# The 2015 National Consumer Survey on the Medication Experience and Pharmacists' Roles

## *Background*

Over 500 million times a day in the United States, individuals make the decision to-take or not-to-take a prescription medication [1]. Arguably, this decision is the most frequently occurring health care event, far outpacing such things as the number of pharmacy visits (6 million per day) [1], physician office visits (2.6 million per day) [2], hospital inpatient procedures (123,287 per day) [3], and hospital discharges (108,041 per day) [3]. Eighty percent of the way chronic diseases are prevented and managed is with medications [4]. In any given week, 81% of U.S. adults take at least one medication, and nearly one-third take five or more different medications [5-6]. Over a lifetime, it is estimated that a typical person will take 14,000 pills [7]. When one considers that a 60-year span of adulthood is about 22,000 days, the frequency with which individuals interact with medications is astounding. A person's regular interaction with medications is not only a frequently and consistently occurring health care event, it also interfaces with almost all other aspects of his or her health care. For example, four out of five people who visit a physician leave with at least one prescription [6]. When transitions in care, such as hospitalization, are experienced by individuals, they become especially vulnerable for medical errors as a result of incomplete or inaccurate communication about medication therapies. After hospital and intensive care unit discharges, individuals are at high risk for unintentional discontinuation of medications with proven efficacy for treating chronic diseases [8]. Avoidable hospital readmissions are directly related to medication-related events about one-third of the time [9].

As the U.S. health-care system moves away from fragmented approaches and closer to a team-based, patient-centered care approach, there is a need for a way to unify and coordinate individuals' health care even as these individuals enter and exit various components of the health-care system and as they shift between their preferred identity as a person and their sometimes necessary identity as a patient. We suggest that the "medication experience" (an individual's subjective experience of taking a medication in his daily life [10-14]) can be used as a unifying and coordinating concept to bridge this dichotomy and that the pharmacist's role is central in this domain. The proposed research will describe the U.S. adult population in terms of their medication experiences and their views of pharmacists' roles. The findings will be useful and impactful for (1) expanding the identification and description of segments of the population based on components of the medication experience, (2) incorporating components of the medication experience into patient care processes, and (3) building systems for identifying and matching patients and providers based upon preferences and capacities in the medication experience domain.

### *Previous Work*

**Previous work** has investigated: (1) pharmacist and patient perceptions of pharmacists' roles over the past two decades [15-16], (2) capacity for patient care developed by the pharmacist workforce over the past two decades [17-19], (3) patient and practitioner viewpoints of the prescription drug choice and the initiation of drug therapy processes [20-22], (4) consumer information-processing and decision-making regarding prescription drugs [23-25], and (5) a pilot study conducted in late 2013 called the **National Consumer Survey on the Medication Experience** [26]. Our research revealed that the pharmacy profession has developed capacity for direct patient care, medication management services, and integration into overall health systems. Our work also revealed that patients hold patient-centered viewpoints of medication use based on their personal expectations and life experiences. This differs from prescribers, pharmacists, and patient advocates who use healthcare-centered viewpoints based upon their professional training and experience. That is, the medication experience is more than a clinical experience … it is a social and personal experience. Typically, the health care system views the medication experience in terms of clinical problem-solving (prescribing, monitoring, reconciling) and in terms of medication regimen adherence (following directions). Our findings revealed that the medication experience is rooted in medication beliefs, personal abilities and motivations, information processing, decision-making, relationships, finances, and the effects of life experiences. Patients vary widely in their make-up, their preferences, and their needs. Some patients don't want to receive any information from others about their medications while others desire to take an active role in making decisions about them. Some people want information about effects of medications and others want to know about safety. In addition, when people seek information about medicines, there is a high likelihood that they will involve a personal contact, either lay or professional, in their search. This all underlines the importance of social networks in the decisions we make about prescription drugs. Patients have different abilities, motivations, and needs when it comes to medication use. The challenge, then, is to meet the needs of each individual.

