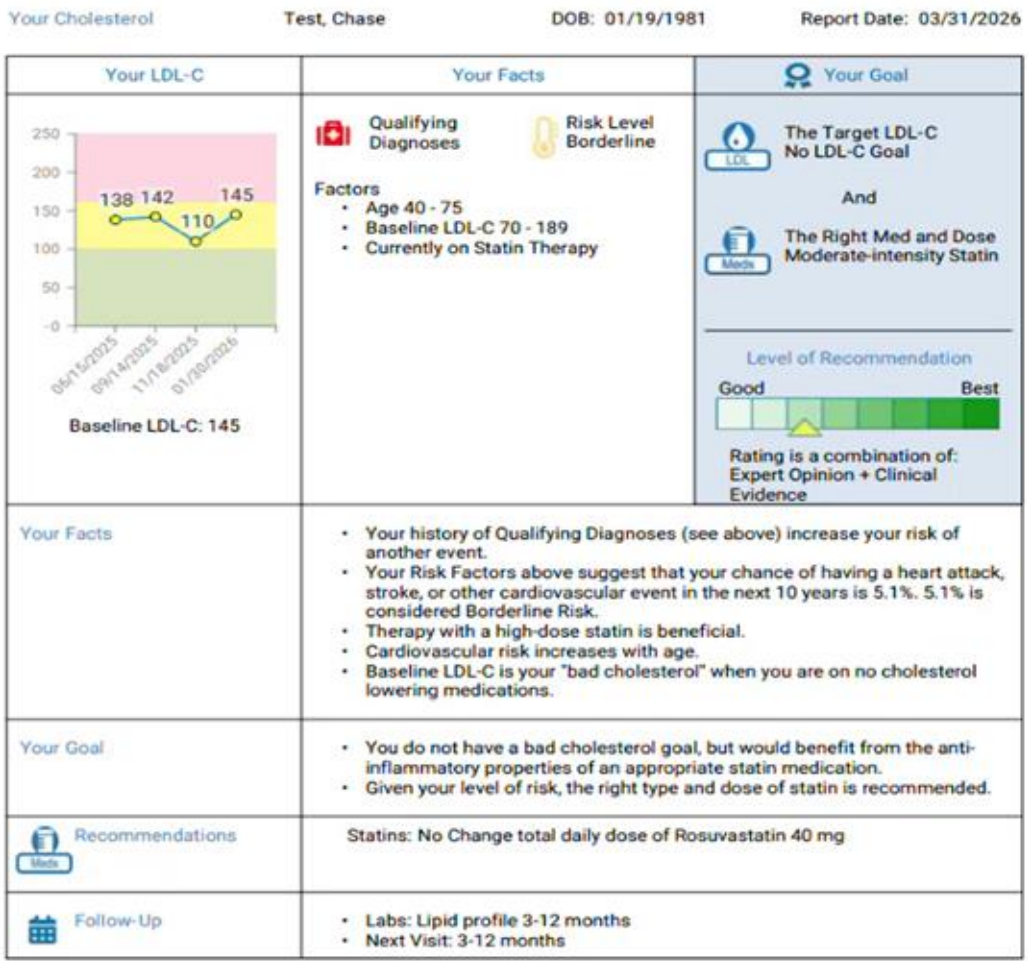


Image 13: MedsEngine Platform - Patient Cholesterol Summary report generated for a patient's personal use and to increase their understanding

Key Observations

Type 2 Diabetes Validation - Complex Multi-Factor Assessment

- Three key diabetes management labs - A1c, eGFR, and Microalbumin/Cr are presented in a historical timeline.
- A1c lab reports or Continuous Glucose Monitor (CGM) reports, residing outside the EHR, can be entered - reflecting flexibility in data collection.
- Hypoglycemia-inducing medications (Sulfonylurea, Insulin) are automatically captured from the EHR with a toggle to confirm active use by patients - a critical safety check.
- Requires approximate number of years a patient has had diabetes (manually, since this is rarely coded in EHR) - one of 35 key factors required to calculate a Personalized A1c goal.
- Disease Factors are again listed as Pertinent Positives (Gastroparesis, HTN, MI, Stroke history) or Negatives. Acknowledgment of the presence of these factors allows for the use of American Diabetes Association treatment recommendations to go beyond glycemic control and address co-morbid conditions, and calculate a Personalized A1c goal.

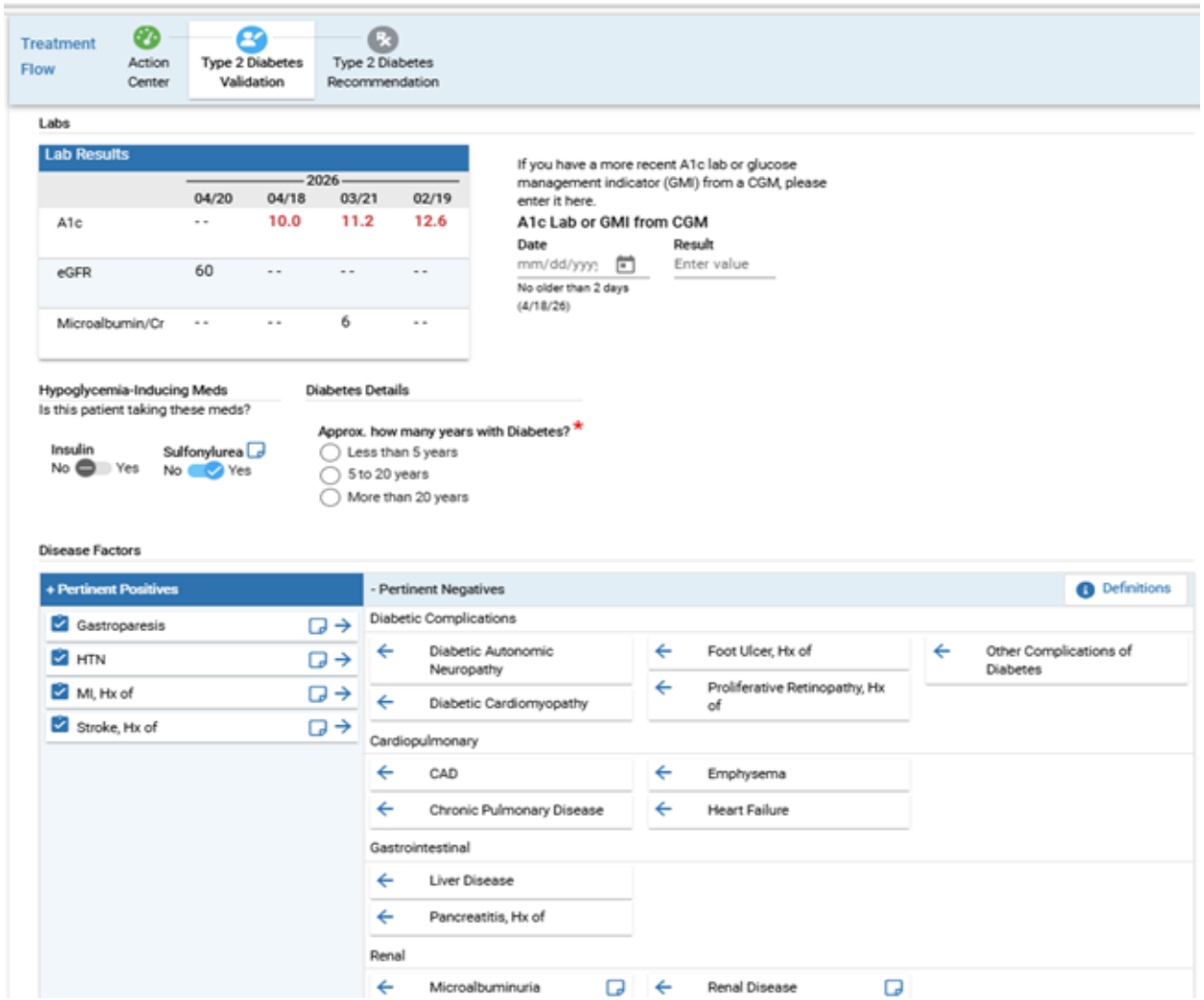


Image 14: Type 2 Diabetes Validation - Complex Multi-Factor Assessment

Key Observations

Type 2 Diabetes Recommendation - Disease Status, Risk, and Personal A1c Goal

- A1c History and Effects on You are displayed in color-coded zones to immediately increase patient understanding of their risk. The descriptions “Likely causing damage”, “Reduce Harm” or “Lowest Risk” are added to emphasize the significance of poor or excellent control.
- Factors Influencing Your Diabetes Care are listed to indicate reports and recommendations have been personalized for each patient.
- A Personalize A1c is calculated from 35 factors and used to determine an A1c goal and treatment intensity. Healthy young patients will benefit from long-term tight blood sugar control while frail elderly patients benefit from avoiding hypoglycemia with less intensive A1c goals.
- Lowering A1c to the ideal range, without risk of hypoglycemia, can be beneficial to eyes, kidneys, feet, and lower the risk of cardiovascular disease, and an option to be discussed with patients.

