Low-to-Moderate Risk Transient Ischemic Attack Patients Can Be Safely Discharged From the Emergency Department to a Nurse Practitioner–Led Clinic

NCPD 2.0 ANCC Contact Hours

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ABSTRACT

BACKGROUND: Unnecessary admissions fuel rising healthcare costs and take away resources from higher acuity patients without evidence of increased safety. The purpose of this quality improvement project was to determine whether the care diversion for transient ischemic attack (TIA), from inpatient to a nurse practitioner (NP)-led specialty clinic, resulted in no increase in stroke incidence at 90 days. **METHODS:** The sample included all adults presenting to the emergency department with TIA at a low-to-moderate risk for stroke. Risks were defined by the ABCD^2 score and noninvasive vessel imaging. Patients who met the criteria were discharged and evaluated by a stroke NP at the TIA clinic within 7 days. These patients were compared with those who were admitted before clinic launch. Medical record reviews were conducted to determine stroke incidence at 90 days post TIA. Descriptive statistics were used to evaluate clinical variables, and Fisher exact test was used to assess difference in stroke rates. Patient satisfaction score was collected using the existing institutional survey. **RESULTS:** Eighty-one participants were included, 40 in the clinic group and 41 in the admission group. The mean ages in the clinic and admission groups were 72.8 and 75.2 years, respectively ($P = .37$). Women comprised 45% of patients in the clinic group, compared with 51.2% in the admission group ($P = .58$). The mean ABCD^2 scores were 4.08 and 3.95 in the clinic and admission groups, respectively ($P = .63$). The median clinic follow-up time was 6 days. There was no stroke incidence in the clinic group and 1 in the admission group within 90 days post TIA. Patient satisfaction score metrics for the NP exceeded the institutional benchmark of 90%. **CONCLUSION:** Referral to an NP-led clinic in patients with low- to moderate-risk TIA was equally safe as hospital admission.

Keywords: advanced practice nursing, advanced practice provider, advanced practice registered nurse, APP, APRN, ED, emergency department, NP, NP-led clinic, nurse practitioner, stroke, TIA, TIA clinic, transient ischemic attack

Background

Individuals with transient ischemic attack (TIA) have up to 17.8% risk of stroke within 90 days post index event.[1] Patients with suspected TIA should receive timely evaluation to establish the diagnosis and to determine the underlying etiology.[2] This evaluation should be performed within 48 hours after symptom onset because of the high incidence of stroke during this period.[3] There is no consensus on the optimal setting in which patients with TIA should be managed—inpatient versus outpatient. Patients with abnormal findings attributable to TIA who are amenable to urgent treatment (surgical intervention, endovascular treatment, or intravenous anticoagulation) are considered high risk

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and require hospital admission. Outpatient management at specialty clinics is a safe option for those absent of high-risk clinical and diagnostic features. The short-term and long-term safety of TIA clinics have been established in various settings.[4–7] Outpatient management of non–high-risk TIA patients is cost-effective and associated with high-quality performance indicators.[6,8,9]

The demand for neurologists continues to rise and will outpace supply. Neurologist shortfall extends to many neurology subspecialties, including stroke neurology.[10] The impact of a neurologist shortage disproportionately affects rural communities with only 9% of physicians in the United States practicing in rural areas, but 20% of Americans living in rural areas.[11]

United States healthcare institutions are challenged to provide quality care for patients with TIA amid the high costs of healthcare and a neurologist shortage. Nurse practitioners (NPs) are well poised to bridge the healthcare gap by providing evidence-based care for patients with TIA in the outpatient setting. Studies have associated high-quality care with the services that NPs provide, regardless of practice setting.[12,13] Nurse practitioners are integral members of acute stroke teams who can improve stroke outcomes in hospitals and mobile stroke units.[14–18] Nurse practitioner–led clinics and other ambulatory programs are safe and associated with quality care in cerebrovascular and other neuroscience specialties.[4,19–24]

This quality improvement (QI) project evaluated the implementation of an NP-led TIA clinic, to which TIA patients with a low-to-moderate risk of stroke were referred from the emergency department (ED) instead of being admitted to the hospital. The goal of this QI project was to determine the safety and patient satisfaction for TIA patients diverted from the inpatient to outpatient setting. The expectation was that the diversion of unnecessary TIA admissions to an NP-led TIA clinic would result in a similar 90-day stroke rate compared with that of those who were admitted before the clinic launch. It was expected that the patient satisfaction of the NP provider would meet the institutional benchmark.

