Baptist Health
HEART INSTITUTE

Primary Care & Cardiology In The Artificial Intelligence Era

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Disclosures: None

The Problems We ALL Face

- Primary care physicians spend **2 hours on EHR tasks** for every **1 hour of patient care**
- The average provider spends **1-2 hours after clinic** finishing documentation
- Administrative burden is driving burnout (63%) and early retirement
- We are losing the parts of medicine that matter: **human connection**
- Less time for what matters: **Patient Care**

"AI won't solve everything, but it can give you back 10-15 hours every week."

What Is Medical AI?

AI Demystified: What It Really Means for You

- **What AI Actually Is:**
  - Software that learns patterns from massive amounts of medical data.
  - Tools that can read ECGs, interpret images, draft notes, predict risk
  - Your new colleague who never sleeps, never gets tired, and never forgets

What AI Is Not

- A replacement for physician judgment ✗
- Capable of empathy or difficult conversations ✗
- Ready to practice independently ✗
- Perfect or infallible ✗

The Bottom Line on AI

- Think of AI as **the world's most tireless resident,** who:
  - Pre-reads every chart
  - Remembers every guideline
  - Never misses a drug interaction
  - Frees YOU to do the medicine only humans can do

"AI won't replace doctors, but doctors who use AI will replace those who don't."

Where We Are In The AI Journey

- **Automation:** We're Here Now (2024-2026)
  - AI medical scribes save 70% documentation time
  - Automated ECG interpretation at point-of-care
  - Patient portal message drafting
  - **Status: Available and working TODAY**
- **Prediction:** Next 2-3 years (2026-2028)
  - AI predicts who will develop Atrial Fibrillation, heart failure, MI
  - Proactive panel management alerts
  - Personalized treatment recommendations
  - **Status: In clinical trials now**
- **Integration:** (2028-2030)
  - Seamless EHR that thinks like a doctor
  - Auto-summarizes hospital records
  - Suggests diagnoses you might have missed
  - **Status: In development**

The ROI Reality Check: Does AI Actually Save Time and Money?

- **Time Savings (Per Physician/Week):**
  - AI Scribe: 5-7 hours saved on documentation
  - Clinical decision support: 2-3 hours on portal messages
  - Automated prior authorizations: 1-2 hours
    - **Already being used by payers to evaluate your claims**
- **Total: 8-12 hours per week back in your life**
- **Cost vs. Benefit:**
  - AI Scribe: ~$400/month
  - Revenue from 2 extra patients/week: ~$1,200/month
  - **Net benefit: $800/month + better work-life balance**
- **Quality Improvements:**
  - 45% reduction in diagnostic errors with AI support
  - 60% reduction in missed drug interactions
  - Earlier disease detection (AFib, heart failure, cancer)

What AI Will NEVER Replace: The Irreplaceable Human Doctor

The Medicine That AI Can't Do

- **Trust & Relationship Building**
  - Patients don't want diagnoses from a machine
  - They want to be heard, understood, cared for
- **Nuanced Clinical Judgment**
  - The 80-year-old with an acute MI who says "No heroics"
  - The subtle clinical gestalt that something isn't right
- **Difficult Conversations**
  - Breaking bad news with compassion
  - Navigating end-of-life decisions
  - Supporting families through crisis
- **Ethical Decision-Making**
  - Balancing quality vs. quantity of life
  - Resource allocation in constrained systems
  - Cultural sensitivity and individual values

Your Quick Wins: AI That Is Ready Today

Three Things You Can Implement This Month

The Trinity of Primary Care AI:

1. AI Medical Scribes 🎯
- Finish notes within 5 minutes after the patient leaves
- Leading platforms: Nuance DAX, Suki, Abridge, Nabla
- Cost: ~$400/month (pays for itself with 2 extra patients/week)
- **Action: Try 2-3 free trials starting tomorrow**

