

Supporting Statement – Part B
Collections of Information Employing Statistical Methods for Survey of Community-Based Health Professionals for QIN-QIO Program to Increase Medication Safety and Prevent Adverse Drug Events

1. Respondent Universe and Sampling Methods

The Quality Innovation Network Quality Improvement Organization (QIN-QIO) program works with healthcare providers, pharmacists and stakeholders across care setting to reduce potential adverse drug reactions, medication errors, overdoses, allergic reactions, and other adverse drug events. This data collection includes an online survey targeting community pharmacists, providers working in a primary care setting, and nursing home administrators or directors of nursing. This survey will examine resources and activities used to promote medication safety and reduce adverse drug events.

The cross-sectional survey will collect information from 600 healthcare professionals who are participating in the CMS QIN-QIO program to reduce adverse drug events (enrolled group) and 600 healthcare professionals who are not participating in the QIN-QIO program to reduce adverse drug events (unenrolled group). Providers will be sent an invitation to complete the survey online via email, and where possible will also be sent a letter via mail with an invitation to complete the survey online.

a) *Community Pharmacists and Primary Care Physician Sample - Panel Methodology*

The sample for the community pharmacist and primary care provider segments of this study will be drawn from administrative records from the QIN-QIO group and supplemented by a provider panel for the unenrolled group. The panel is developed by Medscape, an online repository of health information and continuing education used by over 2 million healthcare providers. This online panel maintains a large network of healthcare providers across care settings. The panel was selected because it includes information on the provider type for panel members—making it a cost-efficient method of targeting multiple provider groups for the professionals unenrolled in the QIN-QIO program. Similarly, the low incidence of these professionals in the general population make probabilistic approaches, such as random digit dialing telephone surveys and address-based sample mail surveys, impractical. Medscape users agree to be contacted for advertising, research, and event recruitment. This means that the sample frame available for surveys is a very large subset of the actual universe being studied (Table 1).

Table 1 shows the percentage of providers included in the panel out of the total number of jobs in the profession estimated by the Bureau of Labor Statistics in 2016. The panel coverage (52% for pharmacists and 77% for physicians) suggests that findings obtained from such an effort would represent over half of healthcare professionals. The panel will have demographic information that has been previously collected from members (including information such as state, zip code, profession, and specialty) which will be used to develop weights for non-respondents, thereby improving the representativeness of results. Questions will also be included in the survey to facilitate non-response analysis and assess any non-response bias.

Table 1. Medscape Market Research Panel Coverage

Provider Type	Members Included in Medscape Market Research Panel (2018)	Total Number of Professionals (Bureau of Labor Statistics, 2016)	Percent Coverage in Medscape Market Research Panel
Physicians and Physician Assistants	633,985	820,000	77.3%
Pharmacists	163,026	312,500	52.2%

a) Nursing Home Administrator/Director of Nursing Sample

CMS maintains a list of all nursing homes that receive CMS funding ($N \approx 15,700$) through the Minimum Data Set (MDS) 3.0, which will serve as the sampling frame for the nursing home administrator/director of nursing group. The list specifies which nursing homes participate in the National Nursing Home Quality Care Collaborative (NNHQCC), a program led by CMS to instill quality and performance improvement practices in nursing homes.

The enrolled group sample for the nursing home professionals will be identified from a list of primary contacts provided by the QIN-QIOs. The list will specify those nursing homes that are involved in QIN-QIO activities to reduce adverse drug events. The sample for the unenrolled group will include nursing homes that are either 1) enrolled in the NNHQCC program but not involved in adverse drug event activities or 2) not enrolled in the NNHQCC program. The nursing home administrator/director of nursing sample will be contacted by email to complete the survey online, as well as via a letter sent by mail with an invitation to complete the survey online.

b) Sample Stratification

The sample will be stratified by healthcare professional type/setting and QIN-QIO region. Stratification by provider type/setting is designed to produce a sample with a mix of healthcare providers that are representative of the range of community-based facilities that QIN-QIOs are actively engaged with to promote medication safety and prevent adverse drug events. For this effort, we will focus on obtaining responses from pharmacists in community retail pharmacies, physicians in primary care settings, and nursing home administrators or directors of nursing.

