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Colorectal Cancer Screening among Chinese, Cambodian, and Vietnamese Immigrants in Chicago

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Abstract Asian Americans are now the most rapidly growing minority group in the USA. Over 60 % of Asian Americans in the USA are immigrants. Cancer has been the leading cause of death among Asian Americans since 1980. Understanding the barriers to screening is essential to reduce the unnecessary burden of cancer. Little is known about colorectal cancer screening behavior among foreign-born Asian Americans and how socio-demographic factors may influence the behavior. Even less is known about disaggregated Asian subgroups. Using data from the Chicago Asian Community Survey, a local health assessment survey of three Asian subgroups in Chicago, Chinese, Cambodian, and Vietnamese, this study found that the colorectal cancer screening rate were much lower among foreign-born Asian Americans in Chicago (30 %) than the national rate for the general population (59 %). Furthermore, we studied disaggregated data to determine colorectal cancer screening differences between communities. Findings from this study provide a critical evidence base to inform future research and intervention designs.

Keywords Asian immigrants · Colorectal Cancer Screening · Chinese · Cambodian · Vietnamese

Introduction

The challenge to eliminate racial/ethnic cancer disparities remains at the forefront as the US population grows increasingly diverse. The two fastest growing population groups are Asian and Hispanic. While the Asian population increased 45.6 % between 2000 and 2010, the Hispanic population increased 43.0 % during the same period [1]. This growth can be largely attributed to new and recent immigrants. In fact, the 2010 American Community Survey shows that 13.9 million immigrants arrived in the US between 2000 and 2010, and one out of eight peoples in the US were foreign born [2]. Although the relationship between immigration and cancer disparities is complex, progress in this area is an important component to eliminate racial/ethnic cancer disparities. Unfortunately, the growth of the US immigrant population has not been accompanied by increased surveillance of immigrant health [21]. Cancer screening behaviors have been under-reported among immigrants. The purpose of this study was to explore colorectal cancer screening behaviors among foreign-born Asian immigrants in the Chicago metropolitan area, the fifth largest metropolitan population of Asian Americans in the USA [2], as well as the influences of socio-demographic factors may have on colorectal cancer screening (CRS) among these immigrants.

Asian Americans in the USA

Asian Americans (AAs) are now the fastest growing minority group in the USA. There are nearly 17.3 million AAs nationwide, or 5.6 % of the total population [3]. By 2050, there will be 40.6 million AAs in the USA or 9 % of the total population [4]. AAs also account for more than one third of the one million legal immigrants who enter the USA annually [5]. In 2010, there were an estimated 11,284,000 foreign-born AAs living in the USA [6]. The AA population is very diverse and differs with respect to country of origin, culture and beliefs, time in the US, primary language spoken and socioeconomic status [7–9]. However, most national studies use aggregated

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AA data which may mask important inter- and intra-group differences and thereby limit the impact and dissemination of findings into Asian subgroups [7, 10]. In fact, several cancer control studies highlighted the importance of identifying differences among disaggregated Asian subgroups in order to prioritize cancer prevention efforts [11–13]. As a population with a well described bimodal distribution of socioeconomic status [9, 14, 15], such as the poverty rate among Filipinos of 6.3 % compared to 29.3 % for the Cambodian [16], in aggregate, AAs are generally described as "the model minority" [17], masking the significant challenges encountered by many AA immigrants who often have lower socioeconomic status.

Immigration and Health

Despite the considerable growth of the US immigrant population over the past four decades, from 9.6 million in 1970 to 40 million in 2010 [2], most national surveillance data systems do not routinely report health statistics by immigrant status. Immigrants are often identified as a vulnerable population, at high risk of poor physical, psychological and social outcomes as well as inadequate health care, especially among those with limited English proficiency [18, 19]. Although new immigrants have relatively better health initially as reported in some studies [20, 21], over time, their health indicators approach those of the US-born population [22, 23]. This phenomenon indicates that the health status among immigrants is declining faster than the US-born population. Research suggests that immigrants, in general, use relatively little health care [24], even in countries, such as Canada and Australia, where free, universal health care is in place [25, 26]. Asian immigrants in the USA follow the same patterns, with their better health declining over time in the USA [23]. Asian Americans, as a group, also have significantly lower total health care expenditures compared with Caucasians [27]. Furthermore, new Asian immigrants, who are constrained by the labor market, housing, language and other cultural barriers, tend to cluster in established old urban ethnic or mixed immigrant enclaves seeking affordable housing, social networks, helpful information on labor market or financial capital, and a familiar culture. Because ethnic enclaves in inner cities are concentrated with recent immigrants who do not speak English well, are unfamiliar with the American culture and society systems, and have meager socioeconomic resources, they are inevitably unstable and deprived [28]. Understanding the cancer screening behaviors among these marginalized Asian immigrants is important to determine optimal mechanisms to improve access and to disseminate needed information regarding preventative health practices.