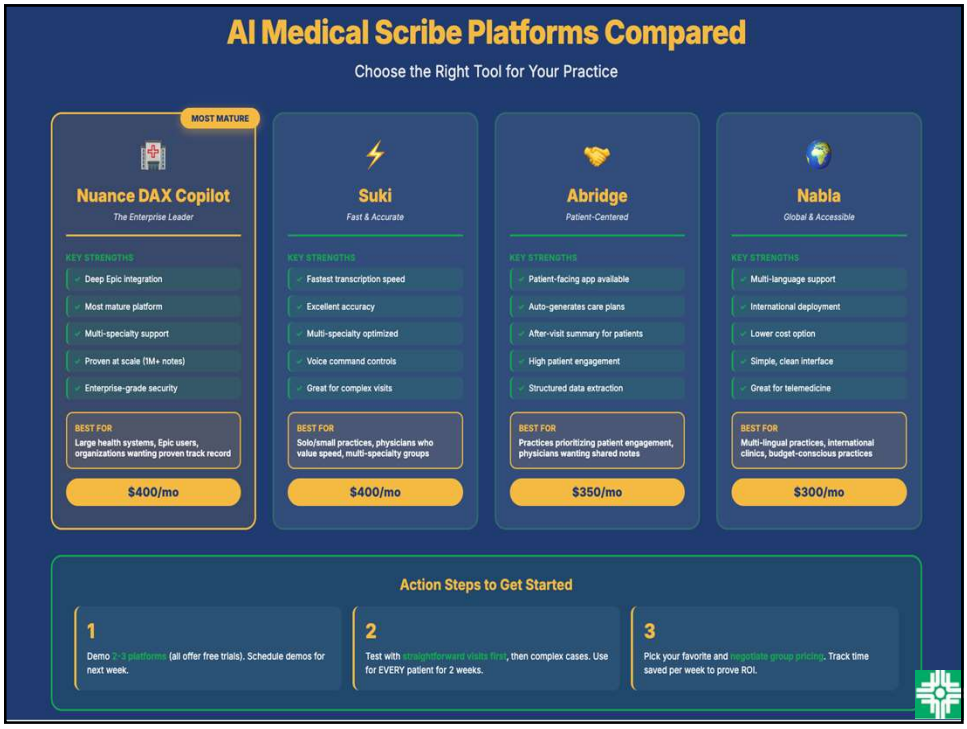
2. Clinical Decision Support 🧠
- Instant drug interaction checks, dosing adjustments
- Reduces cognitive load at end of exhausting clinic days
- Catches things you miss when tired
- **Action: Ask your EHR vendor what's already built-in**

3. Patient Communication Tools ✉️
- Draft portal responses in seconds, not minutes
- Generate after-visit summaries in plain language
- **Action: Try ChatGPT/Google Gemini/Claude for patient ed materials (free)**

The Game-Changer: AI Medical Scribes

- **How It Actually Works:**
  - A small microphone captures your conversation with patient
  - AI transcribes in real-time with medical vocabulary
  - AI generates complete SOAP note in your style
  - You review and approve in 2-3 minutes
  - Sign and done - before the patient checks out
- **The Evidence:**
  - 70% reduction in documentation time (range 20-70%)
  - Physicians report leaving clinic on time for first time in years
  - Patients appreciate increased eye contact and engagement
  - 96% of doctors who try it never go back

"Start with straightforward visits before complex cases."



Clinical Decision Support & Communication

- **Decision Support**
  - Instant answers to drug interactions, dosing checks in renal failure.
    - 60% reduction in missed drug reactions
  - Reduces cognitive load at the end of long clinic days
  - Catches things you might miss when tired.
    - 45% reduction in diagnostic errors with AI support [5]
- **Patient Communication**
  - Draft patient portal responses in seconds
  - Create after-visit summaries in plain language
  - Generate patient education materials
  - Save 10-15 minutes per complex message.

Better Primary Care Cardiology Decisions

Tools That Improve Clinical Care Quality

- ECG Interpretation AI
- Cardiovascular Risk Prediction
- Smarter Referral Decisions

Clinical Decision Support In Action: Your AI Safety Net for Complex Decisions

Scenario 1: The 3:45 PM Patient
- 82-year-old with CKD Stage 4, new AFib, on 8 medications
- You're exhausted, clinic is running 45 minutes late
- **AI checks:** Drug interactions, renal dosing, QTc prolongation risk
- **Result:** Catches potential drug toxicity you were about to miss
- **"Fatigue causes errors, AI doesn't get tired"**

Scenario 2: The Portal Message Avalanche
- 47 messages waiting when you log in
- Patient asking about conflicting information from Dr. Google
- **AI drafts:** Evidence-based response citing guidelines
- **You:** Edit for personal touch, send in 2 minutes vs. 15

Scenario 3: The Diagnostic Puzzle
- Vague symptoms, unclear diagnosis after workup
- **AI suggests:** "Did you consider paraneoplastic syndrome?"
- **Result:** Catch early-stage lung cancer, lives saved

Critical Reminder:
✅ AI suggests - YOU decide

✅ Verify everything before acting

✅ Document that you used AI assistance

Available Tools:
- **UpToDate AI**: Real-time clinical decision support at point-of-care
- **Epic Sepsis Model**: Alerts for early sepsis recognition
- **Isabel Pro**: Differential diagnosis generation
- **Your EHR**: Many have built-in AI tools you don't know about

Cardiovascular Screening for Primary Care

AI-Enhanced CV Risk: Beyond Traditional Scores

The Problem with Current Approach:
- Framingham/ASCVD scores miss 50% of people who have heart attacks
- Based on population data, not individual biology
- Ignore subclinical disease markers
- **Result: Reactive medicine instead of preventive**

The AI Solution - Multimodal Risk Prediction:

What AI Analyzes:
- EHR data: Labs, vitals, medications, family history, social determinants
- ECG patterns: Subtle changes predicting future AFib, MI, heart failure
- Imaging: Automated calcium scoring on routine chest CTs
- Genetics: When available, polygenic risk scores

Clinical Impact:
- Identifies high-risk patients 3-5 years earlier
- Flags patients for preventive interventions before symptoms
- **Example:** AI identifies an asymptomatic patient at high AFib risk → Start monitoring → Detect early → Anticoagulate → Prevent stroke

AI Risk Prediction Tools

- Analyzes EHR data to predict which patients will develop A Fib, heart failure, or MI in the next year
- Helps prioritize preventive care for highest risk patients
- Flags patients who need attention before they become symptomatic
- Available in Epic, Cerner, and standalone platforms

"Practice proactive medicine instead of reactive medicine."

