

WHITE PAPER

Proof That “Fishing Where the Fish Are” Can Improve Success in Patient Recruitment for Clinical Trials

Leigh Hansen, M.S., M.B.A. - Thomson Healthcare
Bill Gwinn, M.B.A. - Inclinix, Inc.
Sara Wang, Ph.D. - Thomson Healthcare

Pharmaceutical Information Services
Thomson Healthcare
May 2007

Reprinted by Inclinix, Inc.
January 2008

Table of Contents

Clinical Trial Recruitment Meets Classical Marketing Segmentation 1

Locating Clinical Trials in Patient Rich Areas 1

Three Retrospective Evaluation Studies 2

 Study A: High physician office visits are directionally correlated with success 2

 Study B: More rigorous analysis validates office visits are predictive 4

 Study C: Office visits, investigator specialty, and experience show
 predictive capabilities 8

Combined Study Results on Evaluated Metrics 16

Conclusions 17

Clinical Trial Recruitment Meets Classical Marketing Segmentation

A significant challenge for clinical trials administrators is to improve the efficiency of the clinical trial process particularly in the area of investigator and patient recruitment. A Thomson CenterWatch survey of over 600 clinical trial sites reports that patient recruiting is the second most critical time-consuming activity in a clinical trial, after contract and budget negotiations and approvals.¹

According to the same U.S. Investigative Site Survey conducted by CenterWatch in 2005, 45% of respondents agree or strongly agree that patient enrollment and recruitment is a top cause of clinical trial delays. This is up from 38% in 2003.²

The Thomson PULSE Healthcare Survey, the largest, private healthcare telephone survey in the United States, found that, with 50,000 households reporting, 3.7% had participated in a clinical trial while 65.4% had never participated and 12.8% had never heard of clinical trials.³

In clinical trials, timely identification of investigators and enrollment of patients is paramount.

Classic marketing segmentation has been used by pharmaceutical companies to successfully identify audiences likely to respond to direct-to-consumer advertising for prescription drugs and over-the-counter medications. In recent years, this classic market research technique is helping to accelerate investigator selection and patient recruitment for clinical trials.

In the clinical operations arena, consumer segmentation information is integrated with empirical data to identify geographies, investigators, and patient groups most likely to yield subjects for a trial. In this way, scientific method is injected into recruiting processes too often reliant on instinct, chance, and guesswork.

Fishing Where The Fish Are — Locating Clinical Trials in Patient Rich Areas

Market Expert – Clinical Trial Solutions (CTS), a metric-based decision support tool from Thomson Healthcare, is designed to help clinical trial administrators pre-plan the best locations to place clinical trial investigation sites. CTS uses classical marketing techniques for locating clinical trial sites and recruiting patients to “fish where the fish are.”

The process of CTS is extensively outlined in the white paper “Using Data and Metrics to Select Investigators and Recruit Patients for Clinical Trials” (available under Pharmaceuticals at www.medstat.com/about/download_library.aspx, the Medstat Library). The underlying premise of the CTS solution is that investigators with offices in areas of high target disease prevalence have the best opportunity to recruit patients for a clinical trial.

Consumer segmentation information is integrated with empirical data to identify geographies, investigators, and patient groups most likely to yield subjects for a trial.

This white paper provides evidence that relevant healthcare data can support the clinical trial process from protocol feasibility assessment to investigator selection and patient recruitment. This evaluation validates that applying this type of information early in the clinical trial planning process can yield faster trial enrollment and avoid “rescue mode” when trials run late due to inadequate patient enrollment.

Are market metrics predictive of recruitment success in clinical trials?

Three Retrospective Evaluation Studies

To assess the value of using classical marketing techniques to speed up patient recruitment, researchers from Thomson Healthcare conducted several validation studies to understand the study questions:

- Does office visit volume predict investigator success?
- Do other available macro measures predict success?

All three analyses were conducted retrospectively comparing actual investigator recruitment performance with CTS metrics used to identify target investigators. The purpose was to validate the predictive capabilities of the CTS system to proactively select successful investigators, thus saving time during trial recruitment. For the balance of this discussion, the studies will be labeled A, B, and C.

Study A was based on the intuitive concept that investigators with high utilization in their local area have a greater opportunity to recruit patients for clinical trials compared to investigators in low utilization areas because they have the highest patient population from which to draw. Study A data provided directional correlation. Directional indicators are appropriate in business analysis when there is no opportunity to create a better data set.

Studies B and C were designed to determine which metrics have the best predictive value to identify potentially successful investigators during the planning stages of a trial. These more rigorous, retrospective analyses used a negative binomial model and, in Study C, a proportional odds model. Both studies resulted in statistically significant results.

Study A: High Physician Office Visits Are Directionally Correlated With Success

A pharmaceutical company was having difficulty recruiting patients for a clinical trial. Before engaging CTS as a potential solution, Thomson Healthcare was asked to conduct a retrospective analysis using data from a completed trial to validate the metrics used by CTS.

Study A was the first retrospective study conducted and was designed to test the hypothesis that investigators with a high number of office visits for the target disease

would have the greatest success in recruiting patients for clinical trials. Offices visits for the target disease were determined by the appropriate ICD-9 code.