Stratification by QIN-QIO region is designed to produce a sample with a mix of healthcare professionals relevant to QIN-QIOs that is consistent with the national distribution of providers (and institutions, for the nursing home component of the sample), but is not intended to produce reliable estimates at the individual QIN-QIO level.¹ We will randomly select healthcare professionals/institutions within strata with the goal of having the number of surveys allocated in proportion to the total number of units in those strata.

¹ There are 14 QIN-QIO regions made up of one or more states (plus Washington, DC, Puerto Rico, and the U.S. Virgin Islands) covered by a QIN-QIO. Subsequent references to “geographic distribution” address these QIN-QIO regions.

c) *Expected Response Rates*

Response rates for surveys with healthcare providers varies as a function of the survey content and the type of provider contacted, making estimating an expected response rate for this study among multiple providers difficult. However, Medscape typically experiences response rates in the range of 5% to 30% for studies conducted using its panel, figures that are comparable to published results from other healthcare provider surveys.² We will be employing a number of strategies to maximize response rates among this group including the use of honoraria, identifying CMS as the survey sponsor, communicating the public policy benefit of participating in the survey, and using multiple reminders and contacts.

For the nursing home survey, we anticipate achieving a response rate of 40%-50%. In addition to employing the same strategies to maximize response rates for the Medscape sample for this group, the availability of nursing home addresses will allow us to contact nursing homes by mail with a personalized letter. Contact by mail allows an additional means by which to identify administrators or directors of nursing suitable to completing the survey, which we expect to lead to a higher response rate in comparison to the Medscape sample.

2. Procedures for the Collection of Information

a) *Statistical Methodology for Stratification and Sample Selection*

We will conduct stratified random sampling as described in section 1b. Table 2 and Table 3 show our target quotas for the enrolled and unenrolled groups following stratification. Within both the enrolled and unenrolled groups, we have additional target quotas based on the provider type/setting of the individuals in the panel. We will set survey complete quotas for different provider types across settings to improve the likelihood that responses are representative. The quotas set are similar for both the enrolled group and the unenrolled group. Our sample will be proportionally allocated based on the distribution of provider types across QIN-QIO regions nationally. Table 4 shows the distribution of provider types by QIN-QIO region based on results from the Bureau of Labor Statistics in May 2016. Stratification will be conducted based on most up-to-date estimates upon study approval.

² Discussions of provider response rates in online surveys can be found in articles such as Cunningham, Ceara Tess, et al. "Exploring physician specialist response rates to web-based surveys." *BMC Medical Research Methodology* 15.1 (2015): 32. and Blackstock, Oni J., et al. "A cross-sectional online survey of HIV pre-exposure prophylaxis adoption among primary care physicians." *Journal of General Internal Medicine* 32.1 (2017): 62-70.

Table 2: Targets for Enrolled and Unenrolled Groups

Respondent Category	Sampling Plan	Sample Size
Healthcare providers participating in the QIN-QIO program (Enrolled Group)	Strata by provider type/setting with proportionate allocation to the number of providers per QIN-QIO region	600
Healthcare providers not participating in the QIN-QIO program (Unenrolled Group)	Strata by provider type/setting with proportionate allocation to the number of providers per QIN-QIO region	600

Table 3. Practice Type/Provider Type Targets for QIN-QIO Enrolled and Unenrolled Groups

Practice Type	Provider Type	QIN-QIO Enrolled Group	Unenrolled Group
Retail pharmacies	Pharmacists	300	300
Primary care practice	Physicians	200	200
Nursing home	Nursing home administrators or directors of nursing	100	100