Cardiovascular Screening for Primary Care

Point-of-Care ECG AI:

- **AliveCor KardiaMobile**: 6-lead ECG on smartphone ($99)
  - Detects AFib, prolonged QT, bradycardia/tachycardia
  - FDA-cleared, instant results
- **Eko Health Stethoscope**: Digital stethoscope with AI ($299-399)
  - Detects heart failure, valvular disease, Atrial Fibrillation
  - Integrate seamlessly with your existing workflow

EHR-Based Risk Prediction:

- **Epic Cognitive Computing**: Built into Epic systems
  - Predicts heart failure, sepsis, deterioration
  - Works in background, alerts high-risk patients
- **HealthPNX**: Standalone platform analyzing claims + EHR data
  - Predicts AFib, MI, stroke in next 12 months
  - Generates prioritized outreach lists

Action for Primary Care:

- Ask IT: "What AI risk prediction tools are in our EHR?"
- Consider point-of-care ECG device for chest pain triage
- Identify your highest-risk patients for intensified prevention

ECG Interpretation AI

- AI detects blocked coronary arteries better than expert ER clinicians do.
  - The AI ECG model demonstrated higher index ECG sensitivity (92.0%) compared to standard ER triage (71%)
  - AI ECG had a false positive rate of 7.9% vs 41.8% for standard triage. A fivefold reduction.
  - Presented at TCT 2025 and simultaneously published in JACC: Cardiovascular Interventions

ECG Interpretation AI

- Flags subtle findings you might miss
- Helps triage chest pain: ER now vs outpatient stress test vs reassure
- Available on point of care devices
  - AliveCor
  - Eko Health
- Can detect Atrial Fibrillation, prolonged QT and signs of cardiomyopathy

"Increased confidence in ECG interpretation for non-cardiologists."

Smart Referral Decisions with AI

The Primary Care Cardiology Dilemma:

- Chest pain: ER? Stress test? Reassure and watch?
  - **Reduced ER referrals by 35%** for low-risk chest pain
- Abnormal ECG: Urgent cardiology? Routine follow-up?
- Borderline echo findings: Specialist or serial imaging?
- **Challenge: Don't miss serious disease- and don't over-refer**

- **When to Still Refer Without AI:**
  - Unstable angina (clinical judgment trumps all)
  - New murmur with concerning exam findings
  - Syncope with family history of sudden death
  - Any time clinical suspicion is high, regardless of AI output
- **Action Steps:**
  - Develop AI-assisted chest pain protocol with your cardiologists
  - Invest in point-of-care ECG AI for triage
  - Create clear communication pathways for borderline cases

AI Implementation Roadmap for Primary Care

Phase 1: WEEKS 1-2 (The Free Trial Phase)

- **This Week:**
  - ☑ Try ChatGPT, Google Gemini or Claude for patient education materials (FREE)
  - ☑ Demo 2 AI scribes (request free trials from vendors)
  - ☑ Call your EHR vendor: "What AI tools are already included?"
- **Next Week:**
  - ☑ Pick one AI scribe, commit to using it for every patient for at least 2 weeks
  - ☑ Explore your EHR's built-in AI features
  - ☑ Order a point-of-care ECG device (AliveCor ~$99)

Phase 2: WEEKS 3-6 (The Optimization Phase)

- **Workflow Integration:**
  - Refine AI scribe templates to match your documentation style
  - Train MA/nursing staff on AI ECG devices
  - Set up patient portal message templates with AI drafts
  - Measure time savings - track hours saved per week

Team Buy-In:

- Share results with partners/administrators
- Present ROI calculation (time saved × hourly rate)
- Demonstrate quality improvements (fewer missed diagnoses)

AI Implementation Roadmap for Primary Care

Phase 3: WEEKS 7-12 (The Expansion Phase)

- **Scale What Works:**
  - Negotiate group pricing for AI tools that proved valuable
  - Implement AI-assisted clinical decision support more broadly
  - Develop AI-enhanced care protocols (chest pain, heart failure, AFib)
  - Train entire practice on AI workflows
- **Measure Success:**
  - Time to complete documentation (before vs. after)
  - After-hours charting time (goal: <30 minutes)
  - Patient satisfaction scores
  - Number of diagnostic near-misses caught by AI
  - Revenue impact from increased patient throughput
- **Budget Reality Check:**
  - AI Scribe: $400/month × 1 physician = $4,800/year
  - Point-of-care ECG: $99 one-time + $10/month = $219/year
  - AI decision support: Often included in HER
  - **Total investment: ~$5,000/year**
  - **Return: 8-12 hours/week saved = $50,000-75,000 value**

AI Implementation Roadmap for Primary Care

Common Barriers & Solutions:

Barrier	Solution
"Too expensive"	Calculate ROI: 2 extra patients/week pays for it
"IT won't approve"	Start with tools that don't need IT (scribes, ChatGPT)
"Patients will object"	Explain: "This helps me focus entirely on you" - 95% accept
"I'm not tech-savvy"	All tools designed for non-technical doctors; support included
"Liability concerns"	You're still responsible; document AI use; reduces errors overall

Advanced Cardiology AI

AI In Cardiac CT

The Cardiac CTA Problem

CCTA shows blockages, but misses:

- Inflammation (most MIs occur in non-obstructive plaque)
- Functional significance (is 50% stenosis causing ischemia?)
- Plaque composition (calcified vs. vulnerable)
- **Result: Either over-refer to cath lab or miss high-risk patients**

AI In Cardiac CT

- **1. Caristo CaRi-Heart: Inflammation Detection**
  - Analyzes perivascular fat inflammation around coronaries
  - **Key Finding:** Cardiac death rate TWICE as high in patients with NO obstructive plaque but HIGH inflammation
  - Predicts heart attacks up to 10 years in advance
  - Color-coded risk maps: Red = high inflammation = treat aggressively
  - **Status:** FDA-cleared, CPT codes approved, endorsed by ACC
  - **Baptist Health Partnership:** Early adopter site. Baptist Health HeartX Trial starting this month.
- **2. Cleerly: Plaque Characterization**
  - Performs 39 automated measurements per patient
  - Color-codes plaque: Blue (calcified/stable), Yellow (non-calcified), Red (high-risk)
  - **CONFIRM2 Study:** Non-calcified plaque volume predicts MACE independent of stenosis
  - 70% of heart attack victims are "low-risk" by conventional calcium score
  - **Turnaround:** 80 minutes from scan to report
- **3. HeartFlow FFRct: Functional Assessment**
  - Computational fluid dynamics creates 3D color-coded blood flow maps
  - Non-invasive fractional flow reserve (FFR) without stress test or cath
  - **NXT Trial:** 90% diagnostic accuracy (AUC 0.90)
  - **PLATFORM Study:** 97% of patients get optimal diagnosis from ONE test
  - Reduces cath lab referrals by 60-80%
  - Already in use at Baptist Health

CaRi Heart: Detecting The Invisible

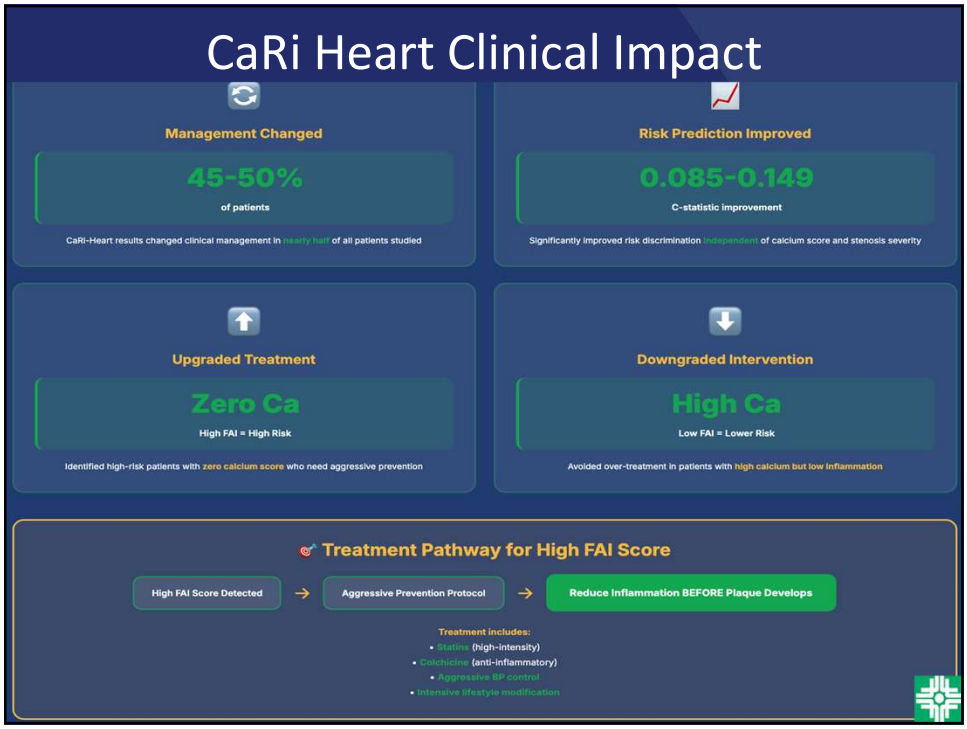
- **The Science:**
  - Fat tissue around inflamed arteries changes composition
  - Inflammatory cytokines alter fat attenuation on CT
  - AI quantifies this as **Fat Attenuation Index (FAI)**
  - High FAI = active inflammation = plaque formation imminent
- **The ORFAN Study - Landmark Data:**
  - **40,091 patients** followed for cardiac events
  - Published: The Lancet, May 2024
  - **Finding:** FAI score predicts cardiac death independent of:
    - Calcium score
    - Stenosis severity
    - Traditional risk factors