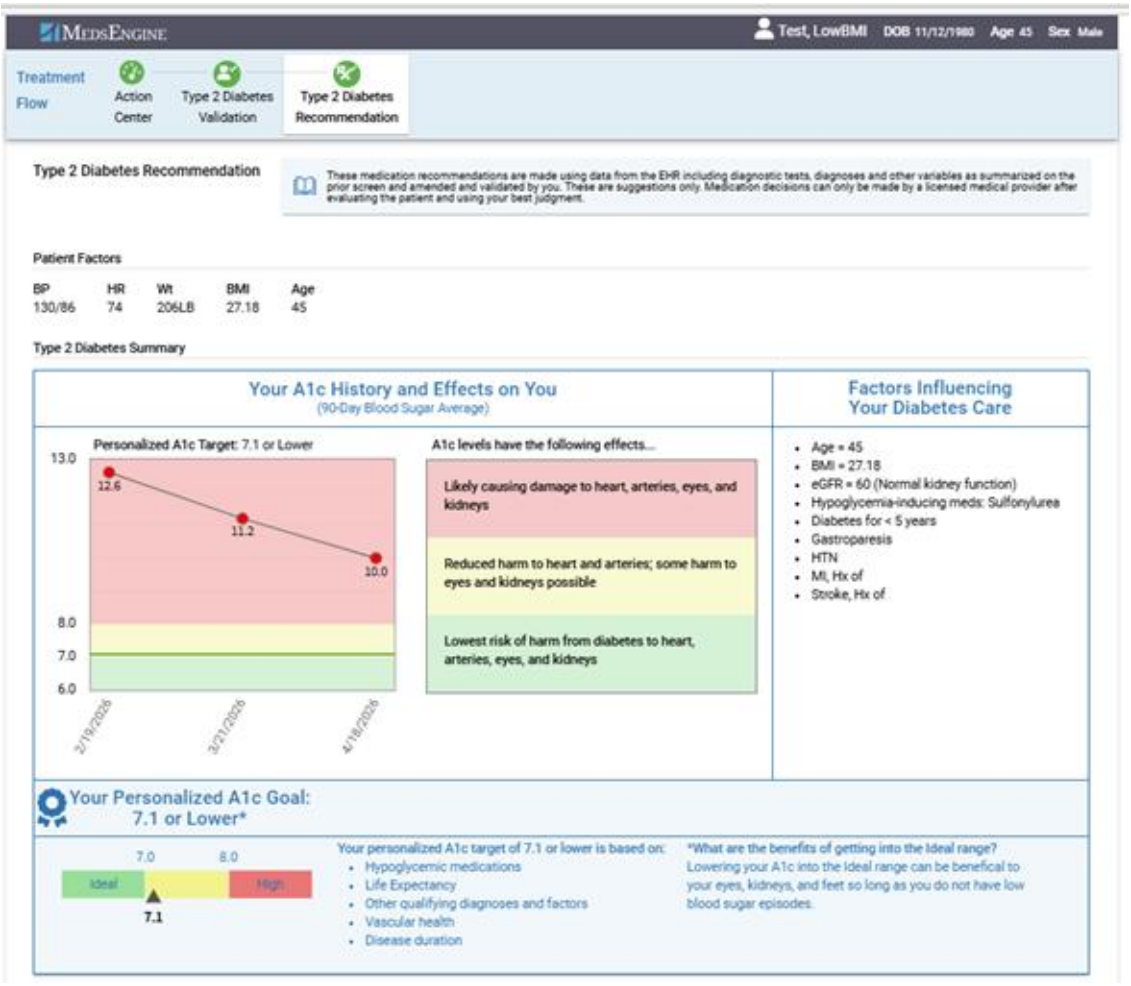


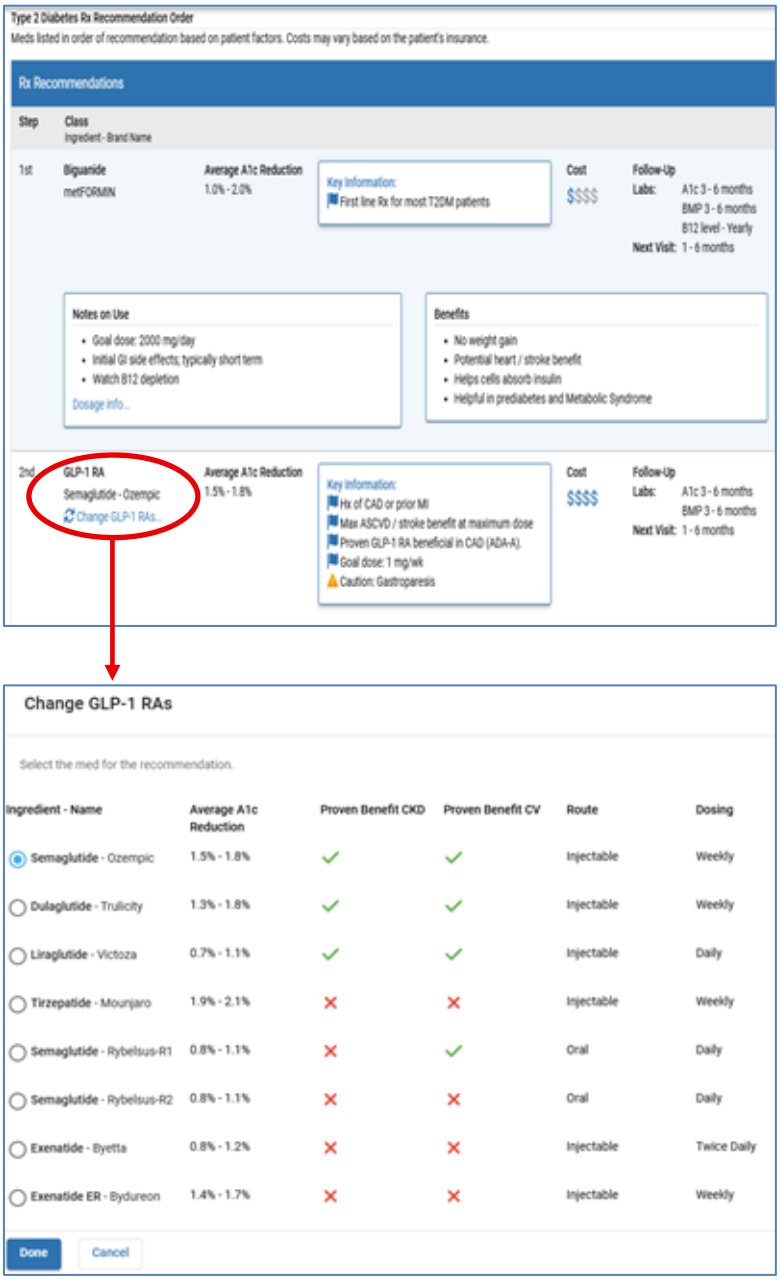
Image 15: Type 2 Diabetes Recommendation - Report on of A1c and Effects, Factors Influencing Care, and a Personalized A1c Goal

HITLAB Heuristic Evaluation

Key Observations

Diabetes Rx Recommendations and Ability to Change Med Within Class

- Drug class recommendations are in order of ability to decrease A1c while also addressing co-morbidities.
- Drug class information includes: generic name, Average A1c Reduction, Key Information, Cost, Follow-Up reminders, Notes on Use, Dosing Information, and Benefits.
- Key Information is very important to know and share with patients.
- Notes on Use include prescribing information and clinical "pearls."
- Benefits facilitate point-of-care education and information sharing with patients.
- 7 drug classes and Insulin are listed according to the most effective clinical escalation pathway.
- Contraindications and Allergies are listed.
- Formulary flexibility: if the default recommendation isn't on the formulary or is not affordable, the clinician can quickly select an alternative without leaving the workflow.
- A Change Med option is available if clinicians prefer an alternate drug in class. An update in dosing is then provided.
- Other drugs are listed along with additional important information. Example: GLP-1 RAs have green check marks indicating Proven Benefit with CKD or Cardiovascular (CV) disease.



Images 16 and 17: MedsEngine Platform showing personalized, ordered medication guidance, Change Med option - vast drug class Information

Key Observations

Patient Diabetes Summary Report - A Personalized Take-Home Report

- A single-page personalized Patient Summary report can be printed: A1c History and Effects on You, Factors Influencing Your Diabetes Care, and Personalized A1c Goal are identical to what was reviewed and discussed by the patient and physician.
- Each of the 3 sections is elaborated upon in detail to increase patient understanding and medication adherence.
- Language is written at a standard patient education reading level - dramatically increasing comprehension among diverse patient populations.
- Red/Yellow/Green color coding is used to emphasize risk levels - an additional attempt to improve patient engagement and medication adherence.
- Diabetes Care and Maintenance: Reminders of the vital importance of controlling BP, treating LDL-C with statins, monitoring kidney function yearly, obtaining eye and foot exams regularly, and keeping vaccines up-to-date to decrease chances of infection.
- Follow-up section specifies lab frequency and next visit timing - supporting care continuity.

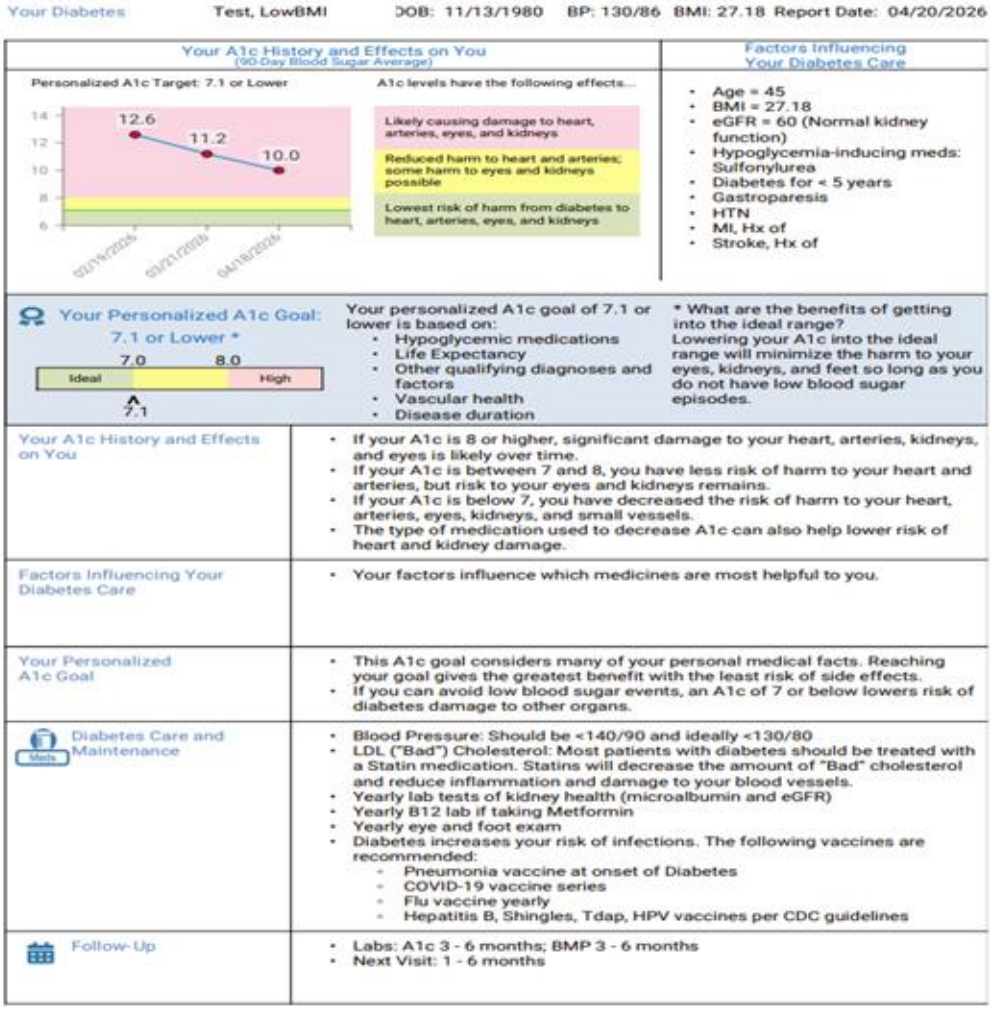


Image 18: MedsEngine Platform - Patient Diabetes Summary report generated for a patient's personal use and to increase their understanding

