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Acculturation in Hispanics and childhood poisoning: Are medicines and household cleaners stored properly?

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ABSTRACT

Background: Unintentional poisonings are a major public health issue in the United States (US). With the increasing number of Hispanics in the US, childhood poisoning is a salient public health issue to address within this population. There is a paucity of research examining the relationship between acculturation in Hispanics and the safe storage of medicines and cleaners. The purpose of the study was to determine if demographic variables, such as acculturation in Hispanics, age, gender and education, were predictive of incorrectly storing medicines and household cleaners.

Methods: We conducted a study among parents/guardians of small children at two pediatric primary care clinics in the Dallas/Fort Worth (DFW) Metropolitan area. We enrolled 201 parents to identify where they stored medicines and household cleaners, and measured acculturation with the *Short Acculturation Scale for Hispanics*.

Results: Of Hispanic participants, 49% were categorized as less acculturated ($n = 99$) while 21% were more acculturated ($n = 42$). Less acculturated participants were over 4 times more likely to store medicines incorrectly, and participants with a high school education or less were over 3 times more likely to improperly store cleaners. With each additional child in the household, the risk for improper storage of cleaners increased by 44%.

Conclusion: The fact that children of less acculturated families are at greater risk for poisoning and have lower levels of education demonstrates the need for readable educational materials on this salient topic. Because social networks are integral in Hispanic culture, especially among new immigrants, poison prevention messages should be disseminated by interpersonal communications.

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1. Introduction

Unintentional poisonings are a major public health issue in the United States (US). In 2003, US poison control centers (PCCs) reported 1,336,209 cases of unintentional poisonings, half of which were from pharmaceutical exposures. Alarming, 43% of the pharmaceutical poisonings occurred in children under 6 years old (CDC, 2006). While childhood poisoning is preventable, it exists in the US because of improper storage of toxic substances (LeBlanc et al., 2006) and lack of adult supervision (Munro et al., 2006). Children are often regarded as being safe in the home environment yet this is where 90% of unintentional poisonings transpire (Litovitz et al., 2001; Soori, 2001). The ingestion of pharmaceuticals can

lead to headaches, dizziness, and vision problems, though more serious outcomes are also possible including hypotension, tachycardia, bradycardia, respiratory depression, and acute renal failure (Wilkerson et al., 2005).

With the increasing number of Hispanics in the US, from immigration and population growth, childhood poisoning is a salient public health issue to address among this population. According to Census Bureau (n.d.), Hispanics consisted of 15% of the US population in 2006, and accounted for one-half of the nation's growth between 2000 and 2006. Despite the sheer size of this ethnic group, Hispanic children are underserved in health care (Children's Defense Fund, 2009) and are at risk for increased injuries, such as poisonings, falls, and burns (Federal Interagency Forum on Child and Family Statistics, 2005; Flores et al., 2005).

Overall, immigrants tend to have better health behaviors than American-born citizens, such as lower rates of cigarette smoking and alcohol usage, in addition to fewer mental health problems (Mull et al., 2001). However, the risk for childhood poisoning and the proper storage of toxic substances have yet to be fully investi-

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gated among this population. Past data on race were often collected by the government without consideration of Hispanic ethnicity (Mays et al., 2003) which poses a significant barrier to understanding how this culture is affected by childhood poisoning. A vast majority of Hispanics, including new immigrants, are uninsured, face barriers in accessing health care, and may not be represented in hospital discharge data, further limiting our understanding of how this population may be affected by unintentional poisoning (Okie, 2007).

While we know that health status tends to decline in immigrants the longer they are in the US (Singh and Siagpush, 2002), the safe storage of medicines and cleaners in less acculturated Hispanics is unknown. After an exhaustive search of the literature, the only documented poison prevention study that focused on the acculturation of Hispanics was conducted by Roddy et al. (2005). They examined the prevalence of unsafe storage of toxic substances among Hispanics living along the Texas-Mexico border. Caregivers who were more acculturated to the US were more likely to unsafely store toxic substances. The authors posited that was due to increased access to medicines compared to less acculturated groups. However, these results are only generalizable to populations located along the Texas border and may not accurately characterize less acculturated populations living in other areas.

