CareCycle Solutions

The TeleHealth Model

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Calendar Year 2011 Data

➢ **Company Overview**

CareCycle Solutions (CCS) specializes in managing the needs of chronically ill patients through the use of Interventional TeleHealth[1] combined with targeted healthcare services. Based in Dallas, Texas, and founded in 2003, the CCS footprint includes 33[2] offices throughout Louisiana and Texas. The company began its TeleHealth specialty in April 2006 in order to provide superior care to chronically ill patients. This service now provides daily TeleHealth care to more than 2200 patients, making it one of the largest telehealth services in the United States.

Unique Combination

Interventional TeleHealth – Critical Care Health Coaches
- Remote monitoring of key health metrics including: - Oxygen Saturation   - Systolic and Diastolic Blood Pressure   - Heart Rate   - Weight   - Blood Glucose   - Peak Expiratory Flow and FEV-1   - In Depth Clinical Telephonic Assessment and Education   - Hospitalization Risk Factors   - Disease Specific Subjective Questions   - Fall Risk Analysis
Targeted Home Therapy and Nursing

CCS developed proprietary software systems to generate detailed patient hospitalization information and assist in directing needed care to its patients. Management believes this system is unique within the healthcare industry in that it contributes to significant reductions in rehospitalization rates for our TeleHealth patients while also reducing operating expenses. Since all CCS patients receive home healthcare services, it is likely that such patients are more seriously ill than the average Medicare patient discharged from a hospital, only 8.9% of whom are diagnosed by a physician as needing homecare services. Nevertheless, the company's 30 day rehospitalization rate for TeleHealth patients (shown below) is 7.3% or about 63% lower than the average readmission rate for all Medicare beneficiaries discharged from a hospital. **Important note: the 14.3% rate of CCS non-TeleHealth patient rehospitalizations is an estimated 40% to 50% lower than those of the home healthcare industry because CCS patients having the greatest need are admitted to the TeleHealth service. In fact, the "Case Mix Weight" (measure of acuity) of TeleHealth patients at 1.9 is 17% higher than that of the non-TeleHealth patients Case Mix Weight of 1.6.**

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[1] There is an inherent difference between telehealth as a general concept, and TeleHealth as we define our specific model. The differences in spelling are purposeful with the intent to aid in clarity and understanding of the topic.

[2] As of May 2, 2012

30 – Day Rehospitalization Rates	
Medicare Beneficiaries – US Average	19.6 %
Texas Medicare Beneficiaries	19.4 %
Louisiana Medicare Beneficiaries	21.3 %
Home Healthcare Partners – Non-TeleHealth	14.3 %
CareCycle Solutions - TeleHealth	7.3 %

More than 43,000 sixty day episodes of TeleHealth care have been completed since program inception. Because this service is provided every day of the year including weekends and holidays, CCS tracks **patient days** of service which now exceed 2,000,000. CCS is using this rich reservoir of data to develop a system that will predict the likelihood of a patient's return to a hospital with a high degree of precision. The system is being engineered to assist Vital Station clinicians to provide more efficient and cost effective TeleHealth service. This Risk Stratified Care Model named **"CareCycle Navigator"** is being developed with the support and assistance of the University of North Texas Health Science Center faculty. Navigator field testing is scheduled to begin during the summer of 2012.
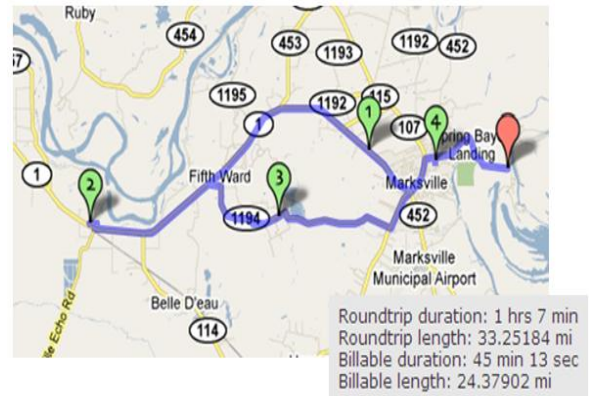