HITLAB Heuristic Evaluation

Key Observations

Administration Console - Clinical Vocabulary & Configuration Management

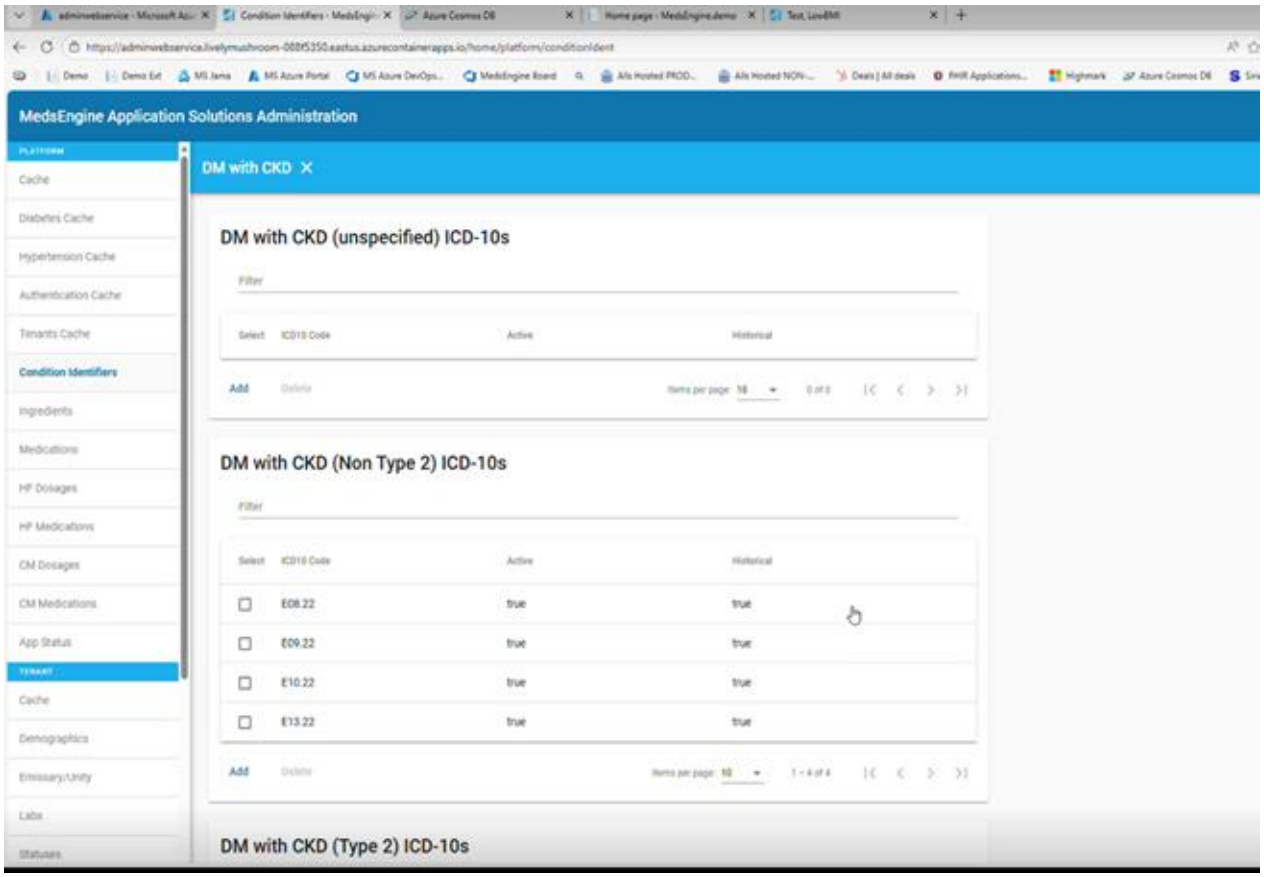


Image 19: MedsEngine Clinical Vocabulary & Configuration Management

- Purpose-built administration interface for managing all clinical vocabularies: ICD-10 codes, medications, dosages, and condition identifiers - across all disease modules.
- ICD-10 code libraries, CPT codes, and other codes are updated on a regular basis. MedsEngine has a defined process and clinical team to review and update.
- Condition identifiers are highly granular (e.g., separate code sets for Hypertension, HTN with CKD Stage 1-4, HTN with CKD and HF, etc.) - allowing precise guideline utilization.
- Multi-tenant architecture: data per client is fully siloed in separate environments - no data commingling.
- Configurable platform supports future white-labeling and international adaptation (drug names, dosages, language, local guidelines) as needed.

HITLAB Heuristic Evaluation Findings

Clinical Workflow Integration

The MedsEngine workflow, as observed during the evaluation, consists of five steps that integrate cleanly into the standard clinical encounter workflow.

- In step one, FHIR integration retrieves relevant patient variables automatically from the EHR; the provider chooses 1-4 chronic diseases to be evaluated (<2 seconds), validates the pulled data before proceeding, ensuring accuracy without requiring manual re-entry (<8 seconds).
- In step two, the algorithm processes inputs against operationalized guideline logic, returning a recommendation in real time during the encounter. The entire workflow takes <10 seconds.
- In step three, the clinician reviews the recommended medication pathway with supporting rationale, retaining full authority to accept, modify, or override the recommendation.
- In step four, a valuable clinical discussion with shared decision-making occurs with the patient. A personalized patient summary report is generated for the patient's personal use with the objective of increasing understanding and improving medication adherence.
- In step five, the clinician exits MedsEngine, writes a Rx if needed, and all actions are documented in a note according to a physician's preference.

The workflow observed was notably efficient. The single-button launch from within the EHR encounter eliminated context-switching; the automated FHIR data pull eliminated an error-prone step in clinical decision support implementation; and the recommendation display was designed for use during a busy encounter rather than as a post-hoc analytical tool. No additional staff were required at any step.

HITLAB Heuristic Evaluation Findings

Usability and Interface Assessment

Assessed against Jakob Nielsen's usability heuristics, MedsEngine demonstrates strong performance across all ten dimensions while aligning well with real-world clinical workflows. Visibility of system status is maintained through real-time processing indicators, though these are often unnoticed given the platform's rapid response time. The system closely matches clinician mental models, reflecting its physician-led design and interfaces refined through direct user feedback. User control and freedom are fully preserved, as physicians receive recommendations only and retain complete responsibility and flexibility for medications prescribed and all follow-up standards of care.

Consistency and standards are upheld through current clinical terminology alongside language designed for patient understanding. Error prevention is robust, with automated data integration minimizing manual entry, alerts flagging abnormal lab values, and notifications prompting reassessment when conditions change in ways that affect other active diagnoses. The platform supports recognition rather than recall by clearly surfacing evidence-based recommendations within the interface.

Flexibility and efficiency of use are enhanced by eliminating the need to memorize guidelines or search for patient data - a uniform process that raises the quality of care for new and experienced users alike. The interface presents a clean, minimalist front end suited for busy clinical encounters, while millions of lines of code operate beneath the surface. Integrated help and documentation allow clinicians to ask clinical or technical questions directly within the application, ensuring accessible support is always at hand.

Heuristic	Observation
Visibility of system status	Processing status clearly communicated; recommendation generation visible within the encounter workflow
Match with real-world clinical models	Language and logic match clinician mental models; interfaces refined through direct user feedback
User control & freedom	Physicians receive recommendations only and retain full responsibility for prescribing and follow-up care
Consistency & standards	Current clinical terminology used consistently alongside patient-friendly language across all disease modules
Error prevention	Automated data integration minimizes manual entry; alerts flag abnormal lab values and prompt reassessment when conditions change
Recognition over recall	Evidence-based recommendations clearly surfaced in the interface - guidelines are never assumed from memory
Flexibility & efficiency	Experienced users can access advanced features; one-button launch for efficiency eliminates the need to search for guidelines or patient data; uniform process reduces variability for new and experienced users
Aesthetic & minimalist design	Interface uncluttered; designed for use during a busy clinical encounter
Help & documentation	In-system guidance available; patient reports serve as shared decision-making tools

HITLAB Heuristic Evaluation Findings

Patient Engagement Features

MedsEngine's patient engagement capabilities represent a meaningful differentiator from conventional clinical decision support tools. At the point of care, a single-page personalized report is generated for each patient, structured to display the condition, level of risk, contributing patient factors, and tailored medication recommendations. Red, yellow, and green color coding provides intuitive risk communication regardless of health literacy level, while written descriptions are presented in two distinct layers - one for the clinician and a separate, plain-language version for the patient. Each medication recommendation is supported by detailed clinical data that the physician can choose to elaborate upon during the visit. Clinicians use this report as a structured shared decision-making tool, guiding discussion around the patient's specific condition, risk level, reason for a recommended medication, and the underlying level of evidence. This approach directly supports patient activation, not just adherence - patients who understand why a medication is recommended and how it addresses their personal risk factors are meaningfully more likely to follow through. The platform's impact on patient activation and reducing physician clinical inertia is reflected in real-world outcomes: sustained blood pressure control rates of 92% over ten years are not achievable without genuine patient understanding and engagement.

Data Security and Compliance

MedsEngine is SOC2 Type II certified, with recertification completed in March 2026, reflecting enterprise-grade security controls and operational reliability. The platform maintains full HIPAA compliance through documented data handling, storage, and access control frameworks. All data is hosted exclusively on US servers, ensuring domestic data residency. SMART-on-FHIR integration ensures that patient data is never stored within the EHR build itself - a critical distinction for health system procurement and IT security review. For detailed questions regarding audit scope or technical architecture, Ray Kaiser, CTO, is available to elaborate.

HIGHLIGHTS

Clinical Workflow Integration

- EHR Data Pull (FHIR Integration)
- Provider Review & Validation
- Real-Time Recommendation Generation
- Patient Engagement & Shared Decision-Making
- Write Rx & Document Encounter

Usability & Interface Assessment

- System Status Visibility
- Real-World Clinical Alignment
- Clinician Control & Autonomy
- Consistency & Standardization
- Error Prevention & Alerts
- Evidence-based Decision Support
- Workflow Efficiency & Speed
- Minimalist, Encounter-Friendly Design

Patient Engagement Features

- Patient-Friendly Summary Report
- Shared Decision-Making Workflow
- Patient Activation & Adherence
- Reduces Clinical Inertia

Data Security & Compliance

- SOC 2 Type II Certification
- HIPAA Compliance
- Secure Data Residency
- FHIR Interoperability

Clinical Outcome Evidence

Hypertension - Nation-Leading Control Rates

Hypertension affects 120 million US adults, yet the national blood pressure (BP) control rate (BP <140/90) has remained below 50% for decades. Adopting the new 2025 AHA/ACC guideline threshold of <130/80 reduces the population control rate further to 21% (NHANES 2021–2023). MedsEngine's hypertension module achieves outcomes that fundamentally distinguish it from any other clinical decision support approach.

- Greater than 92% BP control rate to <140/90, sustained for 10 consecutive years at PriMED Physicians (Dayton, OH), 2014–2023.
- Greater than 85% BP control at Premier Medical Associates/Allegheny Health Network (Pittsburgh, PA), 2018–2023.
- BP control was achieved in fewer than 2 office visits on average across all racial groups (average 1.4 visits).
- Performance sustained in high-Medicaid, high-risk, and socioeconomically challenged populations - 85% Non-White, 59% Medicare/Medicaid/uninsured at PriMED.
- Systolic BP reduction: PriMED −22 mmHg; Premier −18 mmHg - both substantially exceeding published trial benchmarks.
- Decreased incidence of Myocardial Infractions (MI) and Cerebral Vascular (CV) events - despite a population 15 years older and without hypertension.

MedsEngine Hypertension Results

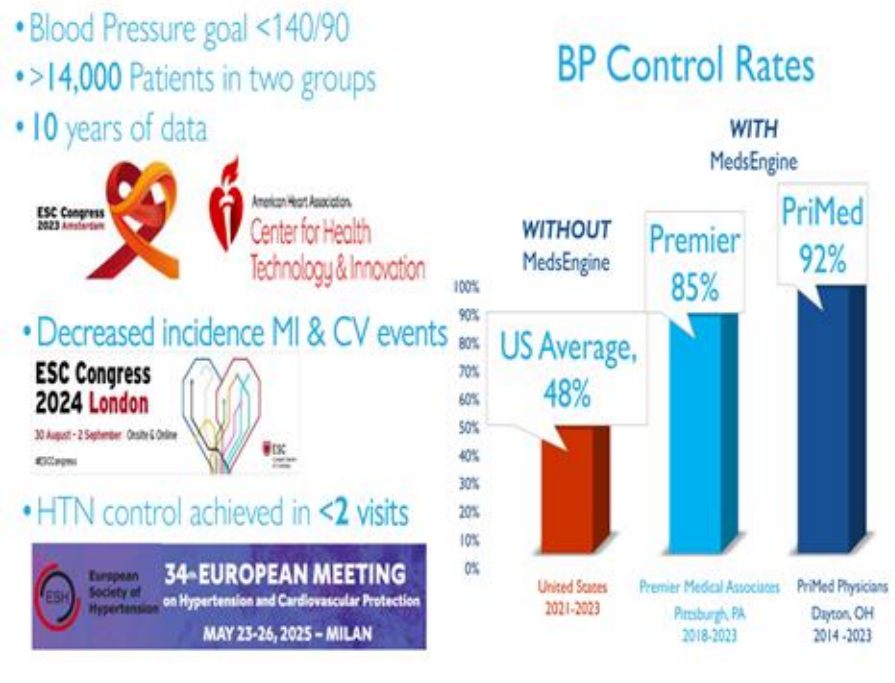


Image 20: BP Control Rates: MedsEngine Sites vs. US National Average
***PriMED** 92% and Premier 85% vs. US Average 48% (NHANES 2021–2023)*
Source: Romer et al., ESC Congress 2023 Amsterdam,
ESC Congress 2024 London, ESH 2025 Milan

The scale of improvement is best understood in the context of the national failure: despite multiple guideline updates and decades of provider education efforts, US BP control rates have oscillated between 31–54% since 1999 without meaningful sustained progress.

