OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:	Indicators for Computer Tomography Angiography (CTA) Following Non-Fatal Strangulation
Describe the need:	Insufficient data to support factors indicating neck Computer Tomography (CT) following non-fatal strangulation; considering risks, cost, and added trauma of CT-angiogram (CTA) after violence, data are needed to establish evidence-based criteria for CTA following non-fatal strangulation.
Keyword(s):	strangulation, non-fatal strangulation, CTA, computed tomography, CT angiogram, domestic violence, intimate partner violence, sexual assault

Submitting subcommittee(s): Forensic Nursing **Date Approved:** 2/2/2023

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

Yes - we would like to develop a standard regarding management of non-fatal strangulation within the context of medical forensic examinations. This research need will inform such a standard.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

Yes - Stellplug and colleagues (2022) examined data from 130 consecutive patients after non-fatal strangulation in a single sexual assault nurse examiner (SANE) program; a ratio of 1 to 23 patients receiving CTA had a positive finding and that patient had visible neck injuries. Zubieri and colleagues reviewed data from 142 consecutive patients with CTA following strangulation. CTA of the neck revealed 21 patients to have acute injuries (15.5%, 95% CI 9.5, 21.4) including 6 initially reported vascular injuries (4.2%, 95% CI 0.9, 7.5). Although neck pain (73, 51.4%), loss of consciousness (67, 47.2%), and headache (31, 21.8%) were frequently reported in the ROS, their predictive value of vascular injury was weak (4.1%, 4.5%, and 3.2%, respectively). On physical exam, redness/bruising of the neck (73, 51.4%) and neck tenderness (47, 33.1%) were both the most common and had the highest prevalence (19.2% and 12.8%, respectively), however, when selecting for vascular injuries alone were found to have low predictive yield (vascular injury 4.1% and 2.1%, respectively). The above statistics were based on the initial radiologist report and Emergency Department findings. After retrospective review, 3 Grade 1 BIFFL vascular injuries were identified (2.1%), with one false negative case (0.7%). Limitations of both studies include retrospective chart review with small samples. More data using large samples of both retrospective and prospective data are needed to identify evidence-based decision rules for CTA following non-fatal strangulation and systematically examine potential risks of more liberal CTA (e.g., radiation exposure, additional patient trauma, cost) and consequences of a more conservative approach (especially missed potentially fatal vascular events, failure to validate patient concerns).

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

Clarot, F., Vaz, E., Papin, F., & Proust, B., (2005). Fatal and non-fatal bilateral delayed carotid artery dissection after manual strangulation. *Forensic Science International*, 149, 143-150. DOI: 10.1016/j.forsciint.2004.06.009

McClane, G. E., Strack, G. B., & Hawley, D. (2001). A review of 300 attempted strangulation cases, part II: clinical evaluation of the surviving victim. Journal of Emergency Medicine, 21(3), 311-315

Patch, M., Dugan, S., Green, W., & Anderson, J.C. (2022). Emergency evaluation of nonfatal strangulation patients: A commentary on controversy and care priorities. Journal of Emergency Nursing, 48(3), 243-247. https://doi.org/10.1016/j.jen.2022.03.003

Patch, M., Farag, Y., Anderson, T., Perrin, N., Kelen, G., & Campbell, J. (2021). United States ED visits by adult women of nonfatal intimate partner strangulation 2006 to 2014: Prevalence and associated characteristics. *Journal of Emergency Nursing, 47(3),* 437-448. https://doi.org/10.1016/j.jen.2021.01.008

Prosser, D. D., Grigsyby, T., & Pollock, J. M. (2018). Unilateral anoxic brain injury secondary to strangulation identified on conventional and arterial spin-labeled perfusion imaging. *Radiology Case Reports, 13,* 563-567. doi: 10.1016/j.radcr.2018.02.004

Shields, L.B., Corey, T.S., Weakley-Jones, B., & Stewart, D. (2010). Living victims of strangulation: a 10 year review of cases in a metropolitan community. *The American Journal of Forensic Medicine and Pathology, 31*(4), 320-325.

Sorenson, S., Joshi, M., & Sivitz, E. (2014). A systematic review of the epidemiology of nonfatal strangulation, a human rights and health concern. *American Journal of Public Health, 104,* e54-e61. DOI: 10.2105/AJPH.2014.302191

Stellpflug, S.J., Taymor, A.D., Dooley, A.E., Carlson, A.M., & LeFevere, R. C. (2022). Analysis of a consecutive retrospective cohort of strangulation victims evaluated by a sexual assault nurse examiner consult service. Journal of Emergency Nursing, 48(3), 257-265. https://doi.org/10.1016/j.jen/2022.01.001

Stellpflug, S.J., Weber, W., Dietrich, A., Springer, B., Polansky, R., Sachs, C., Hsu, A., McGuire, S., Gwinn, C., Strack, G., & Riviello, R. (2022b). Approach considerations for the management of strangulation in the emergency department. Journal of the American College of Emergency Physicians Open, 3(2), e12711. https://doi.org/10.1002/emp2.12711

Zuberi, O., Dixon, T., Richardson, A., Gandhe, A., Hadi, M., & Joshi, J. (2019). CT angiograms of the neck in strangulation victims: Incidence of positive findings at a level one trauma center over a 7-year period. *Emergency Radiology,* 1-10. https://doi.org/10.1007/s10140-019-01690-3

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest? Is your research need identified by NIJ?

No.

5. In what ways would the research results improve current laboratory capabilities?

Not relevant to laboratory capabilities.

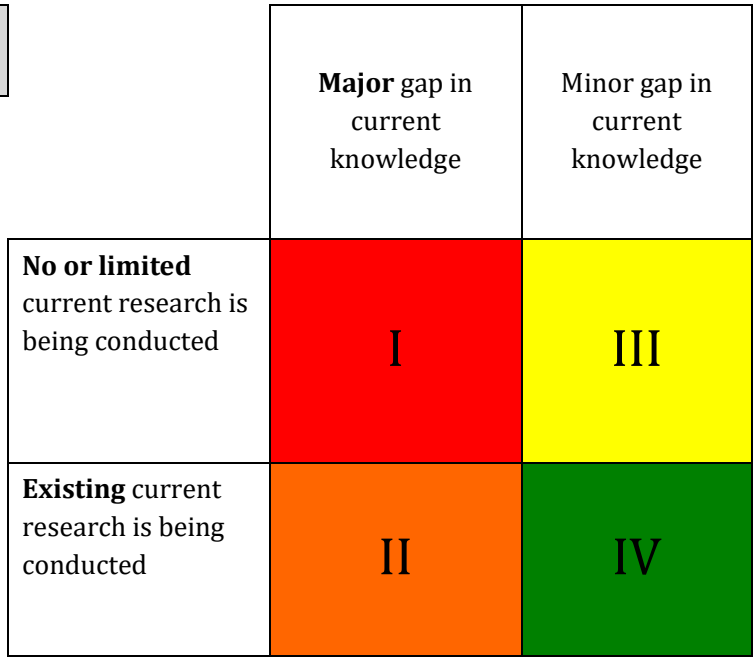
6. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Controversy exists currently regarding use of CTA after non-fatal strangulation; research results would support evidence-based decision models for when to use CTA after non-fatal strangulation.

7. In what ways would the research results improve services to the criminal justice system?

Relevance to the criminal justice system is to prevent morbidity and mortality associated with violent strangulation and support prosecution of cases of non-fatal strangulation by validating potential lethality and identifying and documenting injuries that might be otherwise undetectable.

8. Status assessment (I, II, III, or IV): II



This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.