Table 4. Distribution of Providers/Institutions by QIN-QIO Region per the Bureau of Labor Statistics for May 2016 and CMS MDS 3.0

Provider Setting	Provider Type	QIN F	QIN I	QIN G	QIN A	QIN M	QIN N	QIN E	QIN C	QIN H	QIN L	QIN J	QIN D	QIN B	QIN K
Retail Pharmacies	Pharmacists	6%	8%	9%	2%	22%	5%	3%	7%	1%	2%	10%	7%	12%	4%
Primary Care Practice	Physicians	6%	12%	7%	2%	21%	7%	3%	7%	1%	2%	10%	6%	11%	5%
	Nurse practitioner	6%	10%	11%	2%	20%	8%	3%	6%	1%	2%	8%	5%	10%	5%
Nursing Homes	Administrators or directors of nursing	5%	5%	10%	5%	19%	6%	2%	8%	1%	2%	10%	9%	14%	3%

b) Estimation Procedure

We will assess the QIN-QIO's impact on promoting resources and activities designed to promote medication safety and prevent adverse drug events, as well as clarifying attribution of the QIN-QIO program to the observed outcomes relative to other sources of information used by providers. We will document the use of resources and activities to promote medication safety and prevent adverse drug events among healthcare providers that did not actively participate in the QIN-QIO program. Our analysis for each evaluation question will begin with descriptive statistics including percentages and means in total and across subgroups. Appropriate statistical tests will be employed including t-tests, chi-square tests and analyses of variance (ANOVA) depending on the evaluation question. To identify potential drivers of high performance among QIN-QIOs, analyses will include bi-variate analyses such as cross-tabulations, correlations or attributable effects. The survey findings will also be used in multivariate modeling such as regression modeling, impact analysis, return on investment (ROI), and analysis of changed processes or outcomes that can be attributed to the QIN-QIO versus other quality

improvement programs. Our evaluation analytics will combine survey data with qualitative and secondary data when possible, including information derived from CMS claims data.

c) *Degree of accuracy needed for the purpose described in the justification*

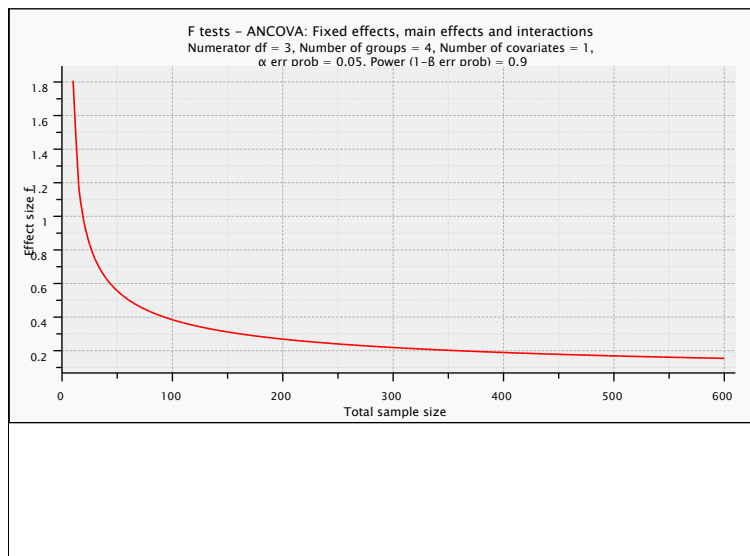
Table 5 shows the planned margins of error for the three health professional groups and for the subsample of participating and non-participating members. The groupings represent the common recipients of adverse drug event-related technical assistance from the QIN-QIOs. Pharmacists and primary care physicians present a higher proportion of the overall study sample due to priority placed on these professional groups in initiatives to curb overall impact of adverse drug events. As such, the study design prioritizes estimation accuracy among these groups. Nursing home administrators or directors of nursing are included to provide holistic findings of how QIN-QIO technical assistance activities impact efforts to reduce adverse drug events, but are intended to provide exploratory results to inform potential efforts among this group.