Because the ingestion of cleaning products was the 2nd leading cause of pediatric poisoning in 2004–2006 (McKenzie et al., 2010), and in a national study approximately 60% of poisonings were due to the ingestions of prescription or over the counter medicines (Franklin and Rodgers, 2008), more research is needed to assess the current storage of medicines and household cleaners. The purpose of this pilot study was to determine if demographic variables, such as acculturation in Hispanics, age, gender, and education were predictive of incorrectly storing medicines and household cleaners. A secondary purpose was to assess the readability and the culturally appropriateness of poison prevention materials, and to discuss the benefits of utilizing promotoras (community health workers) to reduce childhood poisonings among Hispanic populations.

2. Methods

2.1. Study design and participants

We conducted a study among parents/guardians of small children at two pediatric primary care clinics in the Dallas/Fort Worth (DFW) Metropolitan area. The percentage of patients covered by Medicaid, CHIP, and private insurance were similar between clinics. In addition, families from both clinics were equivalent in terms of socioeconomic status (SES) and education level. The clinics differed in that one consisted of families that were primarily Spanish speaking with several that recently immigrated while the other had more English speakers. To be eligible for the study, parents/guardians had to be 18 or older, speak either English or Spanish, and have children that were under 7 years old. This study was approved by the UT Southwestern Medical Center Institutional Review Board.

We enrolled 201 parents ($N = 100$ from Spanish-speaking clinic; $N = 101$ from English speaking clinic) to identify where they stored medicines and household cleaners. To measure acculturation, Hispanics completed a short 4-item questionnaire, as well as a single item measuring English proficiency. While families were waiting for their appointments, a member of the research team approached parents inviting them to participate in the study. After the each parent completed the questionnaires, he/she received a complimentary safety kit (cabinet latches, etc.) to reimburse them for their time and effort, as well as educational materials on poison prevention.

Table 1
Descriptive characteristics of study participants ($N = 201$).

Variables	Frequency	%
Gender		
Female	190	95
Male	11	5
Race		
African American	19	9.5
Caucasian	15	7.5
Asian or Pacific Islander	9	4.5
Hispanic	151	75.1
Other	7	3
Ethnicity		
Hispanic origin	151	75.1
Not of Hispanic origin	50	24.9
Payor source		
Medicaid	138	68.7
CHIP	27	13.4
Private insurance	9	4.5
No insurance	16	8
Education		
Less than high school	38	18.9
High school	77	38.3
Some college	36	17.9
College	29	14.4
Graduate school	12	6.0
Acculturation (Hispanics)		
Less acculturated	99	49
More acculturated[10 missing data points]	42	21

2.2. Instruments

While one of our instruments, *Short Acculturation Scale for Hispanics*, was already translated and validated in Spanish, we carefully translated the other three instruments that were employed in this study. After the initial translation by a non-native Spanish speaker, another native Spanish speaker back translated the instruments into English to ensure accuracy and preservation of content and meaning. After the translation was completed, we piloted the instruments by recruiting several parents at one of the clinics to provide feedback. A brief description of each instrument is as follows.

2.2.1. Demographic information

Basic demographic information was collected with this instrument, as depicted in Table 1. Insurance type was collected as a proxy for income. In addition, we asked participants what they would do if their child swallowed rat poison.

2.2.2. Short Acculturation Scale for Hispanics

This validated instrument consists of 4 items and is a shortened version of the Acculturation Scale for Hispanics. The constructs used in the shortened instrument are centered around the language spoken at home and with friends. It was developed by Marin et al. (1987), and has been tested in several Latino sub-populations. The instrument is in a Likert format with responses ranging from 1 to 4. For scoring, the average for all items is computed. If the average is above 2.99, one is considered to be “more acculturated” and “less acculturated” if below 2.99. Researchers have reported high scores on the reliability and validity of this instrument with a Cronbach alpha of .92 (Marin et al., 1987).

2.2.3. Storage of medicines/household cleaners

We adapted an instrument developed by Beirens et al. (2006) to identify the places in which parents stored medicines and cleaners in their household. The American Academy of Pediatrics' definition of correct storage was defined as medicines and cleaners locked in a cabinet or at adult eye level (2010a). For medicines, parents identified if they stored them in the bathroom, kitchen, bedroom, or

in another location, whereas the instrument for cleaners included areas such as the bathroom, kitchen, garage/shed, or an alternate location. There were three possible responses for each place to store medicines/cleaners: (1) Not stored in locked cabinet or at adult eye level; (2) stored in locked cabinet or at adult eye level; (3) not present.