Methods

This was a QI project with 2 groups: those who were referred to the TIA clinic (clinic group) compared with a cohort of patients who were admitted to the hospital before clinic implementation (admission group). The project was deemed exempt for review by the Eisenhower Health (EH) and the University of California, Los Angeles Institutional Review Boards, because it did not meet the definition of human subject research.

The clinic group included a convenience sample of all adults (18 years or older) who were discharged from the ED between October 1, 2020, and September 30, 2021, with suspected TIA and deemed to have a low-to-moderate risk of future stroke. The minimal diagnostic requirement to complete in the ED includes brain magnetic resonance imaging (MRI), head and neck magnetic resonance angiography (or computed tomography angiography), 12-lead electrocardiography, and routine laboratory testing. Patients with brain MRI findings consistent with stroke and those with symptomatic intracranial or extracranial disease noted on vessel imaging necessitated hospital admission according to the institutional protocol for further management. Possible nonstroke medical etiologies that could have explained stroke-like symptoms had to be ruled out before ED discharge, and patients were only referred if the suspected diagnosis was TIA. The patient's presenting symptoms also had to be resolved with return of baseline neurological status before discharge.

> The higher than average follow-up rate of 94.6% suggests patients valued this option.

The admission group included a convenience sample of patients meeting the same inclusion criteria as the clinic group, who were admitted to the hospital from the ED before October 1, 2020. Patients were excluded if they left the hospital against medical advice or were referred to hospice. The project was conducted at a 463-bed nonprofit community-based teaching hospital with a Joint Commission Primary Stroke Center designation.

The $ABCD^2$ instrument includes age, blood pressure, clinical symptoms, duration of symptoms, and diabetes history.[1] The score on this tool ranges from 0 to 7, with 0 to 3 classified as low risk, 4 to 5 classified as moderate risk, and 6 to 7 classified as high risk for future stroke (see Supplemental Digital Content 1, available at http://links.lww.com/JNN/A433 for scoring criteria, and Supplemental Digital Content 2, available at http://links.lww.com/JNN/A434, for stroke risks post TIA with each risk classification). Because an $ABCD^2$ score greater than 5 is associated with a 90-day stroke rate up to 17.8% and considered high risk, only patients with an $ABCD^2$ score between 0 and 5 were included in the project.

Patients who met the clinic referral criteria were discharged home from the ED to receive clinic evaluation within 7 days. The clinic was located within an ambulatory neurology specialty center facility and staffed by a stroke-trained NP 1 day per week.

The EH specialty clinic staff were available during normal business operating hours (Monday to Friday from 7 AM to 5 PM), and they had direct access to the NP at any given business day. The final diagnosis of TIA versus TIA mimic was rendered by the NP after clinic evaluation. Medical record reviews were conducted to determine the stroke incidence at 90 days post TIA.

An electronic referral order was placed by the discharging ED provider to refer any patient to the TIA clinic. Patients received an after-visit summary document that included the clinic information and the NP's name. The referral orders were electronically forwarded to the project leader and the clinic scheduler. The scheduler contacted the patients to set up an appointment. The patients were also instructed before discharge to call the clinic for an appointment to optimize the follow-up rate.

Medical record reviews were conducted to collect data on all variables and outcome measures. The same patient selection criteria used in the clinic group were also applied to select participants in the admission group. $ABCD^2$ scores that were not clearly documented in the patient's medical record were calculated manually by the project leader. Patients with non-TIA final diagnosis after clinic evaluation were excluded. Any incidence of stroke within 90 days post TIA was recorded. Sources of this information included provider notes and brain imaging reports. Medical record reviews also included scanned paper records from outside facilities. The project participants' demographic information was collected to establish participant characteristics. Patient satisfaction data were collected using the National Research Corporation Health consumer data that are utilized throughout the institution.