CaRi-Heart: Risk Stratification & Clinical Impact

ORFAN Study (40,091 patients) - Lancet 2024

Risk Stratification by FAI Score

FAI SCORE RANGE	8-YEAR CARDIAC DEATH RISK	INTERPRETATION
< -70.1	0.9%	Low inflammation, low risk
-70.1 to -46.1	3.5%	Moderate inflammation
> -46.1	8.7% 9.7× RISK	High inflammation, aggressive treatment needed



CaRi Heart: Changing Treatment

- **Baptist Health/HeartX Implementation:**
  - Participating in Caristo retrospective trial starting this month.
  - Can be integrated into CCTA workflow - no extra scan needed
  - Reimbursed via CPT codes (0710T, 0711T, 0712T, 0713T)
  - Results typically within 48 hours
- **Treatment Implications:** High FAI Score → Aggressive Prevention:
  - Statins (high-intensity)
  - Colchicine (anti-inflammatory)
  - Aggressive BP control
  - Intensive lifestyle modification → **Goal: Reduce inflammation before plaque develops**

"This is game-changing - we're detecting heart disease before it becomes structural"

Cleerly: The Plaque Detective

What It Does:

- Analyzes entire coronary tree in 39 dimensions
- Quantifies plaque volume, composition, distribution
- Color codes risk: Blue < Yellow < Red (high-risk plaque)

Key Studies:

- **CONFIRM2 Registry (3,551 patients):**
  - Non-calcified plaque volume predicts MACE
  - Works even when calcium score = 0
  - Reclassified 30% of patients to different risk category
- **CREDENCE Trial:**
  - Higher accuracy than FFR-CT for lesion-specific ischemia
  - Sensitivity 91%, Specificity 87% for obstructive CAD

Clinical Scenarios:

- Patient A: 60% stenosis, mostly calcified (blue) → Medical management
- Patient B: 40% stenosis, high-risk plaque (red) → Aggressive treatment, close follow-up
- Patient C: Diffuse non-calcified plaque, low calcium score → Missed by traditional scoring

Heartflow FFRct: The Functional Assessment

Available to Arkansas Cardiology/Baptist Health today

- **What It Does:**
  - Computational fluid dynamics from CCTA images
  - Creates 3-D color-coded coronary blood-flow maps
  - Calculates FFR at every point without catheter or stress

The Evidence:

- **NXT Trial:**
  - Diagnostic accuracy AUC 0.90
  - Sensitivity 86%, Specificity 79% vs. invasive FFR
- **PLATFORM Study:**
  - 97% of patients received optimal diagnosis from HeartFlow alone
  - 61% reduction in cath procedures showing no obstructive disease
  - Cost savings: $7,674 per patient
- **NICE Guidelines 2021:** Recommended as first-line functional test in UK

AI ECG: Beyond The Standard 12-Lead

ECG AI: Detecting the Invisible on Standard Tracings

- **Detecting Future AFib from Sinus Rhythm ECG:**
  - **Attia et al., Lancet 2019:**
    - AI trained on 180,000 ECGs
    - Predicts who will develop AFib in next 12 months
    - **Accuracy: AUC 0.87** from normal sinus rhythm ECG
    - Detects subclinical atrial remodeling before electrical changes
    - **Clinical Use:** Screen high-risk patients → Closer monitoring → Early detection → Prevent stroke

ECG AI: Beyond the Standard 12-lead

Detecting Reduced EF from 12-Lead ECG:

- **Attia et al., Nature Medicine 2019:**
  - AI identifies EF ≤35% with AUC 0.93
  - Works even with normal-appearing ECG
  - Could screen for heart failure in primary care
  - **Clinical Use:** Flag patients for echo who would otherwise be missed

Detecting Blocked Coronary Arteries (STEMI Detection):

- **Herman et al., JACC Cardiovasc Interv 2025:**
  - AI outperforms expert ER clinicians in detecting coronary occlusion
  - **Sensitivity: 92.0%** (vs. 71.0% standard triage)
  - **False positive rate: 7.9%** (vs. 41.8% standard triage)
  - 5-fold reduction in unnecessary cath lab activations
  - **Clinical Impact:**
    - Faster treatment for true STEMIs
    - Fewer false activations (saves resources, reduces patient harm)
    - Works 24/7 without fatigue

ECG AI: Beyond the 12-lead

Detecting Electrolyte Abnormalities:

- **Lin et al., Mayo Clin Proc 2020:**
  - AI detects hyperkalemia (K+ >5.5) with AUC 0.86
  - Could prevent sudden cardiac death in CKD patients
  - Flags patients for urgent lab draw

"AI turns the ECG into a crystal ball"
"We're detecting disease states BEFORE they become clinically apparent"

AI in Echocardiography: Automated Interpretation

The Echo Problem:

- Echo is operator-dependent (huge inter-observer variability)
- Complex measurements: EF, strain, valve areas, pressures
- Time-consuming: 30-45 min per complete study
- Novice sonographers struggle with image quality

