

Non-Fatal Strangulation Documentation TOOLKIT



Research. Educate. Lead.



INTERNATIONAL
ASSOCIATION OF
**Forensic
Nurses**

Table Of Contents

PREFACE	3
PURPOSE	4
ACKNOWLEDGEMENTS	4
PATIENT CONSENT AND REPORTING OBLIGATIONS.....	5
STRANGULATION ASSESSMENT, DOCUMENTATION, AND EVIDENCE COLLECTION GUIDELINES.....	6
DEFINITION	6
ANATOMY OF THE NECK.....	6
PEDIATRIC HIGHLIGHT	8
PATHOPHYSIOLOGY OF STRANGULATION.....	9
STRANGULATION INJURIES	9
FACTORS IMPACTING STRANGULATION	10
HISTORY/PATIENT DESCRIPTION OF THE STRANGULATION EVENT	10
ASSESSMENT AND DOCUMENTATION OF PHYSICAL FINDINGS/DESCRIPTION OF INJURIES	11
DANGER ASSESSMENT	14
NECK MEASUREMENT.....	15
PHOTOGRAPHS	16
COLLECTION OF EVIDENCE	16
RADIOLOGY STUDIES (AS INDICATED BY MEDICAL PROVIDER).....	17
SAFETY PLANNING	18
MULTIDISCIPLINARY RESPONSE.....	19
CITATIONS.....	20
Appendix A – Sample Policy and Procedure.....	1
Appendix B – Strangulation Assessment Tool	5
Appendix C – Sample Strangulation Protocol.....	17

Appendix D – Sample history-taking questions for the adult/adolescent patient	22
Appendix E - Sample history-taking questions for the pediatric patient	25
Appendix F – Sample discharge instructions	28
Appendix G – Comprehensive bibliography	30

PREFACE

In 1992, the International Association of Forensic Nurses (IAFN) was created by a group of nurses who recognized violence as a healthcare problem. Over the past three decades, much progress has been made as it relates to the care of patients affected by violence. Through this progress, knowledge has been gained and practice guidelines continue to evolve with the goal of continuous provision of safe and effective patient care. In early 2015, IAFN identified the need for practice guidance related to the evaluation of the patient who has experienced non-fatal strangulation. A task force of experts convened to develop an associated toolkit for clinical use. The following is the second edition of the toolkit, updated in 2022.

The Strangulation Toolkit provides clinicians with detailed information on the existing evidence-base, as well as guidance on assessment techniques, evidence collection, and documentation when caring for a patient who has experienced strangulation. This toolkit also provides sample policies, documentation tools, and discharge instructions that can be adapted to best suit institution and practice needs. The toolkit components represent the minimum documentation expectations of clinicians caring for this patient population.

Additional studies are needed to provide optimal care to adult, adolescent, and pediatric patients who are victims of non-fatal strangulation. Research regarding the short and long-term health consequences of non-fatal strangulation is limited. Standardizing the associated evaluation and documentation will further the healthcare profession's ability to add to the available evidence-base as it relates to commonality of signs and symptoms, risk for delayed lethality from carotid artery dissection, occlusion, thrombosis, and/or stroke, as well as mental health consequences (Patch et al. 2017, Patch et al., 2022). Studies exploring non-accidental strangulation injuries in the pediatric patient are sparsely represented in the published literature. Patients who have experienced physical or sexual abuse may have endured non-fatal strangulation and should receive an appropriate clinical evaluation. As such, IAFN encourages adopting these documents as-is, or adding to them rather than reducing the elements currently recommended.



PURPOSE

This document was created to identify and outline a standardized approach to the medical forensic examination and documentation of the patient who has experienced non-fatal strangulation (See [Appendix A](#) for Institutional Policy Example).

ACKNOWLEDGEMENTS

Special thanks to these individuals who contributed their skills and expertise to the development of this toolkit:

Tara Henry, MSN, FNP-C, SANE-A, SANE-P

Megan Lechner, DNP, APRN, CNS, SANE-A, SANE-P

Jenifer Markowitz, ND, RN, WHNP-BC, SANE-A, DF-IAFN

Jennifer Pierce-Weeks, BSN, RN, SANE-A, SANE-P

Ashley Stewart, MSN, BScPN RPN, SANE-A, SANE-P

PATIENT CONSENT AND REPORTING OBLIGATIONS

Before utilizing the components of this toolkit, it is imperative to address patient rights. Patients have the right to decline any assessment, including a strangulation assessment, they have the right to decline photography of their injuries, and they have the right to decline evidence collection. An explanation of the procedures themselves, rationale for conducting them, how the information or evidence will be used, and the option to decline any or all of the examination are components of informed consent. Informed consent must be obtained before assessing patients who have been strangled.

