Driving Cost, Quality and Access Improvements with Technology and Process Optimization

By linking streamlined workflow with wireless technology and information systems, HCA's National Group saw measurable results
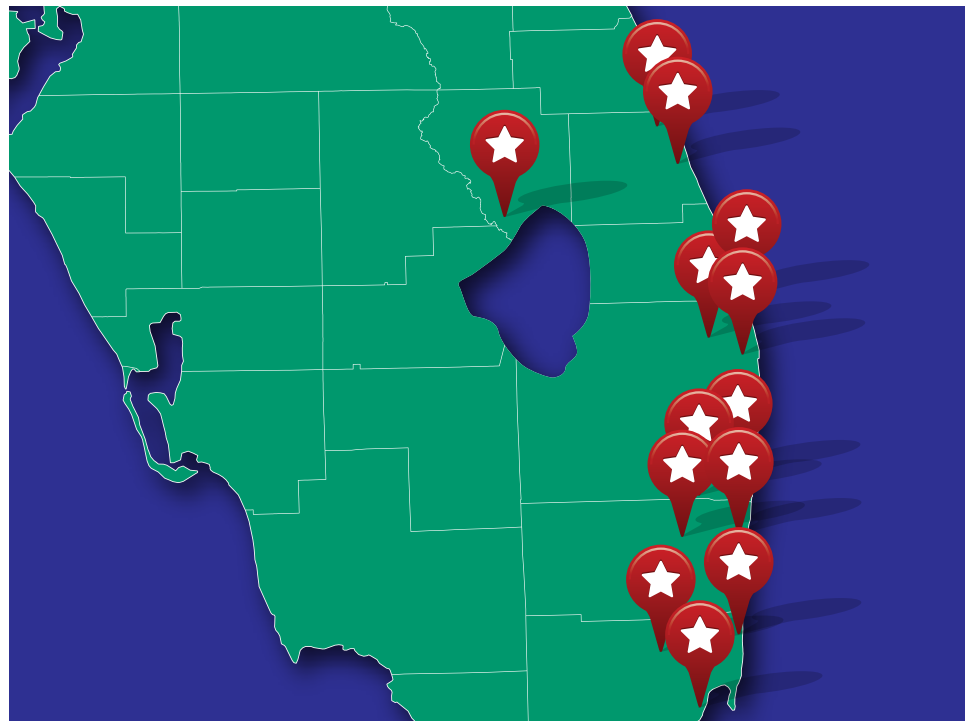
About HCA

HCA affiliated facilities in the East Florida Division are a part of a quality healthcare network in East Florida and the Treasure Coast with 14 affiliated hospitals, 12 surgery centers, an integrated regional lab and consolidated service center. Together, the network employs more than 12,500 individuals and has close to 6,000 physicians on staff.

HCA is committed to the care and improvement of healthcare and strives to deliver high quality, cost effective healthcare in the communities they serve.

More than 1.3 million ECGs are performed each year in the 50+ hospitals within HCA's National Group. Over the past couple of years, the Hospital Corporation of America (HCA) has been moving toward a digital ECG environment to expand quality, access, efficiency and cost-savings in cardiovascular services.

Working with GE Healthcare, participating HCA facilities implemented the MUSE® cardiology information system, standardized ECG carts and identified process changes that would help the organization achieve four primary goals:

- Improve the quality of patient care

- Increase departmental efficiency

- Reduce length of stay (LOS)

- Improve turnaround time for ECG reports

To optimize technology implementation and improve workflow, GE's Performance Solutions team used a collaborative approach to perform a 2009 analysis of each process step from ordering the ECG through acquisition, physician reporting, billing and data management. Based on a clear assessment of the current environment, they could design an optimal state, define gaps, mitigate risks, implement Lean processes and apply GE's Change Acceleration Process (CAP).

The team found existing processes could at times be cumbersome and time-consuming. At some sites patient information was not consistently entered into ECG carts, delaying interpretation and often forcing the cardiology staff to manually update patient information. Storage processes varied among facilities, and cardiologists at some sites could not review and compare the ECG to previous records because paper ECG strips were not readily available.

Prior to the implementation of MUSE, report turnaround time was estimated at an average of 24 hours, although there was really no reliable way to measure this time. The start of surgical procedures as well as patient discharges from the hospital have been delayed by the report not yet being read by the cardiologist and the ECG not being available to other physicians.

"This was a great team effort. Every hospital now knows how important it is to successfully implement a system-wide electronic health record and migrate from paper to digital capture. In cardiology, MUSE is the mechanism for that process. Combining the right workflow adjustments with technology implementation carries greater value than any equipment could carry alone."

— Finance executive, HCA Eastern Division

Recommending and Implementing Solutions

GE's team provided detailed recommendations for each facility. Major issues were addressed through an approach combining several key elements:

- Implementation of GE's MUSE

- Integration of bedside monitors

- Implementation of HIS interfaces (ADT, orders, results, billing) to MUSE

- Standardized process used to acquire and transmit 12-lead ECGs from the carts

- MobileLink™ Wireless ECG communications

- Optimization of workflow through connectivity between the hospitals' electronic ordering systems to MUSE and ECG carts

- Reporting and the transfer of final results from MUSE to the Electronic Medical Record (EMR)

- Cardiologist reading panels to interpret ECGs

Interfaces between the HIS and MUSE enables users to download ECG orders to the carts so patient demographic information is automatically attached to performed ECGs. MUSE stores and references ECGs according to patient name and ID. When identifiers are accurate and consistent, the system performs an automatic serial comparison of current ECG waveform shapes and measurements to the first previous ECG. The HCA team feels that automated serial comparison has helped to drive quality.