Colorectal Cancer Screening Among Asian Americans

Cancer has been the leading cause of death among AA population since 1980; the first and only racial/ethnic group to experience cancer as the leading cause of death [29]. Colorectal cancer (CRC) is the third most commonly diagnosed cancer in both men and women in the USA [30]; however, it is the second most common cancer among the Asian population [31]. Disturbingly, 50 % of new cases diagnosed yearly in the USA could have been avoided with routine CRS [32, 33]. The current level of CRS uptake is suboptimal, especially among minorities and in particular among AAs [34, 35]. Despite an increase in CRS rates for all racial/ethnic groups, disparities in the use of CRS have widened over the years [36]. In addition, the CRS rate among those with limited English proficiency (LEP) was even lower, and Asian subgroup analysis has been understudied, which may have important effects on health behavior and cancer screening [31, 37].

Methods

Data Sources

Between 2007 and 2010, the Chicago Asian Community Survey (CACS) project was designed and implemented as a comprehensive local health needs assessment, to assess determinants of morbidity and mortality, and health care access patterns of three Asian immigrant enclaves in the City of Chicago: Chinese, Cambodian, and Vietnamese [38]. The CACS project consisted of face-to-face interviews with random sampling of the Chinese community and Respondent Driven Sampling (RDS) of the Vietnamese and Cambodian communities. Random sampling was feasible in the Chinese community (Armour Square) where the concentration of Chinese living within the chosen blocks were majority of Chinese ethnicity. The random sampling of the Chinese community included a three-stage process. In the first stage of sampling, four census tracts were chosen with the highest percentage of Asian adults living in the area according to the 2000 US census. Next, 30 census blocks were randomly selected among the four census tracts. Utilizing US Postal Service data, every household and apartment building on those blocks were assigned an identification number. In the last stage, one member from each household was selected for participation in the study using a random selection derived from the Trodahl-Carter-Bryant selection matrix [39]. Household members were eligible if they were self-identified as Chinese Americans, were at least 18 years of age, were able to provide written informed consent, and lived in the community for at least 6 months.

Unlike the Chinese community, the Vietnamese and Cambodian communities are less concentrated and do not consist

of a majority population within their defined neighborhoods, given their relatively smaller population size. Therefore, in an attempt to maximize resources and to maintain scientific sampling, Respondent Driven Sampling (RSD) was used to administer our survey. RDS has been used successfully in hard to access populations both nationally and internationally [40, 41]. RDS employs a dual system of structured incentives to reach "hidden" population, when the size and boundaries of the population are unknown. The RDS sampling begins with choosing a set of initial subjects and the composition of the ultimate sample is independent of those initial subjects [42]. The difference between RDS and other traditional chain-referral methods, such as snowball method, is that it uses a primary and secondary incentive system. The primary incentive system provides material incentives, while the secondary incentive converts material incentives into peer-based symbolic incentives [42]. In CACS, two and four seeds were chosen from the Cambodian community and Vietnamese community respectively from the phone book, employing common surnames. Like the Chinese Americans, participants were eligible if they were self-identified as Cambodian Americans or Vietnamese Americans, were at least 18 years of age, were able to provide written informed consent, and lived in the community for at least 6 months. Each seed was given three coupons, which contained contact information regarding how to participate in the study. Each new survey participant, upon completing the survey, was given the same instructions.

