



## Medical Device/EHR Connectivity Success Story

# Connected Vital Signs and ECG Devices Improve Workflow, Patient Care and the Bottom Line at Cardiology of Tulsa

Through a collaboration with Welch Allyn and NextGen Healthcare Information Systems, Cardiology of Tulsa (COT) has developed a comprehensive medical device/electronic health record (EHR) integration that allows physicians and staff to efficiently and seamlessly capture and record patient diagnostic data into the EHR, enabling immediate enterprise-wide access to patient information. Data from a variety of Welch Allyn medical products—including Spot Vital Signs® LXi devices and PC-based resting and stress ECG machines—flow directly into COT's electronic health record system, NextGen® EHR. This integration has virtually eliminated lost readings, transcription errors and the need to take duplicate readings at COT, and has dramatically optimized staff workflow, particularly in the area of ECG testing—producing a host of administrative and financial benefits, while enhancing patient care and safety.

### The Challenge:

#### Fulfilling a Technology Vision

When Cardiology of Tulsa (COT) implemented its EHR solution in 2001, it had taken an important first step in achieving its technology vision: to provide its physicians full access to each patient's health record at every location from which they provided care, whether they were at home, in one of the practice's offices or satellite locations, in the hospital or on the road. Full access to patient data in all settings enhances the physician's ability to make diagnostic assessments and select the most appropriate and effective treatment options, thus elevating the level of patient care. However, because the quality of clinical decisions is also directly related to the accuracy, completeness and timeliness of the patient data in the electronic health record, COT still needed to achieve an important clinical objective. That objective—to minimize errors and omissions in patient diagnostic data, and to make the most current data immediately available to physicians—would require a fundamental change in the way COT captured and recorded patient diagnostics.

## Overview

Customer



Location

Tulsa, Oklahoma

EHR Partner



EHR Solution

NextGen® EHR

### Customer Profile

Cardiology of Tulsa is a 14-physician, full-service cardiology practice that offers comprehensive noninvasive diagnostic and therapeutic care ranging from disease prevention and diagnostic testing to interventional cardiology and electrophysiology. In October 2008, Cardiology of Tulsa was renamed Warren Clinic Cardiology of Tulsa through a merger with St. Francis Health System.

According to Nancy Nelson, chief administrative officer at COT, the key to elevating the quality of patient data resided in eliminating the manual transcription of data into the health record. Says Nelson, “We knew we needed a more accurate and efficient way to capture and record patient data at the point of care. So several years ago, when an office move prompted us to purchase new diagnostic devices, we quickly recognized an opportunity to connect these new devices with our existing EHR. We also recognized that a key factor in our success would be the selection of the right medical device manufacturer—one who would be willing and able to collaborate with our EHR vendor, NextGen Healthcare Information Systems.”

## The Solution:

### The Welch Allyn/NextGen Healthcare Information Systems Integration

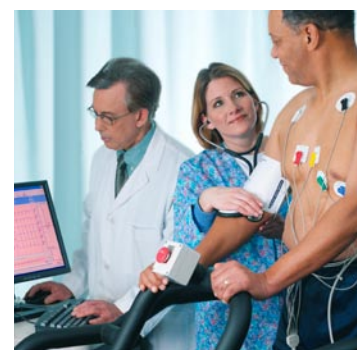
With its broad portfolio of digital vital signs devices and cardiopulmonary diagnostic equipment, proven track record and organizational commitment to integrate its devices with virtually all electronic health record solutions, Welch Allyn was the clear choice for a medical device partner. An integration team consisting of key COT staff members and representatives from Welch Allyn and NextGen Healthcare Information Systems worked to build and install interfaces to seamlessly transfer discrete data elements captured through digital vital signs devices and PC-based ECG machines directly into patients’ central records within the NextGen® EHR database.

