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ORIGINAL ARTICLE

# Improved Timeliness of Care for the Underserved: A Potential for Patient Navigation

***Jason F Ohlstein[1,2*], Thomas S Edwards[1,3], Charles A Riley[1], Joseph F Buell[4] and Paul L Friedlander[1]***

*[1]Department of Otolaryngology and Head & Neck Surgery, Tulane University School of Medicine, USA*

*[2]Department of Otolaryngology and Head & Neck Surgery, University of Texas Medical Branch, USA*

*[3]Department of Otolaryngology and Head & Neck Surgery, Emory University School of Medicine, USA*

*[4]Department of Surgery, Tulane University School of Medicine, USA*

***Corresponding author:** *Jason F Ohlstein, MD, MS, MPH, Department of Otolaryngology and Head & Neck Surgery, Tulane University School of Medicine, New Orleans, LA 70112, USA; Department of Otolaryngology and Head & Neck Surgery, University of Texas Medical Branch, Galveston, TX 77550, USA, Tel: 504-988-5454, Fax: 504-988-7864*

## Abstract

**Background:** Minorities suffer disproportionately worse outcomes in malignancies of the head and neck; Here we seek to determine the potential for patient navigation to improve the timeliness of head and neck cancer care in an underserved population.

**Methods:** Retrospective chart review of 100 consecutive patients presenting from each of two tertiary referral centers in inner city New Orleans, Louisiana located in the same zip code serving the local community, with a new diagnosis of squamous cell carcinoma of the head and neck between 2011 and 2014.The data from 187 patients were analyzed for delay at presentation and subsequent provider delay. Statistical analysis was performed to evaluate the effect of race, insurance status, and patient navigation on patient and provider delay using.

**Results:** The mean patient delay to presentation was 161 days while the mean provider delay was 27 days. Analysis revealed three groups with significant provider delay: African Americans (37 *vs.* 23 days, $P = 0.0003$), uninsured (33 *vs.* 21 days, $P = 0.002$), and absence of navigation (36 *vs.* 19 days, $P = 0.0001$). Accounting for race and insurance status, adjusted subset analysis revealed that the absence of patient navigation was associated with an increased risk of provider delay. An adjusted risk ratio ($RR_{mh}$) was found to be 1.55 (1.10, 2.2 $P = 0.006$).

**Conclusions**: Patient navigation has the potential to diminish temporal disparities for the underserved and at risk populations afflicted with HNC; This finding has great implications in the shaping of future health policy. Further studies are needed to define the benefit of patient navigation in this at risk population.

### Keywords

Cancer disparities, Head and neck cancer, Patient navigation, Delays in care, Underserved

## Introduction

The plight of the underserved afflicted with head and neck cancer (HNC) in the United States and the importance of early detection has been extensively documented [1,2]. From the perspective of race, African American (AA) patients are more likely to present with advanced disease and are twice as likely to die of disease as their counterparts [3,4]. Five-year survival for the AA patient is 27.9% versus 54.2% for caucasians [5]; Furthermore, patients who are uninsured/underinsured, are three times as likely to die of malignancy [6]. This is a devastating disparity in outcomes that is not truly understood and is often overlooked.

Advances have been made in understanding the individual factors contributing to this disparity. Inherent biological differences of race have been suggested as a driver for racial disparity. A lower prevalence of human papilloma virus (HPV) associated HNC has been

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described in the AA population and has been associated with poor outcomes [7]. Insurance status, access to care, difficulties with child care, transportation, and feelings of mistrust toward the healthcare system have been identified as important non-biological contributing factors [8,9]. The challenge of understanding racial and socioeconomic disparity lies in the interwoven nature of these factors: The entanglement of race and poverty.

It is surprising that effective strategies addressing disparity for HNC have not been developed. This lack of effective management of disparity is in contrast to other cancer sites, such as breast cancer, in which the development of formal screening and management have improved outcomes for the underserved [10,11]. For these cancers, success rests on effective community partnerships and the development of patient navigation systems focused on the underserved [12,13].

