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Comparison of Medical Service Utilization and HPV Vaccination Rates among Somali and White/non-Hispanic Females

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Abstract

Objective—To determine if there is a relationship between medical utilization patterns and HPV vaccination rates among a previously studied population of Somali and white/non-Hispanic girls in Rochester, MN.

Materials and Methods—Utilizing a previously identified group of Somali and white/non-Hispanic girls with known human papillomavirus vaccination (HPV) status, the number, type and age at provider visits were abstracted. Abstraction was blinded to vaccination status and ethnic designation. Chi-squared test and student's t-test were performed for descriptive analysis of parametric data. For non-parametric data, Wilcoxon Rank Sum Test was performed.

Results—Somali girls had fewer provider visits (median, 7; Interquartile Range [IQR], 3/12.25) than white/non-Hispanic girls (median, 12; IQR, 6-18) ($p<0.001$). Among those who completed the HPV vaccine series, Somali girls had more well-child visits (median, 2; IQR 1-2) compared to the white/non-Hispanic group (median 1; IQR 1-2) ($p=0.028$). There was no difference in the number of ER visits or inpatient hospitalization between groups.

Conclusions—White/non-Hispanic girls had higher HPV vaccine completion rates and more provider visits. However, this increase in number of encounters is due to an increase in specialty visits. This is unlikely to account for the increase in HPV vaccination completion rates. Community-based research will likely provide greater insight into the cause(s) of reduced vaccine rates among Somali adolescent girls.

Keywords

Papillomavirus Vaccines; Uterine Cervical Neoplasms; Somalia; Refugees and Immigrants; health care utilization

Introduction

The Somali population in the United States (US) continues to grow with estimates exceeding 100,000 and Minnesota alone having an estimated 60,000 Somali individuals (1). While it is

unknown if the rate of cervical cancer among Somali immigrants is similar to that of Somali women in Somalia, the incidence of cervical cancer among women in Somalia is one of the highest worldwide, with an incidence of 20.3 women per 100,000 and a mortality rate of 15.2 per 100,000 (2). Although Papanicolaou (Pap) testing is effective at reducing the rate of cervical cancer, Somali immigrants are less likely to routinely participate in Pap testing, thus placing them at higher risk for cervical disease and cancer (3). Therefore, primary prevention of cervical cancer through HPV vaccination has an essential role in preventing cervical cancer in this population. Unfortunately, recent evidence suggests Somali girls are less likely to complete the HPV vaccination series when compared to their white/non-Hispanic cohort (4).

It is unclear whether or not the reduced vaccine completion rates among the Somali population is due to differences in medical service utilization. Somali women in the US experience several challenges in accessing the health care system including language barriers, difficulty navigating the healthcare system, and cultural differences (5,6), some or all of which may lead to difference in utilization of the health care system (7). These challenges may result in under vaccination within this population. Therefore, the aim of this study was to determine if there is a relationship between medical utilization patterns and HPV vaccination rates among a previously studied population of Somali and white/non-Hispanic girls in Rochester, MN.

Methods

Study Population

The study population is previously described in *Pruitt et al.* (4). Study subjects were identified using the Rochester Epidemiology Project (REP), a system which links medical records from multiple participating institutions by patient (8). Subjects who were female, 9 to 18 years of age during the study period, (August 01, 2006 through December 31, 2009) and Olmsted county residents during this time were eligible for inclusion in the study. Somali identity was ascertained using self-identified information from the REP, data from the electronic medical record and surname. White/non-Hispanic subjects were excluded from the study population if a preferred language other than English was specified in the electronic medical record. Research authorization was verified for each subject; those who had withdrawn authorization were excluded from the study. All Somali girls who met inclusion criteria were included in the study. They were randomly matched by year of birth to a white/non-Hispanic girl who also met inclusion criteria at a ratio of 3:1 (white/non-Hispanic: Somali) to improve the statistical power of the study.

For each study subject, the number, date, type, associated diagnoses and age at each medical encounter/provider visit during the study period was extracted from the electronic medical record by the Health Sciences Research Department, Division of Biomedical Statistics and Informatics. Data extraction was performed by an individual blinded to patient race or national identity and HPV vaccination status. This study was approved by the Mayo Clinic Institutional Review Board.