2.2.4. Strategies for future interventions

As a way to guide for future prevention efforts, parents were asked 2 open ended questions regarding how and whom they would like to learn about injury prevention/childhood poisoning.

2.3. Statistical analyses

Descriptive statistics including central tendency of the mean were performed to characterize the sample. Independent *t*-tests were performed to identify differences between less and more acculturated groups. A series of logistic regression analyses were conducted to examine predictors of improper storage of medicines/cleaners. The predictors included demographic variables such as acculturation level, gender, education level, insurance type, employment status, marital status, and number of kids. The outcome variables were improper storage of medicines/cleaners for each area in the household. Additionally, if a participant improperly stored medicines or cleaners in one or more rooms of the house, they were added to a category of "overall unsafe storage" for medicines and/or cleaners. For example, if medicine was improperly stored in the kitchen, the participant was classified as having overall unsafe storage of medicine. Statistical significance was set at a level of *p* < .05.

3. Results

3.1. Descriptives

As shown in Table 1, approximately 95% of participants were female, and 55.7% of all participants were unemployed. The age range for this sample was 18–59 years old with the average age of 28 (SD = 6.5). Approximately 60% of participants had a high school education or less, while the remaining participants had some college experience or advanced education. The vast majority of families who initially seek services at these clinics are enrolled in Medicaid and CHIP. For this reason, the most common type of insurance was Medicaid (68.7%), followed by CHIP (13.4%), private insurance (4.5%), and no insurance (8.0%).

Approximately 75% of participants were Hispanic, 9.5% were African American, and 7.5% were Caucasian. Of the Hispanic participants, 49% were categorized as less acculturated (*n* = 99) while 21% were more acculturated (*n* = 42). When asked about English-speaking ability, 17% of participants did not speak English, 22% did not speak English well, 15% spoke English well, and 16% spoke very well. Bivariate correlation analyses were performed to explore the relationship between acculturation and limited English proficiency (LEP). There was a statistically significant correlation (*r* = .71, *p* < .05) indicating that there is a strong relationship between the two variables. Low acculturation was associated with LEP. Parents were asked a hypothetical question regarding how they would respond if their child swallowed rat poison, and only 27% knew to call the PCC while a large majority would either call 911 (34.3%) or go to the emergency room (12.9%).

3.2. Storage of medicines and household cleaners

As shown in Table 2, approximately 8% of medicines were stored incorrectly in both the kitchen and the bathroom. In contrast, a large percentage of cleaners were incorrectly stored in the kitchen and bathroom. The most common place for improper storage of cleaners

Table 2
The frequency and % of improperly stored medicines and cleaners.

Medicines			Cleaners		
Location	Frequency	% stored incorrectly	Location	Frequency	% stored incorrectly
Bathroom	11	5.7	Bathroom	40	20.0
Kitchen	16	8.0	Kitchen	53	26.4
Bedroom	15	7.5	Garage	7	3.5
Other	7	3.5	Other	14	7.0

occurred in the kitchen, as 26% of cleaners were incorrectly stored often under the sink without an appropriate child lock.

3.3. Predictors for storage of medicines and cleaners

Several univariate logistic regression analyses were conducted to examine predictors of storage of medicines and cleaners. The predictors included demographic variables such as acculturation level, gender, education level, insurance type, employment status, marital status, and number of kids. The outcome variables were improper storage of medicines/cleaners for each area in the household, and overall unsafe storage as defined previously.

As shown in Table 3, the results indicated that acculturation level significantly predicted for improper storage of medicines overall (CI: 1.2–15.5; *p* < .05). Less acculturated participants were over 4 times more likely to store medicines incorrectly compared to more acculturated participants when controlled for other covariates. Education was a significant predictor in the storage of cleaners in the bathroom, in that participants with a high school education or less were over 3 times more likely to improperly store cleaners than more educated participants (CI: 1.4–8.3; *p* < .01). In addition to education, the number of kids in the household was also a significant predictor for the improper storage of cleaners in the bathroom. With each additional child in the household, the risk for improper storage of cleaners increased by 44% (CI: 1.022–2.05; *p* < .05).

3.4. Strategies for future interventions

As a way to guide for a future intervention, parents were asked how they would like to learn about poison prevention. Emerging themes were identified from open-ended questions, which included learning from media (radio and video), as well as written information (i.e., brochures). Most parents indicated they would prefer to learn from someone at a PCC, in addition to a physician or a teacher.