For head and neck cancer, the utility of patient navigation for HNC disparity is unknown. A PubMed search revealed only one study addressing the efficacy of patient navigation for HNC; Which demonstrated that implementation of a patient navigation system in an academic center allowed for greater timeliness of care. Meaningful conclusions of efficacy of patient navigation for the underserved in terms of timeliness of care could not be made secondary to the homogenous nature of the study population [14].

Nevertheless, we hypothesize that patient navigation can improve healthcare delivery for the underserved afflicted with head and neck cancer by enhancing timeliness of care. In this study, we test this hypothesis through the investigation of two academic head and neck cancer centers: One residing in a traditionally underserved hospital without navigation and one residing in a hospital already utilizing navigation. Risk factors associated with patient and provider delay for the underserved were investigated, along with the impact of patient navigation on timeliness of care.

## Materials and Methods

### Study population and data collection

One hundred consecutive patients presenting between 2011 and 2014 with a presumed new diagnosis of primary squamous cell carcinoma (SCC) of the head and neck were identified at each of two tertiary cancer centers within the same zip code, for a total initial study population of 200 patients. Both were academic cancer centers: One university-based with a patient navigation system with a two-week aspirational goal for treatment recommendations and one residing within a public safety-net hospital without a patient navigation system. Inclusion criteria were limited to those with a newly diagnosed primary SCC malignancy of the head and neck. Patients were excluded if the records were incomplete and time points could not be determined.

The data of both sites were combined in this study to minimize bias, for a final study population of 187 patients. 93 patients originated from an academic center which utilized patient navigation, while 94 patients originated from a center which did not use navigation. Thirteen patients were excluded due to: Tumors later found to be benign, tumors later found to be recurrent, or patients lost to follow up after first visit. Dates of first symptom, first presentation to a healthcare system, presentation to head and neck clinic, and treatment recommendation were recorded. Demographic data including: Insurance type, race, age, sex, and stage were collected. Tumor stage was determined according to American Joint Committee on Cancer (AJCC) guidelines, with early stage including stage I and II and late stage including stage III and IV.

### The Effect of race and insurance status on timeliness of care

Subset analysis for racial and socioeconomic disparities for timeliness of care was determined. Timeliness of care comparisons were made for African American (AA) versus non-African American (non-AA) patients. Socioeconomic comparisons were performed using insurance as a surrogate. Patients were divided into two groups: An insured group (those with Medicare or private insurance) and an uninsured group (those with Medicaid or no insurance). Timeliness of care was determined for each group.

### The effect of patient navigation on timeliness of care

Subset analysis was performed for patients who had patient navigation versus those who did not. The relative risk of temporal delay was determined for both groups as well as accounting for confounding variables of race and insurance status.

### Definitions of patient and provider delay

In this study *patient delay* was defined as an interval in excess of 30 days from a patient's first symptom to their first presentation to a health care system. *Provider delay* was defined as an interval from a patient's first visit to the head and neck clinic to treatment recommendation greater than 14 days. At both institutions in this study, treatment recommendations were only provided after tissue biopsy was performed and staging was discussed at tumor board.

### Patient navigation model

The navigation model utilized in this study, which has been previously described, utilizes a nurse navigator to help facilitate a 14-day aspirational goal from initial clinic presentation to treatment recommendation [14]. The navigator in this study also functioned as a clinic nurse, thus minimizing costs and increasing efficiency. The navigator is tasked with scheduling all diagnostic studies including panendoscopy, follow-up appointments, and coordinating patient presentation at a weekly multidisciplinary tumor board.

### Data collection and analysis

This study met Institutional Review Board (IRB) approval, and all patient information and data was collected and protected following guidelines set forth by both site's IRB and HIPPA regulations. Data and statistical analysis was performed using SAS 9.4 (SAS Institute, Cary, NC) and Prism 6 (Graphpad Software, San Diego, CA). Subgroup analysis and stratification was performed on categorical variables to identify confounders, crude risk ratios (RR) and adjusted risk ratios ($RR_{mh}$), utilizing the Cochran-Matnel-Haenszel method, are reported as such. The unpaired *t* test was used to determine the statistical significance between continuous variables and two-tailed Fisher's exact for categorical variables. 95%-confidence intervals were calculated for all RR and presented as such. *P* values less than 0.05 were considered significant.