In some states, territories, or jurisdictions strangulation may not require a mandatory report to law enforcement by healthcare providers. Strangulation-specific laws may be in place, and healthcare providers should be familiar with the laws in their location of practice. These laws may overlap, align, or compete with other existing laws regarding other types of violence frequently seen co-occurring with strangulation, such as sexual assault and intimate partner violence laws. Both of these categories of laws may have exceptions to mandatory reporting obligations for healthcare providers, therefore being familiar with what they are and how they intersect is crucial.

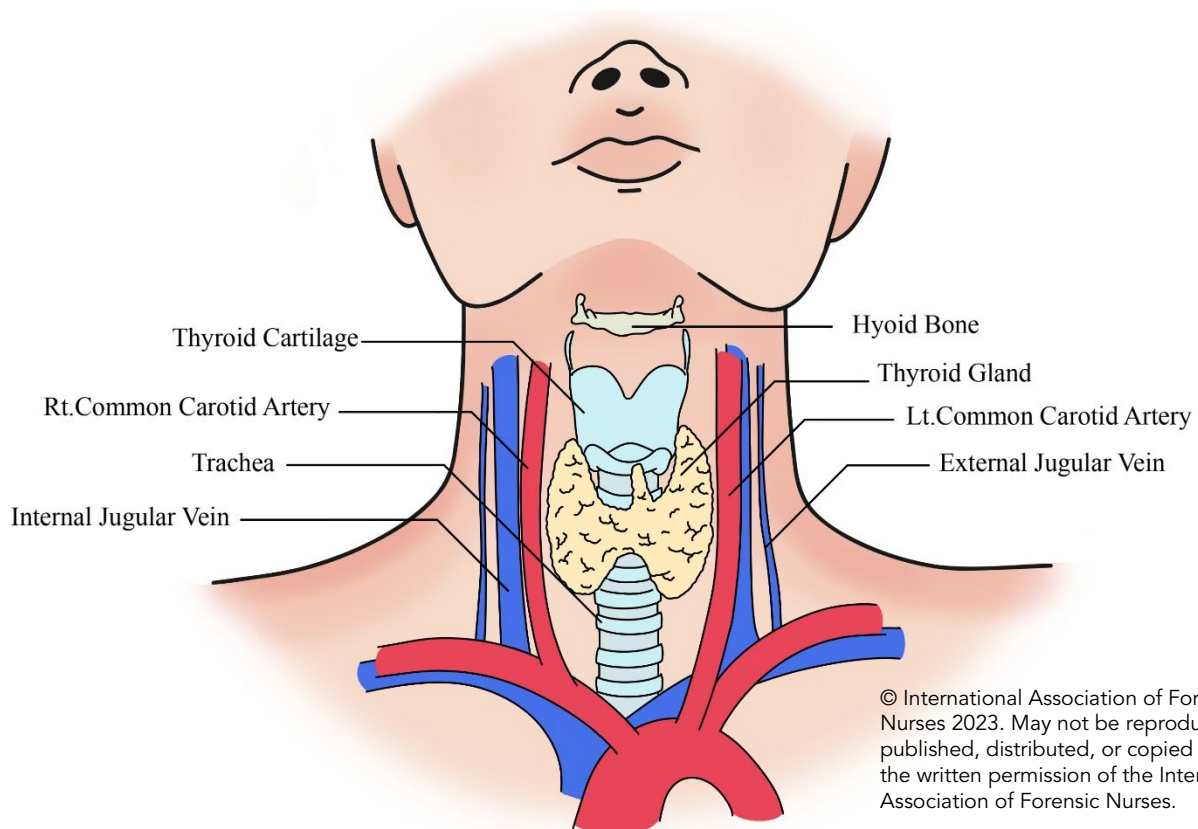
In the event that the patient has the option to not make a law enforcement report, evidence will likely not be collected. Refer to the local state, territory, or jurisdiction for protocols regarding evidence collection in strangulation.

STRANGULATION ASSESSMENT, DOCUMENTATION, AND EVIDENCE COLLECTION GUIDELINES

DEFINITION

Strangulation is a form of asphyxia produced by the occlusion of blood vessels and/or the respiratory passage as a result of external pressure applied to the neck. The three types of strangulation include hanging, ligature, and manual strangulation. Hanging strangulation occurs when a ligature around the neck is tightened by the gravitational weight of the person's body or part of the body. Ligature strangulation occurs when material, such as a cord, suture, or rope, is placed around the neck and is then tightened by a force other than the weight of the body. Manual strangulation occurs when hands, arms, or legs are used to apply external pressure to the neck (Ernoehazy, 2016; Taliaferro, Hawley, McClane & Strack 2009; Sauvageau & Boghossian, 2010).