AI in Echocardiography: Solutions

Level 1: Image Acquisition Guidance (Available Now)
- AI coaches novice operators in real-time
- **Sahashi et al., JACC 2025:**
  - Novice + AI achieved diagnostic quality images equivalent to experts
  - Reduced training time from months to weeks
- Improved inter-rater agreement

Level 2: Automated Measurements (FDA-Cleared)
- **EchoNet-Dynamic (Stanford):**
  Automated EF calculation: Correlation 0.92 with expert readers
  - Reduces measurement time from 5-10 min to 5 seconds
  - Eliminates inter-observer variability
- **Boston Scientific AI Echo:**
  - Auto-measures: EF, LV volumes, wall thickness, valve areas
  - Real-time quality feedback during acquisition

Level 3: Automated Diagnosis (In Development)
- **Holste et al., JAMA 2025 - PanEcho Study:**
  - AI performed 39 diagnostic tasks across full echo report
  - Accuracy: 92.1% for chamber quantification
  - Detected regional wall motion abnormalities with 88% accuracy
  - Identified valve disease with expert-level precision

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AI in Echocardiography

Time Savings:

- Image acquisition: 20-30 min → 15-20 min (with guidance)
- Measurements: 10-15 min → 2-3 min (automated)
- Report generation: 10 min → 3 min (AI pre-populates)
- **Total:** 40-55 min → 20-26 min per study (50% time savings)

Quality Improvements:

- Reduced inter-observer variability (EF measurements within ±2%)
- Fewer "technically limited" studies
- Earlier detection of subtle findings (e.g., mild diastolic dysfunction)
- Standardized reporting across all sonographers

Available AI Echo Platforms:

- **Caption Health** (acquired by GE): FDA-cleared AI guidance
- **Ultromics** (Oxford): AI for EchoGo Core (automated EF)
- **Us2.ai**: Automated measurements + reporting
- **Philips EPIQ AI**: Integrated AI in ultrasound machine

AI in the Cath Lab

AI-Assisted Intervention: QFR & IVUS

QUANTITATIVE FLOW RATIO (QFR) - Wire-Free FFR

The Problem:

- Invasive FFR requires pressure wire + adenosine
- 7+ minutes per measurement
- Expensive ($500-1000 per wire)
- Adenosine contraindicated in some patients (asthma, high-grade AVB)

The AI Solution:

- QFR calculates FFR from standard angiography alone
- NO pressure wire, NO adenosine
- Results in 4-5 minutes
  - Based on computational fluid dynamics

The Evidence:

- **FAVOR II China & Europe-Japan Trials:**
  - **Diagnostic accuracy: 92.7%** vs. invasive FFR
  - Correlation coefficient 0.88
  - Sensitivity 94.6%, Specificity 91.9%
- **FAVOR III China (Randomized Trial - Lancet 2021):**
  - 3,825 patients randomized to QFR-guided vs. angiography-guided PCI
  - Primary endpoint (1-year MACE): **5.8% (QFR) vs. 8.8% (angio)** - p<0.001
  - QFR guidance improved outcomes by identifying physiologically significant lesions

AI Powered IVUS Analysis

The Problem:

- IVUS interpretation requires expertise
- Manual measurements time-consuming
- Inter-observer variability in plaque classification
- Optimal stent sizing subjective

The AI Solution:

- Real-time automated lumen/vessel border detection
- Automated plaque classification (5 types)
- Instant optimal balloon/stent sizing recommendations

The Evidence:

- **Matsumura et al., JACC Advances 2023:**
  - **0.99 correlation** with expert readers for vessel measurements
  - Eliminated inter-observer variability
  - Reduced analysis time by 70%
- **Yang et al., IEEE Transactions on Medical Imaging 2024:**
  - Trained on 100,000+ IVUS frames
  - **87.7% accuracy** for 5-class plaque classification
  - **95.3% agreement** with experts on balloon sizing
- **PROSPECT Study (revisited with AI):**
  - Plaque burden >70% = 5× increased MACE risk
  - AI identifies high-risk plaques in real-time during procedure
  - Guides decision: Treat now vs. medical management

The AI Enhanced Cath Lab

- **Pre-PCI Decision:**
  - QFR identifies ischemia-causing lesions
  - Prioritize multi-vessel disease treatment
  - Avoid treating non-flow-limiting stenoses
- **During PCI:**
  - IVUS AI guides optimal stent sizing
  - Real-time plaque burden assessment
  - Identifies high-risk features (large lipid pool, thin cap)
- **Post-PCI Validation:**
  - AI confirms adequate stent expansion
  - Detects edge dissection or malposition
  - Objective quality control
- **Outcomes Data - Why This Matters:**
  - **FAVOR III:** QFR-guided PCI → 35% MACE reduction
  - **IVUS-guided PCI:** Meta-analysis shows 40% reduction in stent thrombosis
  - **AI IVUS:** Reduces procedural time by 15-20 min → More cases/day
  - **Radiation reduction:** 49% less radiation with QFR vs. wire-based FFR