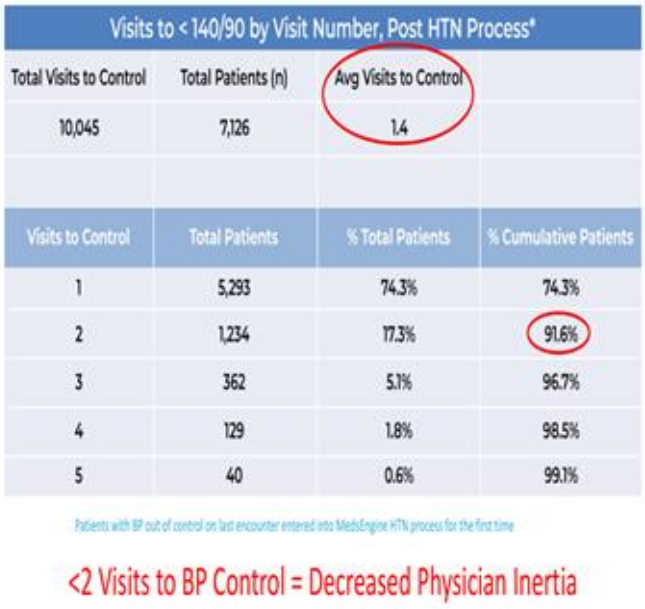
MedsEngine sites have maintained rates nearly double the national average for a decade.

Clinical Outcome Evidence

Time to BP Control - PriMED Cohort Analysis

The data documents the speed of BP control achievement when MedsEngine's hemodynamic evidence-based recommendations are applied to patients with previously uncontrolled hypertension. The cohort represents patients entering the MedsEngine HTN process for the first time after a documented failure to control BP on their most recent encounter.

These results represent a dramatic reduction in clinical inertia and save physicians' time. Under conventional care, months of empiric trial-and-error often elapse before BP control is achieved - if it is achieved at all. The 1.4 average visits to control 99.1% of patients is a direct consequence of matching drug class to hemodynamic phenotype from the first encounter, rather than initiating standard first-line therapy and adding drugs with similar class effect.



Visits to < 140/90 by Visit Number, Post HTN Process*

Total Visits to Control	Total Patients (n)	Avg Visits to Control
10,045	7,126	1.4

Visits to Control	Total Patients	% Total Patients	% Cumulative Patients
1	5,293	74.3%	74.3%
2	1,234	17.3%	91.6%
3	362	5.1%	96.7%
4	129	1.8%	98.5%
5	40	0.6%	99.1%

*Patients with BP out of control on last encounter entered into MedsEngine HTN process for the first time

<2 Visits to BP Control = Decreased Physician Inertia

Image 21: PriMED: 1.2 Visits to >90% BP control

Visits to First BP Control <140/90, PriMED Physicians (n=7,126 patients, 10,045 total visits) 1.4 visits to control 99.1% of patients. 74.3% achieved control at Visit 1 and 91.6% cumulative at Visit 2.

Historical Trajectory - The Role of Hemodynamic Guidance

The following chart illustrates the pivotal role of hemodynamic data at PriMED Physicians over two decades. BP control rates rose dramatically when the ICG-based hypertension process was introduced, declined sharply when equipment failed (paper records transition and Bio-Z equipment failure), and rose again when the NICaS ICG device and the MedsEngine platform were deployed. This natural experiment provides powerful real-world evidence that hemodynamic guidance - not guideline availability alone - is the decisive factor in achieving high BP control rates.

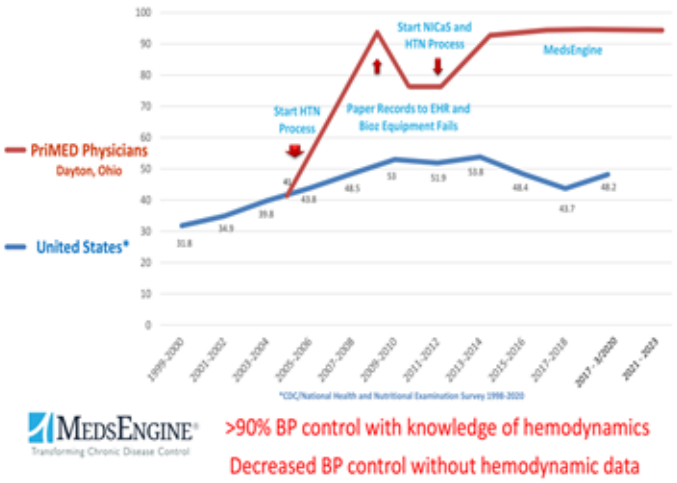


Image 22: Average Hypertension Control Rates

PriMED Physicians vs. US Average BP Control rates (1999–2023). Natural experiment demonstrated that the decisive impact of hemodynamic-guided therapy (ICG/NICaS) Source: CDC/NHANES 1998–2020 vs. PriMED EHR data

Clinical Outcome Evidence

BP Control by Race - Equity Performance

One of the most clinically significant findings in the MedsEngine dataset is the near-identical BP control trajectory across racial groups. This stands in sharp contrast to widely documented racial disparities in hypertension control nationally. The hemodynamic approach eliminates race-based empirical assumptions by measuring the actual physiologic driver of elevated BP for each patient.

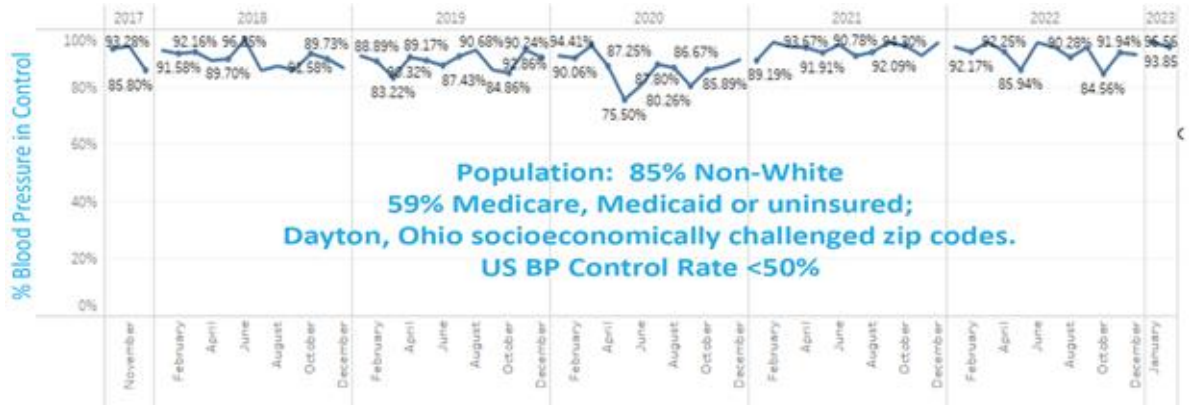


Image 23: MedsEngine High Blood Pressure Control Rates by Month, 2017–2023

Physicians Population: 85% Non-White, 59% Medicare/Medicaid/Uninsured US National Control Rate <50% throughout the same period.

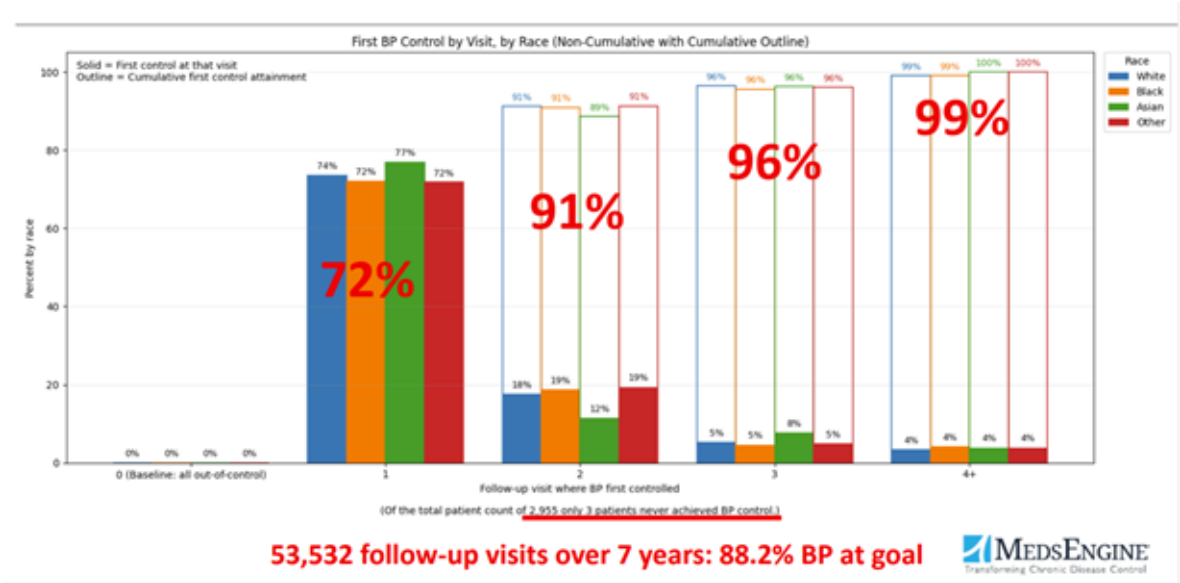


Image 24: Time to blood pressure control by race in MedsEngine: 91% of patients achieve BP control within the first two visits, with minimal variation across racial groups and near-complete control (99–100%) by visit four

At follow-up visit 2, cumulative BP control reaches 89–91% across White, Black, Asian, and Other racial groups, respectively. Of the total cohort of 2,955 patients followed for 7 years, only 3 never achieved BP control - a 99.9% eventual control rate. This performance is unprecedented in published US primary care literature.

Clinical Outcome Evidence

Cholesterol - Complete Population-Level Guideline Implementation

The 2018 AHA/ACC Guideline on Blood Cholesterol Management spans 120 pages, contains 70 pages of clinical guidance (simplified to 22 pages for provider use), 13 patient flows, 35 treatment endpoints, and requires knowledge of and finding 77 patient-specific factors. Despite widely available guidelines, approximately 50% of individuals eligible for cholesterol-lowering therapy in the US remain undertreated (J Gen Intern Med, DOI: 10.1007/s11606-025-09625-0). Full implementation of treatment guidelines would produce a 21–27% relative reduction in cardiovascular events and $25–30 billion in annual US healthcare expenditure reduction (Johns Hopkins, June 2025).

- MedsEngine operationalizes the complete 120-page guideline - not excerpts - applying all 77 patient variables to determine the appropriate recommendation from 35 possible endpoints.
- Enables rapid population-level screening - entire patient panels can be assessed systematically rather than ad hoc during individual encounters.
- Drives appropriate statin intensity prescribing and de-prescribing, reducing both undertreatment and overtreatment.
- Enables systematic billing of HCPCS G0446 (Cardiovascular Risk Reduction Counseling) - generating approximately $25,000 net income per PCP annually (at 50% of 2,000-patient panel).
- Validated savings of $780 per patient per year when cholesterol guidelines are fully followed (J Gen Intern Med 2025; Prog Cardiovasc Dis 2022).