ANATOMY OF THE NECK



© International Association of Forensic Nurses 2023. May not be reproduced, published, distributed, or copied without the written permission of the International Association of Forensic Nurses.

MUSCLES The major neck muscles are the sternocleidomastoid and trapezius. These muscles are innervated by cranial nerve XI, the spinal accessory nerve. The sternocleidomastoid muscle divides each side of the neck into two triangles. The anterior triangle lies between the sternocleidomastoid and the midline of the body, with its base up along the lower mandible and its apex at the suprasternal notch. The posterior triangle is behind the sternocleidomastoid muscle, with the trapezius muscle on the other side and with its base along the clavicle below. These triangles are helpful guidelines when describing findings in or on the neck.

Despite their size, the trapezius muscles are not often injured as a result of strangulation, due to their posterior location. Injuries are more commonly seen in the sternocleidomastoid, levator scapula, scalenes, and hyoid muscles (thyrohyoid, omohyoid, sternohyoid, sternothyroid), making the assessment of these extremely important (Deininger-Czermak et al., 2020; Marty et al., 2020).

AIRWAY The trachea, more commonly described as the “windpipe,” lies anteriorly to the esophagus. The trachea is supported by rings made of cartilage. The superior tracheal ring, also known as the cricoid cartilage, is positioned inferiorly to the thyroid cartilage. At this point, a small palpable notch can be palpated. The trachea extends just below the sternal angle, where it bifurcates into the right and left main bronchi. The hyoid bone lies between the mandible, or jawbone, and the thyroid cartilage, and is attached to the floor of the oral cavity.

The larynx, positioned at the base of the anterior triangle of the neck, is a midline structure composed of a cartilaginous core with interconnecting membranes and associated musculature. The larynx houses the vocal cords, assists with airway protection, and regulates intrathoracic and intra-abdominal pressures.

VESSELS The major vessels in the neck include the right and left common carotid arteries, and the right and left internal and external jugular veins. The carotid arteries are located in the groove between the trachea and the sternocleidomastoid muscle. The larger internal jugular veins lie medial to the sternocleidomastoid muscle. The external jugular veins are more superficial and lie lateral to the sternocleidomastoid muscle, above the clavicle.

NERVES

The cranial nerves enter and exit the brain rather than the spinal cord and assist with sensory function of the head and neck, with the exception of the vagus nerve. The vagus nerve travels to the heart, respiratory muscles, stomach, and gallbladder. The olfactory and optic nerves originate from the cerebrum, while the other ten cranial nerves originate from the brainstem. The larynx is not innervated directly by any of the cranial nerves, but the superior and recurrent laryngeal nerves are branches off the vagus nerve.

