



Client Success Study: **Temple University**

A unique study investigating COPD disease management enabled by eDiaries and real-time online access to electronic patient reported outcome (ePRO) data

PA-SCOPE (Phase 2) Overview

The State of Pennsylvania has awarded a research grant to **Temple University** in order to evaluate how a call center and real-time health alerts may decrease hospitalizations, reduce deaths, and improve quality of life (QoL), lung function and activity levels in patients living with chronic obstructive pulmonary disease (COPD). **PHT Corporation** of Charlestown, MA was selected to provide the electronic patient reported outcome (ePRO) solution for the research study.

Pennsylvania's COPD Problem

In a description of Health Research Non-Formula Grants awarded by the State in fiscal year 2003-2004, the Pennsylvania Department of Health states, "In the U.S. in 2000, COPD was responsible for 8 million office visits, 1.5 million emergency room visits, 726,000 hospitalizations, and 119,000 deaths. In Pennsylvania, chronic respiratory lung diseases are the 4th leading cause of death and the age-adjusted mortality rate for COPD is 80% higher than the national average. Pennsylvania spends at least \$400 million per year treating acute episodes of COPD. As the population ages, these costs will still soar even if smoking cessation programs are successful because of the aging COPD patients who are 'already in the pipeline.'"¹

Goals of the Study

According to the same report, Phase 2 of the PA-SCOPE study was funded in order to "test a novel, low-cost system designed to help COPD patients of all races get earlier medical help via a 1-800 phone number. In this randomized 2-year prospective trial in 400 patients with a recent history of exacerbation, the goals will be to reduce hospitalizations and deaths due to COPD exacerbations and to improve patient quality of life, lung function, and everyday activity levels." The state has allocated \$4,717,877 to undertake both phases of PA-SCOPE, a 48-month program which began on June 1, 2004.¹

The hypothesis being tested in the protocol, authored by Gerard J. Criner, M.D., Professor of Medicine at Temple University, is not a study drug but rather graded scoring of exacerbation prodromal symptoms and patient access to trained pulmonary call center staff.

"COPD patients frequently have prodromal symptoms that herald an impending exacerbation which are rarely reported to their physicians," said Dr. Criner. "The capability for caregivers to identify early warning signs of an exacerbation in real time is lacking. Improving the classification and quantification of symptoms that herald an exacerbation may greatly benefit those who suffer with COPD."

The study will investigate whether daily symptom reporting, using an electronic system with graded scoring and individual alerts, coupled with a centralized call center and real-time data review, will produce the desired clinical results and will reduce the COPD-related utilization burden on the State's hospitals.

¹ "Health Research Non-Formula Grants." Pennsylvania Department of Health. URL: http://www.dsf.health.state.pa.us/health/lib/health/cure/2003_Nonformula_Grants_SFY_03-04_.pdf

Success at a Glance



Client: Temple University



Partner:
Palm, Inc.

Purpose: To reduce hospitalizations and deaths due to COPD exacerbations, and to improve patient quality of life, lung function, and everyday activity levels.

Therapeutic Area: Pulmonary

Patients: 400

Sites: 4 (coordinated by Temple)

Study Design: Phase 2 of the State's 48-month, \$4.7million **PA-SCOPE** program requires subjects to record symptom and QoL data on an electronic patient diary and to transmit daily for two years. The treatment group is provided access to a call center staffed with trained pulmonary medical staff. The control group receives standard of care from their personal physicians. This enables researchers to evaluate the effect of graded scoring and a call center upon clinical benefit.

Technology: PHT's **LogPad® System**, based on the Palm platform, serves as the eDiary solution used in the study. The LogPad calculates scores automatically and alerts patients to contact the call center if certain thresholds are reached. PHT **StudyWorks™** provides site personnel with real-time online reports showing triggered alerts, thus enabling the Temple call center staff to prepare for an expected patient call.

Methods

There will be approximately 400 patients participating in the study. Each is assigned a LogPad, PHT's electronic patient diary application implemented on reliable **Palm, Inc.** handheld devices. Patients will use the eDiary at home to record symptom and quality of life information (*Figure 1*) every morning, and transmit that data over an analog telephone line. Questions are answered on...