Large patient populations can be rapidly screened and treated according to guidelines

23,834 patients

Age Groups	LDL-C Treatment Goals							Patient Totals	
	30% reduction of untreated LDL-C	50% reduction of untreated LDL-C		LDL-C less than 100	LDL-C less than 70	No LDL-C Goal		Patient Count Total	Patient % Total
	Primary	Primary	Secondary	Primary	Secondary	Primary	Secondary		
18-39									
Lifestyle						1,441	-	1,441	86.4%
Statin Therapy		-	15	60		151	-	226	13.6%
18-39 Total	-	-	15	60	-	1,592	-	1,667	100.0%
40-59									
Lifestyle						4,921	-	4,921	63.7%
Statin Therapy	743	416	235	279	26	1,105	-	2,804	36.3%
40-59 Total	743	416	235	279	26	6,026	-	7,725	100.0%
60-75									
Lifestyle						1,790	-	1,790	16.6%
Statin Therapy	3,971	2,146	1,004	282	340	1,281	-	9,024	83.4%
60-75 Total	3,971	2,146	1,004	282	340	3,071	-	10,814	100.0%
76+									
Lifestyle						830	-	830	22.9%
Statin Therapy	196	374	143	41	334	1,167	543	2,798	77.1%
76+ Total	196	374	143	41	334	1,997	543	3,628	100.0%
Grand Total	4,910	2,936	1,397	662	700	12,686	543	23,834	
Primary/Secondary %		68%	32%			96%	4%		

15% High Risk Primary Prevention

Prevention
Primary 89%
Secondary 11%

Image 25: AHA/ACC Cholesterol Guideline:

Complexity Requiring MedsEngine: 120 page AHA/ACC guideline · 70 pages of guidance · 77 patient factors · 13 flows · 35 endpoints

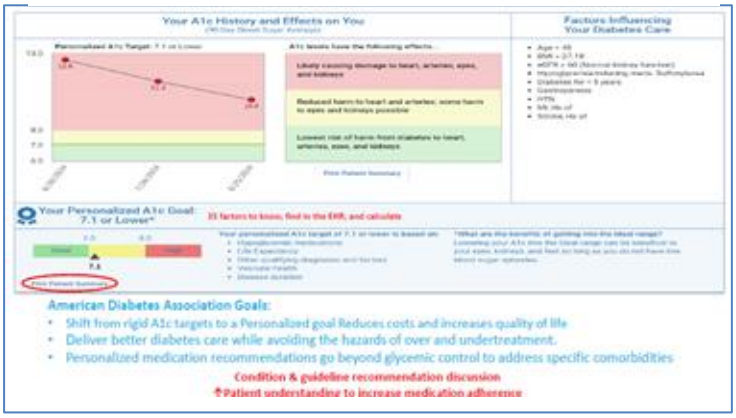
Clinical Outcome Evidence

Type 2 Diabetes - Personalized A1c Goal & Comorbidity Management

Type 2 diabetes affects 38 million US adults; fewer than 50% have blood sugar under control (CDC). The ADA Standards of Medical Care in Diabetes encompasses 362 pages and 35 variables required to calculate a personalized A1c goal - a calculation so complex it is rarely performed in clinical practice. MedsEngine implements the validated algorithm developed by 151 diabetologists worldwide (Diabetes Care 2015;38:2293–2300) to deliver a patient-specific A1c target at the point of care in seconds.

- Calculates a personalized A1c goal for every patient using 5 weighted objective parameters: risk of hypoglycemia from treatment (30%, 2 factors); life expectancy via updated Charlson Comorbidity Index (27%, 13 factors); important comorbidities (17%, 11 factors); macrovascular and advanced microvascular complications (16%, 6 factors); disease duration (10%, 3 factors).
- Medication recommendations address comorbidities beyond glycemic control: heart failure, CKD, CAD, MASH, MASLD, and obesity - recognizing that the leading causes of death in diabetes are cardiovascular, not glycemic.
- GLP-1 RA selection: MedsEngine presents comparative data on average A1c reduction, proven CV benefit, renal dosing limitations, route, and dosing schedule for all available agents - enabling informed formulary-sensitive selection.
- Validated savings of $1,956 per patient per year for each patient brought to glycemic control (Ochsner Validation Institute, 2023).

MedsEngine Calculation of Personalized A1c Goal



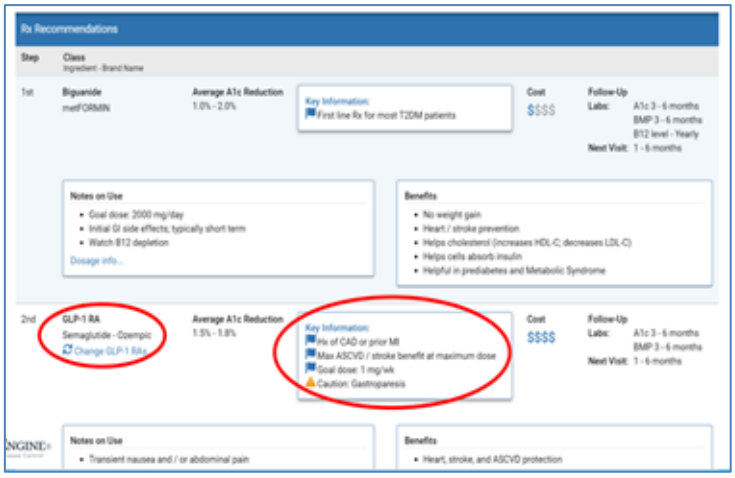


Image 26-28 : Personalized A1c Goal and Medication Recommendation

Personalized A1c target of 7.1, comorbidity-adjusted drug selection (Metformin + GLP-1 RA), and patient-facing explanation of why the personalized goal was chosen

Clinical Outcome Evidence

Heart Failure (HFrEF) - Enabling Primary Care to Achieve Guideline-Directed Therapy

Heart failure affects 6.7 million US adults, with over 457,000 deaths annually and hospitalization costs of $10,700–$17,800 per admission (CDC). Despite clear ACC/AHA/HFSA guidelines recommending quadruple therapy at maximum tolerated doses, only 1.1% of HF patients nationally were on triple therapy at maximum dose as of 2018 (ACC/CHAMP HF Registry) - and this figure has likely declined with the addition of a fourth recommended drug class (SGLT2 inhibitors). The 159-page ACC/AHA/HFSA guideline requires tracking 11 interactive variables with complex dosing interactions.

- MedsEngine is adjusting its software to allow physicians and APPs to confidently and safely titrate patients to the GDMT maximum tolerated dose.
- Processes 11 interactive variables, including K+, eGFR, delta-eGFR, SBP, total body water, cardiac index, heart rate, and patient functional status, to determine safe and appropriate dosing at each encounter.
- Clinician testimony: One MedsEngine family physician reported 0% triple therapy at max GDMT dose among 38 HF patients when managed by cardiology. After discussions with cardiologists and within one year of assuming care, 26% of patients achieved triple therapy at maximum dose when using the MedsEngine HF module.
- Reduces 30-day readmissions and emergency department visits - the primary cost drivers in heart failure, where a single hospitalization averages $14,000.

Any Dose	Improve HF 2008	Champ HF 2018	Dayton Cardiology 2019
Beta Blocker	21%	28%	1%
ACE/ARB/ARNI	36%	17%	10%
MRA	74%	77%	15%
Triple Therapy (Max Dose)	Not Measured	1.1%	0%

MedsEngine HFrEF enables primary care to confidently advance Triple Therapy Max Dose

Image 29: HFrEF Triple Therapy at Maximum Dose

Published Benchmarks CHAMP HF (2018): 1.1% of patients on "Triple Therapy" at maximum dose· MedsEngine HFrEF enables primary care to confidently advance Triple Therapy, and newer Quadruple Therapy goals

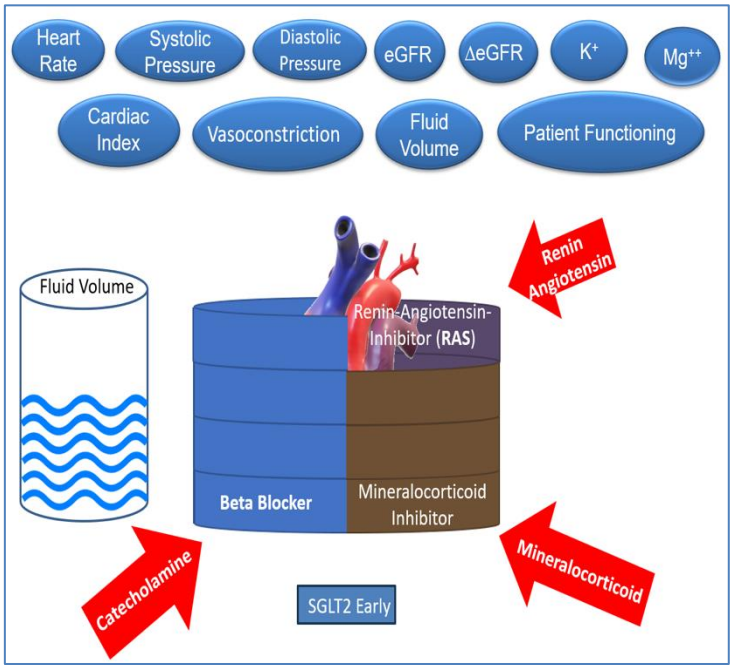


Image 30: HFrEF Triple Therapy: 11 Variables Assessed for Safe and Incremental Increases to Achieve Triple Therapy, Max Dose

Clinical Outcome Evidence

Hemodynamic Phenotyping –The Value of Determining the Cause of High BP

The foundational scientific premise of MedsEngine's hypertension module - that blood pressure elevation has distinct hemodynamic causes requiring distinct drug classes - is validated by a more than 14,000 patient primary care impedance cardiography dataset and independently corroborated by population-scale epidemiological studies spanning over two decades.

The Hemodynamic Heterogeneity of Hypertension

Elevated blood pressure is not a single physiologic entity. It can result from three fundamentally different hemodynamic phenotypes, each of which responds to different drug classes and is unlikely to respond adequately to the others:

Hemodynamic Phenotype	Prevalence (MedsEngine n=22,346 ICGs)	Pathophysiology	Optimal Drug Classes
Vasoconstriction	47%	Elevated total peripheral resistance; arteries too tight	ACEi, ARBs, CCB Dihydropyridines, Thiazide diuretics
Mixed Hemodynamic	29%	Combination of vasoconstriction and hyperdynamic	Vasodilating Beta Blockers, CCB Non-Dihydropyridines
Hyperdynamic	24%	Hyperdynamic heart; high heart rate and/or stroke volume. No vasoconstriction	Beta Blockers, CCB Non-Dihydropyridines, Central Alpha Agonists

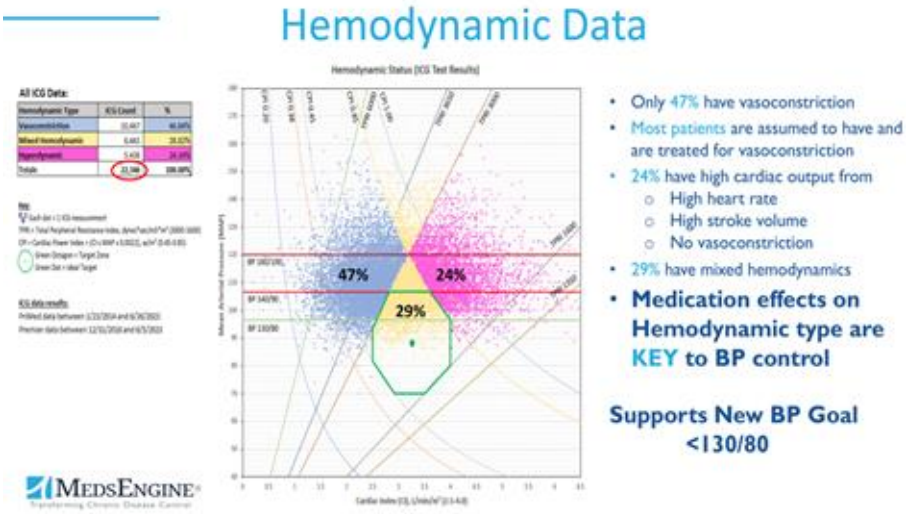


Image 31: Hemodynamic Status - ICG Test Results: 22,346 measurements from PriMED and Premier medical groups: 47% Vasoconstriction · 29% Mixed Hemodynamic - 24% Hyperdynamic. No demographic feature predicts phenotype - ICG measurement is required to determine hemodynamic status

The critical implication: 53% of hypertensive patients have a hemodynamic profile that standard first-line drug classes targeting vasoconstriction are unlikely to address adequately. These patients will experience trial-and-error delays, suboptimal response, and continued cardiovascular risk regardless of medication adherence - until drug classes affect the hemodynamic cause of their high BP.