4. Discussion

With more than two million children who unintentionally come into contact with a poisonous substance annually in the US, it is

Table 3
Univariate logistic regression analyses predicting improper storage of medicines and cleaners.

Predictor	Improper storage of medicines overall			Improper storage of cleaners in bathroom		
	CI	<i>p</i>	OR	CI	<i>p</i>	OR
Acculturation	1.2–15.5	.02	4.4	1.3–12.1	.01	4.1
Education	.21–1.1	.08	.48	1.36–8.2	.008	3.4
Employment	.62–2.8	.48	1.3	.48–2.2	.93	1.03
Insurance	.66–2.2	.55	1.2	.40–1.561	.51	.79
# of kids	.66–1.3	.746	.95	1.02–2.04	.03	1.44

CI = confidence interval; OR = odds ratio. For ORs, *Acculturation*: less acculturated = 1, more acculturated = 0; *Education*: high school or less = 1, college or more = 0; *Employment*: not employed = 1, employed = 0. Bold font indicates statistically significant results.

critical to assess whether potentially dangerous substances are stored properly (AAP, 2010). This study provides insight into the relationship between acculturation in Hispanics and its effects on the storage of substances, as a paucity of research exists on this salient topic. In contrast to Roddy et al. (2005), our findings indicate that less acculturated Hispanics were over 4 times more likely to improperly store medicines overall, and moreover, did not store cleaners properly in the bathroom. While it is not clear why there were differences between our study and Roddy et al., one explanation could be that the less acculturated participants in the other study resided along the Mexico border and were very poor. More acculturated participants had greater access to medicines and cleaners, whereas economic factors did not discriminate between participants in our study.

In addition to measuring acculturation, educational levels were assessed as a possible predictor of improper storage. Less educated participants were over 3 times more likely to improperly store cleaners in the bathroom, and this supports other findings in that toxic substances are more often misplaced in the bathroom than in other rooms (Gibbs et al., 2005). The improper storage of cleaners in the bathroom increased by 44% with each additional child in the household. By developing a profile of families who are less educated and have multiple children, tailored messages can be communicated regarding correctly storing medicines and cleaners in the household. As documented in the literature, products that are currently in use are often improperly stored because it is not convenient for parents to put medicines and cleaners away (Gibbs et al., 2005). Educational interventions are needed to highlight the importance of safe storage and to illustrate the potential dangers to children.

In our study, less acculturated Hispanics had limited English speaking abilities and several had recently immigrated to the US. It is documented that newly immigrated populations, traditionally having a lower status in society, are more susceptible to injuries (Kandula et al., 2004). For example, children of immigrants are at a greater risk for home injuries, such as poisonings, falls, and burns given their transition into American culture (Flores et al., 2005), especially in homes that are Spanish-speaking only (Federal Interagency Forum on Child and Family Statistics, 2005). Because of language and cultural barriers, less acculturated Hispanics require culturally appropriate educational materials and health care services that specifically address risk factors for childhood poisoning. Additionally, by employing promotoras (community health workers) in a pediatric primary care clinic, poison prevention information may be communicated in a more culturally appropriate and effective manner.

4.1. Educational materials

Too often, educational materials are written for a general audience without consideration of health literacy levels, cultural perspectives and experiences (Kreuter et al., 1999). Culturally appropriate educational materials may reduce health disparities by providing information that is relevant to values and is disseminated in a way that builds the knowledge base. Participants in this study were provided with poison prevention brochures from the Texas Poison Control Center (PCC) in either Spanish or English. One of the authors (KC) conducted a Fry readability test on the brochures, which is a validated method to determine reading level and appropriateness of educational materials (Parker and Hasbrouck, 2001). The adapted Fry method for Spanish materials was used to assess the reading level of the Spanish brochure. To improve accuracy, two separate passages were analyzed in each brochure to determine reading level and then averaged. Both brochures were written at the 9th grade level; however, approximately 40 million Americans read below the 5th grade reading level, and 90 million people do

not possess adequate health literacy (Institute of Medicine, 2004). The fact that children of less acculturated families are at greater risk for poisoning and have lower levels of education demonstrates the need for readable educational materials on this important topic.