In the Chinese community, interviewers visited 904 households, of which 570 (63.1 %) met the inclusion criteria. Interviewers subsequently made contact with 447 household members, of whom 383 (85.6 %) completed the survey interview. The overall response rate was 67.2 %. For the Cambodian community, it took 13 waves to complete 150 interviews over a 12-week period; while for the Vietnamese community, it took 35 waves to complete 250 interviews over 21 weeks. A total of 783 participants completed their interviews. Table 1 shows the proportion of our sample in the Chicago Asian population.

The survey instrument was modified and culturally adapted using questions from the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) and the National Health Interview Survey (NHIS). A community advisory board, which was composed of community members, community leaders, health administrators, and physicians, provided feedback on the survey instrument to ensure that the questions asked and the health topics covered were the most relevant and important to the community. The survey instrument, consent form, and methodology protocols were translated into Chinese, Cambodian, and Vietnamese. The translated documents were then back translated to English to assure the translated text expressed the same meaning. All translated documents were reviewed by the community advisory board to ensure cultural appropriateness and social acceptance. The final translated documents were approved by Institutional Review Board. The survey interview was conducted by a trained bilingual interviewer in a one-on-one setting. Questions and answers were read to participants. Prompts were included in the survey questions to address potential low health literacy. For example, the prompt for colonoscopy or sigmoidoscopy was that they were internal examinations of the colon often used to screen or diagnose cancer. All participants signed and received copies of the informed consent.

Table 1 The proportion of our sample in the Chicago Asian Population

	Population in Chicago City[a]	No. of sample	% of sample
Chinese	43,227	383	0.9
Cambodian	3001	150	5.0
Vietnamese	8476	250	2.9

[a] Based on American Community Survey 2009, the year the CACS was conducted

Sample

The sample in this study was from participants in the CACS project. The US Preventive Services Task Force recommends CRS using FOBT, sigmoidoscopy, or colonoscopy in adults beginning at age 50 years and continuing until age 75 years for average risk. Participants in the CACS project, who were immigrants and at least 50 years old, were included in the final analyses. Table 2 summarized the numbers and proportion of respondents who were included in the final data analyses from the three communities.

Measures

The main outcome measure was self-reports of CRS. Respondents were asked "Have you ever had either sigmoidoscopy or colonoscopy?" The main outcome was dichotomized into "Yes" versus "No". Those who responded affirmatively were also asked, "How long has it been since you had your last sigmoidoscopy or colonoscopy?" The CACS project followed the NHIS questionnaire and combined sigmoidoscopy and colonoscopy into a single question. In addition, screening tests were not distinguished from diagnostic tests. The main social

Table 2 The number (n) and Proportions (%) of Respondents ≥ 50Years Old

	Total sample	Chinese	Cambodian	Vietnamese
n	474	237	69	168
%	61	62	46	67

Table 3 Characteristics of study sample (n=474)

Characteristics	% of Asian in Chicago[a]	% of sample
Married	47.8	43.6
Family annual income <$20,000 for foreign-born	4.8	72.1
Education <12 years	17.0	70.8
Unemployment/Not in labor force	41.7	77.2
Have health insurance	77.3	83.3
Speak English less than very well	33.0	89.9

[a] Based on American Community Survey 2009

and demographic variables of interest in this study were educational attainment, employment status, marital status, annual family income, age, English proficiency, the number of years in the USA, health insurance coverage, and having a regular place for health care. Educational attainment included two categories: less than a high school diploma and had a high school diploma or higher. Employment status was dichotomized into employed (full-time, part-time, and self-employed) and unemployed (including not in the labor force). Marital status was dichotomized into married and unmarried (including widowed, divorced, separated). Annual family income consisted of two categories: less than or equal to $20,000/year and greater than $20,000/year. In 2009, the US Federal poverty guidelines for three and four persons in family were between $18,310 and $22,050. English proficiency was dichotomized into "Not at all or not well' and "Well or very well". The length in the USA was the actual years residing in the USA. Having health insurance and a regular place for health care were used as proxies for "access to care" and were dichotomized into "yes" and "no". Since participants who were ≥65 years old were eligible for Medicare and most likely to have access to CRS, the age variable was also dichotomized into less than 65 years old and 65 years or older.