Data

The client provided a data set containing the number of patients recruited by each trial investigator from a recently completed trial. Each investigator was placed into one of three groups based on the investigator’s recruitment success:

- Group 1: Low (two to five screened patients)
- Group 2: Medium (six to 12 screened patients)
- Group 3: High (13+ screened patients)

Thomson researchers used the following variables in Study A:

- The number of office visits for the three-digit ICD-9 diagnosis code for the trial’s disease within a five-mile radius of the investigator’s address
- The number of patients each investigator was able to screen for the trial

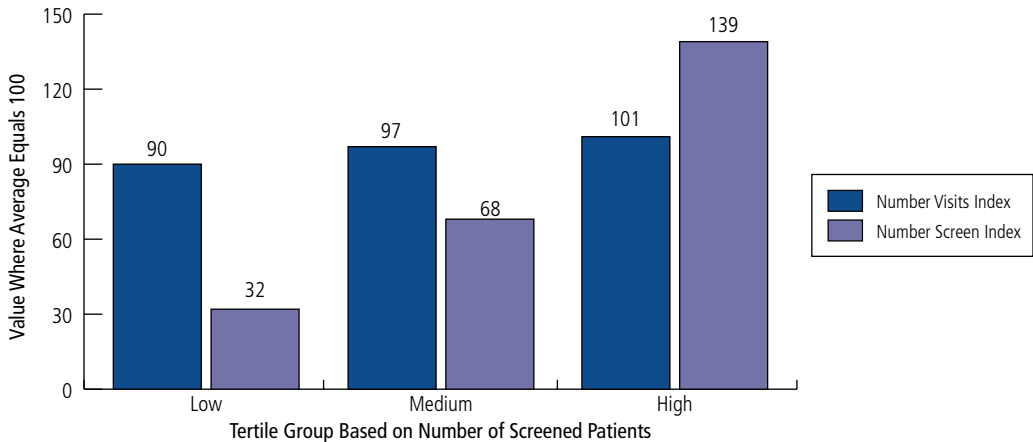
As the number of office visits increased, the number of patients screened increased.

Results

As shown in Exhibit 1, the data illustrate that as the number of office visits around an investigator increased, the number of patients screened increased.

The data shown in Exhibit 1 have been indexed to their average. The average number of office visits for the studied disease code equals an index of 100. This is known as an Index of Concentration (IOC). The average overall patients screened also equals 100. Investigators who screened more patients than the average are above 100. Investigators who screened fewer patients than the average are less than 100. Indexing standardizes the information for easier comparison of the two measures — office visits and patients screened.

Exhibit 1: Comparison of Office Visits and Number of Patient Screened



Study A provides directional evidence that the “fishing where the fish are” concept is sound.

Results Summary — Study A

- The volume of **office visits within a five-mile radius of the investigator’s office** was directionally correlated with higher patient screening. Those in the highest office visit area had an index of 139, indicating that 39% more patients were screened than the average for this trial.

This analysis reinforces the study hypothesis that investigators in locations with more office visits for the target disease will screen more patients. It provides directional evidence that the concept of “fishing where the fish are” is sound.

Study Limitations

The data represented in Study A demonstrate directional correlation. Directional indicators are appropriate in business analysis when there is no opportunity to create a better data set.

Data distortions required adjustments. The most important adjustment was to eliminate data points where no screening occurred, i.e., where screened patients equaled zero. There was no relationship between zero screened and the number of office visits. The client indicated that those investigators never got started.

Study B: More Rigorous Analysis Validates Office Visits Are Predictive of Investigator Success

Researchers from Thomson Healthcare conducted Study B, a more rigorous analysis, for another customer to determine the optimal way to utilize data and information in CTS to identify clinical trial investigators who would be successful in recruiting patients. Results of Study B were statistically significant at the 95% level of confidence or better.

The client had used the CTS system to identify and recruit investigators and patients for several clinical trials. The client asked Thomson researchers to establish the quantitative relationship between CTS measures and the client’s success measures using a retrospective analysis of a recently completed clinical trial.

Data and Methods

Eighty investigators from one trial were used in the analysis. The client provided the following data:

- Investigator name and address
- Investigator ratings
- Number of patients enrolled per investigator

The client's Investigator Rating used a scale from zero to five to rank investigators' ability to recruit patients based on their actual performance in the trial. Five represented the best performance and zero represented the worst performance.

The number of patients enrolled per investigator was based on randomized, not screened, patients. "Randomized" patients are those actually enrolled in the study. Based on random chance, they are assigned either the study drug or a placebo.

Thomson researchers used the following sets of variables to create the model for predicting physician success:

- The number of office visits for the three-digit ICD-9 diagnosis code for the target disease
- The number of outpatient hospital visits for the three-digit ICD-9 diagnosis code for the target disease
- Three age groups variables: 18+, 45+, and 65+
- Two distance variables relative to patient driving distance to an investigator's office:
 - Short driving distance (five-mile radius of the investigator address)
 - Long driving distance (15-mile radius of the investigator address)

Thomson analysts combined client and CTS data to explore a number of different approaches for stratifying investigators. The models used CTS data to predict the number of patients an office would enroll in the study and to stratify investigators based on this predicted enrollment count. The best model used a combination of two of the CTS variable sets.

Statistical Model: Negative Binomial

A negative binomial model was used to predict the number of patients each investigator randomized (enrolled) into the clinical trial. The model is the one best suited to this analysis of rates of occurrence.

The negative binomial model is a non-linear generalization of a linear regression model that accounts for:

- Discrete, non-negative outcomes such as office visits data
- Skewness in the outcome variable
- Dependence between events, i.e., occurrence of an event increases the probability of further occurrence
- Distributional misspecification

Results: High Office Visits Predict Success

The predicted counts were converted into a variable measuring successful or unsuccessful recruitment performance. The model was validated by converting the client's six-point Investigator Ranking to a successful/unsuccessful rating based on the net number of patients enrolled per month. Fifty-eight investigators or 73% were rated as successful. Twenty-two investigators or 27% were rated as unsuccessful.