Descriptive statistics, such as frequencies, percentages, means, and medians, were calculated to analyze baseline patient characteristics and stroke outcome at 90 days. Chi-square and Fisher exact tests were used to compare the groups on demographic characteristics and outcomes as relevant to distributional characteristics. A P value less than .05 was considered statistically significant. All statistical analyses were conducted using SPSS v27 (IBM Corp). Patient satisfaction score of the NP provider was collected and shown as a percentage.

Results

The flow diagram of clinic group selection process is illustrated in Supplemental Digital Content 3, available at http://links.lww.com/JNN/A435. Two hundred eighteen patients were discharged from the hospital with a primary diagnosis of TIA between October 1, 2020, and September 30, 2021. Fifty-six of 84 patients (66.6%) discharged from the ED met clinic referral criteria. Of these, 43 (76.8%) received a clinic referral and 13 were found to be eligible during medical record audits. Two patients did not come to their clinic appointment, and 1 followed up with their primary neurologist. Of the 53 patients who were evaluated at the clinic, 40 (75.5%) retained their TIA diagnosis, whereas 13 were subsequently determined to have non-TIA diagnoses.

Of 81 patients included in this project, 40 were in the clinic group and 41 were in the admission group. Table 1 illustrates the sample baseline demographics and characteristics. The mean age was 72.8 years in the clinic group and 75.2 years in the admission group ($P = .37$). Women comprised 45% of the clinic group, compared with 51.2% in the admission group ($P = .58$). White was the predominant race in both groups, with 85% in the clinic group and 92.7% in the admission group ($P = .27$). Furthermore, 95% of the clinic group and 95.1% of the admission group were of non-Hispanic or Latino ethnicity ($P = .98$). The mean $ABCD^2$ scores were similar in both groups,

TABLE 1. Sample Demographics and Characteristics

	Clinic Group	Admission Group	*P*
Sex			
Female	18/40 (45%)	21/41 (51.2%)	.58
Male	22/40 (55%)	20/41 (48.8%)	.58
Age, mean (SD), y	72.8 (9.3)	75.2 (13.6)	.37
Race			
White	34/40 (85%)	38/41 (92.7%)	.27
Non-White	6/40 (15%)	3/41 (7.3%)	.27
Ethnicity			
Non-Hispanic or Latino	38/40 (95%)	39/41 (95.1%)	.98
Hispanic or Latino	2/40 (5%)	2/41 (4.9%)	.98
$ABCD^2$ score, mean (SD)	4.08 (1.31)	3.95 (0.95)	.63

4.08 in the clinic group and 3.95 in the admission group ($P = .63$).

Median clinic follow-up times were computed because follow-up times were skewed (1-50 days). The median clinic follow-up time was 6 days, and 60% of participants in the clinic group received clinic evaluation within 7 days (see Supplemental Digital Content 4, available at http://links.lww.com/JNN/A436). There were no strokes in the clinic group and 1 stroke within 90 days in the admission group (Fisher exact test, $P = 1.00$). The 1 stroke patient in the admission group was rehospitalized 47 days post index TIA. This event occurred despite a follow-up visit with a neurologist at day 26 post TIA. Table 2 illustrates the 2-, 7-, and 90-day stroke rates in both groups, which were compared with the stroke risks as predicted by the ABCD^2 tool. Patient satisfaction with the NP provider was measured using 5 metrics. The 5 items with satisfaction scores are as follows: provider explained well (92.8%), provider listened with care (96.9%), rating of provider (92.6%), respected for what patient said (97.9%), and spent time with patient (96.9%). Each of these metrics exceeded the institutional benchmark of 90%.

Discussion

The key finding of this QI project was that TIA patients with a low-to-moderate risk of stroke who were managed at an outpatient NP-led specialty clinic did not have an increased risk of stroke at 90 days, compared with hospital-admitted patients before clinic launch. None of the patients in the clinic group developed stroke, and 1 patient from the admission group was readmitted for stroke at day 47.

