WHITE PAPER

Alternative Care

Shifting Care Settings

Primary Care on the Front Lines

There is little doubt that both public and private payers want to shift care to the least costly setting that is consistent with appropriate care. Many patients, especially in the face of rising costs and increasing cost-sharing and out-of-pocket expenditures, prefer to receive medical services in the most affordable, convenient setting. Thus, the offices of primary care physicians in the U.S. are on the front lines in the battle to provide quality care at an affordable cost.

Grappling with government and managed care reimbursement constraints, and facing increased demands to do more for their patients during office visits, primary care physicians must uphold quality while managing costs. To cover practice overhead and maintain their incomes, they strive to see more patients per day. If they could quickly and effectively perform more high-tech diagnostic test, primary care physicians could maximize the value of office visits, improve quality, and enhance convenience of patients. They could reduce costs and increase revenues by performing tests for many patients themselves instead of referring them to specialists. Instant access to test results also enables primary care physicians to communicate effectively with specialists when they do refer patients.

Point-of-care testing in primary care is becoming increasingly popular and important and offers the potential for improving patient care and outcomes while boosting revenues in primary care practices.

More and more diagnostic tests, traditionally done by specialists in their offices or by technicians in hospital outpatient departments, are now performed in the offices of primary care physicians. Point-of-care testing in primary care is becoming increasingly popular and important and offers the potential for improving patient care and outcomes while boosting revenues in primary care practices. That is why primary care physicians need reliable, reasonably priced medical devices for diagnostic testing and patient monitoring. Yet, many primary care physicians are still reluctant to perform diagnostic procedures such as spirometry and pulse oximetry, and many more underutilize common electrocardiography (ECG). Why? Most medical devices are not designed for primary care physicians. They are too complex and too costly.

QRS Diagnostic (www.QRSdiagnostic.com), leader in innovative design and development of software-based medical devices contained entirely in computer cards, offers high-tech medical devices for diagnostic testing that cost 25 percent to 50 percent less than comparable products. QRS holds two U.S. patents on

the design of medical devices contained entirely in computer cards, such as PC Cards, Compact Flash (CF) Cards, and Springboard™ modules. QRS uses its patented technology to program the intelligence of physiological data acquisition and analysis into computer cards. QRS computer cards, with integrated sensors, slide into the PC and CF Card drives of PDAs, notebook, handheld, or Pocket PCs, like the HP iPAQ™. So, QRS makes off-the-shelf PDAs and portable computers work as fully functioning medical devices. Because they are software-based and integrate with standard PDAs and PCs, QRS devices are readily upgradeable and highly mobile. In addition, QRS eliminates the need to purchase and support separate, stand-alone devices for several different types of diagnostic procedures, since a single PDA or handheld computer can support all QRS computer card devices.

Case in Point: Managing Pulmonary Disease in Primary Care

It is imperative for primary care providers to step up to the challenge of effective COPD management.

According to the American Lung Association and the Center for Disease Control and Prevention (CDC), 10 million to 12 million Americans suffer from chronic obstructive pulmonary disease (COPD), including emphysema and chronic bronchitis. COPD kills 120,000 people in the U.S. every year, and the annual death toll is on the rise. In fact, COPD is now the forth leading cause of death in the United States, and it could climb to number three by 2020.

Arguably, there are not enough pulmonologists in the country to manage the ever increasing volume of mild to moderate lung diseases. Therefore, it is imperative for primary care providers to step up to the challenge of effective COPD management.

Thomas Petty, M.D., chairman of the board of the National Lung Health Education Program (NLHEP) is a noted advocate of early detection and treatment of emphysema and related chronic bronchitis in primary care. Pulmonary function testing in primary care physicians' offices is essential to the NLHEP model of care. Quantifying pulmonary function establishes a baseline, provides the factual data to determine the disease stage, and enables physicians to monitor and measure disease progression over time. Some physicians now perform an initial baseline spirometry test and then re-test after any change in medication, incidence of bronchitis or pheumonia, or any incidence of non-infectious symptoms (for instance, a persistent cough).

Asthma, of course, is another clinical challenge for primary care physicians. The American Lung Association estimates that asthma afflicts an estimated 20 million to 25 million people in the U.S., and its incidence is on the rise. An estimated 3.8 million children under 18 years of age have had an asthma attack in the past 12 months, and many others have "hidden" or undiagnosed asthma. Asthma is the most common cause of school absenteeism due to chronic disease.

Many family practice physicians and pediatrics have used peak flow meters to diagnose patients with asthma. Spirometry offers more specific diagnostic detail for pulmonary function testing. Spirometers more precisely measure the rate and volume of airflow to and from the lungs during various phases of the respiratory cycle. Peak flow is not as helpful as spirometry because it measures larger airflow resistance. Many pediatric patients with asthma report no symptoms between acute episodes and yet show clear evidence of increased small airway resistance on spirometers. It is very important to accurately identify and appropriately treat these patients.