The models used CTS data to predict the number of patients an office would enroll in the study and to stratify physicians based on this predicted enrollment count.

Higher office visits raised the score.

Higher hospital outpatient visits lowered the score.

Independent variables were the number of hospital outpatient visits and office visits. These created a model that scored each investigator on a scale of one (worst) to 12 (best). Higher office visits within the selected distance radius raised the score. Higher hospital outpatient visits within the selected distance radius lowered the score, consistent with the client’s judgment that patients who went to the hospital were too sick for this trial.

Exhibit 2 shows the distribution of successful (tan) and unsuccessful (blue) investigators along the model’s 12-point scale. The tan color, designating a successful investigator, is distributed to the right among the higher scores. The blue color, designating unsuccessful investigators, is distributed more to the left among the lower scores. For scores of six or better, only 25% of the investigators were unsuccessful. Clearly, the distribution of successful investigators is geared toward more office visits.

The distribution of successful investigators is skewed toward a higher frequency of office visits.

Exhibit 2: Distribution of Physicians Based on Success Ranking

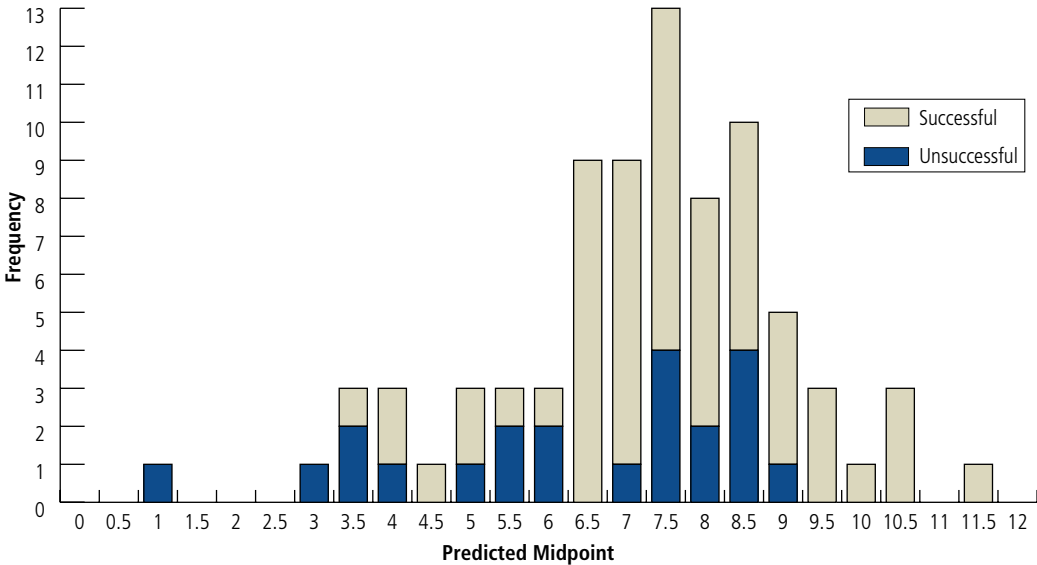


Table 1: Analysis of Parameter Estimates (Study B — Negative Binomial Model)			
Analysis of Parameter Estimates			
	Parameter Estimate	Standard Error	P-Value
Intercept	1.9697	0.1559	<.0001
Office Visits, age 45+, 5 miles	0.0340	0.0167	0.0415
Hospital Outpatient, age 65+, 15 miles	-0.1095	0.0450	0.0151
Dispersion	0.9054	0.1764	

Highlighted numbers in Table 1 indicate statistically significant relationships at the 99% level of confidence or better. Scaled deviance and Pearson’s chi-square statistic are used to assess model goodness of fit. A p-value of 0.11 indicates that the model fits the data reasonably well.

Study B results indicate that the number of physician office and hospital outpatient visits for the clinical trial’s disease for adults age 45+ can be used to predict number of patients each office would enroll in the study.

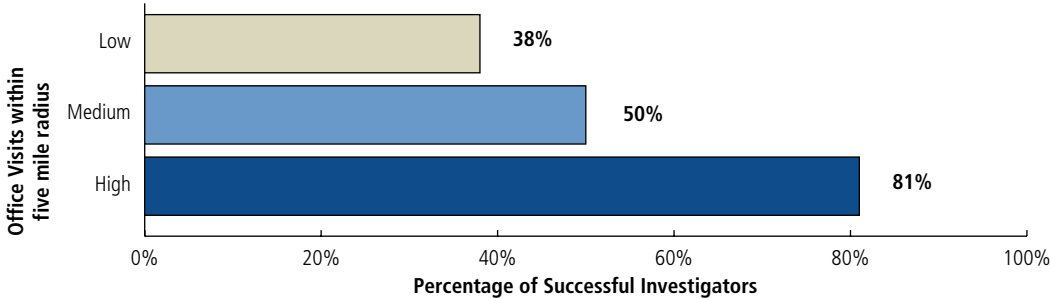
Results Summary — Study B

- There was a **3.4% increase in patient enrollment per 1,000 increase in office visits** for adults 45+ within a five-mile radius of the investigator’s address.
- There was an **11% decrease in patient enrollment per 1,000 increase in hospital outpatient visits** for adults 65+ within a 15-mile radius of the investigator’s address. The hypothesis is that patients requiring hospitalization were too sick to participate in a clinical trial.

81% of investigators ranked as successful had high office visits within a five-mile radius of their office.