- Dyspnea (breathlessness)
- Sputum quantity, color and consistency
- Peak Flow (PF)
- Coughing, wheezing, sore throat, nasal congestion and fever

The figure displays six screenshots of the 'Daily Diary' application interface, each with a back arrow at the bottom left.

- Top Left:** Question: 'Today when I walk on a level surface, I am...'. A horizontal scale from 0 to 10. Above 0 is 'not breathless at all', and above 10 is 'totally breathless'.
- Top Middle:** Question: 'How much sputum have you brought up in the past 24 hours?'. Options: ☐ none, ☐ less than 1 tablespoon, ☐ greater than or equal to 1 tablespoon, ☐ greater than or equal to 1/4 cup.
- Top Right:** Question: 'Measure your peak flow every morning about 15 minutes after using your inhalers. Perform the peak flow maneuver 3 times and record your highest number.' A rectangular input box.
- Bottom Left:** Question: 'Did you WHEEZE today?'. Options: ☐ No, ☐ Yes.
- Bottom Middle:** Question: 'Today I feel well enough to DO LIGHT WORK AROUND THE HOUSE LIKE DUSTING OR WASHING DISHES'. Options: ☐ No, I don't feel well enough to do that, ☐ Yes, I do feel well enough to do that.
- Bottom Right:** Question: 'Today I feel well enough to RUN A SHORT DISTANCE'. Options: ☐ No, I don't feel well enough to do that, ☐ Yes, I do feel well enough to do that.

Figure 1: Sample Daily Diary Questions

The screenshot shows a 'Daily Diary' screen with the text: 'Your score for today is 1.5. Please complete your diary and then call 1-877-586-4287 (1-877-LUNGCTR).' There are back and forward arrows at the bottom.

Figure 2: Real-time patient alert on the LogPad eDiary

Key enabling features of the PHT ePRO system:

– Graded Scoring and Alerts

Subjects are randomized into two groups. The treatment group is provided access to a toll-free hotline, which connects them directly to a centralized call center staffed by pulmonary nurse specialists and a board-certified pulmonologist with special expertise in COPD management. The control group receives standard care from their primary health-care provider, with no access to the call center.

As subjects record quantitative and qualitative answers to the diary questions, the LogPad automatically calculates a score from baseline as specified by the trial protocol. If the score exceeds a pre-determined level in the treatment group, an alert is generated on the LogPad, instructing the patient to contact the call center (*Figure 2*).

– Real-time Data Review by Site Personnel

eDiary data is transmitted daily by subjects and sites to a secure server hosted by PHT Corporation. Study coordinators at Temple and three other investigator sites (Lancaster General Hospital, Philadelphia College of Medicine and Western Pennsylvania Hospital) have constant online access to the treatment group's patient data through PHT StudyWorks, which enables them to see when an alert has been triggered in real time. Therefore, if a patient does not call the hotline, the call center will contact the patient proactively based on these reports.

"StudyWorks enables the study conduct to be more efficient for us," said Carla Grabianowski, RN, BSN, CCRP, Research Nurse Coordinator (Pulmonary & Critical Care Medicine) at Temple University Hospital. "It lets us know when to expect a patient's call, and allows us to see when a patient should have called the hotline, but didn't. It also enables us to keep close track of their daily diary compliance with the protocol."

For the control group, study coordinators use StudyWorks to manage subject compliance in real time, but they are not able to use the Web application in order to view patient symptom scores on a daily basis. Patient symptom information is available only during study visits, which are scheduled in six-month intervals.

Results

Real-time analysis of data was not only a primary focus of the study, but it also helped improve the trial protocol design.

“The initial scoring system indicated constant exacerbation (*Figure 3*) that was without clinical relevance,” said Dr. Criner. “Even when the LogPad scoring scheme indicated moderate or severe exacerbation, subjects contacted by call center personnel felt well, without change in baseline condition.”

It was determined that breathlessness, sputum color, Peak Flow and temperature were the key variables found to most closely mirror a clinically relevant change in subject’s condition.

“We revised the scoring system to quantify the changes in patients’ baseline symptoms and re-weighted more heavily changes in Peak Flow, sputum purulence and temperature,” explained Dr. Criner. “PHT worked with us to perform a mid-study change, which seems to trigger more clinically relevant exacerbation alerts (*Figure 4*).”