Statistical Analysis

Descriptive analyses were conducted to summarize sample characteristics. Chi-square tests were used to compare social and demographic characteristics on CRS behaviors, overall and across the three communities. A three-step logistic regression analyses was used to estimate the predictive power of social and demographic variables on having had CRS before. In the first step, we assessed the simple effect of ethnic subgroup. As we pointed out earlier, CRC screening rates might differ among Asian subgroups. Next, we adjusted for access to care using having health insurance as a proxy. Having health insurance was frequently found to be significantly associated with cancer screenings. People who have health insurance are also more likely to have a regular place for health care. Finally, we adjusted for socio-demographic factors that were found significant to see if it increased the predictive power. Socio-demographic factors, such as higher income and being employed, can positively affect CRS [43]. Any missing

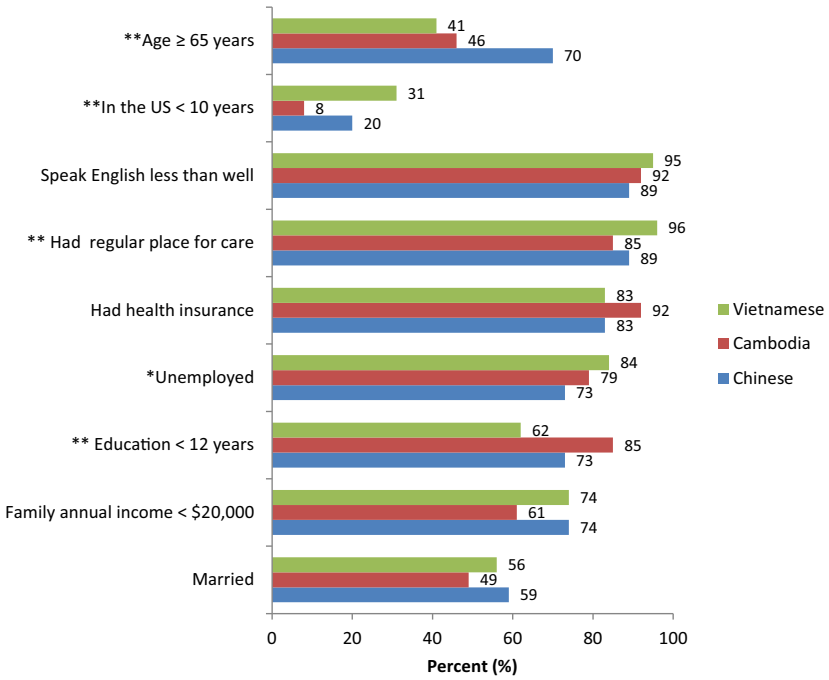

Fig. 1 Comparisons of socio-demographic characteristics across the three communities

* $p < .005$; ** $p < .0005$

values with dichotomous variables were replaced by the value of nearby point. Any missing values with continuous variables (age and time in the USA) were replaced by using the mean of 6 nearby points. All analyses were conducted using SPSS software version 21.0, and two-tailed p values less than or equal to 0.5 were considered statistically significant.

Results

Sample Characteristics

A total of 783 participants completed the CACS interviews. Of the 783 participants, 474 met the age and immigrant criteria, and 456 (96 %) responded to the CRS question. Table 3 shows the selected social and demographic characteristics of the sample (n=456) compared to the Chicago Asian population. Compared to the Chicago Asian population, a higher portion of our sample lived in a low-income household, had less years of education, was unemployed, and spoke English less than well. Figure 1 compares these characteristics across the three disaggregated communities. Vietnamese participants were less likely to complete a high school education compared to the Chinese and Cambodian participants, and were more likely to be unemployed. Although only 83 % of the Vietnamese participants reported having health insurance, 96 % reported having regular place for health care. Almost one-third of the Vietnamese participants (30 %) lived in the USA less than 10 years compared to only 20 % of the Chinese participants and 8 % of the Cambodian participants. The majority of the Chinese participants were significantly older, 70 % were 65 years or older.

Colorectal Cancer Screening Rates Among the Three Communities

Figure 2 shows the overall as well as the subgroup colorectal cancer screening rates. Overall, our sample had a low CRS rate (30 %). The majority of the respondents, who reported having CRS with either sigmoidoscopy or colonoscopy, were done within 5 years.