Thomson researchers worked with the client to simplify these results, classifying investigators as successful or unsuccessful based on their monthly rate of randomizing patients. Researchers then looked at the success rates in three office visit groups; low, medium, and high. Eighty-one percent (81%) of investigators ranked as successful in high visit areas while only 38% were successful in the low visit areas. The distribution in Exhibit 3 clearly validates that high office visits within a five-mile radius of an investigator’s office is predictive of an investigator’s success in recruiting for this clinical trial.

Exhibit 3: Percent of Successful Investigators



To validate the predictive ability of the statistical model, it was necessary to evaluate its ability to predict investigator success in another trial. A second, smaller trial was evaluated with similar results.

Study B’s analysis demonstrated a statistically significant relationship between the number of patients randomized (enrolled) by an investigator and office visits as measured by the CTS system. The greater the number of patients seen in the office setting leads to higher enrollment; the greater the number of patients seen in the hospital outpatient setting decreases enrollment. All relationships were statistically significant at the 95% level of confidence or better.

Study C: Office Visits, Physician Specialty, and Experience Show Predictive Capabilities

After using the CTS system to identify and recruit investigators and patients for several clinical trials, a client asked Thomson researchers to establish the quantitative relationship between CTS measures and the client’s own investigator rating system. The client provided the necessary investigator and patient recruitment data to researchers to conduct the analysis. The nature of the clinical trial was unknown to the researchers, except for knowing the target disease for which patients were recruited.

Study C also looked at physician specialty and prior clinical trial experience.

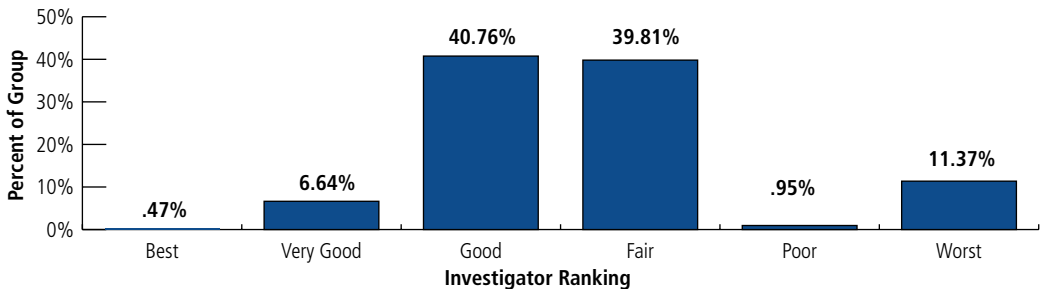
Like Study B, Study C was designed to analyze the relationship between hospital outpatient visits, office visits, and investigator success using retrospective trial data. The target disease in Study C versus that in Study B was different. Study C also sought to understand if two additional variables — physician specialty and prior investigator experience — were predictive of investigator success in trial recruitment.

Results of Study C showed that disease-related office visits, the investigator’s specialty, and past clinical trial experience all had a statistically significant relationship with the number of patients randomized by an investigator into a clinical trial. This, in turn, was related to the client’s own Investigator Rating that characterized investigator success for patient enrollment. The results of Study C reinforced results found in Study B.

Data and Methods

Of the 211 investigators from the clinical trial, average enrollment per site was 9.84 patients. Exhibit 4 illustrates the investigator distribution based on the client’s ranking of their enrollment success. Most were rated good or fair.

Exhibit 4: Physician Ranking Distribution



Researchers identified the following sets of variables to create the model for predicting physician success:

- Office visits for the three-digit ICD-9 diagnosis codes for the target disease
- Hospital outpatient visits for the three-digit ICD-9 diagnosis codes for the target disease
- Age group: 18+

- Two distance variables:
 - Short driving distance (within five miles of the investigator address)
 - Long driving distance (within 15 miles of the investigator address)
- Physician information: physician’s specialty, date of last trial, and clinical trial volume in the past 10 years

A negative binomial model and proportional odds model proved to be most appropriate.

Thomson analysts used combined client and CTS data to explore a number of different approaches for stratifying physicians. Two models, a negative binomial model and a proportional odds model, proved to be most appropriate. **The negative binomial model was used to predict the number of patients an investigator would enroll into a study; the proportional odds model was used to predict an investigator’s ranking.**

Negative Binomial Model: Predicting Patient Enrollment

As in Study B, a negative binomial model was used to predict the number of patients each physician randomized into the clinical trial. This model resulted in a 95% level of confidence or better in the results.

Regression indicated that three factors were positively correlated with results:

- The number of clinical trial disease-related office visits
- Whether an investigator had conducted a clinical trial during that year (2005)
- Being a primary care physician

For this particular clinical trial, being a specialist did not correlate well with results.

Table 2: Analysis of Parameter Estimates (Study C — Negative Binomial Model)			
Analysis of Parameter Estimates			
	Parameter Estimate	Standard Error	P-Value
Intercept	2.2395	0.0545	0.0000
Disease related Hospital Outpatient & Office Visits — 5 miles	0.0804	0.0300	0.0074
Investigator had conducted a trial in 2005	0.2567	0.0800	0.0013
PCP	0.2038	0.1192	0.0873
Specialist	0.0043	0.0737	0.9534
Dispersion	0.1171	0.0211	

Highlighted numbers in Table 2 indicate statistically significant relationships at the 99% level of confidence or better. Results indicate that it is unlikely that the relationships occurred by chance.

Comparing the deviance of 188.67 with its asymptotic chi-square with 182 degrees of freedom, the p-value is .3519. This p-value indicates the specific model fits the data reasonably well.

Results: When measures improve, patient recruitment improves.

