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ORIGINAL RESEARCH

## Hospitalist Co-Management of Stroke Patients and Implementation of a Protocol for Standardization of Care

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### *Introduction*

Patients with acute stroke represent an important subset of hospitalized patients. The majority of these patients are now cared for by a hospitalist with consultation from a neurologist.<sup>1,2</sup> This type of collaborative care model between hospitalists and subspecialty services is increasingly common. A 2013 survey conducted by the Society of Hospital Medicine showed that 87% of hospitalists participate in co-management.<sup>3</sup> Benefits of co-management models include reduced hospital costs and improved health care professionals' perceptions of care quality.<sup>4</sup> Implementation of surgical and medical co-management models have also been shown to enhance patient care by reducing complications, mortality, and pain scores.<sup>5,6</sup> At our institution, we employ a co-management model for the care of stroke patients consisting of the stroke service and the internal medicine consult service. The stroke service is staffed by a vascular neurology attending, fellow, and residents. The internal medicine consult service involved in the care of these patients are staffed by hospitalist attendings who have specific experience in the care of stroke patients. Given the scheduling of the hospitalist program, the internal medicine consult service has new attendings approximately every seven days. This rotation in attendings lead to the observation that there was a variation in the recommendations provided to the stroke physicians, particularly in the area of blood pressure management. This variation was thought to be related to individual practice patterns of the hospitalist attendings.

To address such variation, several hospitalists within the internal medicine consult service cohort undertook a quality improvement project to develop a clinical pathway for practice management specifically in blood pressure management. The aims of the quality improvement clinical pathway were as follows: to standardize the practice patterns of the internal medicine consultative service; to initiate all patients who had suffered an ischemic stroke on the most appropriate agents; and to initiate such medications prior to hospital

discharge to increase compliance in the long term outpatient setting.

### *Methods*

A systemic review of trials involving patients with transient ischemic attack (TIA) or stroke showed that treatment with antihypertensive drugs was associated with significant reductions in recurrent strokes as well as myocardial infarction and all vascular events.<sup>7</sup> Specifically, ACE inhibitors have been established in several studies to reduce the risk of stroke.<sup>8,9</sup>

In the Use of Ramipril in Preventing Stroke trial (as part of the HOPE study), patients with vascular disease or diabetes plus at least one other risk factor were randomized to treatment with ramipril or placebo. The relative risk of any stroke was reduced by 32% in the ramipril group compared to the placebo group, and the relative risk of fatal stroke was reduced by 61%.<sup>9,10</sup>

Contemporaneous with the design of the consult service stroke clinical pathway was the publication of the CATIS trial.<sup>11</sup> In this large randomized controlled trial of more than 2000 patients there was no difference in the primary outcome of death or major disability between the group treated with antihypertensives in the first 24 hours after ischemic stroke compared to the control arm. Although a single study, this data did support the operationalizing of an inpatient pathway for blood pressure management immediately post-acute stroke.

Using available evidence on blood pressure management and the use of ACE inhibitors in the post-acute stroke patient population, a draft clinical pathway was created. This pathway was then presented to the stroke attendings for open discussion and revision. When final consensus was reached the pathway was presented via email to all stroke attendings and internal medicine consult service hospitalists for final feedback prior to becoming final.

To implement the pathway, an educational presentation was created for the hospitalists. This consisted of a powerpoint presentation on the evidence based therapeutics that improve morbidity and mortality post stroke, including studies on the use of ACE in post stroke prevention. The presentation was usually delivered in person, but was also sent via email to those individuals unable to conference in person. The detailed pathway was available to all internal medicine residents on a password protected website managed by the hospitalist service. To ease use and enhance compliance, a standard template internal medicine consult note was created and added to our institution's electronic health record to be used by residents on the consult service. The template prompted the initiation of ACE inhibitors in appropriate post stroke patients; in patients for whom ACE inhibitors were not started, the template prompted an entry as to the reason. Pre-determined exclusion criteria included females who are pregnant or planning on getting pregnant, already on an ACE or ARB, history of ACE allergy or intolerance, hyperkalemia, blood pressure < 100/60, ongoing neurological deterioration, and other contraindication as determined by the vascular neurology or hospitalist attending.

Once the pathway had gone through this vetting process and the platform for launching it was in place a start date was selected. In our co-management model, all adult patients admitted to the primary stroke service are seen in medical consultation by the internal medicine consult service. Therefore, all patients admitted to the stroke team were evaluated for appropriateness of the pathway. Patients were excluded from consultation if the primary team had determined that the patient did not have a stroke and/or would not benefit from medical consultation.