Benefits of Office-Based Spirometry in Primary Care

First, immediate access to test results. With immediate access to spirometry during patients' office visits, physicians have better information for clinical decision support right at the point of care. In turn, that strengthens early detection. With results of simple spirometry starting at the very early stages of dyspnea complaints, primary care physicians can detect and treat lung disease that might go otherwise go undiagnosed for many years.

Second, improved diagnostic precision. For instance, with spirometry, physicians can differentiate between pure cardiac disease and concomitant lung disease. Cardiac patients often complain of dyspnea. So, the ability to get immediate, objective lung function measurements helps physicians make a more accurate diagnosis. Also, with spirometry readily available, it is easier to make precise determinations on patient responses to changes in medications or to new medications.

Third, more cost-effective resource use. With spirometry in primary care offices, physicians can ascertain when a patient appropriately needs to see a specialist, or if high-end pulmonary function studies are required. Primary care testing prevents the unnecessary costs of sending patients who can be appropriately managed in primary care settings to specialists.

Fourth, convenience, for both physicians and patients. Primary care physicians do not have to wait to get spirometry results back form a specialist. The full continuum of care- from office visits, to testing, to diagnosis, and then on to treatment- becomes more complete and convenient.

Fifth, enhanced patient education. The time of a pulmonary function test is ideal for describing disease processes, such as COPD or asthma. And, many primary care physicians find that even patients without advanced disease are more likely to quit smoking after spirometry results are used to dramatically show the impact of smoking.

Sixth, increased revenue. Spirometry and lung health management services can attract new patients to primary care practices, boost patient retention by protecting against the possible loss of patients referred to specialists for testing, and increase revenues. The table below lists common procedure terminology (CPT) codes for spirometric procedures and the national average Medicare reimbursement to physicians submitting these codes:

Spirometry Reimbursement, 2003

Comprehensive Code	Component Code	Description	National Fee
94010	00520. 94200, 94375, 95070, 95071	Spirometry, including graphic record, total and timed vital capacity, expiratory flow rate measurement(s), with or without MVV	$39.73
94014	00520, 94010, 94015, 94016, 94200, 94375	Patient-initiated spirometric recording per 30 day period of time; includes reinforced education, transmission of spirometric tracings, data capture, analysis of transmitted data, periodic recalibration and physician review and interpretation	$56.28
94015	00520, 94010, 94200, 94375	Patient-initiated spirometric recording per 30 day period of time; recording (includes hook up, reinforced education, data transmission, data capture, trend analysis and periodic recalibration)	$30.16
94016	00520, 94010, 94375	Patient-initiated spirometric recording per 30 day period of time; physician review and interpretation only	$26.12
94060	00520, 36000, 36410, 94010, 94200, 94375, 94640, 94664, 94770, 95071	Bronchospasm evaluation: Spirometry as in 94010, before and after bronchodilator (aerosol or parenteral)	$69.52
94150		Vital capacity; total separate procedure)	$27.59
94200		Maximum breathing capacity, maximal voluntary ventilation	$28.32
94375	00520	Respiratory Flow Volume Loop	$37.15

Source: CodeCorrect, a strategic partner of the Health Forum, and American Hospital Association affiliate

Parallel clinical and business arguments certainly apply as well to electrocardiography in primary care settings. Electrocardiography, of course, is a critical tool in the diagnosis and treatment of heart disease. The clinical rationale and business case for electrocardiography in primary care are as strong as those for spirometry.

QRS Medical Devices for Primary Care

SpiroCard® from QRS Diagnostic is software-based spirometer contained entirely in a computer card. Weighing less than two ounces, SpiroCard is the smallest and lightest spirometer on the market.

SpiroCard exceeds the accuracy standards of the American Thoracic Society (ATS). Independent testing has verified that SpiroCard is actually more precise than many spirometers that are much more expensive. For example, testing at the LDS Hospital in Salt Lake City against 26 standard volume-time waveforms validated that SpiroCard is 99.4 percent accurate:

SpiroCard Accuracy Validation: Percentage Accuracy

FVC	99.890%
FEV_1	99.968%
$FEF_{25-75\%}$	99.546%
PEF	99.099%
Average	99.375%

Source: Test Report LDS Hospital, a Service of Intermountain Health Care

In addition, Texas Children's Hospital in Houston, the largest pediatric hospital in the U.S. evaluated SpiroCard side by side with its spirometer in the hospital's pulmonary function lab, and SpiroCard consistently performed just as accurately.

OxiCard® is QRS Diagnostic's pulse oximeter that provides instant, noninvasive measurement of pulse rates and oxygen saturation in the blood. The device is built into a Compact Flash (CF) Card and weighs only 2.4 ounces. It substantially eliminates the problems of low peripheral perfusion and most weak signal-to-noise environments. SpirOxCard® is the only combination spirometer/pulse oximeter. It measures pulmonary function and monitors blood oxygenation with one convenient device contained entirely in a computer card.