Data from a broad spectrum of Welch Allyn medical products—including four Spot Vital Signs LXi devices, six PC-based stress ECG machines and eight PC-based resting ECG machines—all flow directly into the EHR. As Nancy Nelson explains, “Our connected device solution enables physicians and staff to capture, view and record data from a range of medical devices in a timely and very efficient way. The user interfaces for the connected Welch Allyn devices are intuitive and easy to use, and the tight integration of the devices with our EHR has also enabled us to develop and maintain complete and accurate health records for all of our patients.”

## The Benefits:

### Timely, Accurate and Complete Results—Enhancing Patient Care and Safety

When compared with the manual method of patient diagnostic data capture and recording, the advantages of integrating digital devices with the EHR are many. For example, it is a well-documented fact that manual recording of diagnostic tests propagates errors—ranging from inaccurate and incomplete patient ID, to transcription errors to lost readings. In fact, 10 to 25 percent of all transcribed readings include some type of error, thereby putting patients at greater risk. Says Nelson, “By integrating device data output into the EHR and making it immediately available to our physicians, we’ve been able to eliminate these problems and make great strides in the quality of patient care.”



*“The process of patient data gathering using the Welch Allyn product is excellent—now I don’t have to read 30 and 40 pages of ECGs. Now with the Welch Allyn devices, you hit one button and everything is there for you. The process is so streamlined now, and that allows me to focus more on my patients.”*

*—Sasha Van Dyke,  
Exercise Physiologist*

The use of digital devices also helps to standardize vital signs capture processes and to minimize variations in vitals data. Manual methods of capturing patient vitals do not always produce consistent readings. At COT, before the Welch Allyn device integration, it was not uncommon to have to capture a duplicate reading of a patient's vitals due to these variations, resulting in lost productivity. As Nelson explains, "Once we put the vital signs devices in place and started consistently capturing all vital signs simultaneously, we found that the accuracy of every reading was greatly improved. We now take few duplicate vitals readings and have improved the quality of our documentation as well, which helps us to minimize risks and optimize reimbursement."

Edward J. Morris, M.D., a cardiologist with COT, adds, "One of the things that the Welch Allyn devices brought to us . . . is a longitudinal view of a patient's vital signs. Previously, you had to flip from page to page to page to compare readings. [The new approach] is a very powerful way to monitor adequate blood pressure and vital signs control."

### More Efficient ECG Testing Workflows

The tight integration between the NextGen® EHR and the Welch Allyn PC-based resting and stress ECGs has eliminated the need for physicians to sort through lengthy paper reports or interpret hard-to-read faxed copies of test results. With immediate, enterprise-wide access to diagnostic information, physicians can now review and interpret results for resting and stress ECG tests remotely through the EHR. This speeds the turnaround of test results, makes patient diagnostic information more readily available to physicians at the point of care, and enhances communication among the physicians, staff, referring providers and patients themselves.

Dr. Morris describes the impact of the new integrated ECG testing approach: "Because of the connection of the Welch Allyn devices to the NextGen® EHR, as fast as you can click, you're reading each tracing, and then that information is put into the NextGen documentation form. As fast as you can click, your report is done and you're on to the next tracing." These increased efficiencies are an obvious benefit to physicians and staff, and the quick turnaround of test results and diagnoses to patients—often within 24 hours—has had a positive effect on patient satisfaction and has enhanced the quality of patient care.

Sasha Van Dyke, an exercise physiologist at COT, is thrilled with the improved workflow and feels that it has brought a real benefit to her patients. "The process of patient data gathering using the Welch Allyn product is excellent—now I don't have to read 30 and 40 pages of ECGs. Now with the Welch Allyn devices, you hit one button and everything is there for you. The process is so streamlined now, and that allows me to focus more on my patients," explains Van Dyke.