Call Center Subject Diary Summary Report													
Sponsor: Temple University Protocol: PA-SCOPE Site: 01 Report Generated at: 09 May 2006 10:37:38AM (EST)													
Site: 01 Subject ID: 018-01 Subject Reference: RFA Group: Call Center Group													
Diary	Date	Breathless- ness	Sputum Quantity	Sputum Color	Sputum Consistency	Peak Flow	Cough	Wheeze	Score Throat	Nasal Congestion	Temp Over 100	Score	
Baseline	21-Jul-2005	4	none	none or white	none	215							
DailyDiary	05-Sep-2005	1	< 1/2 tsp	Yellow	thin	250	Yes	Yes	No	Yes	No	2.00	
DailyDiary	06-Sep-2005	1	< 1/2 tsp	Yellow	thin	210	Yes	Yes	No	Yes	No	2.00	
Edit Baseline	06-Sep-2005		< 1/2 tsp	none or white	thin								
DailyDiary	07-Sep-2005	1	< 1/2 tsp	Yellow	thick	260	Yes	Yes	No	Yes	No	2.00	
DailyDiary	08-Sep-2005	1	> 1/2 tsp	White	thick	230	Yes	Yes	No	No	No	1.50	
DailyDiary	09-Sep-2005	1	< 1/2 tsp	White	thin	240	Yes	Yes	No	Yes	No	1.50	
DailyDiary	10-Sep-2005	1	scant	White	Watery	280	Yes	Yes	No	No	No	1.50	
DailyDiary	11-Sep-2005	1	> 1/2 tsp	White	thin	235	Yes	Yes	Yes	Yes	No	1.50	

Figure 3: Original scoring system
(StudyWorks report displaying a patient’s triggered alerts)

Call Center Subject Diary Summary Report													
Sponsor: Temple University Protocol: PA-SCOPE Site: 01 Report Generated at: 09 May 2006 10:59:18AM (EST)													
Site: 01 Subject ID: 018-01 Subject Reference: RFA Group: Call Center Group													
Diary	Date	Breathless- ness	Sputum Quantity	Sputum Color	Sputum Consistency	Peak Flow	Cough	Wheeze	Score Throat	Nasal Congestion	Temp Over 100	Score	
EditBaseline	06-Sep-2005		< 1/2 tsp	none or white	thin								
DailyDiary	15-Feb-2006	3	> 1/2 tsp	White	thin	520	Yes	Yes	No	Yes	No	1.00	
DailyDiary	15-Feb-2006	3	> 1/2 tsp	White	thin	520	Yes	Yes	No	No	No	1.90	
EditBaseline	16-Feb-2006		>= 1 TBSP	none or white	thick	520	Yes	Yes	No	No	No		
DailyDiary	22-Feb-2006	3	>= 1 TBSP	White	thin	520	Yes	Yes	No	No	No	0.00	
DailyDiary	23-Feb-2006	3	>= 1 TBSP	White	thin	520	Yes	Yes	No	No	No	0.00	
DailyDiary	24-Feb-2006	3	>= 1 TBSP	White	thin	450	Yes	Yes	No	Yes	Yes	0.50	
DailyDiary	25-Feb-2006	3	>= 1 TBSP	White	thin	480	Yes	Yes	No	No	No	0.00	
DailyDiary	26-Feb-2006	4	>= 1 TBSP	White	thin	480	Yes	Yes	No	Yes	No	0.00	

Figure 4: Revised scoring system
(StudyWorks report displaying a patient’s triggered alerts)

Benefits

It is difficult to imagine the feasibility of implementing this study on paper. The graded scoring on the LogPad removes the burden from subjects to perform manual daily calculations of their score for two years. With a paper diary, subjects could potentially make calculation mistakes or forget to complete them every day. In addition, real-time access to subject diary compliance, symptom and triggered alert data empowers site staff with information on symptom scores and alerts every day, rather than only during study visits.

“The main benefit of PHT’s solution is the ability to review the patient symptom data in real time,” said Grabianowski. “In this study, patients go six months between study visits. If we had used paper diaries for the study, we may not have had any information during this time. It would have been harder to track compliance and whether patients were scoring correctly. Perhaps most importantly, it would have been unlikely to know whether a treatment patient was exhibiting early signs of an exacerbation and in need of call center intervention if patients simply chose not to call when they should have.”

