

# Addressing health disparities at a large academic medical center: AI-driven cardiac care for aortic stenosis and mitral regurgitation

## EXECUTIVE SUMMARY

Leveraging a natural language processing (NLP) based, artificial intelligence (AI) driven protocol, Tempus Next worked to help clinicians improve management of patients with severe aortic stenosis (sAS) and severe mitral regurgitation (sMR) by identifying patients who may have been previously overlooked.

### → 42% decrease in time to follow-up overall

The deployment of Tempus Next markedly decreased the average duration from index echocardiogram to follow-up for patients in the study, cutting it down from 74 to 43 days.

### → 2x more notifications needed for black patients compared to white patients due to baseline disparity

Providers of black patients were twice as likely to receive notifications for follow-up care for those patients compared to those for white patients.

### → 47% decrease in time to follow-up for black patients

Black patients had a larger reduction in time to appropriate clinical follow up from 120 to 64 days compared to the reduction of 57 to 36 days for white patients.

## THE CHALLENGE

The undertreatment of sAS and sMR is influenced by patient literacy and economic barriers, which limit access to care.<sup>1</sup> An estimated one-third of patients in the United States who meet the AHA/ACC Guidelines criteria for severe aortic stenosis don't have a guideline-recommended treatment plan.<sup>2</sup> Getting patients to the next step in their care, especially for valvular interventions, is also frequently delayed, and racial disparities in access to care are prominent in the United States.<sup>3</sup> Systemic challenges, such as fragmented care and rapidly evolving clinical guidelines, hinder the consistent application of treatments.

## THE SOLUTION

Tempus Next Cardiology, in partnership with a large academic medical center, utilized AI and multimodal data to expedite the care process for patients with sAS and sMR.

Between October 2019 and November 2022, Tempus Next analyzed echocardiogram reports, clinic schedules, and clinical notes from 126,678 echocardiograms across 73,453 patients.<sup>4</sup> By employing natural language processing (NLP), we structured and harmonized data to identify patients with sAS and sMR according to ACC/AHA guidelines. Our secure VPN/HL7 connection to the hospital's electronic medical records system (EMR) allowed us, at the hospital's direction, to extract over 120 structured and unstructured data elements per patient record. We focused on tracking patient follow-up, which we defined as any subsequent echocardiogram, specialist clinic visit, or valvular intervention.

Working closely with the hospital's clinical experts, we refined our algorithms to marry clinical guidelines with local practices,

ensuring that Tempus Next accurately identified patients in need of specialist follow-up. Our system delivered targeted notifications to clinicians, facilitating the rapid communication of essential information, which is crucial for timely medical interventions and assisting compliance with the most current care standards.

1 Harris E, Benham A, Stephenson J, et al. [Patient decision aids for aortic stenosis and chronic coronary artery disease: a systematic review and meta-analysis](#). *Eur J Cardiovasc Nurs.* 2024;23(6):561-581. doi:10.1093/eurjcn/zvad138

2 Tempus data on file

3 Sleder A, Tackett S, Cerasale M, et al. [Socioeconomic and Racial Disparities: a Case-Control Study of Patients Receiving Transcatheter Aortic Valve Replacement for Severe Aortic Stenosis](#). *J Racial Ethn Health Disparities.* 2017;4(6):1189-1194. doi:10.1007/s40615-016-0325-x

4 [Use of an echocardiographic-based, artificial intelligence system to improve racial disparities in care of patients with valvular heart disease](#). *European Heart Journal - Cardiovascular Imaging*, Volume 24, Issue Supplement\_1, June 2023, jead119.303

5 *European Heart Journal - Cardiovascular Imaging*, Volume 24, Issue Supplement\_1, June 2023, jead119.303, <https://doi.org/10.1093/ehic/jead119.303>



Flexibility and sophistication—that's what Tempus Next brings to the table. Tempus Next distinguishes itself from other clinical decision support tools through its sophisticated algorithms and the use of natural language processing (NLP) to complement limited structured data in patient charts. This approach enables a more nuanced identification of patients, allowing for targeted and specific notifications to physicians about patient care gaps.