*"The user interfaces for the connected Welch Allyn devices are intuitive and easy to use, and the tight integration of the devices with our EHR has also enabled us to develop and maintain complete and accurate health records for all of our patients."*

*—Nancy Nelson,  
Chief Administrative Officer*

## Manual vs Integrated Stress ECG Testing Workflow

MANUAL	INTEGRATED
<ul style="list-style-type: none"><li>• Manually input patient information</li><li>• Manually enter BP and heart rate</li><li>• Manage and label ECG paper</li><li>• Produce 10-30 sheets of paper/manual notes</li><li>• Take result to MD inbox for review</li><li>• MD goes to ECG reading station</li><li>• Flips 30 page report and adds interpretation manually</li><li>• Report goes to the "to-be-scanned" basket</li><li>• Report is physically taken to scan station</li><li>• Results scanned into EHR, 30 sheets of paper... 1 at a time</li><li>• Scanned results added to patient record</li><li>• ECG tracing is shredded</li><li>• Done</li></ul>	<ul style="list-style-type: none"><li>• Patient info transferred electronically</li><li>• BP and HR transferred electronically</li><li>• Test recorded electronically</li><li>• MD views results from anywhere via remote or local connection to network</li><li>• Report viewed rapidly via mouse clicks and interpretation electronically recorded</li><li>• Done</li></ul>

The integrated solution has also eliminated the staff time required to scan ECG test results—often 30 to 40 pages long—into the EHR. The staff time and expense associated with shredding those same results after they have been scanned has also been eliminated.

An added workflow benefit of the Welch Allyn PC-based ECG is its ability to function in standalone mode, enabling uninterrupted ECG testing even when the facility's network is down. Unlike competitive PC-based equipment for which the software resides within the EHR system itself, the Welch Allyn's ECG testing software is installed on a client workstation; in the event of a network failure, test results can be acquired and saved locally, and then subsequently transferred to the EHR when network issues are resolved.

### More Efficient Vital Signs Capture and Recording Workflow

After COT installed its first digital spot-check devices (four Welch Allyn Spot Vital Signs devices), the efficiency gains for both the acquisition and recording of patient vitals data were dramatic. According to Nancy Nelson, with the new workflow of capturing all vitals simultaneously through the Spot Vital Signs devices and connecting seamlessly with the EHR, the total vitals processing time per patient was reduced to less than one minute. Previously, the manual method of vitals capture (gathering and using multiple pieces of equipment, recording results by hand and then transcribing into the EHR) required anywhere from 2.5 to 3 minutes per patient. Nelson estimates that the Spot Vital Signs device workflow has saved the practice about 500 hours of staff time per year.



But the process improvements didn't stop there: in 2007, COT upgraded to Spot Vital Signs LXi devices. With SureBP™ technology that measures blood pressure in about 15 seconds as the cuff is inflating, and connectivity to digital scales, the Spot LXi's have further streamlined patient data capture at COT, saving the practice an additional 189 hours of staff time per year. When asked about the benefits of integrating patients' weight measurements directly from the scale to the Spot Vital Signs LXi, Sasha Van Dyke comments, "We love it! The digital scale integration gives us one less measurement we have to record manually, one less step we have to worry about."

### Positive Impact on the Bottom Line

As the following chart describes, COT has been able to achieve cost savings in excess of \$36,000 per year in staff time and material costs through more efficient workflows and the elimination of tasks such as scanning and shredding reports. The resulting productivity gains realized through device connectivity have enabled COT to respond to growing patient demand without having to hire additional staff.

#### Cardiology of Tulsa Return on Investment Using Connected Vital Signs and ECG Testing Devices

Full-time employee savings resulting from fewer manual, paper-based processes	\$ 15,237
Full-time employee savings resulting from shorter stress ECG testing processes	\$ 7,961
Reduced paper costs for treadmill ECG testing	\$ 8,399
Reduced paper costs for stress ECG testing	\$ 583
Decreased shredding costs	\$ 4,000
<b>Total Annual Savings*</b>	<b>\$ 36,180</b>

\*This number does not include a one-time savings of \$12,000 for elimination of six personal computers

But as Nancy Nelson explains, the financial gains, while impressive, pale by comparison to the benefits of complete, accurate and timely data in the EHR, significantly streamlined workflows for physicians and staff, and enhanced patient care and satisfaction—all made possible through the Welch Allyn solution.



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