The AI Enhanced Cath Lab

- "This is the future of the cath lab - already here"
- "Every decision is backed by objective data, not gestalt"
- "The FAVOR III trial proves this improves outcomes - Level 1 evidence"
- "Fellows trained on AI-assisted cases learn faster and better"
- "This isn't about replacing expertise - it's about augmenting it"

AI In Structural Heart Disease

TAVR Planning & Guidance:

- **AI-automated CT measurements** for TAVR sizing
  - Upcoming Baptist Health/HeartX Trial with Hi-D Imaging (https://www.hidimaging.com/)
  - Annulus diameter, perimeter, area, calcium quantification
  - Reduces planning time from 45 min to 5 min
  - Predicts paravalvular leak risk based on calcium distribution
- **AI during TAVR procedure:**
  - Real-time fluoroscopic guidance for optimal valve positioning
  - Predicts final valve position before deployment
  - Reduces need for second valve (costly complication)
  - **Mitral Regurgitation Assessment:**
- **AI echo quantification** of MR severity
  - Automated vena contracta, EROA, regurgitant volume
  - Reduces variability between readers
  - Tracks progression over time more reliably

AI In Electrophysiology

AFib Burden Prediction & Monitoring:

- **Wearable AI (Apple Watch, Fitbit):**
  - Detects AFib with 98% sensitivity
  - Tracks burden (% time in AFib) automatically
  - Alerts to new-onset AFib before symptoms
- **ECG AI predicting AFib recurrence post-ablation:**
  - Analyzes baseline ECG to predict who will recur
  - Guides patient selection for ablation
  - May guide decision between drugs vs. ablation
- **Ablation Guidance:**
  - **AI-enhanced electro-anatomic mapping (EAM):**
    - Auto-detects critical isthmuses for ablation
    - Reduces procedure time by 20-30%
    - Improves first-pass pulmonary vein isolation rates

AI In Heart Failure Management

Remote Monitoring & Prediction:

- **CardioMEMS AI analytics:**
  - Predicts HF decompensation 7-14 days before symptoms
  - Guides remote titration of diuretics
  - Reduces HF hospitalizations by 58%
- **EHR-based AI prediction:**
  - Epic Deterioration Index for inpatient HF worsening
  - Predicts 30-day readmission risk
  - Identifies patients needing intensive outpatient follow-up
- **AI-Optimized GDMT Titration:**
  - **In development:** AI suggests medication adjustments
    - Analyzes: Symptoms, vitals, labs, previous responses
    - Recommends: "Increase carvedilol to 25mg BID"
    - Goal: Get more patients to guideline-directed doses faster

The Future of AI in Cardiology

NEAR-TERM (2026-2028): Wave 2 Applications

- **Comprehensive Clinical Reasoning:**
  - Present complex cases to AI, get differential diagnosis + workup plan
  - **Example prompt:** "73F, new-onset HF, preserved EF, chronic AFib, recent TIA - help me think through this"
  - AI synthesizes: Guidelines + literature + your patient's specific data
  - Like having a senior cardiologist available 24/7
- **Predictive Panel Management:**
  - AI monitors your entire patient panel continuously
  - **Morning report:** "Dr. Smith, 12 of your patients are due for echo, 5 are overdue for stress test, 3 have worsening HF based on remote monitoring"
  - Proactive care instead of reactive crisis management
- **Automated Prior Authorization:**
  - AI reads guidelines, patient chart, generates prior auth automatically
  - 90% of routine cases approved without physician involvement
  - You only handle the complex denials
  - **AI is already in use by payers to review/deny claims**

The Future of AI in Cardiology

MID-TERM (2028-2030): Wave 3 Integration

- **The AI-Enhanced EHR:**
  - Automatically summarizes 100-page hospital discharge summary into 3 paragraphs
  - Flags discrepancies between hospital meds and your records
  - Pre-fills referral letters with all relevant history
  - **You review and sign, don't create from scratch**
- **AI Diagnostic Support:**
  - Reviews all data: symptoms, exam, labs, imaging, family history
  - Suggests diagnoses you might not have considered
  - **Example:** "Did you consider peripartum cardiomyopathy?" in young woman with SOB
  - Reduces cognitive errors from fatigue or anchoring bias
- **Genomic Integration:**
  - AI analyzes polygenic risk scores + clinical data
  - Identifies high-risk patients for aggressive prevention
  - Suggests personalized therapy based on genetic profile
  - **Example:** "Patient has HFrEF gene variant - may respond better to sacubitril/valsartan"

The Future of AI in Cardiology

LONG-TERM (2030+): Transformative Changes

- **AI-Guided Therapy Optimization:**
  - Continuous learning from outcomes data
  - **Example:** "Your patient with EF 25% should be on this specific GDMT regimen based on 10,000 similar patients' outcomes"
  - Real-time adjustments based on response
- **Virtual Cardiac Physiology Lab:**
  - Upload patient's CCTA → AI creates digital twin of their coronary circulation
  - Simulate: What happens if we stent LAD? What if CABG instead?
  - Test treatment strategies before touching the patient
- **Fully Integrated Remote Care:**
  - Wearables + home monitoring → AI triage
  - AI handles routine follow-ups
  - You see only the complex cases requiring human judgment
  - **Cardiologist becomes conductor of AI-powered care orchestra**