Why Telehealth Works
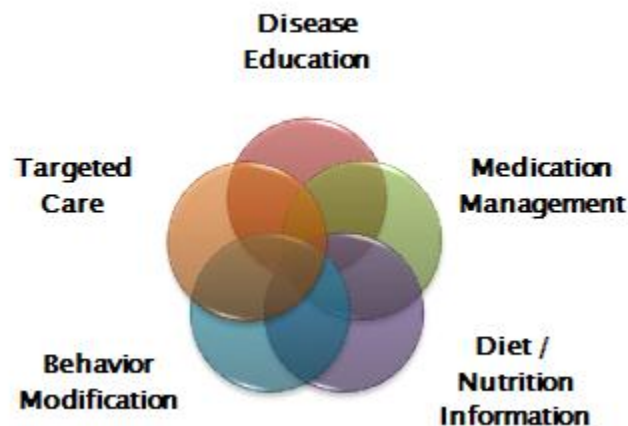
Building a personal relationship with each patient is a very important part of the process. Frequent calls during the first two weeks following the patient's admission are designed to accomplish this result while also gaining important information about the patient's medications, diet and health profile. Psychosocial matters are accorded a high level of focus by TeleHealth coaches. Only after gaining the patient's trust is the TeleHealth coach able to be of greatest service. Attention is given to helping patients better understand their health issues, manage their medications and regulate their diet. Most patients who are thought to be non-compliant are simply not well informed about their health. As patients become better educated about their health needs, it becomes possible to coach them toward accomplishing significantly positive behavior modification. Coupled with targeted care, patients become far better managers of their own health care, the ultimate objective of Care Cycle Solutions.

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➢ **Proprietary Systems**

Key to the company's success is its Data Warehouse (CUBE) which collects data hourly from CCS's clinical, TeleHealth and accounting systems. The CUBE is designed specifically and exclusively for rapid, accurate data analysis rather than managing transactions. Reports, designed in three to five minutes and automatically updated hourly, are available at all times to all management. The CUBE provides information used by management to follow and understand the myriad of CCS operations relationships and to generate "what if" scenarios as changes in operations are being considered.

The efficient delivery and installation of monitoring hardware, coupled with instructing patients in its use, are important components of any telehealth service. A team of **TeleHealth Field Coaches** provide these services. CCS developed a training DVD to assure that all Field Coaches use the same techniques for equipment set up and patient training. A **Routing, Mapping and Standardized Mileage** system, also developed by CCS, interfaces with Google Maps to generate optimal routes driving instructions. In addition, it calculates mileage for each route, providing an accurate basis for mileage reimbursement.

Roundtrip duration: 1 hrs 7 min
Roundtrip length: 33.25184 mi
Billable duration: 45 min 13 sec
Billable length: 24.37902 mi

➢ **Key Components of a Successful Telehealth Service**

The success of a telehealth service depends primarily on the effectiveness of its **Clinical Care Management** component. While there are a number of telehealth monitors available, they all serve as devices for data transmission. What differentiates such systems is cost and the level of operating efficiency achieved. Capturing all important information in a system that provides rapid, accurate analysis is essential to effective management of telehealth patients. The ability of seasoned nurses and therapists who have had extensive critical care experience to "coach" patients regarding their health issues, medications and nutrition management is the heart of a successful telehealth program. Developing a team of such nurses, therapists and program support systems is time consuming and expensive. The reasons that CCS requires case managers to have had extensive critical care experience include those characteristics listed below.

- Confident assessment skills--if a clinician is not confident in their assessment, they cannot be confident in their intervention.
- Confident in medication knowledge and drug interactions.
- Calm under pressure.
- Patient Advocates with all members of the patient's healthcare team.
- Experience in handling life threatening emergencies.

Nurses and therapists having these skills seek to prevent patient hospitalizations without the intervention of field-based clinicians whenever possible. However, they must also be confident enough in their judgments to call upon the help of healthcare team members when necessary, and to direct patients to the hospital when warranted by their condition.

The skill set of home healthcare clinicians, physician and hospital floor nurses do not match up well with the skills needed by successful TeleHealth team leaders. Therefore clinicians with these types of backgrounds are not eligible to become CCS TeleHealth team leaders and at this time, only clinicians with extensive critical care experience are candidates for this position.

