

# Clear care pathways for early intervention in heart failure

It's not just recognizing the urgency of heart failure.  
It's having a clear path to early intervention.

## Challenge

Streamlining and integrating workflows to support clear care pathways for early diagnosis and management of heart failure patients at risk of progression to more severe disease.

## Solution

Noninvasive imaging solutions with AI-enabled automation for streamlined workflows and reproducible insights bring clinical efficiency to 3D echo and cardiac MR strain. Easy access to longitudinal patient insights for assessment, treatment and long-term management – combined with advanced visualization and quantitative analysis – is supported by information and image management for fast, informed decisions throughout the entire care journey.

## Results

Integrated workflows with reproducible and robust imaging results, fast exams, advanced visualization and comprehensive image and information management are bringing the diagnostic confidence and efficiency to help clinicians diagnose and manage heart failure early.

Heart failure is increasing in prevalence, and results in significant costs and impact to quality of life.<sup>1</sup> "If you identify those patients [who are likely to progress] and start early treatment, that would help to prevent further progression of that myocardial disease," says Dr. Marcus Stoddard, a cardiology specialist in Louisville, KY. Early diagnosis and management of heart failure is a challenge that requires not only smart diagnostic systems but also integrated workflows and information that support both diagnostic confidence and clinical efficiency. Diagnostic tools such as 3D echocardiography and cardiac MR can deliver rich clinical insights for heart failure diagnosis and the patient care pathway, but historically have also added time and complexity to a study.

Complicating the situation is that many heart failure patients – who may have early symptoms such as fatigue, dyspnea during exercise and minor edema – do not present to a cardiologist early on, and so their symptoms might be associated simply with aging or even overlooked.<sup>1</sup> In addition, often specialists in heart failure are located in centers for advanced care, and so they don't see patients in time for an early diagnosis of heart failure. Other challenges that exist in imaging workflows for heart failure include time lost when clinicians need to access multiple information systems for a single case, as well as barriers to accessing relevant patient information (such as prior studies and any missing or incomplete information) and coordinating consultation and collaboration with fellow clinicians and experts. These obstacles and inefficiencies within workflows must be addressed for early diagnosis and management of heart failure, and health technology plays a key role in the solution.

Clinicians are finding that advances in noninvasive imaging, analysis, integrated diagnostics and remote collaboration are enabling their clinical teams to deliver efficient diagnoses and better quality patient care. Further, the ability to integrate systems and streamline workflows can strengthen clinical confidence among their cardiac care teams, while allowing for efficient communication across devices, systems and clinicians.

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– Dr. Marcus Stoddard  
University of Louisville School of Medicine, Louisville, KY, USA

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Heart failure affects approximately 26 million patients worldwide, representing a significant cause of morbidity and mortality.<sup>2</sup> Heart failure has a substantial financial impact related to hospitalization, medication, and procedural expenses, and the costs of heart failure also extend to the reduced quality of life associated with its symptoms.<sup>2</sup> Can we identify patients earlier in the disease process to allow for early initiation of guideline-driven therapy, prolonging the time until they experience advanced stages of heart failure?

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**“Clinicians are very astute in how they manage their patients. These modalities can help us make sure we’re still on target for an individual patient, particularly those that are at higher risk of progressing.”**

– Dr. Marcus Stoddard  
University of Louisville School of Medicine, Louisville, KY, USA

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## Identifying heart failure earlier

Dr. Stoddard highlights the challenge of managing heart failure progression, saying, “The subclinical population is obviously a huge one. In real life, we’re just not as committed until we get that diagnosis that there’s muscle disease, myocardial dysfunction in this patient. That’s where sometimes the disconnect occurs.” Fortunately, workflows can be integrated, streamlining advanced imaging, visualization and informatics for a more complete picture of the patient during the entire cardiac care journey.

As Dr. Stoddard says, “After the diagnosis of myocardial dysfunction, then that patient becomes a special patient who needs to be followed more closely, more prudently, and will certainly need intensive preventive strategies. When a patient comes in with overt heart failure, particularly when they progress on to systolic impairment and become a more advanced heart failure patient, it’s costly to take care of that patient. Following a prevention strategy upfront may ultimately lead to less expenditure of capital long-term.”

Dr. Henning Steen, Head of Cardiac Imaging at medneo in Germany, concurs about the urgency of heart failure, and speaks of his latest research. When it comes to patients on the path to heart failure, “People are sicker than you think,” he says “And we’re usually too late. When you see those people, they’re already [at a point where] 50% to 60% of their segmental function [as measured by MR] is too low,” he says. “We see ejection fraction, but that’s radial strain, and that’s going down last. We have a chance to see dysfunction earlier because we can see circumferential strength or longitudinal changes in several segments without a needle, without contrast, without stress.”

## Workflow ease

Dr. Stoddard finds the combination of quality imaging and the AI-enabled automated tools in the cardiovascular workspace valuable in the ongoing management of heart failure patients, including assessing the need for interventional solutions. He describes how streamlining the workflow for advanced imaging techniques, along with comprehensive image and information management has changed how he’s able to diagnose and manage heart failure patients. He says, “Strain is now so quick and so easy to do. Having the longitudinal patient data in one place through the Philips IntelliSpace Cardiovascular workspace is very helpful in terms of chronic management of the patient with heart failure to prevent them from getting worse. It can tell me surely if there’s a change in EF, LV volume size, longitudinal strain. It lets me know if I’m losing ground and the myocardial disease process is progressing. That allows me to think about what I could do differently in maybe a more aggressive fashion in that particular patient.”