Vaccination Status

To ascertain vaccination status, the electronic medical record and immunization record were reviewed for each study subject by the lead investigator. Documentation of HPV vaccine administration in the medical record, immunization record, or both records during the study dates was recorded as the subject having received the HPV vaccine. One dose of HPV vaccine during the study period delineated vaccine initiation. Three documented doses of the HPV vaccine during the study period denoted vaccine completion regardless if the vaccine series was completed within the recommended 6 months.

Statistical Analysis

Vaccination status, self-identified race/nationality and provider visit profiles were combined for data analysis. Statistical analysis was carried out using JMP 9.0 software (SAS Institute, INC, Cary, NC). Data are presented as frequency (N), median, and interquartile range (IQR). Chi-squared test and student's t-test were performed for descriptive analysis of parametric data. For non-parametric data, Wilcoxon Rank Sum Test was performed. An alpha level of 0.05 was used to determine statistical significance; this level was adjusted for multiple comparisons using a Bonferroni correction. Odds Ratios (OR) with corresponding 95% confidence intervals (CI) were determined using logistic regression.

Results

A total of 248 Somali and 715 white/non-Hispanic females met eligibility criteria. The average patient age at the initial visit within the study period was 10.4 years for white/non-Hispanic girls and 10.9 for Somali girls ($p = 0.06$).

Among both Somali and white/non-Hispanic groups, initiation of the vaccine series was more likely among those who had more provider visits (Table 1). Among Somali subjects ($N=248$), those who initiated the HPV vaccine ($N=92$) had more (median, 10; IQR, 6-16) provider visits compared to those who did not (median, 5; IQR, 3-10) ($p<0.0001$). Somali girls who completed the vaccine series ($N=57$) also had more provider visits (median, 11; IQR, 7.5-19) than those who did not complete the vaccine series (median, 5; IQR, 3-10) ($p=0.0012$).

Among all white/non-Hispanic girls ($N=715$), those who initiated the HPV vaccine ($N=325$) had more provider visits (median, 14; IQR, 9-21) compared to non-initiators (median, 8; IQR 3.75-14) ($p<0.0001$). Similarly, those who completed the vaccine ($N=233$) had more provider visits (median, 15; IQR, 10-23) compared to those who did not (median, 9; IQR, 4-15) ($p<0.0001$).

Somali girls had fewer (median, 7; IQR, 3-13) provider interactions throughout the study period compared to white/non-Hispanic girls (median, 11; IQR 6-18) ($p<0.0001$) (Table 2). For those who initiated the vaccine series white/non-Hispanic girls had more (median, 14; IQR 9-21) provider visits when compared to Somali girls (median, 10; IQR, 6-15.75) ($p=0.0003$). Similarly, among those who completed the vaccine series white/non-Hispanic girls had more (median, 15; IQR 10-23) provider visits compared to Somali girls (median, 11; IQR 7.5-19) ($p=0.0592$).

The types of provider visits were also abstracted and compared to ascertain whether the type of visit influenced receipt of the HPV vaccine. Between groups comparison of types of visits is displayed in Table 2. Well-child visits are of particular interest since they typically involve review of patient's immunization status. Overall, the median number of well-child visits was 1 (IQR, 1-2) for both Somali and white/non-Hispanic groups. Similarly, among those who initiated the vaccine series, the median number of well-child exams was 1 (IQR, 1-2) for both Somali and white/non-Hispanic groups. Among those who completed the vaccine, Somali girls had more well-child exams (median, 2; IQR, 1-2) compared to white/non-Hispanic girls (median, 1; IQR, 1-2), however this difference was not statistically significant ($p=0.084$).

While, the Somali group had a greater range in the number of ER visits (median, 1; IQR, 1-3) than the white/non-Hispanic girls (median, 1; IQR 1-2) ($p=0.261$), there was no statistically significant difference between groups for those who initiated or completed the vaccine series and number of ER visits (Table 2).

Similarly, there was no statistically significant difference in number of inpatient hospitalizations between Somali and white/non-Hispanic girls (Table 2). Overall, Somali girls had a greater range in number of inpatient hospitalizations during the study dates compared to the white/non-Hispanic girls, which was similarly found for those who initiated and completed the vaccine series.