Table 5: Sample Size and Margin of Error

Sample Size	Group	Margin of Error	Recruited	Margin of Error	Non-Recruited	Margin of Error
600	Community Pharmacists	4.00%	300	5.66%	300	5.66%
400	Primary Care Physicians	4.9%	200	6.93%	200	6.93%
200	Nursing Home Administrators	6.89%	100	9.77%	100	9.77%

This sample size also provides sufficient power for testing between groups within the sample. The following figure is a power chart that shows sample sizes and the corresponding effect size detected with power of 90%, Type I probability of 5% and accounting for the finite population. The community pharmacist group with sample size of 600 achieves an effect size of under 0.15, the primary care physician group with sample size of 400 achieves an effect size of 0.19, and the nursing home administrator group with sample size of 200 achieves an effect size of 0.27. In other words, the sample size will differentiate between medium to smaller size differences between groups.

Figure 1. Sample Size and Effect Size



d) Unusual problems requiring specialized sampling procedures

We do not foresee any unusual problems that require specialized sampling procedures.

e) Any use of periodic (less frequent than annual) data collection cycles to reduce burden

The adverse drug events survey will be conducted once.

3. Methods to Maximize Response Rates and Deal with Issues of Non-Response

a) Methods to Maximize Response Rates

To maximize response rates of the surveys we will employ multiple contacts. Please see Appendix B and C for a sample of the emails that will be sent to healthcare providers inviting them to take the survey. In addition, we will work with CMS to establish advance communication about the study, its purpose, the public policy objectives of the effort, and anticipated timing for the data collection effort. Communications will establish CMS as the sponsor of the study to improve provider confidence in the work.

Multiple contacts: In this data collection, we plan to follow some of the principles of the Dillman Total Design survey method³ which emphasizes multiple contacts with members of the sample as being one of the most successful techniques to increase response rates. This technique is now considered standard methodology for any survey.

When possible, we will work with QIN-QIOs to provide its members with information and notices about the data collection effort, purpose, and a time frame of when to expect a contact. Also, CMS's contractor for this survey effort, the Independent Evaluation Center (IEC) for the Quality Improvement Program in the 11th Scope of Work, has conducted numerous online surveys using panel sample on a variety of topics that will be

³ Dillman DA (2000). Mail and internet surveys: The tailored design method (Vol. 2). New York: Wiley.

leveraged to maximize response rates. The initial survey invitation will provide more information on the study to increase respondent confidence in the validity and the importance of the survey resulting in higher response rates.⁴ Multiple email follow-ups will be employed following the initial invitation to take the survey. The email invitations will be CMS-sponsored, prominently displaying their logo to increase confidence in the content and importance of the study. For the nursing home administrator/director of nursing sample, letters with an invitation to take the survey online will use a CMS letterhead to increase confidence in study. Multiple mail invitations will be sent. Providers will also be provided with an honorarium for their time spent on the survey in keeping with standard practice for the Medscape panel.

b) Methods to Deal with Issues of Non-Response

There are two types of non-response – unit non-response and item non-response. Unit non-response, the failure of a sampled entity to respond, is handled in two ways:

- 1) *Intensive contact and re-contact plan to receive a response from the sampled entity.* We will make follow up attempts with each sample entity. If the designated respondent is unavailable after several attempts, we identify a qualified alternative respondent.
- 2) *A weighting plan to compensate for nonresponse.* The sampling plan calls for a proportionate allocation of the sample. In theory, the sample would be self-weighting. Due to unit non-response, the sample distribution may not be proportionate. Initial weighting will be employed to bring the strata back into proportion. There may be key qualities of the sample entities that are related to their propensity to respond. The IEC team will review response rates across information available in the sampling frame to identify qualities and characteristics that differentiate between the propensities to respond. Measures that may be available or used include urban/non-urban, provider age, and size of the facility where the individual is practicing. If any of these measures indicate a differentiation in the yield rates, they will be included in the weighting plan where we will use methods such as raking ratio adjustment to balance the sample according to these variables, and hold the relative proportion across the QIOs.