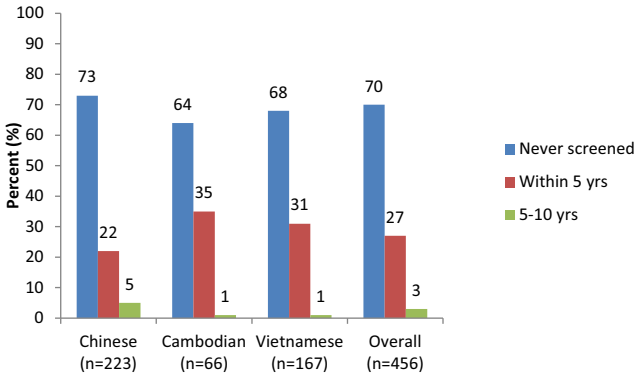

Fig. 2 Colorectal cancer screening rates across the three communities

Socio-demographic Factor and Colorectal Cancer Screening

Table 4 shows the association between socio-demographic factors and having had CRS before. There were no significant differences in having had CRS before among the three ethnic subgroups. However, Chinese had the lowest screening rate among the three groups. Although Cambodian and Vietnamese had a higher CRS rates, it remained lower than the national level for the general population (59 %) and the national level for the Asian population (47 %). Employment status, having health insurance, and length in the USA were significantly associated with having had CRS in the past. Participants,

Table 4 Socio-demographic characteristics and having had CRS before (n=456)

Socio-demographic characteristics	No (%)	Yes (%)	p value
Ethnic subgroup			
Chinese	73	27	
Cambodian	64	36	
Vietnamese	68	32	0.2328
Marital status			
Not married	72	28	
Married	68	32	0.419
Employment status			
Not employed	67	33	
Employed (self, full/part-time)	80	20	0.013
Education			
<12 years	71	29	
≥12 years	68	31	0.144
Annual family income			
≤$20,000	68	32	
>$20,000	73	27	0.313
Had health insurance			
No	82	18	
Yes	68	32	0.015
Had a regular place for health care			
No	81	19	
Yes	68	32	0.108
English speaking proficiency			
Not at all/not well	70	30	
Well/very well	68	32	0.889
Age ≥65 years old			
No	76		
Yes	65	24	0.008
Years in the USA, mean (SD)	18 (11)	21 (12)	0.002

who were ≥65 years old, were also more likely to have CRS before. Table 5 shows the results of the three-step logistic regression analysis on having had CRS in the past. Ethnic subgroup did not have any significant predictive effect on having had CRS before when considered alone. In Model 2, when adjusting for access to care using health insurance coverage as a proxy, participants who had health insurance were two times more likely to have CRS in the past. In model 3, when considering other significant socio-demographic factors identified in Table 4, the effect of having health insurance attenuated. However, participants who were in the USA longer and were ≥65 years old were more likely to have CRS in the past. When considering for other socio-demographic factors, the likelihood for Chinese participants to have CRC before attenuated.

Discussion

This study provides an overview of colorectal cancer screening using either sigmoidoscopy or colonoscopy among immigrants from three Asian ethnic subgroups and the potential influence of socio-demographic factors on colorectal cancer screening behavior. Several findings are important in the context of cancer prevention. Our study cohort showed lower screening rates (30 %) compared to national average for the general population (59 %) and for the Asian population alone (47 %). This is not surprising since Asian immigrants in the Midwest, and in Chicago in particular, lack a health infrastructure which can provide easy access to care or receipt of culturally competent, linguistically appropriate services. This is in stark contrast to coastal regions where the Asian American population and health resources are significantly more established. As urban settings become increasingly diverse, variation in the health status of smaller geographic areas may be substantial, especially if true advances in disease prevention and control are to be achieved [44–46].