Results Summary — Study C: Negative Binomial Model

- An 8% increase in patient enrollment per 1,000 increase in combined office visits and hospital outpatient visits for adults age 18+ within a five-mile radius of an investigator’s address.
- A 29% increase in patient enrollment if the investigator had clinical trial experience in 2005.
- A 23% increase in patient enrollment if the investigator was a primary care physician.

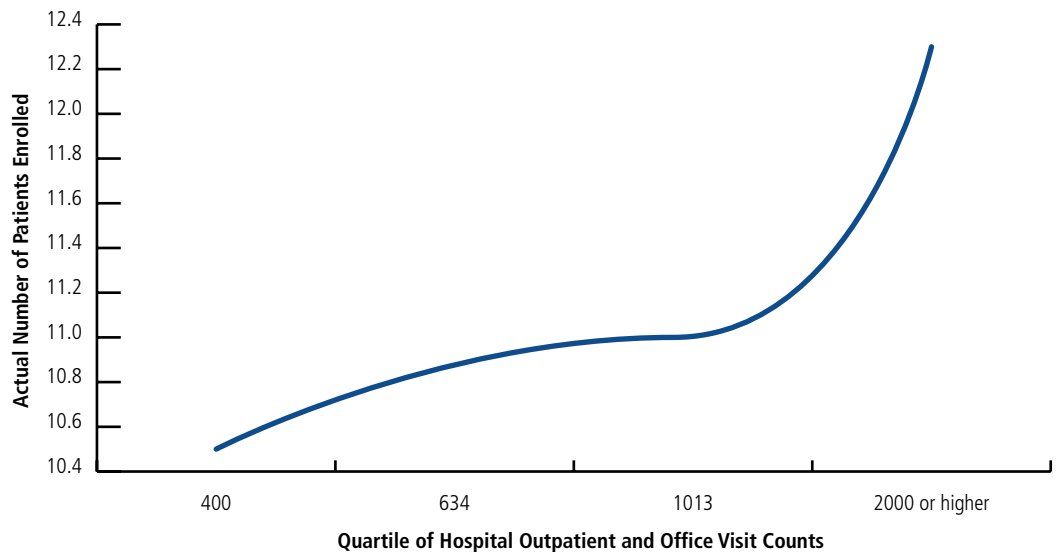
The results of this analysis indicate that we can predict patient enrollment. When any of the three selected measures increase, patient recruitment also improves.

Visual Validation of Negative Binomial Model

The next series of exhibits provides visual validation of these results.

The analysis indicated a strong increasing trend between the number of clinical trial disease-specific hospital outpatient and physician office visits and actual patient enrollment as shown in Exhibit 5.

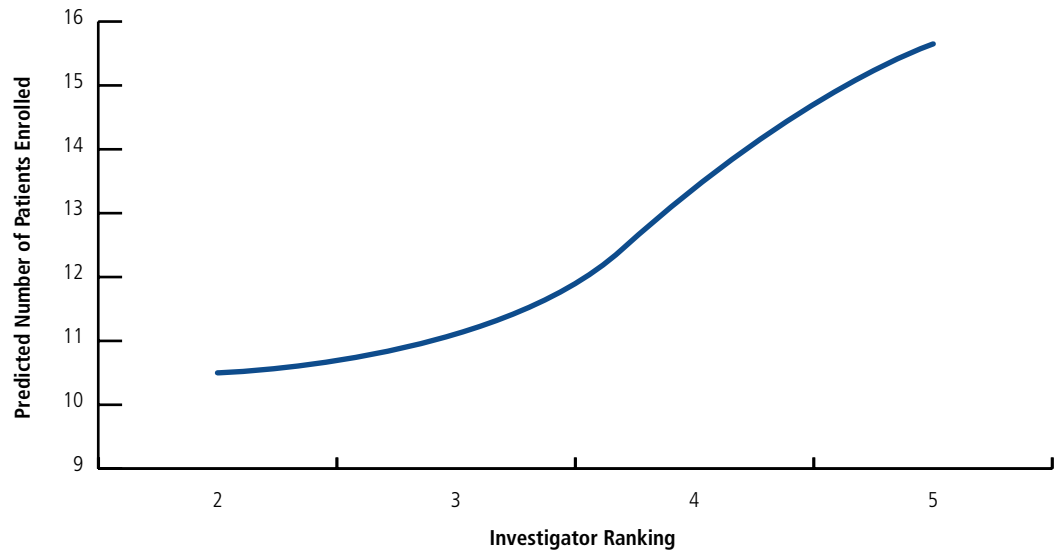
Exhibit 5: Combined Hospital Outpatient and Office Visits and Predicted Enrollment



There is a strong association between patients randomized and outpatient-office visit volume.

Exhibit 6, on page 11, compares the **predicted** number of patient enrolled (vertical axis), as determined by CTS metrics, to the client’s ranking of **actual** investigator success (horizontal axis). It is clear from this graph that the two metrics go up together.

Exhibit 6: Investigator Ranking and Patients Recruited



Trial experience in 2005 improved patient recruitment predictions.

The positive correlation between an investigator’s trial experience in the past year and patient enrollment is clearly illustrated in Exhibit 7. If the investigator had trial experience in the past year, actual recruitment was higher.

In this clinical trial, primary care physicians (PCP) were associated with high patient recruitment while specialists were not. This is shown in Exhibit 8. If the investigator was a PCP, actual recruitment was higher.

Physician specialty relates to recruitment success.