Clinical Outcome Evidence

Hemodynamic Phenotyping - Demographics Does Not Predict Hemodynamic Cause of High BP

The Demographic Predictors Fail to Identify Hemodynamic Phenotype

A central evidence pillar supporting MedsEngine's ICG approach is the demonstrated inability of any demographic characteristic - age, race, sex, or BMI - to reliably predict a patient's hemodynamic phenotype. This has been confirmed at both the MedsEngine cohort level and in two independent large-scale epidemiological studies:

Guidelines suggest all patients have Vasoconstriction

Hemodynamic Type	ICG Count	%
Vasoconstriction	10,467	46.84%
Mixed Hemodynamic	6,441	28.82%
Hyperdynamic	5,438	24.34%
Totals	22,346	100.00%

Data show that <50% of patients have Vasoconstriction

Ages 18-39

Hemodynamic Type	ICG Count	%
Vasoconstriction	461	38.64%
Mixed Hemodynamic	314	26.32%
Hyperdynamic	418	35.04%
Totals	1,193	100.00%

Ages 60-69

Hemodynamic Type	ICG Count	%
Vasoconstriction	2,618	44.65%
Mixed Hemodynamic	1,763	30.06%
Hyperdynamic	1,483	25.29%
Totals	5,864	100.00%

Ages 40-49

Hemodynamic Type	ICG Count	%
Vasoconstriction	1,029	39.98%
Mixed Hemodynamic	681	26.46%
Hyperdynamic	864	33.57%
Totals	2,574	100.00%

Ages 70-79

Hemodynamic Type	ICG Count	%
Vasoconstriction	2,576	51.03%
Mixed Hemodynamic	1,542	30.55%
Hyperdynamic	930	18.42%
Totals	5,048	100.00%

Ages 50-59

Hemodynamic Type	ICG Count	%
Vasoconstriction	1,806	42.21%
Mixed Hemodynamic	1,182	27.62%
Hyperdynamic	1,291	30.17%
Totals	4,279	100.00%

Ages ≥80

Hemodynamic Type	ICG Count	%
Vasoconstriction	1,977	58.35%
Mixed Hemodynamic	959	28.31%
Hyperdynamic	452	13.34%
Totals	3,388	100.00%

Image 32: Hemodynamic Phenotype Distribution by Age Group (ICG Data, n=22,346)

Vasoconstriction prevalence ranges from 39% (ages 18–39) to 58% (ages ≥80). No age group approaches the very high vasoconstriction rate that standard guidelines implicitly assume

Guidelines suggest all patients have Vasoconstriction

Male

Hemodynamic Type	ICG Count	%
Vasoconstriction	5,497	48.83%
Mixed Hemodynamic	3,245	28.82%
Hyperdynamic	2,516	22.35%
Totals	11,258	100.00%

Data show that <50% of patients have Vasoconstriction

Female

Hemodynamic Type	ICG Count	%
Vasoconstriction	4,970	44.82%
Mixed Hemodynamic	3,196	28.82%
Hyperdynamic	2,922	26.35%
Totals	11,088	100.00%

All ICG Black Data:

Hemodynamic Type	ICG Count	%
Vasoconstriction	1,770	54.71%
Mixed Hemodynamic	793	24.51%
Hyperdynamic	672	20.77%
Totals	3,235	100.00%

All ICG Non-Black Data:

Hemodynamic Type	ICG Count	%
Vasoconstriction	8,697	45.51%
Mixed Hemodynamic	5,648	29.55%
Hyperdynamic	4,766	24.94%
Totals	19,111	100.00%

All ICG Asian Data:

Hemodynamic Type	ICG Count	%
Vasoconstriction	84	39.44%
Mixed Hemodynamic	63	29.58%
Hyperdynamic	66	30.99%
Totals	213	100.00%

All ICG Non-Asian Data:

Hemodynamic Type	ICG Count	%
Vasoconstriction	10,383	46.91%
Mixed Hemodynamic	6,378	28.82%
Hyperdynamic	5,372	24.27%
Totals	22,133	100.00%

Image 33: Hemodynamic phenotype distribution by sex and race (ICG data, n=22,346)

Vasoconstriction accounts for 49% in males and 45% in females; 55% in Black patients, 46% in Non-Black patients, 39% in Asian patients, and 47% in Non-Asian patients. Mixed hemodynamic ranges from 25%–30%, while hyperdynamic ranges from 21%–31%, indicating substantial variation across demographic groups.

External Validation

Randomized Controlled Trial Evidence (6 RCTs, 2002–2021)

MedsEngine is not asking the market to trust a novel, unproven concept. Impedance cardiography-guided hypertension management has been independently validated in six randomized controlled trials conducted across two decades in multiple countries, including landmark US primary care studies that directly parallel MedsEngine's real-world deployment model.

Across all six RCTs, ICG-guided therapy is superior, achieving 56–77% BP control compared to 33–57% with standard empiric care. The following table summarizes the key trials:

Year	Study / Trial	Setting	Design	Key Outcome
2002	Taler et al. (Hypertension)	Resistant HTN specialist care	RCT: ICG vs. specialist management	56% vs. 33% BP control; ICG superior to expert clinical judgment
2006	Smith et al. - CONTROL Trial (Hypertension)	11 US primary care clinics	Landmark US RCT: ICG-guided vs. standard care	77% vs. 57% BP control (OR=2.32); 19/12 mmHg greater reduction
2013	Krzesinski et al. (Medical Science Monitor)	European outpatient	RCT: Patient-tailored ICG vs. empiric therapy	ICG superior; supports early deployment to establish correct therapy rapidly
2017	Krzesinski et al. - Pooled Analysis	Two European RCTs (n=272)	Pooled RCT analysis	Defines optimal target population: BP >140/90 after failed initial therapy
2018	Talvik et al. - BEAUTY Study (Blood Pressure)	Multicenter European	RCT: ICG-guided vs. specialist management	ICG-guided care non-inferior to specialist; generalizable beyond specialist settings
2021	Lu et al. (Open Heart)	Real-world outpatient - CDSS integrated	Pragmatic RCT: ICG + CDSS vs. standard care	67% vs. 41% BP control (p=0.017); closest analog to MedsEngine workflow

The most directly analogous external trial to MedsEngine's workflow is Lu et al. 2021 – a pragmatic outpatient RCT combining ICG with a clinical decision support system in a real-world primary care setting. The 67% vs. 41% BP control result (p=0.017) supports MedsEngine's approach of determining every patient's hemodynamic phenotype and using CDS tools for treatment recommendations.

External Validation

Systematic Reviews & Meta-Analyses

Ferrario et al. 2010 (Therapeutic Advances in Cardiovascular Disease): First meta-analysis of ICG RCTs. Confirmed ICG-based approaches provide practical, cost-effective improvement in hypertension control rates across clinical settings.

Viera et al. 2024 (American Journal of Hypertension): Most current systematic review (spanning 1946–2024, including all 6 RCTs). ICG-guided care improved odds of BP control (OR 1.87–2.92 for <140/90 at 3 months), including in primary care settings. Cited in the MedsEngine/Cleland manuscript currently under journal review.

Prognostic Evidence - ICG Beyond Treatment Guidance

- Caraballo et al. 2018 (PREVENCION Study, JAHA): 10.9-year follow-up of 1,639 patients. ICG hemodynamic parameters independently predict mortality in the general population beyond BP alone - supporting ICG for broader cardiometabolic risk stratification.
- Spaak et al. 2013 (Blood Pressure, n=1,151): ICG cardiac index and SVRI independently predict cardiovascular events and stroke in hypertensive outpatients over 3.9 years.

Real-World US Primary Care Implementation Studies

- Matthews et al. 2008 - US community generalist practice: BP control improved from 42% to 85% after ICG implementation. Control rate almost identical to MedsEngine's Premier results (85%) - validates that MedsEngine outcomes are reproducible in community practice.
- Strobeck et al. 2003 - Community primary care, US: earliest published report of ICG effectiveness in a non-specialist US setting; establishes generalizability outside academic medical centers.

Diabetes & Heart Failure Expansion Evidence

- Bonora et al. 2019 (Cardiovascular Diabetology) - RCT: Establishes ICG as a monitoring tool for hemodynamic effects of SGLT2 inhibitors in type 2 diabetes; directly aligned with MedsEngine's diabetes module.
- Liu et al. 2023 (Taiwan) - Prospective study: Canagliflozin improves ICG-derived stroke volume index, cardiac output index, and reduces SVR index - ICG detects SGLT2-driven hemodynamic improvements independent of BP changes
- Krzesinski et al. 2022 (Cardiology Journal) - RCT: Nurse-led ICG with telemedicine reduces HF hospitalizations; scalable primary care delivery model mirrors MedsEngine's workflow for APPs.
- Ausbuettel et al. 2025 (Clinical Cardiology) - NICaS ICG vs. right heart catheterization in 203 CHF patients: validates the exact hardware platform used by MedsEngine against the gold standard in a contemporary 2025 study.

Hemodynamic Phenotyping: The Value of Determining the Cause of High BP

- Abdelhammed et al. 2005 (American Journal of Hypertension): Established prevalence distribution of hemodynamic phenotypes - the three-category classification (vasoconstriction / hyperdynamic/mixed) used in MedsEngine.
- Mahajan et al. 2020 (American Journal of Medicine, NHANES): Nationally representative US data confirms BP alone is fundamentally insufficient to guide antihypertensive therapy; no demographic reliably predicts hemodynamic phenotype.
- Caraballo et al. 2022 (PLOS ONE, n=45,082): Population-scale validation across 51 outpatient centers in China; significant sex and age differences in hemodynamic profiles confirm standardized BP treatment is systematically mismatched for large subgroups.

Published & Conference Evidence

The MedsEngine cohort of over 14,000 primary care patients reported on over 22,000 ICGs and has been presented at the premier European Society of Cardiology Congress in 2023 and 2024 and at the European Society of Hypertension in 2025.

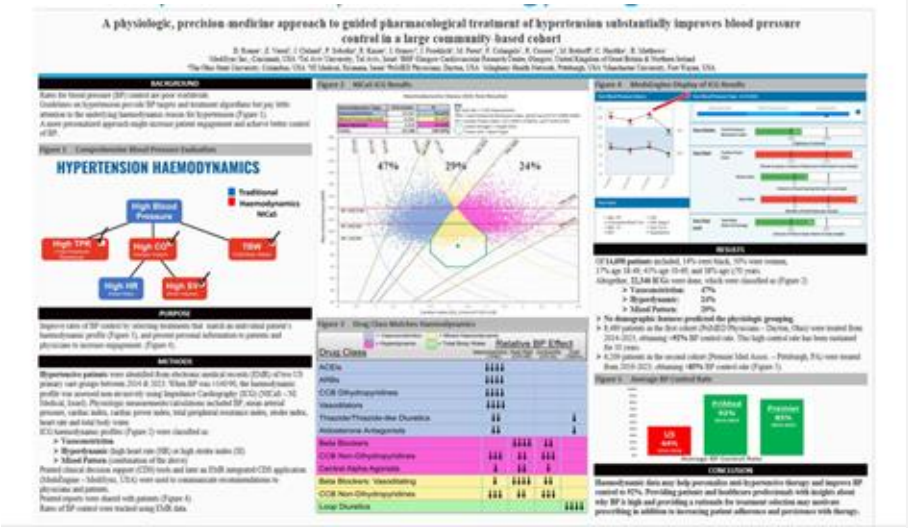


Image 34: ESC Congress 2023 Amsterdam: Romer D, Cleland J, et al. "A physiologic, precision-medicine approach to guided pharmacological treatment of hypertension substantially improves blood pressure control in a large community-based cohort" 14,698 patients · 22,346 ICG measurements· PriMED Physicians and Premier Medical Associates/AHN