EKGCard™, measuring 2.1 inches x 5.5 inches x 1.0 inch and weighing only 3.2 ounces, is the smallest and lightest 12-channel electrocardiograph device available in the medical device market today. EKGCard utilizes QRS Diagnostic's patented computer card technology to build the intelligence of electrocardiography data acquisition entirely into a Type II (PCMCIA) PC Card. The electrode leads connect directly to the PC Card itself. By simply sliding EKGCard into the PC Card slot of an off-the-shelf Personal Digital Assistant (PDA) or handheld PC, physicians and nurses instantly have a light-weight, portable, and full-function 12-channel diagnostic device.

EKGCard displays all data on-screen for immediate assessment. In addition, it gathers a full set of diagnostic measurements and produces an automated narrative interpretation, utilizing the advance algorithm developed at the University of Louvain Medical School in Belgium. The program employs decision-tree logic to generate diagnostic statements based on the logical processes performed by an actual cardiologist. In 1994, researchers evaluated this interpretative ECG program and found that it achieved the highest score of total and partial accuracy amount the total of twelve programs tested. For example, it had the highest sensitivity to Anterior Myocardial Infarction, 81.8 percent with only 3.6 percent false positives for non-AMI cases.

BPCard™ is the world's first, and only, computer card blood pressure monitor. BPCard is designed to give users precise, digital blood pressure readings in seconds using off-the-shelf PC and handhelds. Its patented Quantum BP™ algorithm offers unparalleled accuracy. By eliminating digital blood pressure equipment, BPCard helps primary care physicians improve patient outcomes and substantially reduces costs, errors and liability.

Thus, QRS turns PDAs, laptops and handhelds into modular, upgradeable and portable medical devices and streamlines the collection and communication of precise physiological data. QRS technology enables primary care physicians to cost-effectively practice high-tech medicine while delivering the accuracy that specialists and hospitals demand.

Moreover, all QRS devices can communicate to the company's Office Medic™ Integrated Data Management System (IDMS), providing clinicians instant access to physiological data anywhere on their computer networks. Office Medic can also interface easily with electronic medical record systems.

QRS turns PDAs, laptops and handhelds into modular, upgradeable and portable medical devices and streamlines the collection and communication of precise physiological data.

Patients' Homes- The Next Stage of Alternative Care

The least restrictive, and least costly, setting for alternative care is the home of the patient. More than 20,000 home health care agencies operate in the U.S. today. According to the Centers for Medicare and Medicaid Services (CMS), formerly the Health Care Financing Administration (HCFA), annual spending on home health care will approach $40 billion in 2003. CMS projects that it could top $50 billion within five years. The demand for home care will certainly continue to grow as baby boomers age and their need for health care services increases.

Annual spending on home health care will approach $40 billion in 2003.
Centers for Medicare and Medicaid Services (CMS)

Putting diagnostic devices in patient' homes to support at-home monitoring is an emerging trend that is likely to accelerate. Home health care professionals, visiting nurses and physicians themselves can now monitor patients' physiological data remotely. Patients do not have to come into physicians' offices for testing. And, their conditions can be cost-effectively checked as frequently as physicians deem appropriate. CPT Code 94014 provides reimbursement to physicians for monitoring patient-initiated spirometry. Estimated payment to physicians for interpreting thirty days of spirometry values collected in the home is approximately $58.

For example, in July 2002, Texas Children's Hospital (TCH) in Houston and Terry Respiratory, a provider of pediatric respiratory care services in patients' homes, chose SpiroCard from QRS Diagnostic as their preferred device for spirometry for lung transplant patients. They use SpiroCard with the Office Medic™ Integrated Data Management System (IDMS) from QRS to collect and then store and manage the test results on a notebook PC. With SpiroCard and Office Medic on a notebook PC with pcAnywhere™ from Symantec, pulmonary function technicians at TCH access the children's spirometry results via a modem connection at any time.

For the first three months post-transplant, patients generally test their lung function twice a day. After that, spirometry is usually done once a day. The professionals in the TCH pulmonary department connect to the children's computers to verify that they have performed their spirometry tests and then assess the results. Thus, TCH accesses the results right from its center, and the solution has worked well for the school-age children transplanted so far in Houston. The solution is easy to use, and compliance has been excellent.

Summary

To ensure that medical care is appropriate, affordable and patient-centered, the delivery of services is increasingly shifting to less costly settings, to the offices of primary care physicians and to patients' homes. QRS Diagnostic's computer card medical devices are upgradeable, portable and affordable. QRS enables primary care physicians to perform essential diagnostic test in their offices and to monitor patients from their homes.