Exhibit 7: 2005 Clinical Trial Experience

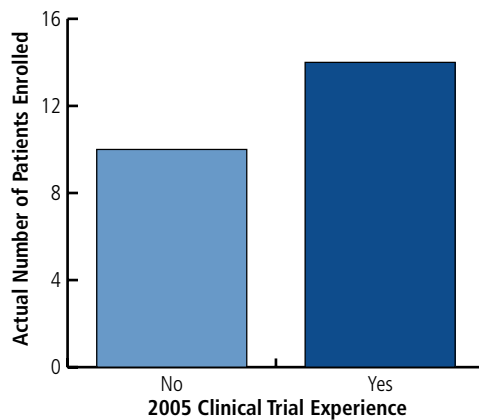
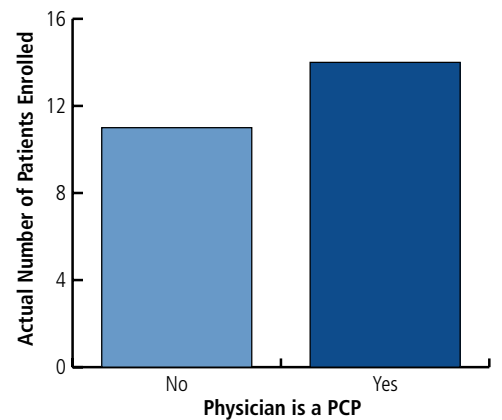


Exhibit 8: PCPs Enrolled More Patients



Results of Other Variables

Other variables in the CTS variable set proved to have either less predictive power or no statistically significant predictive value.

Ten-year trial volume was statistically significant.

Clinical trial volume in the past 10 years was statistically significant; however, the last date of the clinical trial, i.e., “Trial in 2005,” proved to be a better measure. As high trial volume had a strong correlation with a 2005 trial date, adding this measure to the model did not improve the models’ performance beyond using “Trial in 2005” alone.

The regression analysis indicated a 26% increase in patient enrollment if the investigator’s past clinical trial volume was five or more trials and a 27% increase in patient enrollment for 10 or more trials in the past 10 years. The difference between five and 10 trials was negligible. More generally, higher trial volume did predict success. Many investigators had experience with only one or two trials and their recruitment success was poor.

Office visits within a 15-mile radius had statistically significant value; however, it was not as predictive a measure as the five-mile radius variable. The regression analysis indicated only a 2% increase in patient enrollment per 1,000 increase in combined outpatient hospital outpatient and office visits within a 15-mile radius of an investigator’s address.

Study C also examined office visits per capita and an IOC (Index of Concentration) based on visits per capita. The value of using the IOC is in a report looking at the total U.S. where the IOC is used to place geographic areas into rank order based on their relative concentration of patients. Areas with an IOC greater than one have more patients per capita than average. Researchers at Thomson have established the reliability of this national ranking system by comparing data sources. The per capita rankings come from a large, proprietary insurance claims database.⁴ They yield rankings almost identical to a large survey⁵ that directly measures disease prevalence.

In applying the per capita information to Study C, there was a mathematical constraint. As expected, there are not huge differences in disease prevalence between geographic areas. If 5% of the country’s population has a disease, one might expect to find areas with 7% or 8%, but not 25% in one area and 1% in another. Hospital outpatient and office visits per capita move in lock step with prevalence percent and are similarly constrained.

Intuitively, higher per capita values are more favorable and should predict successful clinical trial sites. However, the limited variability in the per capita measures meant that Study C could not establish their predictive value for patient recruitment with statistically significant results. This reflects an inherent difficulty in assessing any independent variable with a limited range.

Per capita measures remain a promising area for future validation studies if there are more values and if overall disease prevalence is higher than that for Study C, which was 3% of U.S. adults. With more data points and/or a more common disease, one would expect to find per capita measures to have statistically significant predictive value.

4. The MarketScan® Research Databases.

5. The PULSE Healthcare survey completes 100,000 interviews annually, conducted by telephone with a statistically representative sample of households. PULSE is the largest private survey of health behaviors and disease prevalence in the United States.

Proportional Odds Model: Predicting Investigator Rankings

The client provided Thomson researchers with data on 211 investigators including a numerical ranking based on the investigator’s patient recruitment success from a recently completed trial. This Investigator Ranking was based on randomization per month to assess the best rates of recruitment and not just total recruitment.

Exhibit 4, on page 8, illustrates the distribution of investigators based on a zero (0) to five (5) ranking scale. Five represented the best performance and zero represented the worst performance relative to an investigator’s ability to recruit patients. A Proportional Odds model was used to examine the factors associated with the Investigator Ranking.

A probability model for analyzing ordered response data such as the 211 investigator rankings, the Proportional Odds model fully utilizes the natural ordering of the data and assumes that explanatory factors are the same for all response levels. It also assumes that the effect of the explanatory factor does not change when response categories are collapsed or the category definitions are changed. This fact is an important technical characteristic of the model because, due to small cell sizes, investigator rankings one and two were collapsed for the analysis, as were rankings four and five.

Results: Visits and Prior Experience Are Predictive

As shown in Table 3, two measures had predictive value (highlighted below) and two did not. Combined hospital outpatient/office visits and clinical trial experience within the past year successfully predicted an investigator’s ranking. The highlighted numbers in Table 3 indicate statistically significant relationships at the 95% level of confidence or better.

Physician specialty, either primary care physician or specialist, did not predict success.

In the proportional odds model, physician specialty was not predictive of success.