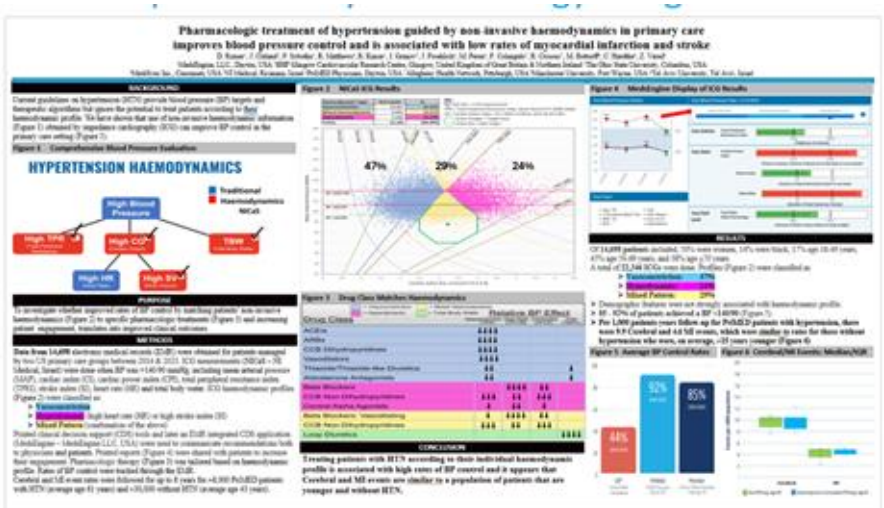


Image 35: ESC Congress 2024 London: Romer D, Cleland J, et al. "Pharmacologic treatment of hypertension guided by non-invasive hemodynamics in primary care improves blood pressure control and is associated with low rates of myocardial infarction and stroke." Key findings: MI and stroke rates similar to a population >15 years younger without HTN

- Romer D, Cleland J, et al. - ESC Congress 2023 Amsterdam (ePoster): 14,698 patients, 22,346 ICG measurements at PriMED (Dayton OH) and Premier/AHN (Pittsburgh PA). BP control: PriMED 92%, Premier 85% vs. US national 48%. No demographic features predicted hemodynamic profile.
- Romer D, Cleland J, et al. - ESC Congress 2024 London (ePoster): Updated results confirming 9.9 Cerebral events per 1,000 patient-years and 4.6 MI events per 1,000 - similar to a population >15 years younger without hypertension.
- Romer D, et al. - ESH 2025 Milan (34th European Meeting on Hypertension): 10-year sustained results; low cardiovascular event rates; HTN controlled in <2 visits on average.
- Romer D, Cleland JGF, et al. - Full manuscript covering 14,058 patients over 10 years: Pending journal submission. MI rate and stroke rate were both similar to SPRINT trial benchmarks.

Economic Value Analysis

Provider-Level Return on Investment

This analysis quantifies the economic impact across three dimensions:

- Clinical cost avoidance from improved cardiovascular and metabolic outcomes.
- Provider revenue generation through quality-based reimbursement (G0446 billing).
- Payer and system-level savings through the Triple Aim framework.

$2,500 Hypertension Savings / Patient / Year	**$25,600** Net Provider Income / 1,000 Patients	**$2,000** Diabetes Savings / Patient / Year

1. Clinical Impact: Chronic Disease Control = Cost Control

Uncontrolled chronic diseases - hypertension, diabetes, and dyslipidemia - are some of the primary cost drivers in US healthcare. MedsEngine directly targets these conditions with structured, evidence-based protocols. The economic case for control is well-established in peer-reviewed literature.

Risk Reduction With a 10-point Drop in Systolic BP

Cardiovascular Event	Risk Reduction	Cost Per Event
Major Adverse Cardiovascular Events (MACE)	20%	$29,500 / MI
Stroke	27%	$20,000 – $43,000 / Stroke
Heart Failure	28%	$14,000 / Admission
Coronary Artery Disease (CAD) Related Events	17%	$32,500 / Event

PriMED Physicians	Premier Physicians (Pittsburgh, PA)
Systolic BP Drop = 22 points	Systolic BP Drop = 18 points

MedsEngine-enabled practices have demonstrated BP reductions that far exceed the 10-point clinical threshold referenced in published literature

These results, 80–120% above the published benchmark, confirm that MedsEngine's ICG-guided, guideline-directed approach yields superior clinical outcomes compared to standard-of-care management

Per 1,000 Patients
$2,500,000 / year Controlled HTN Savings
$2,000,000 / year Controlled Diabetes Savings
$780,000 / year Cholesterol Guideline Savings
$25,600 / year G0446 Net Provider Revenue
$5,400 / year MedsEngine Platform Cost

Economic Value Analysis

Economic Savings: The Triple Aim Framework

MedsEngine's clinical protocols generate validated annual savings across three chronic disease categories. Data sourced from the Ochsner Validation Institute (2023) and peer-reviewed cardiovascular journals (J Gen Intern Med 2025; Prog Cardiovasc Dis 2022).

Condition	Validated Savings	Mechanism	Source
Hypertension	$2,500/patient/year controlled	$250,000/provider/year from 10% control improvement; $32,000 per avoided CV event	Ochsner Validation Institute 2023
Type 2 Diabetes	$2,000/patient/year	Reduced complications (dialysis, amputation, blindness); avoided hospitalizations	Ochsner Validation Institute 2023
Cholesterol	$780/patient/year + $25,600/PCP G0446	CV risk reduction; G0446 billing at 50% of 2,000-patient panel	J Gen Intern Med 2025; Johns Hopkins 2025
Heart Failure	$10,700–$17,800 per admission avoided	Reduced admissions, 30-day readmissions, ED visits; HEDIS improvements	CDC; ACC data

For a primary care practice managing 2,000 patients with one or more of these chronic conditions, achieving control across the panel represents a potential aggregate savings of greater than 100,000 dollars annually to the broader healthcare system - a compelling argument for value-based contract negotiation and quality bonuses.

Provider Revenue: G0446 Billing Opportunity

Beyond clinical outcomes, MedsEngine creates a direct revenue stream for providers through the G0446 billing code - Cardiovascular Risk Reduction Counseling. MedsEngine's Cholesterol module simplifies the documentation of work and time required to utilize this code.

Covered payers include: Medicare, Medicaid, UHC, Anthem, Aetna, and Humana. The code is billable once per year per patient over 18 years of age.

Revenue / Cost Component	Amount	Amount (x1000 patients)
G0446 Reimbursement (Medicare 2026)	$31.00	$31,000
MedsEngine Platform Cost	$5.40 per patient/year	$5,400
Net Provider Income Per Patient	$25.60	$25,600

Net Provider Income from G0446 Alone: $25,600 / year / provider

These figures do not include additional provider income from improved Star ratings, HEDIS scores, and value-based payment bonuses, which can be significant. Deploying MedsEngine also documents the establishment of a formal quality improvement plan - a requirement for multiple payer incentive programs.

Economic Value Analysis

ICG Cost-Effectiveness - Independent Peer-Reviewed Validation

The cost-effectiveness of ICG-guided hypertension management is independently validated in peer-reviewed health economics literature, not derived from MedsEngine's own financial models:

- Ferrario et al. 2006 (CONTROL Trial cost analysis, Journal of Clinical Hypertension): A $35 ICG test reduces cost per mmHg systolic BP reduction by >50% compared to standard care ($20 vs. $36 per mmHg reduction).
- Long-term 10-year model: $476 net savings per patient and 0.109 QALYs gained per patient from ICG-guided therapy, yielding a cost per QALY of $4,371 - meaning ICG-guided therapy is cost-dominant (saves money AND improves outcomes).
- At these economics, MedsEngine is a cost-efficient solution in a value-based care framework. Payer perspective: a $35 ICG test vs. a $2,500 annual cost of uncontrolled hypertension per patient represents a straightforward cost-benefit case.

HEDIS/STAR Quality Metric Impact

HEDIS Measure	Code	Weight	MedsEngine Module
Controlling High Blood Pressure (new goal <130/80)	CBP	3x	Hypertension
Statin Therapy for Patients with CVD	SPC	1x	Cholesterol
Glycemic Status Assessment	GSD	3x	Type 2 Diabetes
Kidney Health Evaluation	KED	1x	Type 2 Diabetes
Medication Adherence - Cholesterol	MAC	3x	Cholesterol
Medication Adherence - Diabetes Medication	MAD	3x	Type 2 Diabetes
Medication Adherence - Hypertension	MAH	3x	Hypertension
Statin Use in Persons with Diabetes	SUPD	1x	Cholesterol/ Diabetes

MedsEngine Improves Outcomes and Reduces Costs

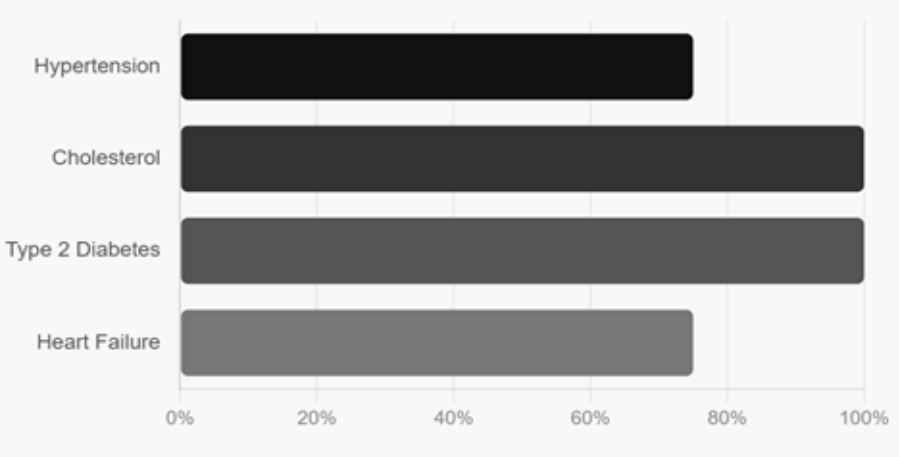
Hypertension	Utilizes an FDA-approved Impedance Cardiography (ICG) device to identify the hemodynamic cause of hypertension (cardiac output vs. vascular resistance), enabling evidenced-based treatment recommendations. This approach achieves nation-leading BP control rates.
Diabetes	Improves Type 2 Diabetes control by applying American Diabetes Association (ADA) recommendations and calculating a personalized A1c target for each patient based on individual comorbidities, risk factors, and clinical profile.
Cholesterol	Supports complete population-level cholesterol goal-setting and treatment recommendations based on comprehensive American Heart Association (AHA) guidelines. Enables G0446 documentation and submission.
Patient Engagement	Generates personalized patient summary reports tailored to each patient's specific condition profile to improve health literacy, treatment understanding, and satisfaction - directly increasing medication adherence and long-term outcome sustainability.

User Feedback

HITLAB conducted a structured physician feedback survey in March 2026 to capture real-world clinical experiences, patient engagement outcomes, workflow impact, and satisfaction scores. Four physician respondents provided validated, attributable feedback. The following report summarizes findings from the four valid respondents:

Respondent	Title / Role	Organization	Specialty	MedsEngine Tenure
Jan Froehlich, MD	President, PriMED Physicians; Family Physician	PriMED Physicians	Family Practice	More than 5 years
Maureen Perez, MD	CMO, PriMED Physicians	PriMED Physicians	Family Medicine	More than 5 years
Robert Crossey, DO/FAAFP	Family Physician	AHN Primary Care	Family Medicine	2–5 years
John Newman MD	ED CMO	Volunteers in Medicine	Surgery / Primary Care	2–5 years

Modules Used Across Respondents (N=4)



Satisfaction & Engagement Scores

9.0 Avg. Overall Satisfaction (Scale 1–10)	**9.5** Avg. Patient Engagement (Scale 1–10)	**4 / 4** Willing to Be Quoted (Name & Title)

Key theme across all respondents: Patients engage more when they can see and understand their own data.

User Feedback

Physicians feedback on MedsEngine usage

"I have primarily used MedsEngine as a specialty second opinion to confirm (or challenge) my chronic care management plan. Additionally, it has tremendous value in educating/informing my patients as we engage in shared decision making. Finally, it serves as a tool to deliver consistent, high-quality care in a care delivery model that demands a team approach with provider extenders."

- Jan Froehlich, MD

"Improved patient engagement as we review pertinent labs and data points to develop their individualized plan of care. Improved patient outcomes by utilizing optimal therapy and getting to goal quickly. Improved confidence that the right med at the right dose is being offered."