Continued Grabianowski, “StudyWorks eliminates additional data entry responsibilities because the transmitted data is accessible anytime by our biostatistician. While outside of the study scope, it will also be interesting to see whether the LogPad helps improve COPD symptom education level amongst patients.”

Further, real-time analysis of the data revealed to researchers that adjustments needed to be made in the scoring system, thereby transforming the traditionally burdensome mid-study change process into a valuable opportunity, seized by Temple, to save time, improve the trial processes, and generate more clinically relevant data.

The Bottom Line

While results of the study are premature, PA-SCOPE is a novel use case of electronic patient diaries, which are normally employed to collect ePRO data evaluating the effects of a study drug. This example further illustrates the ever-increasing abilities of ePRO systems to assist clinicians in patients’ disease management. Temple University and the State of Pennsylvania serve as an ideal model for leveraging emerging technology in order to create new, innovative ways to answer important and persistent health status questions.

About the Temple University School of Medicine

Since the Temple University School of Medicine (TUSM) opened its doors in 1901, it has been a pioneer in academic medicine and research, while also serving the community - a proud legacy for today and generations to come. The School is guided by its mission each day: to educate superior physicians, enhance research and knowledge, and improve health care in the North Philadelphia community, as well as the greater Philadelphia region.

TUSM is recognized as an exceptional medical educational institution with a diverse and socially-conscious student body, outstanding faculty, and cutting edge research. Approximately 800 students are enrolled in the MD program and 140 students in MS and PhD programs. Distinguished faculty members are passionate about imparting knowledge and motivating students to be active lifelong learners. Many are top scholars who've come from leading institutions around the nation to participate in Temple's dynamic growth and to make their mark on students, patients, and modern medicine.

Medical research at Temple flourishes in both the clinical and basic science realms. Research strengths lie in pulmonary, cardiology and gastroenterology, and interdisciplinary research centers include the Cardiovascular Research Group; the Center for Substance Abuse Research; the Sol Sherry Thrombosis Research Center; the Fels Institute for Cancer Research and Molecular Biology; the Center for Minority Health Studies and the Center for Obesity Research and Education.



About Palm, Inc.

Palm, Inc., a leader in mobile computing, strives to put the power of computing in people's hands so they can access and share their most important information. The company's products for consumers, mobile professionals and businesses include Palm® handheld computers, Palm Treo™ smartphones, Palm LifeDrive™ mobile managers, as well as software, services and accessories.

Palm products are sold through select Internet, retail, reseller and wireless operator channels throughout the world, and at Palm Retail Stores and Palm online stores (<http://www.palm.com/store>).

More information about Palm, Inc. is available at <http://www.palm.com>.



About PHT Corporation

PHT is the market-leading provider of electronic patient reported outcome (ePRO) solutions used in over 220 clinical trials worldwide. Subjects of all ages use PHT's LogPad® and StudyPad® Systems (implemented on leading mobile devices including Palm's handheld **Tungsten™ E2, TX, and Treo 650** smartphone), in over 70 languages and 60 countries around the world, to enter and transmit nearly 10,000 electronic reports every day. This high-quality timestamped data is used by over 70 biopharmaceutical and medical device companies to measure the safety and efficacy of new treatments for disease in many therapeutic areas, including pain, asthma, allergy, gastrointestinal distress, and disorders of the CNS. The data is available for real-time online use by sites and sponsors to manage research trials through PHT StudyWorks™, to increase subject compliance, to track enrollment and to monitor the progress of a trial.

PHT, the industry leader in both experience and innovation, was the first ePRO provider to implement a study in Japan, first to incorporate Indic languages on an eDiary, and first to wirelessly integrate measurement devices with eDiaries. Subject experiences, captured firsthand by PHT's user-friendly ePRO systems, have been successfully used in at least six NDA submissions, with three known approvals to date. To find out why leading biopharmaceutical companies worldwide rely on PHT's ePRO solutions to improve data quality, reduce data variance and enhance trial management efficiencies, visit www.phtcorp.com.