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Traditional TeleHealth as a Home Healthcare Service Component--In traditional home care models, telehealth is a spoke in the agency's patient care system. It is seen as another service, not a standard of care or core service. Telehealth services are generally made available when requested by patient care givers. This model might be viewed as follows.
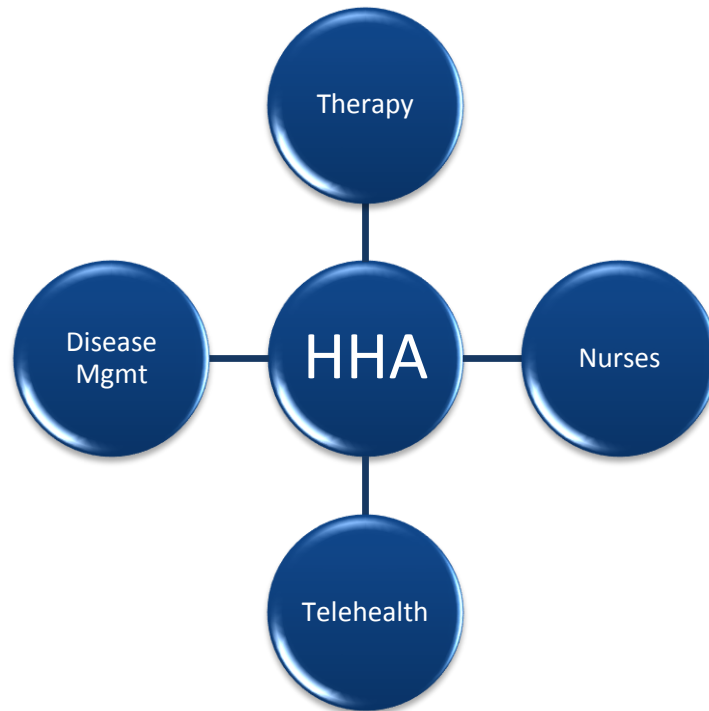
This model continues the pattern of relying on **scheduled** rather than **targeted** visits. It neutralizes the value of daily vital signs information and frequent telephonic patient contacts. In order to provide the best and also the most cost effective care, on-site patient visits should be scheduled based on need, not a prearranged schedule. If the patient will not be benefited by a "hands on" clinician visit, their daily routine should not be interrupted in order to make time for an unnecessary visit and the patient's provider should not utilize valuable resources in this way. However, changing the traditional system to a more efficient and cost effective strategy requires reinventing the business model; and major changes of any kind do not occur quickly or easily.

Managing patient populations remotely is not achieved by adding a telehealth service to the present business model. This approach will often result in adding, not reducing, operating expenses. Fundamental changes in existing models must take place before telehealth services can be fully effective. The health care industry has long relied on "HIGH TOUCH" skills. It must now develop the skills of "HIGH HEAR".

TeleHealth as Intervention Center—the CCS TeleHealth model establishes a Clinical Care Center **(Vital Station)** which case manages each TeleHealth patient's care. Because these patients are being tracked on a daily basis, Vital Station nurses and therapists are positioned to recognize the patient's need for specific types of care. Nursing and therapy visits are **TARGETED** according to the patient's need; not simply scheduled based on an assessment of the patient's needs upon their admission. With TeleHealth, the patient's health needs assessment is dynamic and therefore subject to being changed daily and sometimes several times in a single day. The frequent flow of information and patient contact positions the Vital Station to coordinate its patients' care as shown in the following diagram. HIGH HEAR skills are essential for a telehealth-based service to be fully successful.

CCS benchmarks TeleHealth patient outcomes so that any organization with patients being served by CCS can compare outcomes of its patients to those of CCS patients receiving the same type of services. Reporting metrics may be customized but will likely include patient age, gender, race, income level, discharging hospital, reason for hospitalization, disease category, urban or rural location, and patient satisfaction. Over time, best practices for each type of patient are developed so that continual reductions in healthcare costs may be achieved while patient outcomes are improved. CCS believes in the statement, "if you don't measure it, you can't manage it". Without the ability to gather and quickly analyze the millions of patient data points generated by CCS systems, currently reported patient outcomes would not be attainable. Nor would information required to develop the Navigator be available. Examples of the company's TeleHealth patient outcomes will be seen later in this paper.

➢ **TeleHealth Internal Benchmarking**

CCS has developed a procedure to objectively compare hospitalization rates of TeleHealth patients to those of its patients who do not participate in this program. In order to do this, certain rules were established:

- Patients are admitted to the TeleHealth program based on risk of hospitalization rather than diagnosis.

- All hospitalizations of TeleHealth patients are counted even if the patient had been monitored for only one day when hospitalized and/or the hospitalization was due to an accident or a scheduled procedure.

TeleHealth patient sixty day episodes are ranked by Case Mix Weight (CMW), highest to lowest. CMW (acuity levels) is developed from a coding system created by Medicare to compare patient health and environmental conditions. Higher scores indicate that a patient's condition requires more intense care than patients with lower scores.

- o Episodes are divided into four groups with an equal number of patients, and the average CMW of each group is calculated.
- o Non-TeleHealth patient episodes are placed into four groups having exactly the same average CMW as comparison TeleHealth groups without regard to the number of episodes that fall into any single group.
- o TeleHealth and non-TeleHealth episodes having the same average CMW are compared.

