The Future of Remote Care in Neurology

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Neurology:

What are neurologists?

Neurologists are specialists for the brain, muscle, and nerve.

We treat strokes, seizures, dementia, parkinsons disease, multiple sclerosis, etc.

Due to complexity and low reimbursement, fewer people entering and more people retiring.
Yearly Economic Burden of Major Neurological Diseases in Billions (2014 Dollars)

- Traumatic Spinal Cord Injury, $19 billion
- Epilepsy, $37 billion
- Migraine Headache, $78 billion
- Traumatic Brain Injury, $86 billion
- Stroke, $110 billion
- Chronic Low Back Pain, $177 billion
- Alzheimer’s + Other Dementias, $243 billion
- Parkinson's, $15 billion
- Multiple Sclerosis, $25 billion
Timely neurologic care is important

Many patients are undiagnosed and untreated

Earlier detection can lead to improved outcomes
Past, Present, and Future

Where have we come from?

Where are we now?

Where are we going?
Where did it all begin for neurology?

Ischemic Stroke

#3 cause of mortality in the 1990s
Tissue Plasminogen Activator

FDA approved in 1996
Suddenly, stroke was an emergency

The sooner we could give TPA within the window, the better the outcome
Medicare provider analysis and review (MEDPAR) Database

64% of US hospitals did not use TPA in 2005-2007
Huge geographic disparities - worse in midwest and southeast
Hospitals with <100 beds and low population density

Most medical professionals were uncomfortable using this life saving medication!
Stroke is its own science

Subspecialty training

Hospitals that see infrequent cases of TPA annually had **worse** outcomes

JC approved stroke centers
So the key to treating Stroke emergencies was:

Getting a trained neurologist to bedside as soon as possible!

Seems simple enough, right?
Supply and demand analysis of the current and future US neurology workforce

ABSTRACT

Objective: This study estimates current and projects future neurologist supply and demand under alternative scenarios nationally and by state from 2012 through 2025.

Methods: A microsimulation supply model simulates likely career choices of individual neurologists, taking into account the number of new neurologists trained each year and changing demographics of the neurology workforce. A microsimulation demand model simulates utilization of neurology services for each individual in a representative sample of the population in each state and for the United States as a whole. Demand projections reflect increased prevalence of neurologic conditions associated with population growth and aging, and expanded coverage under health care reform.

Results: The estimated active supply of 16,366 neurologists in 2012 is projected to increase to 18,060 by 2025. Long wait times for patients to see a neurologist, difficulty hiring new neurologists, and large numbers of neurologists who do not accept new Medicaid patients are consistent with a current national shortfall of neurologists. Demand for neurologists is projected to increase from ~18,180 in 2012 (11% shortfall) to 21,440 by 2025 (19% shortfall). This includes an increased demand of 520 full-time equivalent neurologists starting in 2014 from expanded medical insurance coverage associated with the Patient Protection and Affordable Care Act.

Conclusions: In the absence of efforts to increase the number of neurology professionals and retain the existing workforce, current national and geographic shortfalls of neurologists are likely to worsen, exacerbating long wait times and reducing access to care for Medicaid beneficiaries. Current geographic differences in adequacy of supply likely will persist into the future. Neurology © 2013.
Lack of Neurologists

Demand greater than supply
- Demand 20% or more
- Demand 6-19%
- Demand = Supply (±5%)

Supply greater than demand
- Supply 6-19%
- Supply 20% or more

Map of the United States showing the lack of neurologists, with states colored to indicate demand supply ratios.
Not just for stroke!
Telemedicine for stroke

TIME LOST IS BRAIN LOST
Telestroke

Coined in 1999 when telemedicine for stroke became increasingly adopted.

Now 16-17 years later, telestroke is mainstream.
Telemedicine use increased

Could certify centers as JC accredited with telestroke

Interventional capabilities allow for increased need for selection of appropriate candidates.