In our study, the combined socio-demographic variables, including having health insurance and a regular place for health care as proxies for access to care had a minimum effect in predicting colorectal cancer screening behavior. The weak association between our socio-demographic variables and having had CRS in the past is consistent with other studies and highlights the importance of exploring other factors which may contribute to the low screening rates among our local Asian immigrant population. Even after controlling for socioeconomic status, access and language barriers, studies show that the low rates in cancer screenings persisted among Asian Americans compared to non-Hispanic whites and other minorities, such as African Americans and Hispanic Americans [47, 48]. Cultural factors may play a more significant role in contributing to the disparity in CRS than socioeconomic status alone, especially when Asian immigrants' health beliefs and normative values differ from Western health beliefs and values. While health care reform under the Affordable Care Act will certainly improve access to care, our findings suggested that expanding public health insurance programs may not be enough to improve cancer screening rates among these growing Asian immigrant populations. Studies have shown that without culturally and linguistically appropriate services,

Table 5 Logistic regression analysis on having had CRS in the PAST (n=456)

	Model 1 OR (95 % CI)	Model 2 OR (95 % CI)	Model 3 OR (95 % CI)
Ethnic subgroup			
Ethnic subgroup 1 (1=Chinese)	0.849 (0.545–1.322)	0.848 (0.543–1.325)	0.546 (0.316–0.943)*0
Ethnic subgroup 2 (1=Cambodian)	1.176 (0.637–2.172)	1.104 (0.595–2.047)	0.911 (0.474–1.748)
Had health insurance (1=yes)		2.153 (1.134–4.086)*	1.042 (0.485–2.240)
Socio-demographic factor			
Employment status (1=employed)			0.833 (0.434–1.599)
Age ≥65 years old (1=yes)			1.730 (1.016–2.947)*
Years in the USA			1.029 (1.006–1.052)*
Over all model evaluation	$\chi^2(2)=1.292$	$\chi^2(3)=7.449$	χ^2 (6) = 21.060
	$p=0.524$	$p=0.059$	p = .002
Good-of-fit test (Hosmer and Lemeshow)	NA	p=0.490	p=.971
Cox and Snell R Square	0.003	0.017	0.046
Nagelkerke R Square	0.004	0.024	0.066
c statistic	69.8 %	69.8 %	69.8 %

Missing cases, 7 (1.5 %)

OR odd ratio

*p<0.05

access to care alone does not improve screening behavior [49, 50]. The logistic regression model showed that being in the U.S. longer and older than 65 years old had a positive effect on colorectal cancer screening. Interestingly, Chinese participants had the highest average years in the US and yet had the lowest screening rate among the three groups. In addition, 70 % of the Chinese participants were ≥65 years old and more likely to have access to CRS through Medicare. While this needs to be further explored, one possible explanation may be the belief that they are not at risk of colorectal cancer [51]. This type of health belief may hinder adoption of colorectal cancer screening. However, why this group differs from both the Cambodian and Vietnamese cohorts needs to be further studied.

Limitation

This study has several limitations. The cross-sectional nature of the study does not allow us to ascertain causal relationships. Furthermore, the screening data were collected via self-report by the participants and may subject to recall bias and social desirability. Different sampling methods for Chinese versus Cambodian and Vietnamese participants may have introduced some selection bias. Finally, the generalizability was limited to Chicago Asian immigrants and may not reflect similar resources in other regions. In addition, because of limited resources, we only included three communities. Nonetheless, the purpose of this study was to provide an overview of current and local trends and needs on colorectal cancer screening among disaggregated foreign-born Asians.

Conclusion

Addressing the health care needs of the immigrant population is challenging both because of the heterogeneity of this group and because of the lack of disaggregated national and local health data. In spite of the above limitations, this study provides important information on colorectal cancer screening disparities among low socioeconomic status and limited English proficient foreign-born Chinese, Vietnamese and Cambodians in Chicago and the role of social and demographic factors in accounting for these disparities. These findings should serve as a critical evidence base to inform future research, policy and targeted interventions. With increasing access to care and preventative services under the Patient Protection and Affordable Care Act, AA immigrants may continue to be at risk for suboptimal colorectal cancer screening unless further studies help us understand the intra- and inter-group differences among Asian subgroups and barriers and facilitators of cancer prevention. Future studies on the effectiveness of culturally and linguistically specific interventions are needed to address these gaps and to achieve health equity.

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Conflict of Interest Authors Kim K., Chandrasekar E., and Lam H. declare that they have no conflict of interest.

Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

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