Table 3: Analysis of Parameter Estimates (Study C — Proportional Odds Model)			
Analysis of Parameter Estimates			
	Parameter Estimate	Standard Error	P-Value
Intercept: rank 2=4	-3.3921	0.3879	0.0000
Intercept: rank 2=3	-0.4886	0.2397	0.0415
Disease related Hospital Outpatient & Office Visits - 5 miles	0.3881	0.1427	0.0065
Investigator had conducted a trial in 2005	1.3915	0.3692	0.0002
PCP	0.2288	0.5319	0.6670
Specialist	0.0154	0.3155	0.9611

Results Summary — Study C: Proportional Odds Model

- Investigators are 44% more likely to have a better rating in patient recruitment per 1,000 increase in trial disease-related hospital outpatient and office visits — for adults 18+ — within a five-mile radius of the investigator’s address.
- Physicians with recent investigator experience (i.e., in 2005) are four times more likely to have a better ranking for patient recruitment.

Visual Validation of the Results

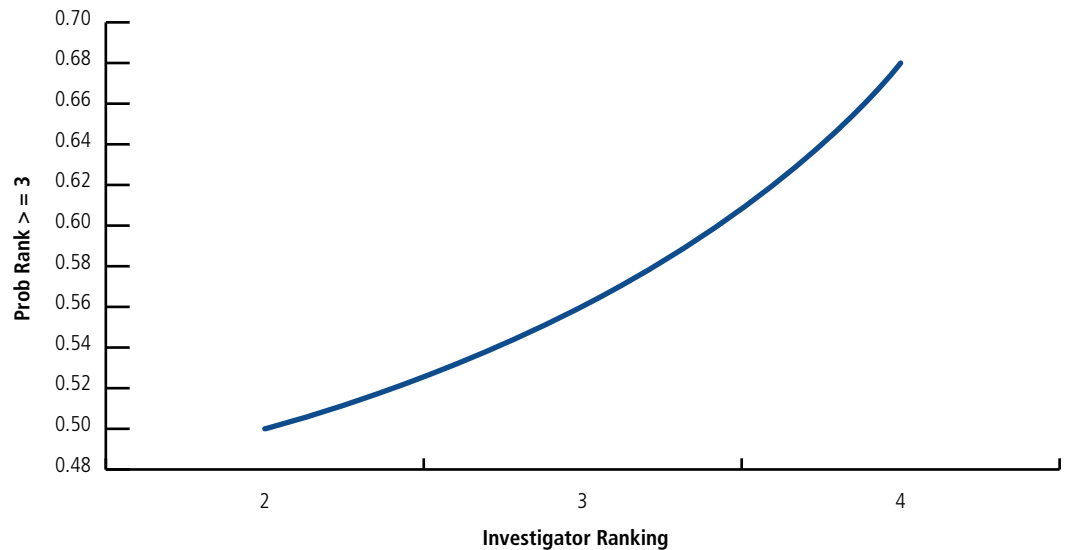
Using the predictive probabilities set by the model, the following graphs confirm the forecasting capability of the predictive variables — investigator ranking, office visits, and investigator’s prior experience — to successfully predict an investigator’s ability to recruit patients.

The probability of recruitment success went up with the investigator’s ranking.

Exhibit 9 compares the probability that an investigator’s ranking is three or better, as predicted by the model (vertical axis), with the investigator’s actual assigned ranking (horizontal axis).

- On the far left, the curve indicates a 50% probability of a score of three or better corresponds with an average actual score of two.
- On the far right, the curve indicates there is nearly a 70% chance that the investigator will score three or better. Here, the actual average score is four.
- Over all, the higher the predicted probability of a high ranking, the higher the actual ranking based on recruitment results.

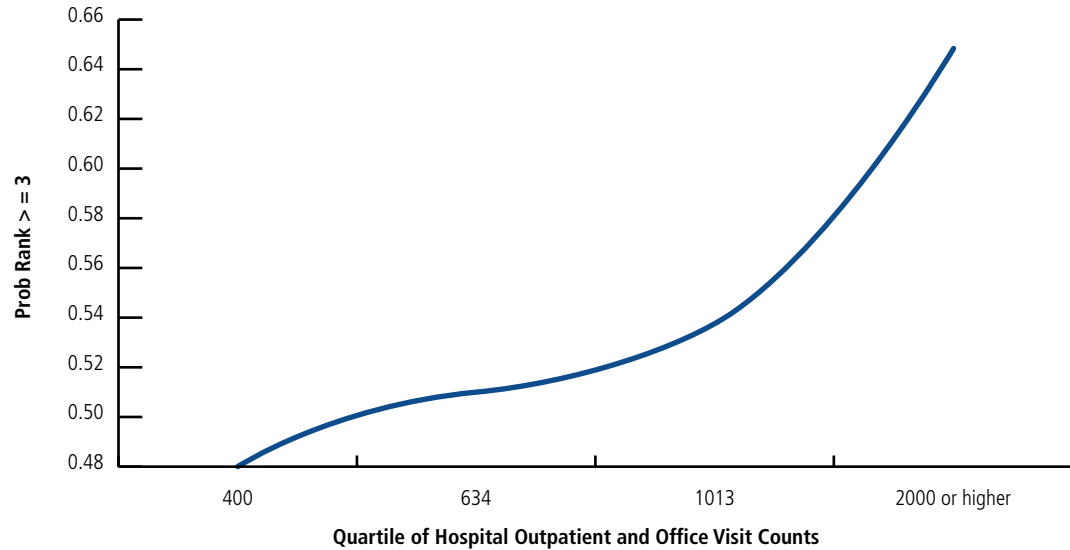
Exhibit 9: Investigator Ranking and Probability of Patient Recruitment



The probability of recruitment success went up with visit volume.