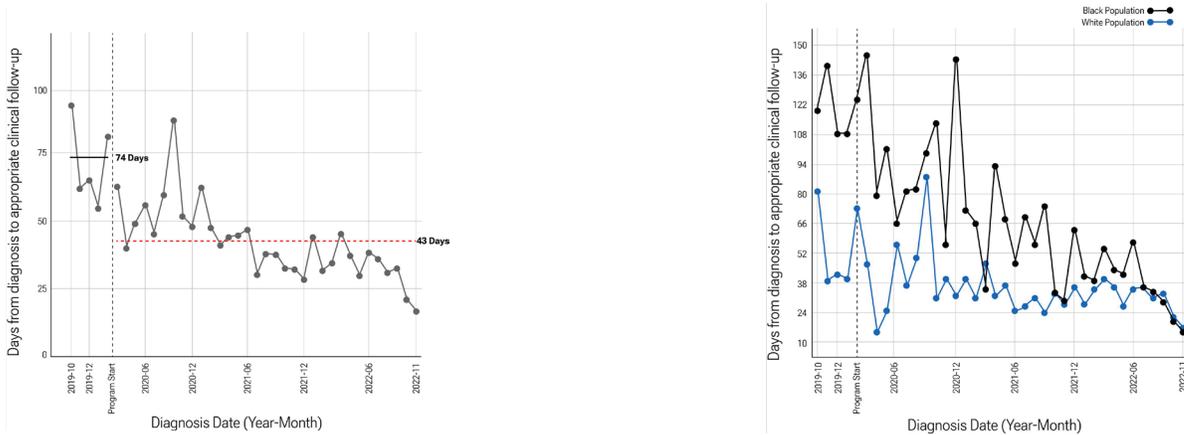
**///Cardiologist at the Academic Medical Center**

The impact of our AI-driven screening and notification process was rigorously assessed through ongoing reports and post-launch outcomes. Executive committees regularly reviewed follow-up timelines to confirm that patient care was optimized. This comprehensive approach underscores Tempus Next's commitment to improving patient outcomes by ensuring timely and guideline-concordant follow-up care.

## IMPACT

The deployment of Tempus Next markedly decreased the average time to follow-up for patients in the study, cutting it down from 74 to 43 days—a statistically significant improvement. This advancement was consistent across different racial demographics. Specifically, the average time to follow-up for white patients was reduced from 57 to 36 days in the pre vs post implementation phase, while for black patients, it dropped from 120 to 64 days. By the end of the study duration, the black vs white disparity was essentially eliminated (Figure 1). These results demonstrate the effectiveness of Tempus Next's echocardiogram-based, AI and NLP-driven system in enhancing the management of patients with severe Aortic Stenosis and severe Mitral Regurgitation.

Figure 1: Tempus Next resulted in a sustained decrease in time to clinical follow-up and improved health equity



In this study, black patients saw a larger decrease in average time from index echo to follow up (120 vs 64 days) compared to white patients (57 to 36 days), showing the improvement in black patients' time to follow up towards the average seen in white patients—a narrowing of the gap.<sup>5</sup>

## CLOSING DISPARITIES IN CARE

Our data revealed a notable trend: providers of black patients were twice as likely (odds ratio [OR] 2, 95% confidence interval,  $p < 0.001$ ) to receive notifications for follow-up care compared to other groups. This was especially true for black patients living in less affluent areas, as indicated by a lower Area Deprivation Index (ADI) score (39.29 compared to 42.33,  $p = 0.001$ ). While the program's differential impact across racial lines was unexpected, the reduction in follow-up time for black patients—from 120 to 64 days—was particularly striking ( $p = 0.035$ ). This decrease highlights Tempus Next's potential to help narrow racial gaps in timely access to care and follow-up services.

*Disclaimer: Case studies and past performance are not necessarily an indication of future results, and do not guarantee a similar outcome. Patient names have been changed to protect patient privacy.*



What we observed was a significant reduction in the time from identifying a patient to actually getting them the care or diagnostics they needed. This was especially true for historically disenfranchised groups, like black patients, where we saw a dramatic improvement and eventual closing of the care gap compared to the general population. It's a powerful example of how technology can act as a safety net, ensuring timely care for those who need it most.

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## PATIENT STORY: MEET CATHERINE

Catherine had a history of aortic valve disease and was under consistent monitoring, with clinical metrics not yet indicating a transition to severe disease. Tempus Next identified her as a potential candidate for surgery. The timely flagging by Tempus Next facilitated a surgical consultation, revealing the patient's urgent need for intervention. The surgeon noted the severity of the condition, which had been greater than anticipated, and confirmed that the surgery was conducted at a critical juncture. This case exemplifies the vital role of technology in healthcare, serving as a safeguard to ensure patients receive necessary care before it's too late.