Cut down transfers - transfer only those who need it.
AHRQ Tenet

"Doing the right thing, at the right time, in the right way, for the right person."
Outcomes

Emergency Care of Patients with Acute Ischemic Stroke in the Kaiser Permanente Southern California Integrated Health System

Kori Sauser-Zachrisson, MD, MSc; Ernest Shen, PhD; Zahra Ajanji, MD; William P. Neill, MD; Navdeep Sangha, MD; Michael K. Gould, MD, MS; Adam L. Sharp, MD, MS

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CME credits available for this article

ABSTRACT

Context: Tissue plasminogen activator (tPA) is underutilized for treatment of acute ischemic stroke.
Objective: To determine whether the probability of tPA administration for patients with ischemic stroke in an integrated health care system improved from 2009 to 2013, and to identify predictors of tPA administration.
Design: Retrospective analysis of all ischemic stroke presentations to 14 Emergency Departments between 2009 and 2013. A generalized linear mixed-effects model identified patient and hospital predictors of tPA.
Main Outcome Measures: Primary outcome was tPA administration; secondary outcomes were door-to-imaging and door-to-needle times and tPA-related bleeding complications.
Results: Of the 11,630 patients, 3.5% received tPA. The likelihood of tPA administration increased with presentation in 2012 and 2013 (odds ratio [OR] = 1.73; 95% confidence interval [CI] = 1.26-2.35); and OR = 2.58; 95% CI = 1.90-3.51), female sex (OR = 1.27; 95% CI = 1.04-1.54), and ambulance arrival (OR = 2.17; 95% CI = 1.76-2.67), and decreased with prior stroke (OR = 0.47; 95% CI = 0.25-0.99) and increased age (OR = 0.98; 95% CI = 0.97-0.99). Likelihood varied by Medical Center (pseudo-intraclass correlation coefficient 15.5%). Among tPA-treated patients, median door-to-imaging time was 15 minutes (interquartile range, 9-23 minutes), and door-to-needle time was 73 minutes (interquartile range, 55-103 minutes). The rate of intracranial hemorrhage was 4.2% and 0.9% among tPA- and non-tPA treated patients (p < 0.001).
Conclusion: Acute ischemic stroke care improved over time in this integrated health system. Better understanding of differences in hospital performance will have important quality-improvement and policy implications.
"... the largest care provider for patients with stroke in the country is now not a major medical center but a telemedicine company."
Teleneurology: Emerging care paradigms

Where we are going
Telestroke paved the way

Acute stroke was seen, but then what?

Led to routine consults and follow ups

Tele-Neurohospitalists

additional diagnostic services - EEG
Tele EEG & ICU monitoring

Increasing evidence shows greater ability to prognosticate and manage

Increased survival in ventilated patients without increase in LoS

Growing role for outpatient care

Remote care is being integrated into the care continuum

- pre hospital stroke care (ambulance)
- follow up care in rehab or home
- chronic care at home
Average wait to see a neurologist in 2012:

NV: 34.8 business days up from 28.1 in 2010
FU: 30.0 business days up from 25.6 in 2010
-NSGY: 24.1  -FP: 20.3  -Ortho: 16.8  -Cards: 15.5

Peds Neuro: 45 business days with 39% of childrens hospitals reporting no vacancies for 12 months or longer.
A huge need is identified with a possible solution

Neurology has the most immobile patients.
Mobile health/Digital health (remote monitoring)

Current paradigm is fragmented care

Wearables generate data - which we now react to, but will become predictive

True continuity of care
Multimodal Remote Monitoring Applications

Multiple Sclerosis
- Activity Monitoring
- Tasks

Parkinsons Disease
- Activity Monitoring
- Accelerometer
- Tasks

Dementia
- Activity Monitoring
- Sleep Monitor
- Heart Rate Monitor
- Tasks
Remote Neurostimulator Management
FDA News Release

FDA allows marketing of first direct-to-consumer tests that provide genetic risk information for certain conditions

For Immediate Release April 6, 2017

Parkinsons Disease

Alzheimers disease

Primary Dystonia
Emerging Neurology Clinical Care Team
How will patients access Neurologists?