Charts of all patients seen in consultation by internal medicine residents were audited on a weekly basis to assess compliance with the pathway. Data was collected over the course of 17 weeks. Data points included type of stroke (ischemic versus hemorrhagic), whether ACE was initiated within 24 hours of last known well time or at time of floor status, and exclusion criteria if ACE was not initiated.

**Results**

A total of 154 charts were reviewed. Of these, approximately 77% (119/154) had a diagnosis of either a TIA or stroke. Among those with TIA or stroke, 55% (66/119) were appropriately started on an ACE inhibitor 24 hours from last known well time. Of those not started

on an ACE inhibitor, almost half were on a home ARB regimen, 45% (24/53) (figure 1).

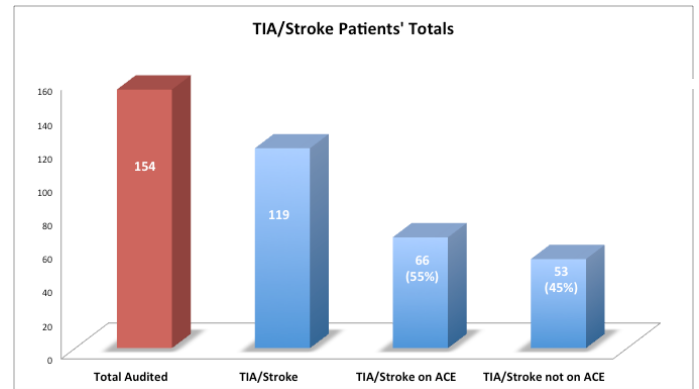


Figure 1: TIA/Stroke Patient Totals

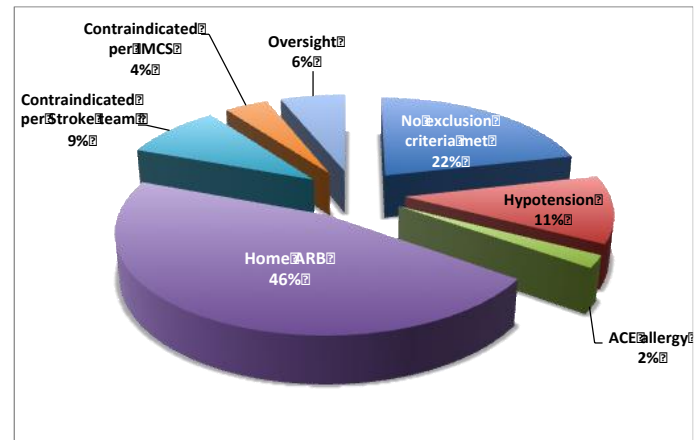


Figure 2: Breakdown of patients not started on ACEI

**Discussion**

With over three-fourths of our target population started on therapy, we conclude that the clinical pathway demonstrated success. In the design of the pathway, it was crucial to allow both the hospitalist and the stroke neurologist to have the ability to “opt out” based on his or her clinical judgment. Further, our pre-intervention education of all clinicians as well as the addition of a standard note template to serve as a clinical reminder may have improved compliance.

Our quality improvement clinical pathway is an important example for the future of co-management models. Oftentimes the patient population is specialized. While ideally hospitalists who are versed in the unique clinical complications of such patients would staff such a service, not all staffing models can accommodate such a practice. Clinical pathways that are strongly researched and based on evidence can help diminish practice variation and maintain practice patterns that utilize the most up to date evidence.

Implementing such a pathway during the hospitalization may impact the long term care of the stroke patient. The lasting effect of medication changes made in the inpatient setting has been well demonstrated in prior stroke<sup>12,13</sup> as well as congestive heart failure literature.<sup>11,14</sup>

With the successful implementation of this structure of co-management we were able to operationalize practice patterns to improve consistency in our consultation recommendations, specifically in the management of elevated blood pressure. With input from the leaders of the stroke program, a quality improvement clinical pathway was established for all patients with ischemic stroke to implement the initiation of specific antihypertensive agents. The success of this pathway serves as a model of how hospitalists can execute quality improvement projects throughout the hospital using the model of co-management.