The Cardiology Practice of 2030

- **Morning Routine:**
  - AI pre-reviews all cases, flags high-priority issues
  - You spend 15 min reviewing AI summaries vs. 2 hours reading charts
  - AI has drafted all patient messages, you edit and send
- **Clinic Day:**
  - AI scribe documents every visit
  - AI suggests diagnostic workup based on presentation
  - You focus entirely on patient, not computer screen
  - Finish on time, zero after-hours charting
- **Cath Lab:**
  - AI analyzes angiogram in real-time
  - QFR + IVUS AI guide every decision
  - Procedures 20-30% faster, better outcomes
  - AI alerts if something looks unusual
- **After Hours:**
  - AI triages calls (routine vs. urgent)
  - AI drafts responses to patient portal messages
  - You handle only complex issues
  - **True work-life balance for the first time in your career**

- **The Big Picture:** Medicine becomes **sustainable** again. AI eliminates burnout-inducing busywork, allowing cardiologists to practice at the top of their license doing the medicine that **only humans can do**.

Critical Reminders: Using AI Safety

AI Best Practices for Clinical Practice

ALWAYS DO THIS

Verify All AI Output
You are legally and ethically responsible for everything AI produces. AI can hallucinate plausible but incorrect information. Always cross-check critical clinical decisions.

Ensure HIPAA Compliance
Use only HIPAA-compliant AI tools with Business Associate Agreements (BAAs). NEVER put patient data into consumer AI (ChatGPT free, Gemini, etc.).

Start with Admin Tasks
Build trust gradually: Scribe ⟶ Portal messages ⟶ Decision support. Don't start with AI guiding clinical management.

Look for Peer-Reviewed Validation
As vendors: "Show me the published validation studies." Check sample size, patient population, comparison group. Be skeptical of vendor-only data.

Document AI Use
Note in chart: "AI scribe used" or "AI ECG interpretation reviewed." Protects you legally and ensures transparency.

RED FLAGS

Promises to Replace Physician Judgment
"AI makes the diagnosis for you" ⟶ RUN AWAY. AI should assist, not replace. You are irreplaceable for nuanced decisions.

No Validation Studies
"Our proprietary algorithm is 99% accurate" ⟶ WHERE'S THE DATA? If they can't show peer-reviewed publications, be very skeptical.

Vendor Claims Without Evidence
"Improves outcomes by 50%" ⟶ Show me the study. "Works better than competitors" ⟶ Head-to-head comparison? Extraordinary claims require extraordinary evidence.

Too Good to Be True
"AI reads your mind to predict diagnoses" or "100% sensitivity and specificity" ⟶ If it sounds impossible, it probably is.

No HIPAA Compliance or BAA
Free consumer AI tools, foreign-hosted servers with unclear data policies, anything without explicit BAA ⟶ DO NOT USE with patient data.

Critical AI Safety Principles

The "Two-Brain Rule"
AI is the first brain (fast, tireless, data-driven). YOU are the second brain (contextual, nuanced, experienced). **Both must agree before action.**

Know Your Limits (and AI's Limits)
AI is bad at: Rare diseases, unusual presentations, ethical nuance. AI is good at: pattern recognition, data synthesis, routine tasks. Use AI where it excels.

Patient Transparency
Tell patients: "I use AI to help me be more accurate and efficient." Most appreciate it when framed as quality improvement. If a patient objects, respect and document.

When to override AI
Clinical gestalt says something is wrong, patient context AI doesn't understand, rare scenario not in training data. **Trust your expertise.**

Questions?

AI Medical Resources

- **ACC Resources:**
  - **ACC.org/AI** - Cardiology AI Resource Center
    - Latest guidelines, position statements
    - Webinars and educational content
    - AI tool directory
  - **JACC AI** - New journal launched in 2025
    - Peer-reviewed AI research in cardiology
- **Online Courses:**
  - Coursera: "AI in Medicine" (Stanford - free audit)
  - edX: "Artificial Intelligence in Healthcare" (Harvard)
  - ACC Cardiology Learning Pathway: AI modules
- **Key Journals to Follow:**
  - JAMA AI (for general medical AI)
  - JACC Cardiovascular Interventions (for cath lab AI)
  - Circulation: Cardiovascular Imaging (for imaging AI)
  - Nature Medicine (for breakthrough AI research)

AI Resources Discussed Today

- **AI Medical Scribes:**
  - Nuance DAX Copilot: nuance.com/dax
  - Suki: suki.ai
  - Abridge: abridge.com
  - Nabla: nabla.com
- **Imaging AI:**
  - Caristo Diagnostics: caristo.com (Baptist Health/HeartX trial!)
  - Cleerly: cleerly.com
  - HeartFlow: heartflow.com
- **Point-of-Care Devices:**
  - AliveCor: alivecor.com
  - Eko Health: ekohealth.com
- **Cath Lab AI:**
  - Medis QAngio: medis.nl
  - Boston Scientific AVVIGO: bostonscientific.com

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