With regard to primary care services, Somali girls were less likely to be seen in Family Medicine (OR, 0.51; 95% CI, 0.37–0.71), and more likely to be seen in Pediatrics (OR, 1.81; 95% CI, 1.30–2.50) (Table 3). Among those seen in Family Medicine, Somali and white/non-Hispanic girls were equally likely to initiate the vaccine. However, white/non-Hispanic girls were more likely to complete (OR, 0.49; 95% CI, 0.26–0.90) the vaccine series. Similarly, among those seen in Pediatrics there was no difference in initiation rates, but Somali girls were less likely to complete (OR, 0.63; 95% CI, 0.44–0.92) the vaccine series.

Discussion

The purpose of this study was to determine if patterns of medical service utilization can help explain previously identified differences in HPV vaccine completion rates between Somali and white/non-Hispanic females 9–18 years of age. Both Somali and white/non-Hispanic girls showed an increased likelihood of initiation and completion of the HPV vaccine series as the number of provider visits increased. This may not be surprising given that each provider visit would introduce an opportunity for vaccination. Somali girls had fewer provider visits throughout the study period overall compared to white/non-Hispanic girls, but those who completed the series had no more overall or well-child visits throughout the study timeframe.

While HPV vaccine initiation rates did not differ between the two study groups, provider visits did, with Somali girls who initiated the vaccine having fewer provider visits than white/non-Hispanic girls. Similar to many preventive health behaviors, HPV vaccine initiation is associated with individual preferences, motivation and knowledge (9, 10).

Therefore, it is likely that those with greater personal motivation to initiate the vaccine actually do so, and that the number of provider encounters is less influential. In contrast, the number of provider visits may influence completion rates by creating opportunities to check patient progress toward series completion during each encounter and administer the second and third doses. Importantly, the number of overall provider visits among vaccine series completers between groups was not statistically significant. This suggests that the type of provider visit, not just the number of visits, may explain the difference in completion rates.

Family Medicine and Pediatrics provide the majority of primary care services for children and adolescents 9–18 years of age. In this investigation, differences in receipt of primary care services were observed such that Somali girls were more likely to have Pediatrics as their primary care service whereas white/non-Hispanic girls were more likely to have Family Medicine as their primary care service. Interestingly, white/non-Hispanic girls were still more likely to complete the vaccine series whether seen by Family Medicine or Pediatrics, suggesting the type of primary care provider specialty did not impact vaccine completion rates.

Examination of the overall number of well-child visits, ER visits or inpatient hospitalizations failed to account for differences in completion rates. Thus, the remaining specialty visits are left to account for the disparities in number of overall provider visits between groups. However, it is unlikely that HPV vaccination is a service provided in specialty clinics, such as ophthalmology. This makes it difficult to explain differences in completion rates by a greater number of provider visits, when the provider visits are non-primary care services.

Of note, the 6-month difference in age between Somali and white/non-Hispanic adolescents at the initial visit captured during the study period was not only statistically significant, but may be clinically relevant. On average, Somali girls were older when compared to the white/non-Hispanic girls, in fact closer to the recommended age for vaccination of 11–12 years. Therefore, it would be expected that Somali girls would not only have higher initiation rates, but higher completion rates given that nationally, girls who are older when they begin the series are more likely to complete the series (11). However, there was no difference found in initiation rates between these two groups of girls, and white/non-Hispanic girls were actually found to be more likely to complete when compared to Somali girls.

Ultimately, the difference in HPV vaccine completion rates may have no relation to number or type of provider interaction. In addition to these findings, we previously did not find a correlation between language and HPV vaccination status; specifically needing a language interpreter did not increase the risk of being unvaccinated (4). Therefore, improving completion rates among the Somali population may have less to do with improving access or the infrastructure of local medical practice and more to do with working directly with the community. Community-engaged research is needed in order to fully understand the needs of this population and identify potential ways to improve vaccine completion rates.