Emergencies (In the ED/remote)

Outpatient consultations (PCP office, home? - In person/remote)

On Demand, over the internet

Chronic care (In person/remote)
Due to lack of specialists, in order to provide the most efficient and cost effective care, remote care in neurology WILL be leveraged.

Some will argue that the role of specialists will be as consultants only

Medical Care home Neighbors
Neurologist

Initial consult
- telemedicine
- in person
Advanced Practice Provider

Follow up telemedicine in person
Data Monitor/Manager/Coordinator

- First line for RPM/mHealth, patient reported events,
- Makes clinical decisions based on RPM/mHealth strategies
Others

Therapists - PT/OT/SLT
Home Health
Other Physicians/Providers
Behavioral Health
Social Work
Caregivers
IT support
Patient
Further down the road . . .

How much will advances in AI and big data analytics influence automation of our speciality?
Limitations
Physical Exam
Lack of Evidence outside of Stroke

Growing body of evidence, but not enough yet to make great changes in insurance payments or convince other physicians to use it.
Some visits are not appropriate for telemedicine

- Neuromuscular - or requiring the elicitation of more subtle exam findings
- Brain death examination
- Vestibular/neuroophthalmology

... YET
DTC telemedicine needs to be defined

Financial impetus is clear

Still need to eliminate silos between the patients and the physicians who care for them
"To fully diagnose a patient you have never seen face to face is dangerous, and while we believe these kinds of visits are appropriate, it should only be with an established patient that we have actively seen in our practice before." - Dr. Reid Blackwelder AAFP
Several Insurance providers are partnered with specific DTC companies.

Currently, most have no plan to change current workflow.
Health systems tend to operate in the interest of Health Systems

Transfer patients within the health system, often times despite other areas being closer.

Would rather have the patient travel hours to their main hospital than see a different neurologist remotely in their community.
Telemedicine Education

Program directors are being asked to sign off on residents and fellows for telemedicine

Stroke

International Stroke Conference Poster Abstracts

Session Title: Emergency Care/Systems Posters II

Abstract T P198: The Importance of Formal Training in Telemedicine During Stroke Fellowship

Judy Jia; Sean Savitz; Amrou Sarraj; Tzu-Ching Wu
Telemedicine has a role in the care continuum

There needs to be standard education in Telemedicine, particularly as it applies to Neurology
June 15, 2016

AMA Encourages Training in Telemedicine for Medical Students and Residents

For immediate release:
June 15, 2016

New policy builds upon the AMA’s efforts to create the medical school of the future

CHICAGO - Recognizing that formalized training in telemedicine is not widely offered to physicians-in-training, the American Medical Association (AMA) today adopted policy during its Annual Meeting aimed at ensuring medical students and residents learn how to use telemedicine in clinical practice. The new policy specifically encourages the accrediting bodies for both undergraduate and graduate medical education to include core competencies for telemedicine in their programs. The new policy also reaffirms existing AMA policy, which supports reducing barriers to incorporating the appropriate use of telemedicine into the education of physicians.
Telemedicine workgroup has formulated a GME curriculum and resources for telemedicine training to be released in 2017

Endorsed by the ATA and our Education Committee
Education of presenters

Some programs exist within a handful of academic centers, but widespread education is severely lacking for neurology.

This matters, especially when time is brain.
Education of our patients

“Education is the most powerful weapon which you can use to change the world.”

NELSON MANDELA

Patient education is telemedicine is grossly underestimated.
A Neurologist in every community

Teleneurology is increasingly recognized as a component of team based healthcare.

The best way to predict the future is to create it.

Many of us are doing our part to be able to do the right thing for the right person, regardless of where.