## Results

### Patient demographics

Analysis of the combined data from the two sites revealed a study population that was predominantly male (82%) (n = 153) with an average age at presentation of 59. There was a balanced distribution of insurance types with 56% being uninsured (Medicaid/uninsured, n = 105) and 44% with insurance (Medicare/private, n = 82). African Americans accounted for 31% of the study population (n = 58) and 86% of patients presented with advanced stage HNC (n = 161) (Table 1).

### Patient and provider delay stratified by race

Patient and provider delay intervals were analyzed for AA and Caucasians. There was no significant difference in patient delay for AA versus Caucasian patients, with a mean interval for AA of 153 ± 186 days versus 164 ± 194 days for Caucasians (*P* = 0.7). The provider delay interval was significantly higher for AA compared to Caucasians, with a mean interval for AA of 37 ± 28 days and 23 ± 22 days in Caucasians (*P* = 0.0003) (Table 2).

**Table 1:** Study demographics: Study population consisted of a relatively even split of insurance types, was predominantly male, caucasian, and presented at an advanced stage. These attributes are similar to the typical head and neck cancer patient presenting in the United States.

| | Total | Mean |
|---|---|---|
| Age | 187 | 59 |
| Access to navigation | 93 (50%) | |
| Gender: Male | 153 | |
| Race: African American | 58 (31%) | |
| White | 129 (69%) | |
| **Stage:** | | |
| Early | 26 (14%) | |
| Advanced | 161 (86%) | |
| **Insurance type:** | | |
| Private/medicare | 105 (44%) | |
| Uninsured/medicaid | 87 (56%) | |

### Patient and provider delay stratified by insurance status

Patient and provider delay was analyzed for those with and without insurance as previously defined. The mean patient delay interval for those without insurance was 161 ± 166 days versus 160 ± 221 days for those with insurance (*P* = 0.97). The mean provider delay interval for those without insurance was 33 ± 26 days and 21 ± 21 days for those with insurance (*P* = 0.001) (Table 2).

### Patient and provider delay stratified by the presence or absence of navigation

Patient and provider delay intervals were analyzed for patients utilizing a system with patient navigation and those who were not. The mean patient delay interval for those with navigation was 129 ± 164 days versus 189 ± 209 days for those without (*P* = 0.03). The mean provider delay interval for those with navigation was 19 ± 19 days and 36 ± 27 days for those without (*P* = 0.0001) (Table 2).

### Subgroup analysis of patient and provider delay

Patient and provider delay was further analyzed by

**Table 2:** Factors influencing patient and provider delay: Delay intervals for both patient and provider delay were stratified an analyzed for race, insurance status, and presence of navigation. Mean, standard deviation, median, and mode number of days were calculated for each interval in each strata. There was no significant different in the patient delay interval for race and insurance status; However, the absence of patient navigation was associated with a statistically significant increase in the patient delay interval. African Americans, the uninsured, and those utilizing a system without patient navigation were all associated with a significantly increased provider delay interval.

| Time period *Variable* | Mean | Median | Mode | STDev | *P*-Value |
|---|---|---|---|---|---|
| **Patient delay** | | | | | |
| **Race:** | | | | | |
| African American | 153 | 85 | 61 | 186 | |
| White | 164 | 94 | 31 | 194 | 0.7 |
| **Insurance status:** | | | | | |
| Uninsured | 161 | 92 | 61 | 166 | |
| Insured | 160 | 80 | 26 | 221 | 0.9 |
| **Patient navigation:** | | | | | |
| With navigation | 189 | 96 | 61 | 209 | |
| Without navigation | 129 | 73 | 31 | 164 | 0.03 |
| **Provider delay** | | | | | |
| **Race:** | | | | | |
| African American | 37 | 28 | 28 | 28 | |
| White | 23 | 16 | 14 | 22 | 0.0003 |
| **Insurance status:** | | | | | |
| Uninsured | 33 | 27 | 14 | 26 | |
| Insured | 21 | 15 | 7 | 21 | 0.03 |
| **Patient navigation:** | | | | | |
| With navigation | 36 | 28 | 14 | 27 | |
| Without navigation | 19 | 15 | 14 | 19 | 0.0001 |