This study had several limitations. The study population is a selected sample of girls and adolescents who receive their health care at a tertiary medical institution. While all study

participants were identified as county residents receiving their primary care at this institution, those girls receiving primary care at an alternative facility were not included and therefore could impart a degree of selection bias. This bias was previously evaluated in *Pruitt et al* 2013 to be minimal (4). Additionally, HPV vaccination status was previously determined using a single institution's electronic medical record. Study subjects may have received one or more doses elsewhere that were not documented in the medical record used for research purposes. However, measures were taken to capture vaccinations that may have occurred at an outside facility by examining both the provider notes and immunization records, as described in *Pruitt et al* 2013 (4). Within this study population, 9.7% of subjects received the vaccine elsewhere yet were captured in the study design (4). While it is a limitation of this study, the effect was minimized.

In conclusion, this study found white/non-Hispanic girls to have an overall greater number of provider visits during the study period when compared to their Somali counterparts. However, this difference was not in the number of well-child exams, ER visits or hospitalizations. Instead, white/non-Hispanic girls had more specialty visits as compared to Somali girls. Due to the nature of specialty care, it is unlikely that a greater number of specialty care visits among white-non-Hispanic girls relative to Somali girls explains the disparity in HPV vaccine completion rates. Community-based research using in-depth, qualitative methods may provide a better understanding of the barriers to HPV vaccine completion in Somali populations and form the basis for effective interventions, particularly among those Somali females who have already initiated the vaccine series.

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Abbreviations

HPV	human papillomavirus
OR	odds ratio
IQR	Interquartile Range
Pap	Papanicolaou

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Table 1
Comparison of the Total Number of Provider Visits within Groups by HPV Vaccination Initiation and Completion Status

Vaccine Status	White/non-Hispanic			Somali		
	N	Median # Visits (IQR)	<i>p</i> [*]	N	Median # Visits (IQR)	<i>p</i> [*]
Initiated						
Yes	325	14 (9–21)	<0.0001	92	10 (6–15.75)	<0.0001
No	390	8 (3.75–14)		156	5 (3–10)	
Completed						
Yes	233	15 (10–23)	<0.0001	57	11 (7.5–19)	0.0012
No	481	9 (4–15)		191	5 (3–10)	

IQR, interquartile range.

^{*} Non-parametric data, Wilcoxon Rank Sum Test

Table 2

Provider Visits Between Groups by HPV Vaccination status

Visit Type	White/non-Hispanic	Somali	<i>p</i> [*]
All			
Overall	11 (6–18)	7 (3–13)	<0.0001
Vaccine Initiated	14 (9–21)	10 (6–15.75)	<0.001
Vaccine Completed	15 (10–23)	11 (7.5–19)	0.059
Well-child			
Overall	1 (1–2)	1 (1–2)	0.99
Vaccine Initiated	1 (1–2)	1 (1–2)	0.99
Vaccine Completed	1 (1–2)	2 (1–2)	0.084
ER			
Overall	1 (1–2)	1 (1–3)	0.261
Vaccine Initiated	1 (1–2.75)	1 (1–2.5)	0.808
Vaccine Completed	1 (1–2)	1 (1–2)	0.99
Inpatient/Hospital			
Overall	1 (1–2)	1 (1–4)	0.627
Vaccine Initiated	1 (1–2)	2 (1–4)	0.966
Vaccine Completed	1 (1–2)	2 (1–3.75)	0.892

IQR, interquartile range.

* Non-parametric data, Wilcoxon Rank Sum Test; corrected with Bonferroni method

Table 3

Odds Ratio of HPV Vaccination between Groups by Primary Care Service

Specialty	White/non-Hispanic N (%)	Somali N (%)	OR (95% CI)
Family Medicine	268 (37.5)	58 (23.4)	0.51 (0.37–0.71)
Initiated	160 (59.7)	29 (50.0)	0.68 (0.38–1.19)
Completed	123 (45.9)	17 (29.3)	0.49 (0.26–0.90)
Pediatrics	450 (62.9)	187 (75.4)	1.81 (1.30–2.50)
Initiated	239 (53.1)	86 (46.0)	0.75 (0.53–1.10)
Completed	178 (39.6)	55 (29.4)	0.63 (0.44–0.92)

OR, odds ratio; 95%; CI, 95% Confidence Interval.