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The Impact of Vanderbilt Teleneurology: A case report.

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The Impact of Vanderbilt Teleneurology: A case report.

Introduction

For those residing in rural communities, treatment of neurologic conditions that require access to emergency and specialty care can hold significant obstacles. The U.S. Department of Health and Human Services estimates that 67.8 million Americans live in a Primary Medical Health Professional Shortage Area.¹ Additionally, in states with large rural populations, there is only one neurologist per approximately 30,000 people.² These statistics are cause for concern as stroke is the fifth leading cause of death in the United States.³ In fact, stroke mortality is 20% higher in the largely rural Stroke Belt of the Southeastern United States than the rest of the nation.⁴

Utilizing information technology to provide care remotely has shown significant promise in addressing the shortage of specialty healthcare professionals. “Telemedicine programs enable physicians to efficiently and effectively evaluate and treat more patients, particularly those that are medically underserved, resulting in improved clinical outcomes, reduced costs, and fewer unnecessary patient transfers.”⁵

In February of 2014, Vanderbilt University Medical Center’s (VUMC) Department of Neurology initiated a teleneurology consultation program for acute neurologic emergencies including stroke. Using handheld tablet technology with three simple applications, VUMC neurologists have the ability to “examine patients in community-based hospitals, view medical images, and record their recommendations in patients’ medical records. This service aims to elevate the availability of neurologic specialty care in the management of acute neurologic emergencies such as stroke.”⁵

The VUMC teleneurology service has demonstrated a significant reduction in unnecessary patient transfers, high community physician satisfaction, and reduced costs; elevating the level of specialty care in community settings closest to the patients' home and families further reduce access barriers.^{5,6}

This case report aims to illustrate the economic impact of VUMC's teleneurology program from the patient's perspective.

Case Report

A 79-year-old, right-handed gentleman presented to the emergency department and later was admitted to a 121-bed community-based hospital in Elizabethton, TN, for a transient ischemic attack (TIA) causing right face and arm numbness. Head CT and MRI images were normal and all symptoms resolved before discharge. Following discharge, however, he was returned to the emergency department by his spouse reporting right facial weakness, confusion, and inability to speak.

The community-based emergency medicine physician confirmed global aphasia and right-sided weakness concerning for acute stroke. Within 6 minutes of requesting a consultation, the community physician and VUMC neurologist were connected by phone to review the case. An acute stroke was confirmed following live audio/video examination by the consulting neurologist and review of repeat brain imaging. Informed consent to proceed with intravenous tPA therapy was obtained, and the patient was successfully treated with tPA therapy in a very timely manner without requiring transfer to a higher level of care.

Methods

The VUMC neurologist and community physician were equipped with iPad® tablets and FaceTime®, a two-way live audio/video application, to conduct the consultation. The VUMC neurologist's tablet also contained Genesis®, a VUMC application for radiologic image sharing, and a third application to access StarPanel®, for electronic medical record documentation.

“Information technology and risk assessment staff at VUMC determined that the security of these systems complied with HIPAA standards when linked over an encrypted and password-protected internet connection.”⁵

A detailed economic analysis of all tests, examinations, and treatments administered in this case was performed. Established network fees for each were compiled exclusive of co-pays or deductibles (Table 1).⁷⁻¹⁶ To estimate the cost savings that resulted from utilizing teleneurology, expenses from what would have been the typical course of treatment were then determined (Table 2). In addition to clinical costs, expenditures that would have been incurred if the patient were transferred to the nearest regional stroke center were included.

Discussion

Without teleneurology consultation, this patient might not have been considered for tPA treatment until he was transferred to a higher level of care, at which point the window for treatment could have passed. The administration of tPA “adds 0.75 quality-adjusted life year (QALY) per use” from reduced recovery time and fewer complications that would otherwise decrease productivity and quality of life.¹⁷ The patient and his support system also avoided the burden of transfer to a stroke center at a regional trauma facility. As can be seen in Table 3, by averting transfer, the patient avoided additional expenses totaling \$2,817.23. For a single family,

such a reduction is significant. These cost savings are solely related to the direct medical and non-medical (travel) expenses associated with treatment for acute stroke. While not the focus of this case report, the indirect savings from retained productivity and lessened need for follow up care are of note as well. Finding means to increase access to care and mitigate costs for patients, healthcare organizations, and payers is an important ongoing search. While this case study is only one example, there was a clear economic benefit in the use of teleneurology for this patient. Ideally, these promising results will serve as an impetus for further studies that are needed to evaluate the societal impact of teleneurology programs in the treatment of stroke and other acute neurologic emergencies.

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Cost to Patient With Teleneurology	
<i>Emergency Dept. Visit for Stroke:</i>	
Typical Visit Fee	\$968.31
MRI	\$825.00
CTA	\$700.00
tPA treatment	\$6,610.54
In-patient Care	\$10,335.06
Total:	\$19,438.91

Table 1: Cost to Patient With Teleneurology

Cost to Patient Without Teleneurology	
<i>Emergency Dept. Visit for Stroke:</i>	
Typical Visit Fee	\$968.31
MRI	\$825.00
CTA	\$700.00
<i>Travel to Regional Trauma Facility:</i>	
Ambulance Transfer	\$1,140.50
<i>Regional Trauma Facility Visit:</i>	
ED Visit & Neuro Consult	\$1,046.73
tPA treatment	\$6,610.54
In-patient Care	\$10,335.06
<i>Family Accommodations During Treatment:</i>	
Lodging and Meals	\$630.00
Total:	\$22,256.14

Table 2: Cost to Patient Without Teleneurology

Estimated Avoided Cost	
Cost Without Teleneurology	\$22,256.14
Cost With Teleneurology	\$19,438.91
Difference:	\$2,817.23

Table 3: Estimated Avoided Cost