Item non-response is the event of not providing a response to question either by No Answer, Refusal or by responding “Don’t Know.” In this study, we consider item nonresponse to be substantial if the missing rate is 30% or more for any given survey item or the missing item rate is greater than 70% for any single questionnaire. Item nonresponse will be handled in two different ways:

- 1) *Re-contact of sample entity.* In the case of item nonresponse for a specific question, we will re-contact the sample entity to ask for clarification and completion of the question.
- 2) *Imputation.* We propose to use imputation sparingly and only for interval scaled questions. We will impute the missing value using a general linear model capturing

⁴ Pit SW, Vo T, Pyakurel S. (2014). The effectiveness of recruitment strategies on general practitioner’s survey response rates—a systematic review. *BMC medical research methodology*, 14(1), 1.

the relationship between providers like age, provider type, setting, facility size, urban/non-urban splits, etc. to create a prediction model. The predicted value for the missing cases could be included in the analysis.

c) Generalizing to the Universe Studied

The Medscape panel represents a sizable proportion of healthcare providers. We will use pre-collected panel information and data collected from surveys to develop weights that will make the data more representative of the universe of healthcare providers. The information collected should yield data that is reliable to CMS in informing future decisions on the QIN-QIO program.

For the nursing home sample, we have access to the universe of nursing homes that receive CMS funding through MDS 3.0 database. Since we are conducting a stratified random sample, we expect that the information collected will yield reliable data that can be generalized to the universe studied (nursing home administrators or directors of nursing of CMS-certified nursing homes).

4. Tests of Procedures or Methods to be Undertaken

As part of developing the survey instruments, the project team has conducted internal beta-testing to assess the hour burden per respondent and to ensure that the questions and responses are readily understandable and skip patterns are logical.

Additionally, we will conduct pre-testing and cognitive interviews of the surveys with the healthcare providers being targeted for this study. Cognitive interviews will be conducted in-person with the recruited respondents. Respondents who agree to help CMS refine the survey will be asked to complete the survey online. This will then be followed by an in-depth cognitive interview. The cognitive interviews will solicit feedback from providers about possible improvements to the survey and the survey administration process. This pre-testing will enable the team to assess and correct ambiguities in the survey questions and instructions. We do not expect the interviews to result in substantial changes affecting survey content or length. No more than 9 people will be recruited for the cognitive interviews.

5. Individuals Consulted on Statistical Aspects and Individuals Collecting and/or Analyzing the Data

Table 6 provides the names and affiliation for those consulted on the statistical aspects of the design and who will collect or analyze the information.

Table 6: Individuals Consulted on Statistical Aspects and Performing Data Collection & Analysis

Name	Affiliation
Michael Samuhel, PhD	Booz Allen Hamilton
Ping Yu, PhD	Booz Allen Hamilton
Jiaqi Li, PhD	Booz Allen Hamilton
Vonna Drayton, DrPH	Booz Allen Hamilton

Name	Affiliation
Anna Ettinger, PhD, MSW, MPH	Booz Allen Hamilton
Elyse Levine, PhD	Booz Allen Hamilton
Tse Hua, Shih, PhD	Booz Allen Hamilton
Jia Zhao, PhD	Booz Allen Hamilton
Zachary Lewis, MA	Ipsos
Omar Pedraza, MPH	Ipsos
Alan Roshwalb, PhD	Ipsos

Table 7 shows the name of CMS staff who advised on survey design.

Table 7: CMS Staff Who Advised on Survey Design

Name	Affiliation
Nancy Sonnenfeld, PhD	Center for Clinical Standards and Quality
Lawrence LaVoie, PhD	Center for Clinical Standards and Quality
Anita Thomas, PhD	Center for Clinical Standards and Quality