Exhibit 10 shows the relationship between the two independent variables — probability of an investigator ranking greater than three and the quartile hospital outpatient and office visit counts. The horizontal axis creates four quartiles of visits based on volume. These naturally correspond to the vertical axis, the probability that an investigator will have a score of “3” or higher. This indicates the model is working correctly, assigning a higher probability for success (high rating) if the investigator is in a high-visit area. This is additional validation that the CTS measure for office visits is predictive of investigator recruitment success.

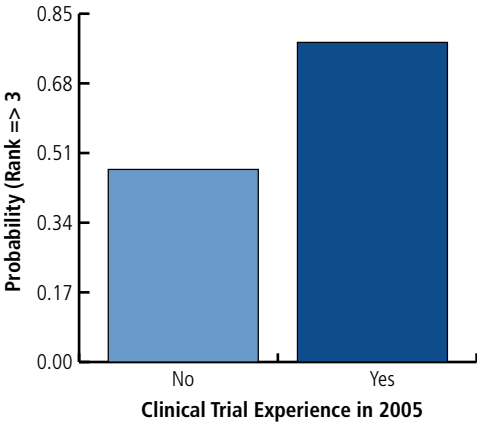
Exhibit 10: Combined Hospital Outpatient/Office Visits and Probability of Patient Recruitment



The probability of recruitment success went up with recent investigator experience.

Exhibit 11 shows that the probability of an investigator having success in patient recruitment is directly related to his/her recent experience as a clinical trial investigator during the prior year. The graph shows that the model works properly, by assigning a higher probability for a high rank if the investigator has had clinical trial experience. As shown in Exhibit 7, recent experience also correlated with better actual results.

Exhibit 11: Recent Investigator Experience and Probability of Patient Recruitment



Combined Study Results on Evaluated Metrics

Tables 4 and 5 summarize the results of the two study questions identified at the start of this white paper. Results in these tables are statistically significant at the 99% level of confidence unless otherwise noted.

Table 4: Results Summary — Does office visit volume predict investigator success?			
	Study A	Study B	Study C
Office visits within a five-mile radius	Higher office visits were directionally correlated with higher numbers of screened patients.	There was a 3.4% increase in patient enrollment per 1,000 increase in office visits for adults age 45+ within a five-mile radius of the investigator’s office.	There was an 8% increase in patient enrollment per 1,000 increase in office visits for adults age 18+ within a five-mile radius of the investigator’s address. In high office visit areas, the client noted 81% of investigators as successful. In low visit areas, the number was only 38%.
Hospital outpatient visits within a 15-mile radius		There was an 11% decrease in patient enrollment per 1,000 increase in hospital outpatient visits for adults age 65+ within a 15-mile radius of investigator’s address.	
Combined hospital outpatient and office visits within a five-mile radius			Investigators were 44% more likely to have a better rating in patient recruitment per 1000 increase in trial disease-related hospital outpatient and office visits for adults age 18+ within a five-mile radius of the investigator’s address.
Combined hospital outpatient and office visits per capita (IOC)	Investigators in areas with higher office visits, screened more patients than the average. Results were directionally correlated.		This per-capita measure did not have statistically significant predictive value.

Table 5: Results Summary — Do other available macro measures predict success?

Table 5: Results Summary — Do other available macro measures predict success?	
	Study C
Recent trial experience (2005)	There was a 29% increase in patient enrollment if the investigator had clinical trial experience in 2005. Physicians with investigator experience in 2005 (recent investigator experience) were four times more likely to have a better ranking for patient recruitment.
Physician specialty	There was a 23% increase in patient enrollment if the investigator was a primary care physician. Being a specialist was not a statistically significant variable.
Clinical trial volume in the past 10 years	This variable was not as predictive as recent trial experience. In the absence of recent trial experience data, past trial volume would provide an alternative variable and it has statistically significant predictive value.

Conclusions

The three studies reported here confirm the intuitive premise that “fishing where the fish are,” i.e., placing clinical trials with investigators located in areas with high concentrations of eligible patients, will yield success in recruiting patients for clinical trials.

The first directionally confirming study led Thomson Healthcare to conduct more statistically robust analyses in Studies B and C to identify several variables that are statistically significant in predicting investigator recruitment success.

Table 6: Top Variables for Predicting Patient Recruitment Success

Volume of office visits for the trial’s disease within a five-mile radius of the investigator’s address
Trial experience in the past year

The type of physician, specialist or primary care, is potentially significant depending upon the disease.

A client’s ratings of its investigators based on prior trial recruitment performance is also an important criteria to consider in selecting trial investigators.

Results confirm the value of the Market Expert-Clinical Trial Solution (CTS) system in helping clinical trials to recruit faster by using office visit and investigator experience measures to act as a “fish finder.”

The results: faster and more effective clinical trial recruitment.

*The results:
Faster and more
effective clinical trial
recruitment.*

For more information about Thomson Clinical Trial Solutions, please call us at 1-866-301-5419 or e-mail medstat.research@thomson.com.

About Thomson Healthcare

Thomson Healthcare is the leading provider of decision support solutions that help organizations across the healthcare industry improve clinical and business performance. Thomson Healthcare products and services help clinicians, hospitals, employers, health plans, government agencies, and pharmaceutical companies manage the cost and improve the quality of healthcare.

Thomson Healthcare is a part of The Thomson Corporation, a provider of value-added information, software tools, and applications to professionals in the fields of healthcare, law, tax, accounting, scientific research, and financial services. The Corporation's common shares are listed on the New York and Toronto stock exchanges (NYSE: TOC; TSX: TOC). For more information, visit www.thomsonhealthcare.com.

Market Expert and MarketScan are registered trademarks of The MEDSTAT Group, Inc.

©2007 Thomson Healthcare.
All rights reserved.