To raise awareness and gain early acceptance for this initiative, the team developed a communication plan with useful tools such as newsletters, posters, customized letters to physicians, and webcasts were held in some cases. Expectations were set that cardiologists would read all ECGs online, improving turnaround times.

Measurement helps in support the success of any major change initiative. For this project, key metrics captured before and after this initiative included:

- Report turnaround time

- Staff or cost reduction of processing time

- Percentage of serial comparison use

- Accuracy of patient demographic information

- Number of tracings printed and copied for each ECG

- Ensuring all studies are confirmed by physicians in MUSE

- Satisfaction level with MUSE

The 2009 report found that staff spends significantly less time completing the daily ECG processing—instead of the many hours that had been required to manage the paper process. At one facility, this translated to a savings of approximately $31,000 annually. A reduction in printed material and storage costs adding up to another $4,800 in annual savings.

Maximizing Benefits from Wireless Technology

The MUSE cardiology information system and wireless technology have made a noticeable difference in quickly, consistently and accurately transmitting clinical information.

When used with the MUSE HIS Interface for ECG orders, wireless communication eliminates manual data input. Patient data is captured more consistently and accurately driving quality improvements in interpretation. A complete patient record is more readily available to physicians allowing them to reach a diagnosis sooner.

In a major step toward a completely wireless environment, with MUSE cardiologists can now read all ECGs online anywhere within the facility or remotely using the MUSE Everywhere application. Physicians are able to view a patient's ECG from any facility using the MUSE Web technology, which proves to be a powerful tool when diagnosing a patient's condition.

Metric	Metric Definition	Overall improvement or results
Turnaround time/online reading of ECGs	ECG completion to interpretation time	Approximately 85–90% done within 24 hours
Capacity management	Staff ability to perform additional procedures by elimination of managing paper processes	10–15 percent improvement
Staff time	Time managing the paper process (printing, gathering, copying, distributing and charting ECGs)	Reduced by $350/day
Staff time to manage MUSE vs. paper	Time managing ECGs within MUSE vs managing the paper processes	Annual savings of $107,850
Quality of care	Patient data accuracy, access to ECGs, serial comparisons	Avoidance of overread delays
Offsite storage cost elimination	Cost to store ECGs in offsite facility	Savings of $4,500
ECG paper, charts, sticker cost elimination	Cost related to paper processes	Savings of $28,525
ECG device redeployment	Cost avoidance of purchasing new ECG carts	Savings of $500,000
Transcription cost	Cost of ECG transcription services	Elimination results in savings of $45,840
Observation/decision time	Cost savings due to improved decision times	Savings of $9.5 M
Productivity improvement	Staff reduction due to not managing paper processes	1–1.5 fewer techs needed per hospital

Quantitative and Qualitative Results

New workflows were implemented, focusing on key areas such as the wireless download of orders to the ECG carts and wireless transmission of ECGs from the carts to MUSE. More orders are now entered into the Meditech order entry system prior to the start of the ECG, allowing the technician to automatically incorporate patient demographic information into the test. At one facility, the inclusion of this information improved from a baseline of 10% to 90% percent. Age and gender are criteria utilized by the Marquette® 12SL™ ECG analysis program. The system can automatically provide an ECG interpretation. When previous exams are available, cardiologists use the MUSE serial comparison feature 100% of the time.

With the MUSE Management Report feature, ECG turnaround times are now measurable, electronically available and distributed throughout the division. There is no longer a need to maintain separate paper logs, as reports are automatically run and accessible from the MUSE system.

After a system-wide inventory and establishing a procedure of performing 12-lead ECGs at the bedside monitors, some ECG carts were redeployed to other facilities. Expected maintenance costs have also been lowered.

Reducing the length of stay in the emergency department impacts the rest of the hospital as well, and it is a key metric to continuously monitor. Although length of stay is dependent on many other tests, including Radiology and Lab, ECG turnaround time can be a significant contributor in reducing a patient's LOS in the ED, observation, and inpatient environments. In this regard, it is important to limit the number of tasks that must be performed as part of the overall ECG process to improve efficiency and patient quality.

Conclusion

Maximizing benefits through wireless technologies requires a carefully planned, comprehensive and coordinated approach. Every hospital with the group now knows how important it is to successfully implement a system-wide electronic health record and to effectively migrate from paper to digital capture. The HCA project team feels that within cardiology, MUSE is the mechanism for that process, and that facilitating implementation carries a greater value than any equipment could carry alone.

With the interfaces to MUSE and the bi-directional wireless connectivity to the ECG carts, HCA was able to significantly decrease costs while increasing the accuracy of the data that was being captured and transmitted. It is important to note that the HCA National Group now has an organized methodology in place for panel reading, and serial comparison, which are considered critical to delivering an accurate diagnosis. Taken together, the technology and process changes have translated to significant improvements in cost, quality and efficiency.