Different TIA clinic staffing models have been reported. Several of these studies evaluated the role and impact of NP-staffed clinics, but most included patients who were discharged with stroke or TIA after hospital admission. In these studies, NP-led stroke clinic management was associated with a decreased 30-day readmission rate,[21,22] an increased medication persistence rate,[23] and a decreased no-show rate.[24] Two studies used a mixed neurologist/stroke NP clinic staffing model to evaluate patients at the TIA clinic.[4,25] There is a paucity of literature examining the safety of primarily NP-staffed clinics that aim to provide care to TIA patients and avoid unnecessary hospital admission. Previous studies have included TIA patients who were admitted to the hospital before their clinic evaluation or patients who were discharged from the ED after evaluation by an inpatient stroke team. The utilization of inpatient stroke services should be reserved for TIA patients who are considered high risk. Our findings are important for 2 reasons: rural residents are negatively impacted by the neurologist shortage leading to excessive outpatient wait times, and referral to an NP-led TIA clinic is safe and acceptable to the patient.

The clinic follow-up rate in this project was 94.6% (53/56). The follow-up rate in the literature ranges from 17%[23] to 95.1%.[5] Utilization of electronic health record features that alerted the project leader and clinic scheduler to all referrals contributed to this high follow-up rate. The high follow-up rate suggests that the patients referred to the clinic valued the care they received.

The TIA diagnosis was retained in 75.5% (40/53) of patients who received clinic evaluation. This finding was not unexpected, because a relatively high rate of false-positive TIA diagnoses is well documented in the literature when the diagnosis is given by a non-neurology provider. The rate of TIA misdiagnosis in a study by Sadighi et al[26] was up to 60% across all care settings (ED, inpatient, and outpatient).

Variability of the expected timeframe during which patients are evaluated at the clinic after the index event exists. The timeframe ranges between 24 hours[5] and 22 days.[25] The goal of the clinic referral program was for patients to be evaluated at the clinic within 7 days. Sixty percent of patients in the clinic group received evaluation within this timeframe. The longest ED-to-clinic timeframe in this project was 50 days. Reasons for delay of clinical evaluation for 40% of the clinic group included patient's stated fear of contracting COVID, clinic restrictions during the early part of pandemic, and limited clinic availability. The initiation of a telemedicine option during the clinic implementation phase helped mitigate some delays and improved ED-to-clinic turnaround times. Despite the delay in some initial clinic visits, none of the patients in the clinic group developed stroke within

TABLE 2. Comparison of Stroke Rates in Both Groups With the Predicted ABCD^2 Stroke Risks by Category

	Clinic Group	Admission Group	Stroke Risk for ABCD^2 Score of 0–3[a]	Stroke Risk for ABCD^2 Score of 4–5[a]
2 d	0/40 (0%)	0/41 (0%)	1.0%	4.1%
7 d	0/40 (0%)	0/41 (0%)	1.2%	5.9%
90 d	0/40 (0%)	1/41 (2.4%)	3.1%	9.8%

[a]Adapted from Johnston et al.[1] Copyright (2007), with permission from Elsevier.

90 days post TIA. This finding suggests that future studies are needed to evaluate the optimal ED-to-clinic timeframe. In addition, future studies could evaluate the financial impact of inpatient versus outpatient management of TIA at NP-led clinics.

Limitations

The small sample size and the single-center setting limit the generalizability of the project's outcome. The clinic and admission comparator groups were not assessed during the same period. Patients referred to the clinic were compared with a matched cohort of patients who were admitted before the launch of TIA clinic. The $ABCD^3$-I tool, a revision of the $ABCD^2$, has been demonstrated to be a better predictive tool than $ABCD^2$ score for assessing the risk of stroke post TIA.[27] The rationale for using $ABCD^2$ score instead of $ABCD^3$-I in the project was due to the fact that the $ABCD^2$ tool was already embedded in the institution's electronic health record. The inclusion of brain MRI and vessel imaging (in addition to $ABCD^2$ score) to the clinic referral criteria, however, should have generated similar stroke prediction power to that of the $ABCD^3$-I tool. Finally, patients with COVID were excluded from the project because they were unable to have timely MRI testing. There are nursing implications related to this project. Nurse practitioners are providing safe and effective care for patients who have been seen in the ED for TIA. As stroke clinical experts in advanced practice roles, neurology NPs must be able to identify patients with TIA versus TIA mimics and provide evidence-based practice to reduce the risk of stroke.

Conclusion

Our QI project demonstrated that it was safe to discharge low-to-moderate risk patients with TIA from the ED to an NP-led TIA clinic.

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