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### **References**

1. **Likosky DJ, Amin AN.** Who will care for our hospitalized patients? *Stroke*. 2005 Jun;36(6):1113-4. PubMed PMID: 15914767.
2. **Amin A, Likosky D.** The role of hospitalists in the acute care of stroke patients. *Curr Treat Options Cardiovasc Med*. 2010 Jun;12(3):240-9. doi:10.1007/s11936-010-0068-7. Epub 2010 Mar 30. PubMed PMID: 20461115; PubMed Central PMCID: PMC2860551.
3. 2014 State of Hospital Medicine Report. Society of Hospital Medicine. [cited 2016 Aug 20]. Available from: [https://www.hospitalmedicine.org/Web/Practice\\_Management/State\\_of\\_HM\\_Surveys/2014.aspx](https://www.hospitalmedicine.org/Web/Practice_Management/State_of_HM_Surveys/2014.aspx)
4. **Auerbach AD, Wachter RM, Cheng HQ, Maselli J, McDermott M, Vittinghoff E, Berger MS.** Comanagement of surgical patients between neurosurgeons and hospitalists. *Arch Intern Med*. 2010 Dec 13;170(22):2004-10. doi:10.1001/archinternmed.2010.432. PubMed PMID: 21149758.
5. **Iberti CT, Briones A, Gabriel E, Dunn AS.** Hospitalist-vascular surgery comanagement: effects on complications and mortality. *Hosp Pract* (1995). 2016 Dec;44(5):233-236. Epub 2016 Nov 24. PubMed PMID: 27831826.
6. **Tadros RO, Faries PL, Malik R, Vouyouka AG, Ting W, Dunn A, Marin ML, Briones A.** The effect of a hospitalist comanagement service on vascular surgery inpatients. *J Vasc Surg*. 2015 Jun;61(6):1550-5. doi: 10.1016/j.jvs.2015.01.006. Epub 2015 Feb 19. PubMed PMID: 25704408.
7. **Rashid P, Leonardi-Bee J, Bath P.** Blood pressure reduction and secondary prevention of stroke and other vascular events: a systematic review. *Stroke*. 2003 Nov;34(11):2741-8. Epub 2003 Oct 23. Review. PubMed PMID: 14576382.
8. **PROGRESS Collaborative Group.** Randomised trial of a perindopril-based blood-pressure-lowering regimen among 6,105 individuals with previous stroke or transient ischaemic attack. *Lancet*. 2001 Sep 29;358(9287):1033-41. Erratum in: *Lancet* 2001 Nov 3;358(9292):1556. *Lancet* 2002 Jun 15;359(9323):2120. PubMed PMID: 11589932.
9. **Bosch J, Yusuf S, Pogue J, Sleight P, Lonn E, Rangoonwala B, Davies R, Ostergren J, Probstfield J; HOPE Investigators.** Heart outcomes prevention evaluation. Use of ramipril in preventing stroke: double blind randomised trial. *BMJ*. 2002 Mar 23;324(7339):699-702. PubMed PMID: 11909785; PubMed Central PMCID: PMC99052.
10. **Heart Outcomes Prevention Evaluation Study Investigators, Yusuf S, Sleight P, Pogue J, Bosch J, Davies R, Dagenais G.** Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. *N Engl J Med*. 2000 Jan 20;342(3):145-53. Erratum in: 2000 May 4;342(18):1376. *N Engl J Med* 2000 Mar 9;342(10):748. PubMed PMID: 10639539.
11. **He J, Zhang Y, Xu T, Zhao Q, Wang D, Chen CS, Tong W, Liu C, Xu T, Ju Z, Peng Y, Peng H, Li Q, Geng D, Zhang J, Li D, Zhang F, Guo L, Sun Y, Wang X, Cui Y, Li Y, Ma D, Yang G, Gao Y, Yuan X, Bazzano LA, Chen J; CATIS Investigators.** Effects of immediate blood pressure reduction on death and major disability in patients with acute ischemic stroke: the CATIS randomized clinical trial. *JAMA*. 2014 Feb 5;311(5):479-89. doi: 10.1001/jama.2013.282543. PubMed PMID: 24240777.
12. **Thrift AG, Kim J, Douzmanian V, Gall SL, Arabshahi S, Loh M, Evans RG.** Discharge is a critical time to influence 10-year use of secondary prevention therapies for stroke. *Stroke*. 2014 Feb;45(2):539-44. doi: 10.1161/STROKEAHA.113.003368. Epub 2013 Dec 12. PubMed PMID: 24335222.

13. **Sturm JW, Donnan GA, Dewey HM, Macdonell RA, Gilligan AK, Srikanth V, Thrift AG.** Quality of life after stroke: the North East Melbourne Stroke Incidence Study (NEMESIS). *Stroke*. 2004 Oct;35(10):2340-5. Epub 2004 Aug 26. PubMed PMID:15331799.
14. **Fonarow GC, Gawlinski A, Moughrabi S, Tillisch JH.** Improved treatment of coronary heart disease by implementation of a Cardiac Hospitalization Atherosclerosis Management Program (CHAMP). *Am J Cardiol*. 2001 Apr 1;87(7):819-22. PubMed PMID: 11274933.

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