- Maureen Perez, MD

"I'm much more likely to show the patient the screen and have them see where their risk is, what recommendations there are to start diabetes medications, and what recommendations are to start blood pressure medications."

- Robert Crossey, DO/FAAFP

"I would say I have decreased my female cholesterol treatment and increased DM meds to try and get folks off insulin. We had several stable IDDM patients who were able to come off insulin with the addition of guidelines."

- John Newman, MD

Over the past three years, MedsEngine has assisted Premier Medical Associates in improving the health outcomes of thousands of patients living with chronic conditions. Now integrated with Epic, we are pleased that Premier clinicians will continue to have access to this game-changing technology for the benefit of both our caregivers and patients

- Dr. Francis Colangelo, MD - Primary Care Provider, Premier Medical Associates (AHN)

Reported Clinical Outcomes

Physician / Practice	Reported Clinical Outcome
Jan Froehlich, MD PriMED Physicians	Significantly lower incidence of CKD, DM complications, and Heart Failure than predicted - attributed to 20+ years of aggressive chronic condition management supported by MedsEngine protocols.
Maureen Perez, MD PriMED Physicians	Patients with poorly controlled HTN reached goal within 2 office visits on average. ICG-guided medication changes replaced guesswork. Improved lipid compliance, diabetes control, and medication adherence.
Robert Crossey, DO/FAAFP AHN Primary Care	Practice BP control rates better than national averages. Higher rates of appropriate statin prescribing among diabetic patients and those with CV risk. Converted a statin-hesitant patient using MedsEngine risk analysis.
John Newman, MD Volunteers in Medicine	DM management improved from 60% controlled to 72% (HbA1c < 8). Multiple stable IDDM patients came off insulin following guideline-based medication additions. Reduced female over-treatment with cholesterol medications.

User Feedback

Patient Impact & Engagement

"My patients appreciate the reports and the conversations. It is helpful to have an output that he/she can review once home."
- Jan Froehlich, MD

"Better medication adherence when the patient understands why certain products are right for their particular condition."
- Maureen Perez, MD

"It helps us visually show the patient where their risk is. It helped me manage patients with chronic diseases and show them that science can be used to determine what medicine works best for them."
-Robert Crossey, DO/FAAFP

"Engages the discussion with pictorial representation - patients are more engaged and involved in the process of adding or subtracting changes."
- John Newman, MD

Workflow Integration

Respondent	Workflow Feedback
Maureen Perez, MD	Extremely easy to incorporate into the flow of an office visit. Patients seem very engaged with reviewing their results. Note: Heart failure module is more intricate and takes more time, which can affect workflow in a busy practice.
Jan Froehlich, MD	Requires consistent use by every team member. Providers and staff need to remain consistent with processes. Success depends on team-wide understanding of chronic care management value.
Robert Crossey, DO/FAAFP	Uses MedsEngine daily. Reviews it whenever bloodwork returns. High utilizer - considers it an essential part of daily patient care workflow.
John Newman, MD	Most modules integrate easily. The tool allows non-primary care volunteer physicians and retired providers to confidently follow current guidelines, expanding care capacity at the free clinic.

Key Themes & Strategic Insights

Evidence-Based Decision Confidence
All four physicians cited MedsEngine as a tool that replaces clinical guesswork with guideline-directed precision - whether selecting antihypertensive class, personalizing A1c targets, or determining statin intensity. Dr. Crossey: "science can be used to determine what medicine works best."

Patient-Facing Visualization Drives Adherence
The platform's ability to show patients their own risk data in visual, accessible formats was repeatedly cited as a differentiator. Patients who understand their condition and their treatment rationale are more likely to adhere - reducing complications and costs downstream.

Long-Term Population Health Investment
Both PriMED physicians framed MedsEngine not as a single-visit tool but as a population health strategy. Dr. Froehlich noted measurably lower CKD, DM complications, and HF incidence attributable to decades of consistent chronic care management supported by the platform.

Enabling Non-Specialist Care Delivery
Dr. Newman highlighted MedsEngine's unique value in extending chronic disease management to under-resourced settings - enabling retired surgeons and volunteer physicians to confidently manage hypertension and diabetes with guideline-level accuracy.

MedsEngine: Evidence, Deployment & Scale

Strength of the Evidence Base

- MedsEngine's clinical foundation rests on over 20 years of independent impedance cardiography (ICG) science, supported by 26 publications that predate the platform itself.
- The evidence base includes six randomized controlled trials, two meta-analyses, a 2024 systematic review, and multiple cost-effectiveness analyses - all validating the hemodynamic personalization approach at the core of MedsEngine's methodology. Real-world performance data spans more than 10 years and over 14,000 patients, with consistent outcomes demonstrated across diverse populations, including high-risk, high-Medicaid, and socioeconomically challenged patients.
- Cerebral and MI events were similar to rates for those without hypertension who were >15 years younger, representing the strongest outcomes statement in the clinical decision support literature. These findings have been presented at premier international congresses, including ESC 2023 and 2024, ESH 2025, and AHA 2023.
- The platform adheres to AHA/ACC/HFSA and ADA guidelines at a depth unusual for clinical decision support tools, delivering transparent and explainable recommendations that support clinician trust, reduce clinical inertia, and enhance patient understanding, medication adherence, and satisfaction.

20+ Years of Independent Science

26 Publications

Large Primary Care ICG Dataset

Deployment Model

- MedsEngine is designed for rapid, low-friction implementation.
- From contract to go-live takes just three to four weeks, requiring only 20 to 30 hours of IT practice team time with no changes to existing EHR build and no additional staff required. Physician and advanced practice provider training is a one-time commitment - one hour each for Hypertension and Diabetes, half an hour for Cholesterol, and two to three one-hour sessions if primary care chooses to assume heart failure care from cardiology.
- Integration is delivered via SMART-on-FHIR, supporting Epic and other major EHR platforms, and the platform is available directly in the Epic Showroom, making adoption straightforward for health systems already operating within the Epic ecosystem.

Three Weeks to Go-Live

No EHR Changes

Single Log-in

MedsEngine: Evidence, Deployment & Scale

Scalability

- MedsEngine is currently deployed across multiple practices and health system contexts, with a roadmap of approximately 12 to 13 additional chronic disease modules in development - including maternal hypertension, chronic kidney disease, asthma, pediatric asthma, and COPD.
- Its FHIR-based architecture enables interoperability across EHR platforms, ensuring the solution can scale seamlessly across diverse health system environments.
- A delivery model that actively supports Advanced Practice Providers (APPs), further demonstrates that hemodynamic monitoring can be delivered at scale without requiring physician-initiated testing at every encounter - directly relevant to MedsEngine's deployment in value-based care and rural health settings.
- APPs have responded particularly positively to the platform, finding it enhances their confidence, clinical skills and serves as an effective tool for teaching and shared decision-making.
- The solution is suitable for single practices through large health systems and is ideally positioned for Value-base care, Population Health, Medicare Advantage, Medicaid, VA, FQHCs, and employer-based on-site care clinics.

12–13 Modules in Pipeline

Single Practice to Large Health System

Value-Based Care Ready

Policy Landscape & Reimbursement Pathway

- The current policy context represents an advocacy opportunity rather than a barrier. ICG is FDA-approved and reimbursed under CPT 93701 for specific cardiac indications. Routine coverage for hypertension management - which existed from 1999 to 2003 - is no longer available for hypertension diagnoses, due to a lack of primary care data being presented in a 2003 CMS review.
- The 2025 AHA/ACC Hypertension Guideline does not yet recommend routine ICG, citing the need for large randomized controlled trials demonstrating hard cardiovascular outcomes.
- MedsEngine is actively addressing this through the Cleland/Romer 2026 manuscript and ongoing ESC/ESH conference presentations, building the evidence base required for future guideline inclusion and reimbursement under CPT 93701.
- Expanding the US evidence base further are active trials at Duke University and Northwestern University, focused on ICG-guided hypertension management in primary care and ICG for decompensation detection, respectively.
- Commercial payer policy varies considerably, creating near-term adoption opportunities with innovative payers and ACOs ahead of formal CMS policy change.
- Value contracts create a substantial ROI when ICG is used to control hypertension.
- With a 10-year, 14,000-plus patient primary care ICG dataset, MedsEngine is uniquely positioned to support a CMS coverage expansion request - turning the current reimbursement gap into a significant strategic opportunity.

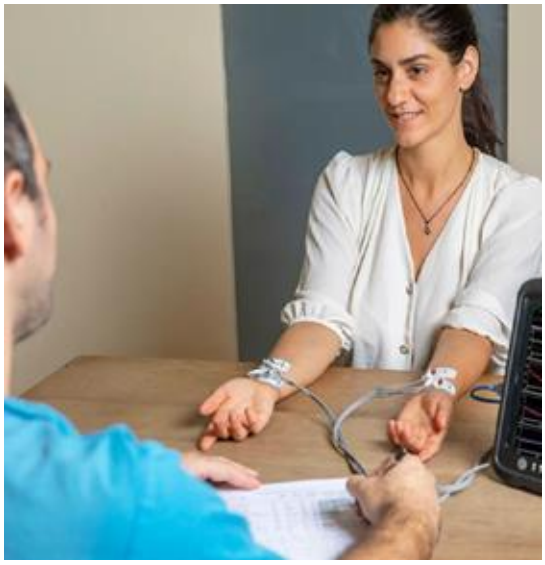
An Advocacy Opportunity

Near-Term Payer Adoption

Evidence-Driven and Guideline-Based Policy Change

Conclusion

Chronic disease represents the defining crisis of modern healthcare. At $4.9 trillion in annual total healthcare expenditure and with blood pressure control rates stubbornly below 50% nationally, the status quo is neither clinically nor financially sustainable. MedsEngine presents a compelling, evidence-anchored response - tested in real clinical environments, over real time, with measurable results.



The evidence reviewed consistently supports MedsEngine's core value proposition: a physician-designed, guideline-driven platform that translates complex patient data into actionable, individualized recommendations at the point of care. Its glass-box architecture - where every recommendation is traceable to its clinical rationale and evidence source - distinguishes it from black-box tools and positions it favorably for both clinical adoption and regulatory scrutiny. Real-world outcomes are the platform's strongest asset.

Over ten years, MedsEngine has demonstrated sustained blood pressure control rates exceeding 92%, far surpassing national averages and comparing favorably against SPRINT trial benchmarks. Cardiovascular event rates among MedsEngine-managed patients fall below those benchmarks, and validated cost savings reinforce the platform's value in risk-based and value-based care models. These are documented outcomes from sustained clinical deployment, not modeled projections. The policy landscape further strengthens the investment case. CMS coverage policy has not yet fully caught up with the evidence supporting clinical decision support software in chronic disease management.

MedsEngine is generating the evidence base that will shape guideline evolution, and early deployments validate the model at scale. The platform is operationally ready to expand across health systems, payors, and value-based care organizations.

HITLAB's overall assessment is that MedsEngine represents a mature, clinically credible, and strategically differentiated platform - one that combines longitudinal real-world evidence with technical infrastructure, compliance posture, and clinical design integrity. It is a validated solution ready for scaled deployment, not a pilot-stage proof of concept. HITLAB recommends that health systems, payors, employers, and investors engage with MedsEngine as a priority partner in chronic disease transformation. The unmet need is enormous, the evidence is strong, and the window to lead - ahead of competitive saturation and policy formalization - is now. Those who move early will define the standard of care for a generation.

"MedsEngine is among the most clinically rigorous and outcomes-validated decision support platforms HITLAB has evaluated.
In a landscape crowded with digital health promises, MedsEngine delivers something rare: a decade of real-world evidence that durably moves the needle on chronic disease control at scale."

- Stan Kachnowski, Chair, HITLAB

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Contact Us for further inquiries

Stan Kachnowkski PhD MPA
212-543-0107
swk16@hitlab.org
www.hitlab.org