- Contraindications for TeleHealth are level four heart failure patients, hospice candidates, patients who cannot manage the telehealth equipment by themselves and have no caregiver at home to help them, and those who suffer from severe psychiatric disorders.

Important to the consistency of TeleHealth patient care management is the influence on visit frequencies provided by the TeleHealth team leaders. Because these clinicians have had no traditional home healthcare experience, their decisions are influenced only by each patient's condition. Vital Station clinicians, not influenced by visit scheduling patterns historically used by the home healthcare industry, have proven that superior TeleHealth patient outcomes can be achieved with many fewer nursing visits than previously thought possible. This knowledge opens the door to patient care models more cost efficient and clinically effective than any in place today.

Unless otherwise indicated, the following schedules compare only patients' first 60 days of care following admission to CCS's service. It is important to note that all patients admitted to any CCS service are subject to the same admissions and episode coding procedures which develop their CMW. These functions are managed by the company's centralized coding department.

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Data shown below was developed from episodes completed during the twelve months ending December 2011.

> **Schedule 1-- Case Mix Weight Comparison**

This analysis was expected to show that fewer patients with low CMWs would benefit from TeleHealth services than those with higher scores. The analysis proved this not to be the case for reasons that have since been identified. It is clear that more patients will benefit from TeleHealth services than first assumed by CCS management. Also note the counterintuitive fact that patients with the lowest CMW have highest rates of hospital readmissions. It was found that fewer of these patients received **Falls Prevention Therapy. Recent analysis indicates that this form of physical therapy is responsible for about 20% of the improvement in patient rehospitalization reductions**. Reminders: the average CMW of patients in each non-TeleHealth group are identical to those of comparison TeleHealth groups, and rehospitalization rates of non-TeleHealth patients are well below industry averages.

1st **60 Day** Episode					
Case Mix Category	Non - TeleHealth Episodes	Hosp. % Non- TeleHealth	TeleHealth Episodes	Hosp. % TeleHealth	Difference
Case Mix Cat 1	535	15.5%	844	11.0%	- 29%
Case Mix Cat 2	582	19.1%	844	12.9%	- 32%
Case Mix Cat 3	800	18.6%	844	13.7%	- 26%
Case Mix Cat 4	1250	24.0%	846	12.9%	- 46%
Grand Total	3167	20.3%	3378	12.6%	- 38%

> **Schedule 2—Comparison of Patients by Disease Category**

Diabetic patients realize the greatest benefit from TeleHealth services of all chronic disease categories (except for the small Alzheimer's group) but all benefit materially. The "Other" category includes patients with a wide array of health issues which the company periodically reviews to determine if new categories should be established.

Hospitalization Rate for 1st **60 Day** Episodes					
Chronic Disease	Non - TeleHealth Episodes	Hosp. % Non-TeleHealth	TeleHealth Episodes	Hosp. % TeleHealth	Difference
Alzheimer's	25	24.0%	14	7.1%	-70%
Cardiac	759	20.0%	852	12.2%	-39%
CHF	480	31.7%	758	18.5%	-42%
Diabetes	407	20.1%	354	8.8%	-57%
Hypertension	733	13.8%	602	9.6%	-30%
Pulmonary	459	25.3%	617	13.5%	-47%
Other	304	11.3%	181	5.5%	-51%
Total	3167	20.3%	3378	12.6%	-38%

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➤ **Schedule 3—Urban/Rural comparison**

The hospitalization rate of rural non-TeleHealth patients is 43% greater than that of rural TeleHealth patients. TeleHealth services positively impact both groups significantly but rural patients, who generally have more limited access to healthcare services than those in urban areas, respond best.

Non-TeleHealth (Rural and Urban)			
Case Mix Category	Rural	Urban	Grand Total
Case Mix Cat 1	11.7%	16.7%	15.5%
Case Mix Cat 2	14.8%	20.8%	19.1%
Case Mix Cat 3	19.1%	18.4%	18.6%
Case Mix Cat 4	28.3%	21.1%	24.0%
Grand Total	21.1%	20.0%	20.3%

TeleHealth (Rural and Urban)			
Case Mix Category	Rural	Urban	Grand Total
Case Mix Cat 1	7.3%	12.0%	11.0%
Case Mix Cat 2	13.4%	12.7%	12.9%
Case Mix Cat 3	13.6%	13.8%	13.7%
Case Mix Cat 4	12.6%	13.0%	12.9%
Grand Total	12.1%	12.8%	12.6%

