Timely Head CT in TBI with Anticoagulation Pre-Injury

Ivascu, F. A., Janczyk, R. J., Junn, F. S., Bair, H. A., Bendick, P. J., & Howells, G. A. (2006). Treatment of trauma patients with intracranial hemorrhage on preinjury warfarin. Journal of Trauma, 61(2), 318-321. doi:10.1097/01.ta.0000223944.25922.91. This single center matched control group study compared outcomes of anticoagulated trauma patients before and after implementation of an expedited triage or "Coumadin Protocol". Time to head CT was 132 min control vs 85 min in the study group (p<0.001). Trauma center protocol for rapid identification of intracranial bleeding without a concomitant therapeutic protocol does not improve survival in head injured patients on preinjury warfarin.

Ivascu, F. A., Howells, G. A., Junn, F. S., Bair, H. A., Bendick, P. J., & Janczyk, R. J. (2005). Rapid warfarin reversal in anticoagulated patients with traumatic intracranial hemorrhage reduces hemorrhage progression and mortality. Journal of Trauma, 59(5), 1131-1137; discussion 1137-1139. This is a single-center review of 82 anticoagulated patients with known or suspected head trauma entered into a "Coumadin protocol". The protocol ensured immediate triage and physician evaluation, head computed tomography (CT) scan, and fresh frozen plasma administration in patients with documented ICH. Neither the initial GCS nor INR in anticoagulated trauma patients reliably identifies patients with ICH. Rapid confirmation of ICH with expedited head CT scan combined with prompt reversal of warfarin anticoagulation with fresh frozen plasma decreases ICH progression and reduces mortality.

Timely Head CT in TBI

Techar, K., Nguyen, A., Lorenzo, R. M., Yang, S., Thielen, B., Cain-Nielsen, A., . . . Tignanelli, C. J. (2019). Early Imaging Associated With Improved Survival in Older Patients With Mild Traumatic Brain Injuries. Journal of Surgical Research, 242, 4-10. doi:10.1016/j.jss.2019.04.006. This is an MTQIP study of 33 trauma centers, TBI patients from 1/1/2011 to 6/30/17. Inclusion criteria of ICD9/10 code for TBI, age $\geq$50, ED GCS $\geq$14, ISS $\leq$20, nonfull trauma activation, and head CT between 5-90 minutes. Mortality nadired at 35 min. Each 1-min delay in CT imaging resulted in a 2% increase in mortality (P = 0.002). Early patients had significantly reduced in-hospital mortality (P = 0.03), shorter emergency department length of stay (P < 0.001), and were more likely to receive fresh frozen plasma within 4 h if anticoagulated (P = 0.03). Teaching, high-volume, and level 2 trauma centers were all less likely to provide early head CTs (all P < 0.05).

Timely Head CT

Rogg, J. G., Huckman, R., Lev, M., Raja, A., Chang, Y., & White, B. A. (2017). Describing wait time bottlenecks for ED patients undergoing head CT. American Journal of Emergency Medicine, 35(10), 1510-1513. doi:10.1016/j.ajem.2017.04.059. This is an observational study of n=8312 patients who underwent head CT between 1/2013 to 6/30/14 at a single-academic ED with >100,000 visits per year. The median time from arrival to head CT preliminary report was 3 h and 13 min with 39 minutes of waiting time resulting from bottlenecks. Bottlenecks were identified in 4 steps: 1) time from patient arrival to head CT order (30%), 2) time from head CT order to head CT scheduled (<1%), time from head CT schedule to head CT completed (27%), and time from head CT completed to head CT preliminary report (42%).

Rados, A., Tiruta, C., Xiao, Z., Kortbeek, J. B., Tourigny, P., Ball, C. G., & Kirkpatrick, A. W. (2013). Does trauma team activation associate with the time to CT scan for those suspected of serious head injuries? World J Emerg Surg, 8(1), 48. doi:10.1186/1749-7922-8-48. This is a single center retrospective comparison of full trauma activation versus (n=58) versus non-trauma team response (n=30), for time to head CT. Median time to CT head was double without full trauma activation (median 50 vs 26 minutes, p< 0.001). Full trauma activations involving trauma surgeons were quicker at transferring serious head injury patients to CT.

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