By comparing the English and Spanish brochures, it is evident that the Spanish brochure was a direct translation from English and did not include cultural values, such as *familismo* (family) and *respeto* (respect) that are known to be significant across several Hispanic sub-cultures (National Alliance for Hispanic Health, 2001). Several Hispanic families may have difficulty understanding these educational materials, yet there are no other materials addressing poison prevention available for distribution. Future research should inform the development of culturally appropriate educational materials to improve the knowledge base among Hispanic families at risk for childhood poisoning.

In addition to printed materials, other methods of communication may be more effective in providing pertinent information to newly immigrated Hispanics. According to Cheong (2007), first generation Hispanics prefer to receive health education from ethnic television and interpersonal communication, while more acculturated Hispanics with private health insurance utilize the Internet for health resources. These findings are similar to what our study participants reported, in that they would like to receive poison prevention information from physicians, teachers, or professionals from the PCC. The fact that social networks are integral in Hispanic culture, and especially among new immigrants, poison prevention messages should be disseminated by using the most efficient channels. For example, integrating correct storage of medicines and cleaners into a telenovela (Spanish soap opera) may appeal to less acculturated Hispanics and bypass language barriers.

4.2. Promotoras

Because interpersonal communication is culturally appropriate among Hispanics, utilizing promotoras, or community health workers, to provide childhood poison education may be a valid approach to primary prevention in this population. Promotoras are typically lay health educators who are trained to become advocates, coaches, and promoters of health in a community. They are often culturally similar to the population they serve, as this provides the platform for optimal educational messaging (Deitrick et al., 2010).

Notably, the use of promotoras in recent years has demonstrated positive effects in terms of health improvement. Typically they are trained to function in the community by educating patients, providing counseling regarding health behaviors, and delivering culturally appropriate health education, but also play a role in advocating for individual and community health issues (CDC, 2010). Promotoras have been successfully utilized to improve cardiovascular health, cervical cancer screening rates, and diabetes education (Balcazar et al., 2009; Deitrick et al., 2010; Nuno and Garcia, 2008). While promotoras are traditionally employed in the community, they have recently been included as part of the health care team within clinics as a way to educate patients and assist them in navigating the health care system (Joshu et al., 2007; Sixta and Ostwald, 2008). In these situations, culturally competent education was provided to promote chronic disease management and fostered a system of collaborative medicine, one which patients were able to participate in their treatment plan. Similarly, the benefits of utilizing promotoras to educate families in a primary care clinic regarding childhood poison prevention may include building trust with parents, providing relevant and appropriate health education, and bypassing language and cultural barriers.

4.3. Limited English proficiency

LEP in minorities is associated with having no medical and dental insurance, affecting overall health status (Flores and

Tomany-Korman, 2008). In our study, LEP was significantly associated with acculturation, and that fact that acculturation was predictive of incorrect storage of medicines and cleaners, it may be a useful proxy for determining acculturation status. By assessing for English speaking abilities in a medical setting, clinicians can gauge the degree of acculturation and can provide appropriate education concerning childhood poisoning prevention. In addition to informing providers about clinical risk factors, LEP can serve as an indicator for the patient's preferred language in which to receive health care, increasing the likelihood that culturally appropriate education regarding poison prevention is delivered effectively (Karliner et al., 2008).

4.4. Limitations

There were several limitations in this study. The participants had limited literacy abilities which decreased the number of items that could be included on the questionnaires. To ensure readability, we piloted the questionnaires among a small sample of participants, but some people may still have had difficulty understanding the questions. Because the questions inquired as to where toxic substances were stored, some participants may have provided a socially desirable answer.

The correct storage of toxic substances was developed based on the AAP guidelines, though it would be advantageous to understand what participants' view as adequate storage according to their perspective. Additionally, parents may have difficulty identifying hazards in the home environment (Gaines and Schwebel, 2009), and some participants may have not viewed certain substances as a medicine or household cleaner. Because acculturation and educational levels are intertwined, it was difficult to separate the two variables in order to truly understand the effect of acculturation on correct storage of substances. Lastly, our sample size was small and may have limited us in terms of statistical power. With a larger sample, multivariate logistic regression may be possible in order to develop a predictive model for the improper storage of medicines and cleaners.

5. Conclusion

This study was a pilot intended to examine the effects of acculturation in storage behavior. The results from the study are intriguing and warrant future research with the growing number of immigrants and 2nd generation of Hispanics in the US. A follow up study should examine from a qualitative perspective how participants view the appropriate storage of substances. By further examining the cultural factors that influence storage behaviors, successful interventions that target less acculturated populations may be developed.

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