In our pilot study [26], unique segments were identified for each component of the mediation experience that we studied. Healthcare consumer type, medication beliefs, patient activation, information seeking, and nature of interactions with health professionals for decision making are relevant and can be used for identifying unique segments of patients. Furthermore, unique aspects of generational cohorts and those individuals who experience financial hardship from purchasing prescription drugs also are important considerations. A final component of the pilot study was to use Geospatial Mapping as a way to describe geographic variation in the findings. Mapping for the pilot data may be viewed at:
http://www.d.umn.edu/gac/main/schommer.html.

### *Research Questions*

As a next step, we propose to build upon the pilot study results and conduct the **2015 National Consumer Survey on the Medication Experience and Pharmacists' Roles**. Our **research**

**questions** are: (1) what are the medication experiences of the U.S. adult population, (2) can this population be categorized into distinct segments, (3) what are the characteristics of those segments, and (4) is there state-to-state variation in the findings? The findings will provide insights for (a) incorporating components of the medication experience into patient care processes, (b)building systems for identifying and matching patients and providers based upon preferences and capacities in the medication experience domain, (c) enhancing the pharmacist's role in this domain, (d) establishing national priorities for patient-centered medication experience research, (e) accounting for treatment heterogeneity in medication related comparative-effectiveness studies, (f) adding insights for data-driven personalized medicine, and (g) incorporating individuals' medication experiences into improved quality and efficiency of health care.

The overall goal for the **2015 National Consumer Survey on the Medication Experience and Pharmacists' Roles** is to collect data for describing respondents' medication experiences with the capability to conduct state-to-state comparisons. The specific objectives for this study are to identify and describe consumer segments based on the following components of the medication experience:

1. Medication beliefs
2. Patient activation
3. Information processing
4. Decision making
5. Nature of interactions with health professionals
6. Views of pharmacists' roles
7. Demographic characteristics

### *Design and Methods*

A cross-sectional, descriptive on-line survey design will be used for collecting and analyzing data using the Dillman Tailored Design method [27] and the technical assistance of Qualtrics Panels. We propose to receive usable responses from a sample of 600 adult individuals residing in each of the 50 states plus the District of Columbia for a total of 30,600 individuals. Responses from this relatively large sample can be achieved through Qualtrics Panels which contracts with panel providers and can develop samples that match overall census statistics for age, gender, and geographic location. Data collected from the sample of 30,600 adult individuals residing in the United States will be used for: (1) making population estimates, (2) conducting cluster analysis, and (3) conducting subgroup descriptions for groups of size 200 or greater.

In order to ascertain the geographic representation of our sample, we will conduct geographic distribution analysis using geographic information sciences techniques. The random sample will be compared geographically based upon U.S. Census data that are publicly available. Overall geographic coverage and proportionate representation will be compared. If discrepancies are found, adjustments will be made to the sample so that identified discrepancies are minimized. Post-stratification weighting will be used to compensate for the fact that persons with certain

characteristics are not as likely to respond to the survey [28-29]. The completed sample will be weighted to accurately reflect U.S. Census data on age, education, ethnicity, gender, place of residence, US citizenship, own a home, and income. Also, wherever practical, sample characteristics will be compared and checked against other published results for disease prevalence, medication utilization, hospitalization, and health insurance coverage.

The measure of the "medication experience" has been tested for validity and reliability using factor analytic, correlation, and Cronbach coefficient alpha techniques in the pilot study [26]. The same approach will be applied to the larger sample to verify validity and reliability. Identification of segments of adult individuals based on their medication experiences will be accomplished through the use of cluster analysis. A *k*-means clustering algorithm [30-31] will be applied in order to partition the nationally representative respondents to our survey into groups, or 'clusters', so that the responses to key variables for respondents in the same cluster are smaller than the differences between respondents from different clusters:

$$J = \sum_{j=1}^{k} \sum_{i=1}^{n} \left\| x_i^{(j)} - c_j \right\|^2,$$

where $\left\| x_i^{(j)} - c_j \right\|^2$ is a chosen distance measure between a data point $x_i^{(j)}$ and the cluster center $c_j$, is an indicator of the distance of the *n* data points from their respective cluster centers. It is possible that the *k*-means clustering algorithm would not result in an interpretable solution. If this difficulty is encountered, we will use a two-step cluster analysis that applies a scalable cluster algorithm, with an agglomerative hierarchical clustering method, and a log-likelihood distance measure (a probability-based distance) so that both continuous and categorical variables can be used if so desired. Clusters will be described through descriptive statistics and also through geographic distribution, demography, and psychographic profiles. Geographic information sciences applications will be applied so that the geographic distribution of the clusters can be mapped along with other geographic characteristics such as: (1) health professional shortage areas, (2) medically underserved areas, (3) distribution of health maladies such as diabetes, obesity, or cardiovascular disease, and (4) geographic distributions of income levels.