➤ **Schedule 4—Age Group Comparison**

There is much more to learn about this analysis but, generally, older TeleHealth and non-TeleHealth patients return to the hospital less often than those less old. Among older patients, some seem to make a conscious decision not return to a hospital. Within the 146 patient 95+ category, there were 14 TeleHealth and 33 non-TeleHealth patients who were 100 or more years old. Within this small group of "oldest of the very old" TeleHealth patients return to a hospital **more** often than non-TeleHealth patients because health deteriorations are seen which otherwise go unnoticed. This suggests that at some age, TeleHealth services should not be offered to the oldest. However, a "rationing" decision of this type is one that CCS management is unwilling and ill-equipped to make.

1st **60 Day** Episode – Non-TeleHealth (Age Groups)						
Case Mix Category	65 – 74	75 – 79	80 – 84	85 – 94	95 +	Grand Total
Case Mix Cat 1	13.8%	23.9%	15.0%	14.4%	4.3%	15.5%
Case Mix Cat 2	20.7%	24.3%	15.3%	14.9%	32.0%	19.1%
Case Mix Cat 3	14.9%	26.8%	20.8%	19.0%	3.4%	18.6%
Case Mix Cat 4	28.2%	21.3%	24.4%	18.2%	25.0%	24.0%
Grand Total	21.8%	23.6%	20.0%	17.0%	17.1%	20.3%

1st 60 Day Episode - TeleHealth (Age Groups)						
Case Mix Category	65 – 74	75 – 79	80 – 84	85 – 94	95 +	Grand Total
Case Mix Cat 1	15.7%	5.7%	6.5%	13.4%	18.2%	11.0%
Case Mix Cat 2	12.2%	12.2%	13.9%	14.2%	5.3%	12.9%
Case Mix Cat 3	16.5%	15.8%	9.4%	11.8%	15.8%	13.7%
Case Mix Cat 4	13.6%	14.3%	14.1%	9.9%	6.3%	12.9%
Grand Total	14.5%	11.9%	10.8%	12.5%	11.8%	12.6%

Schedule 5—Male/Female Comparison

Males return to the hospital more often than females, though TeleHealth services have a significantly positive impact on both. Males are notorious for their reluctance to ask for directions. If this is so, they may also be reluctant to follow directions which may account for the differences when comparing outcomes by gender. Maybe men have more "deferred maintenance" upon becoming elderly. Or maybe the fact that there are twice as many women as men in the sample may skew the comparisons. But then, why are there so many more women than men in these age groups? We don't know.

Non-TeleHealth (Gender)			
Case Mix Category	Female	Male	Grand Total
Case Mix Cat 1	15.6%	15.4%	15.5%
Case Mix Cat 2	16.8%	23.8%	19.1%
Case Mix Cat 3	17.4%	21.1%	18.6%
Case Mix Cat 4	22.9%	25.5%	24.0%
Grand Total	18.9%	22.7%	20.3%

TeleHealth (Gender)			
Case Mix Category	Female	Male	Grand Total
Case Mix Cat 1	11.8%	9.4%	11.0%
Case Mix Cat 2	11.7%	15.0%	12.9%
Case Mix Cat 3	11.9%	16.6%	13.7%
Case Mix Cat 4	10.9%	15.9%	12.9%
Grand Total	11.6%	14.4%	12.6%

➢ Schedule 6—Income Level Comparisons—All Episodes

Patients are assigned income levels based on zip code income information obtained from census data. "All" episode data, rather than first episode data was used so that the under $35,000 category would be large enough to be relevant. This income level group is generally more disadvantaged in terms education and access to healthcare services than the higher income groups. Of all groups, many have thought the lower income group to be the least likely to respond to a telehealth program which places heavy emphasis on behavior modification. However, this group responds about as well to the TeleHealth service as do higher income groups.

Income Brackets – **All Episodes**					
Income Level	Non-TeleHealth		TeleHealth		
	Episodes	Hosp. Rate	Episodes	Hosp. Rate	Reduction
Less than $35,000	2168	17.0%	2693	12.1%	-29%
$35,000 – 49,999	4637	17.2%	5886	11.5%	-33%
$50,000 – 74,999	2032	14.9%	2226	11.4%	-23%
$75,000 and up	914	15.5%	1102	11.0%	-29%
Grand Total	9751	16.5%	11907	11.6%	-30%

The above schedules make it apparent that far more is to be learned through in-depth data mining. We care for individual patients, not groups. Therefore, developing predictive models based on individual patient outcomes should lead to more effective and targeted care.