**Table 3:** Factors associated with patient and provider delay: Patient and provider delay was dichotomized at 30 and 14 days respectively, with an interval greater than 30 and 14 resulting in delay. Risk ratios were then created to assess for associations between race, insurance status, and the presence of navigation and patient or provider delay. Those without insurance and the lack of patient navigation was associated with a higher risk of patient delay. African American race, the lack of insurance, and lack of patient navigation were associated with an increased risk of experiencing provider delay. Finally, an adjusted risk ratio was created to control for the effects of insurance and race, which demonstrated a statistically significant increased risk of provider delay in the absence of patient navigation.

| | **Associations** | | | |
|---|---|---|---|---|
| | **Patient delay** | | **Provider delay** | |
| | RR | *p* | RR | *p* |
| Race | 1.06 (0.95, 1.20) | 0.345 | 1.55 (1.29, 1.86) | < 0.0001 |
| Insurance status | 1.24 (1.09, 1.41) | 0.0003 | 1.45 (1.15, 1.82) | 0.0005 |
| Navigation status | 1.29 (1.14, 1.45) | < 0.0001 | 1.68 (1.34, 2.10) | < 0.0001 |
| Navigation × insurance × race[a] | - | - | 1.55 (1.10, 2.20) | 0.0059 |

[a] = Adjusted risk ratio for controlling for insurance and race effect on navigation, calculated using Cochran-Mantel-Haenszel method.

dichotomizing at 30 and 14 days respectively. Crude risk ratios were calculated for race, insurance status, stage, and presence of patient navigation and their associations with delay.

Patients without insurance and patients utilizing a system without navigation were found to have a higher risk of experiencing patient delay, RR = 1.24 (1.09, 1.41 *P* = 0.0003) and RR = 1.29 (1.14, 1.45 *P* < 0.0001) respectively. African American race, uninsured status, and lack of navigation were all associated with an increased risk of experiencing provider delay with RRs of 1.55 (1.29, 1.86 *P* < 0.0001), 1.45 (1.15, 1.82 *P* = 0.005), and 1.68 (1.34, 2.10 *P* < 0.0001).

A Cochran-Mantel-Haenszel adjusted risk ratio was then calculated for navigation's association with provider delay while controlling for the confounding effects of race and insurance status, resulting in an $RR_{mh}$ 1.55 (1.10, 2.20 *P* = 0.006) (Table 3).

## Discussion

Historically, underserved patient populations have experienced disproportionately worse medical and cancer outcomes. In the early 1970's Harold P. Freeman, in partnership with the American Cancer Society, created a multi-dimensional approach to minimize cancer healthcare disparities in Harlem, New York [12]. Pioneering the concepts of community outreach, patient navigation, and survivorship, Freeman empowered the community to partner with healthcare providers to overcome this disparity [10,12].

The impact of patient navigation on the underserved afflicted with breast cancer is well documented. In Harlem, Oluwole, et al. [11] observed a significant fall in the incidence of late-stage breast cancer from 49% to 21% and a significant rise in the incidence of early-stage breast cancer from 6% to 49% through the use of increased screening and patient navigation [11]. Even more strikingly the 5-year survival rate increased from 39% to 70% after the implementation of patient navigation [10]. This work has extended to other cancer sites with Rodday, et al. [15] showing patient navigation eliminating socioeconomic disparities in the initial workup of several malignancies [15]. Despite this success, little is known about the efficacy and role of patient navigation in the treatment of HNC.

Our group started an outreach effort, *Healing Hands Across the Divide,* built on Dr. Freeman's work to address HNC disparity [16]. Using a faith- and community-based partnership, we have identified high-risk groups that may benefit from HNC screening and developed a culturally competent educational program to promote HPV vaccination [8]. Our approach has been to develop a relationship with leaders in these high-risk communities based upon decency and trust. This culturally competent partnership: Improves trust between at risk communities and the healthcare system, increases awareness of the risk factors and symptoms of HNC, and streamlines access to care for individuals in need of further evaluation.

