A Standardized Approach to Heparin Management During Cardiac Catheterization

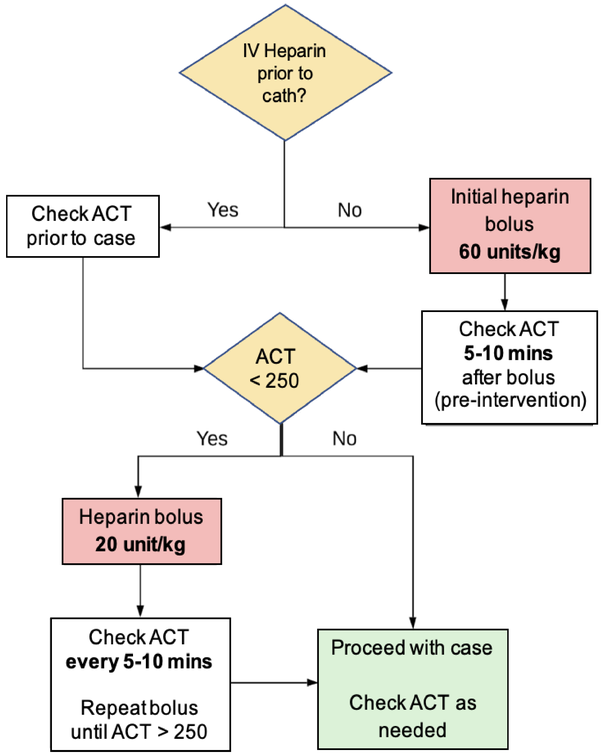
Stephanie Edwin, PharmD, BCPS-AQ Cardiology; Hussein Almadhoun, MD, RPH, MSc Clinical Pharm;
Edouard Daher, MD, FACC; Anthony Gianino, RN, MA; Dawn Light, RN; John Surducan, RN
Ascension St. John Hospital, Detroit, MI

Hussein.Almadhoun@ascension.org

Background

- The Institute for Safe Medication Practices (ISMP) advocates for “process-driven, systems based” approaches to reduce medication errors and improve patient care.
- Adopting a standardized approach to anticoagulation management during cardiac catheterization may help to prevent anticoagulant-related adverse drug events related to supratherapeutic anticoagulation.
- Michigan BMC2 Cardiovascular Consortium
  - Maintain ACT less than 350 seconds during PCI with the use of heparin alone.
  - Goal = less than 15% fallout.
- A standardized approach to heparin management was developed by the multidisciplinary Cath Lab Quality committee to help achieve this goal.

Heparin Protocol



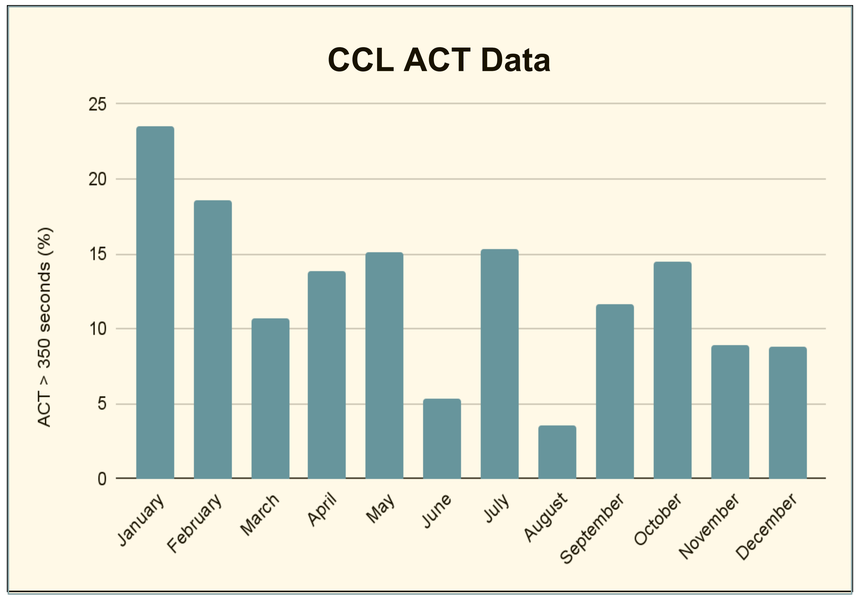
Results

Impact of Protocol Implementation

- Incidence of ACT > 350 seconds was reduced from 27% pre-protocol to 12.2% post-protocol ($p<0.01$).
- Michigan BMC2 Cardiovascular Consortium performance measure of peak ACT > 350 seconds in less than 15% of patients was met in 8 out of 12 months in 2021.

Factors Associated with High ACT

- All cases with ACT > 350 seconds were reviewed monthly by the Cath Lab Quality Committee to determine opportunities for improvement.
  - Addressed with interventional cardiologist by CCL Director.
- Protocol Non-Compliance = 65.3%
  - Initial heparin bolus not accounting for prior IV heparin during inpatient stay.
  - Failure to redraw ACT > 350 seconds to confirm accuracy.
  - ACT drawn too soon following heparin bolus.



Discussion

- Adopting a standardized approach to anticoagulation management during cardiac catheterization may help to promote care efficiency and prevent medication errors related to supratherapeutic anticoagulation.
- While conflicting data exists on the correlation between ACT and clinical outcomes, it is our hope that using the lowest effective heparin dose can minimize procedure-related bleeding.

Key Messages

- Implementation of a standardized approach to heparin management during PCI significantly reduced the incidence of supratherapeutic anticoagulation.
- Our approach has been shared across the Ascension Michigan cardiovascular service line.
- Future directions include evaluating the impact of ACT on the incidence of major bleeding and major adverse cardiac events.

References

1. Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, Bischoff JM, Bittl JA, Cohen MG, DiMaio JM, Don CW, Fremes SE, Gaudino MF, Goldberger ZD, Grant MC, Jaswal JB, Kurlansky PA, Mehran R, Metkus TS Jr, Nnacheta LC, Rao SV, Sellke FW, Sharma G, Yong CM, Zwischenberger BA. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2022 Jan 18;145(3):e4-e17. doi: 10.1161/CIR.0000000000001039. Epub 2021 Dec 9. Erratum in: Circulation. 2022 Mar 15;145(11):e771. PMID: 34882436.
2. Cutlip D, Levin T. Antithrombotic therapy for elective percutaneous coronary intervention: general use. UpToDate Inc. http://www.uptodate.com. Accessed May 25, 2021.
3. Lincoff AM, Cutlip D. Anticoagulant therapy in acute ST elevation myocardial infarction. UpToDate Inc. http://www.uptodate.com. Accessed May 25, 2022.
4. Cruickshank MK, Levine MN, Hirsh J, et al, “A Standard Heparin Nomogram for the Management of Heparin Therapy,” Arch Intern Med, 1991, 151(2):333-7.