With regard to the adoption of fast MR exams allowed for by innovative technologies such as Fast-SENC\* (fast strain encoded cardiac MR) that offer scans in less than a minute, Dr. Steen says, “The shift is to get people to use it within 15 to 20 minutes, depending on what kind of questions you have, to get very good, very reliable insights on pathophysiology. MR has changed so dramatically in the last couple of years, and it will change in the next five to ten years with AI.”



## Cardiovascular disease is even more problematic in the face of COVID-19

The COVID-19 pandemic has presented special challenges for patients with cardiovascular disease. Not only is there a diagnostic imaging backlog caused by the pandemic that affects access to timely care, but also COVID-19 and cardiovascular disease are associated in at least two important ways. Pre-existing cardiovascular disease appears to be linked to more negative outcomes and increased risk of death in patients with COVID-19,<sup>3</sup> and COVID-19 has also been found to induce myocardial injury, arrhythmia, acute coronary syndrome and venous thromboembolism.<sup>3</sup>



## Improve the workflow to help improve care

Clinicians are driving clinical efficiency and diagnostic confidence through innovations in workflows. Advances in AI allow clinicians to use 2D and 3D imaging techniques for precise quantification without an increase in exam time. MR advances such as the Fast-SENC\* acquisition sequence and the MyoStrain analysis tool by Myocardial Solutions allow early dysfunction of heart failure to be detected across 48 segments of the heart in 10 minutes.<sup>4</sup> These modalities are supported by a unified workspace that gives a complete view of a patient's cardiac history through a timeline of images and information, easily accessible for productive collaboration across specialties.

### Integrated workflow solutions

#### Philips EPIQ CVx cardiovascular ultrasound

Exceptional imaging capabilities, combined with automated tools for visualization and analysis for robust, reproducible results and workflow efficiencies are making the effective management of heart failure with ultrasound a reality. The latest release of EPIQ CVx integrates numerous significant quantification features including 3D Auto MV, 3D Auto RV, and the AutoStrain suite of tools for robust and reproducible measurements that can be confidently used while treating a patient before, during and following any treatment plan.

#### TOMTEC-ARENA AI-enabled applications

The Philips extensive expertise in image recognition and segmentation is complemented by the proven, robust quantification capabilities of TOMTEC-ARENA. This helps strengthen diagnostic confidence and treatment planning by optimizing workflows and elevating cardiology performance through AI-enabled applications.

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**“MR is a very powerful tool that has become very, very fast.”**

– Dr. Henning Steen  
Head of Cardiac Imaging, medneo, Germany

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#### Philips Fast-SENC\* and MyoStrain

Philips Fast-SENC\* MR acquisition sequence and the MyoStrain analysis tool by Myocardial Solutions allows clinicians to quickly and directly measure early and subtle changes in heart function. Now early dysfunction of heart failure can be detected across 48 segments of the heart in 10 minutes.<sup>4</sup>

#### Philips IntelliSpace Portal

IntelliSpace Portal now offers AI-based LV and RV automatic contouring of CMR studies, to support the common ejection fraction and other related functional parameters, which were demonstrated to complete functional analysis in less than five minutes. IntelliSpace Portal offers consistent workflow across applications, with ease of use and rich results in a short amount of time. The new MR Strain analysis application of IntelliSpace Portal, which is feature-tracking-based, quantifies strain parameters to determine the potential severity of LV dysfunction, all of this using the traditional MR cine sequences.

#### Philips IntelliSpace Cardiovascular

Accessible anytime and virtually anywhere, IntelliSpace Cardiovascular is a scalable and interoperable multi-modality image and information management solution designed to help streamline the cardiovascular workflow and enhance operational efficiency of the entire cardiovascular service line across departments and the enterprise.\*\* A timeline view of imaging and information can empower clinicians to turn clinical findings into a decisive actionable plan and streamline efficiency with access to advanced clinical tools and integration with EMR/HIS systems from a single location.

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“To be able to compare previous studies right in front of you is brilliant! If I was doing an echo on a patient and I was curious about their ECG, rather than me doing an ECG, I would just cross check to see if they have had one recently.”

– Martine Peagram  
Senior Cardiac Physiologist, Blackrock Clinic, Dublin, Ireland

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## Conclusion

Integrated workflows in heart failure are now fast and efficient to help support early, precise and confident detection of disease progression. These workflows are made possible by Philips solutions for imaging, AI-based visualization and data analytics, and by a multimodality image and information management solution for orchestrated decision-making during the patient’s journey.

To learn more, visit [www.philips.com/cardiology-workflow](http://www.philips.com/cardiology-workflow).

\* Fast-SENC is another term for SENC.

\*\* It is the user’s responsibility to ensure that Philips network requirements (such as performance, VPN) for IntelliSpace Cardiovascular are met.

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3. Nishiga M, Wang DW, Han Y. et al. COVID-19 and cardiovascular disease: from basic mechanisms to clinical perspectives. *Nat Rev Cardiol*. 2020;17:543–558. <https://doi.org/10.1038/s41569-020-0413-9>.
4. Korosoglou G, Giusca S, Hofmann NP, et al. Strain-encoded magnetic resonance: a method for the assessment of myocardial deformation. *ESC Heart Fail*. 2019;6(4):584-602. DOI:10.1002/ehf2.12442.

Results from case studies are not predictive of results in other cases.  
Results in other cases may vary.