Utilizing these concepts, we developed a patient-centric navigation system in 2010 to promote timeliness of care, and published on its long-term efficacy in 2015. The population in this study was fairly homogenous (mostly Caucasian and insured); However, we found through the use of a patient navigation, we could effectively deliver healthcare in a timely manner [14]. Conclusions concerning the possible efficacy of patient navigation for the underserved could not be made secondary to the composition of the study population. For the underserved, the relevant question of the potential for patient navigation remained unanswered; forming the basis for this study.

Our current study examined this question in the context of the impact of racial and socioeconomic disparity on the timeliness of care. Published data exists quantifying both *patient delay* and *provider delay* for non-stratified groups afflicted with head and neck cancer [17]; However, to our knowledge, no data has been published concerning potential differences in either timeliness of care for the underserved or the potential of patient navigation.

### Patient delay

In this study, we did not identify any statistically significant differences in patient delay for the underserved when compared to their counterparts. Intuitively one would expect that uninsured and African American patients who have been established to present with advanced stage of disease would have increased patient delay. The similar rates of patient delay may reflect either inaccuracy's related to the retrospective nature of this data or significant underlying biological differences between the two populations. Nevertheless, our study demonstrated no significant temporal delays for the underserved gaining entry into the healthcare system.

### Provider delay

The absence of differences in timeliness of access to the healthcare system is in sharp contrast to the experience of the underserved once they enter the health care system. Our study demonstrated that there were significant *provider delays* for the underserved after entry. African Americans experienced an increased risk of provider delay compared to their Caucasian counterparts: RR = 1.55 (1.29, 1.86, $p < 0.0001$). Patients who were Medicaid recipients or uninsured experienced similar differences in provider delay than their counterparts: RR= 1.45 (1.15, 1.82, $p < 0.0005$).

Our findings echo the results of previous studies that identified race and insurance status as important prognostic indicators of outcomes. Zandberg, et al. [4] reported adecade-long single center retrospective study of racial disparity in HNC that mirrored national data with African American patients suffering lower survival rates [4]. In a separate study Gourin, et al. [3] controlled for other clinical and social factors, identifying that insurance status had the most significant effect on survival. Gourin then postulated that racial disparity in HNC primarily stems from differences in access to healthcare [3].

### The potential of patient navigation

What are possible solutions to alleviate provider delay experienced by the underserved? Our current data, along with past studies, suggest that patient navigation has the potential to minimize provider delay. In our study population, absence of patient navigation was associated with both increased patient and provider delay. The affect was more pronounced on provider delay with RRs of 1.29 (1.14, 1.45, $p = < 0.0001$) and 1.68 (1.34, 2.10 $p < 0.0001$) respectively. After controlling for the confounding effects of insurance status and race, the absence of patient navigation was associated with an increased risk of provider delay, $RR_{mh}$ of 1.55 (1.10, 2.20, $p < 0.0001$). This supports our hypothesis that patient navigation has the potential to alleviate disparity and improve timeliness of care for the underserved.

### Limitations of the study

The major limitation of this retrospective study was the nature of our two study hospitals, which serve two different patient populations. Moreover, the patient's exposure to a navigation system was dependent on which academic center they presented to, and was independent of patient choice. Each of these academic centers serves different patient populations with different socioeconomics and demographics, which raises the potential for bias. Finally, there is the possibility of additional bias related to resources and infrastructure, due to the fact that providers at one institution had implemented patient navigation while the others had not. As a result, our study design sought not to compare A to B, due to the challenges in comparing hospital systems and the potential for varying populations to confound results. As such, we choose to look at one large, diverse, and more representative of the total population. This larger study population allowed for control of confounding factors and the investigation of the effect of patient navigation on the timeliness of care delivery to the underserved. Future prospective studies will be needed to further evaluate the potential of patient navigation to improve timeliness of care in the underserved.

## Conclusions

Our study identified the presence of temporal healthcare disparity among the underserved afflicted HNC. Although there were no significant temporal differences in entering the healthcare system (patient delay), there were significant temporal differences after entry (provider delay). In this study, the absence of patient navigation was associated with an increased the risk of provider delay, this risk remained constant after controlling for race and insurance status. Our data suggest that patient navigation has the potential to minimize disparity and to improve timeliness of care in the underserved and has the possibility to shape future health policy. This warrants future prospective study.

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