### *Project Timeline*

| | Jan-Jun 2015 | Jul-Dec 2015 | Jan-Jun 2016 | Jul – Dec 2016 |
|---|---|---|---|---|
| Survey Development | → → →→ → | | | |
| Data Collection | | → → →→ → | | |
| Data Analysis | | | → →→ → → | |
| Report Preparation | | | | → →→ → → |

### *Dissemination of Findings*

Findings will be disseminated through a Final Report that presents all methods and results in a transparent form and through peer-reviewed publications. Also, we will prepare a Medication Experience Digest that would be distributed widely and will provide insights for (a) incorporating components of the medication experience into patient care processes, (b)building systems for identifying and matching patients and providers based upon preferences and capacities in the medication experience domain, (c) enhancing the pharmacist's role in this domain, (d) establishing national priorities for patient-centered medication experience research, (e) accounting for treatment heterogeneity in medication related comparative-effectiveness studies, (f) adding insights for data-driven personalized medicine, and (g) incorporating individuals' medication experiences into improved quality and efficiency of health care.

### *Next Step: County-Level Analysis*

This research will provide sufficient sample sizes so that state-to-state comparisons can be made. The findings will be useful for the next step of this research which would be to develop an even larger sample in order to conduct analysis at the county-level (3,007 counties in 48 states + 2 states without county designation + the District of Columbia = 3,010 geographic regions for comparison).

### *Next Step: Matching Algorithms*

Another next step for this research is to incorporate components of the medication experience into patient care processes and building systems for matching patients and providers based on preferences and capacities in the medication experience domain. One way to do this is to develop matching algorithms that can be incorporated into patient care processes.

For example, the survey results will identify medication experience segments (clusters) and provide descriptions of each cluster using mean scores for each question (item). These data can be used as norms. Subsequent individuals can complete a questionnaire (list of items) for which the results can be matched to survey results through the use of simple algorithms (see below).

| | |
|---|---|
| N | = number of questions (items), i = 1,…,N |
| M | = number of segments (clusters), j = 1,…,M |
| | |
| Answer[i] | = Answers to the questions (items) |
| Mean[j,i] | = Mean value for the $j^{th}$ segment and the $i^{th}$ question |
| Variance[j,i] | = Variance value for the $j^{th}$ segment and the $i^{th}$ question |

Score[j] = Score computed using all of the factors

$$Score[j] = \frac{SUM(i=1\ldots N)\ (Answer[i]-Mean[j,i]) * (Answer[i]-Mean[j,i])}{Variance[j,i]}$$

The **Score**, using all of the items, provides an indication for how similar an individual is to a segment (cluster) overall. A smaller score reveals more similarity to a segment (cluster).

Since not all of the questions (items) may have the same degree of relevance or importance to an individual, a Critical Score may also be computed. To accomplish this, individuals would also be asked to identify the five questions (items) that are most important (critical) to them. These five items can then be considered to be "critical factors" used for weighting within the algorithm. That is,

Weight[i] = the weight for each factor. 1 for all factors selected by the user and 0 for all factors not selected by the user.

CriticalScore[j] = Score computed using only the critical factors

$$CriticalScore[j] = \frac{SUM(i=1\ldots N)\ Weight[j] * (Answer[i-Mean[j,i]) * (Answer[i]-Mean[j,i])}{Variance[j,i]}$$

The **Critical Score**, using only the critical factors, provides an indication for how similar an individual is to a segment (cluster) based upon the five critical factors selected by the individual. A smaller score reveals more similarity to a segment (cluster).

The final step in the matching process would be to match patients with providers based upon congruence between a patient's score and a provider's capacity to meet the needs of patients with those scores.

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