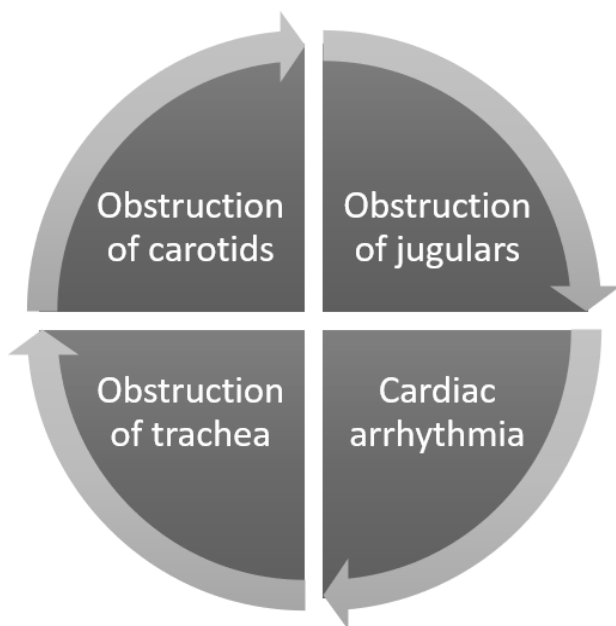
PEDIATRIC HIGHLIGHT

Research with children is limited, even though children can be presumed at great risk of life-threatening injuries if strangled, due to the variation in anatomy and physiology compared to adults. Children have a relative lack of ossification of the laryngeal cartilages and hyoid bone and a higher risk of airway compromise due to small size (Stellpflug et al., 2022). The laryngeal position changes throughout life. In infants and toddlers, the larynx is further superior, allowing air to move directly from the nose to the trachea, enabling infants to swallow liquids and breathe almost simultaneously (Allen, Minutello, & Murcek, 2021). It is thought that in pediatric strangulation the primary mode of injury may be venous congestion resulting in cerebral edema and unconsciousness, followed by airway obstruction (Kline-Fath et al., 2021; Sep & Thies, 2007). Mild soft-tissue edema of the neck along with subcutaneous air consistent with air leaks as well as bilateral lung opacities, pneumomediastinum and pneumothoraces have been noted in children who have been strangled (Kline-Fath, et al., 2021). Cognitive and developmental differences may make it difficult for a child to effectively describe the strangulation event (Baldwin-Johnson & Wiese, 2015). Strangulation should be on the list of differential diagnoses in children who present with suspicion or disclosure of sexual or physical abuse (Prosser et al., 2018)



PATHOPHYSIOLOGY OF STRANGULATION

Asphyxia is insufficient oxygenation of the brain and occurs during strangulation when oxygenation of the brain is interrupted by the occlusion of blood vessels and/or the respiratory passage. When external pressure on the neck obstructs the carotid artery, oxygen delivery to the brain is impeded and results in oxygen deprivation. If the jugular vein is obstructed, removal of deoxygenated blood from the brain is impeded and causes increased carbon dioxide in the brain. The obstruction of the respiratory passage prevents the lungs from receiving oxygen, yielding decreased oxygen in the circulating blood.



The majority of deaths from strangulation occur during the actual event via one of four mechanisms:

1. Obstruction of the cardiac arteries: The inability to carry oxygenated blood from the heart to the brain.
2. Obstruction of the jugular veins: The inability to carry deoxygenated blood down to the heart
3. Obstruction of the trachea: The inability to carry oxygen to the lungs.
4. Cardiac arrhythmia: Irregular heartbeat (too fast, too slow, or simply irregular) resulting in cardiac arrest.

STRANGULATION INJURIES

Strangulation can result in a variety of injuries, including but not limited to the soft tissues of the neck, esophagus, larynx, trachea, cervical spine, and the laryngeal and facial nerves. (Hawley et al., 2001; Shields et al., 2010; Smith et al., 2001; Patch et al., 2017). A rare medical complication that can occur in strangulation is acute bradycardia and/or cardiac arrest related to pressure on the carotid sinus (Taliaferro et al., 2009).

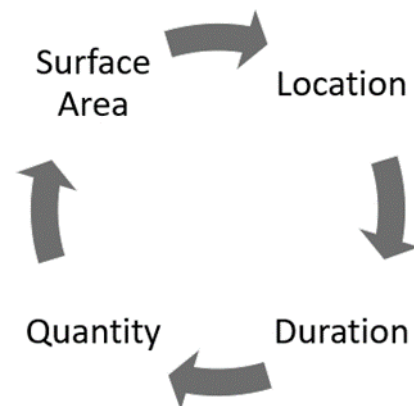
Along with physical injuries, patients can experience psychological and emotional complications as a result of strangulation, such as nightmares, memory loss, depression,

insomnia, among many others (Smith et al., 2001). However, despite a lack of visible injuries, it is important to keep in mind that this does not mean the strangulation did not occur (Shields et al., 2010.)

FACTORS IMPACTING STRANGULATION

Injuries and complications from strangulation are affected by several variables. In addition to the assault details and mechanism of strangulation, there are four main variables to consider (Strack, McClane, & Hawley, 2001):

1. The exact anatomic location of the applied force.
2. The quantity of the applied force.
3. The duration of the applied force.
4. The surface area of the applied force.



One might assume the more times a strangulation occurred, the more severe the injuries or complications. However, this is an inaccurate assumption. Consideration must also be given to how much force or pressure was applied, where it was applied, for how long, and what the dispersion of the pressure was. Differences and alterations in these variables directly impact the severity of the strangulation and potential for injury.

HISTORY/PATIENT DESCRIPTION OF THE STRANGULATION EVENT

Document the patient's history and description of the strangulation incident using the patient's own words as much as possible (U.S. Department of Justice, Office on Violence Against Women, 2013). Use quotation marks when documenting the patient's descriptive comments verbatim. Other types of violence often occur during or near the time of the strangulation, such as hitting, punching, pushing, etc., and should be captured. It is also important to document if the strangulation occurred during a sexual assault. A child or vulnerable adult providing a history of strangulation is diagnostic of physical abuse and must be reported to child/adult protection services and law enforcement.

The patient history guides clinical decision-making for assessment, diagnosis, and treatment. The symptoms of strangulation are meant to provide information about the anatomical structures affected during and after the strangulation, which allows for the identification of current and potential medical complications the patient may be at risk for. All of this information guides clinical decision-making for assessment, diagnosis, and treatment.

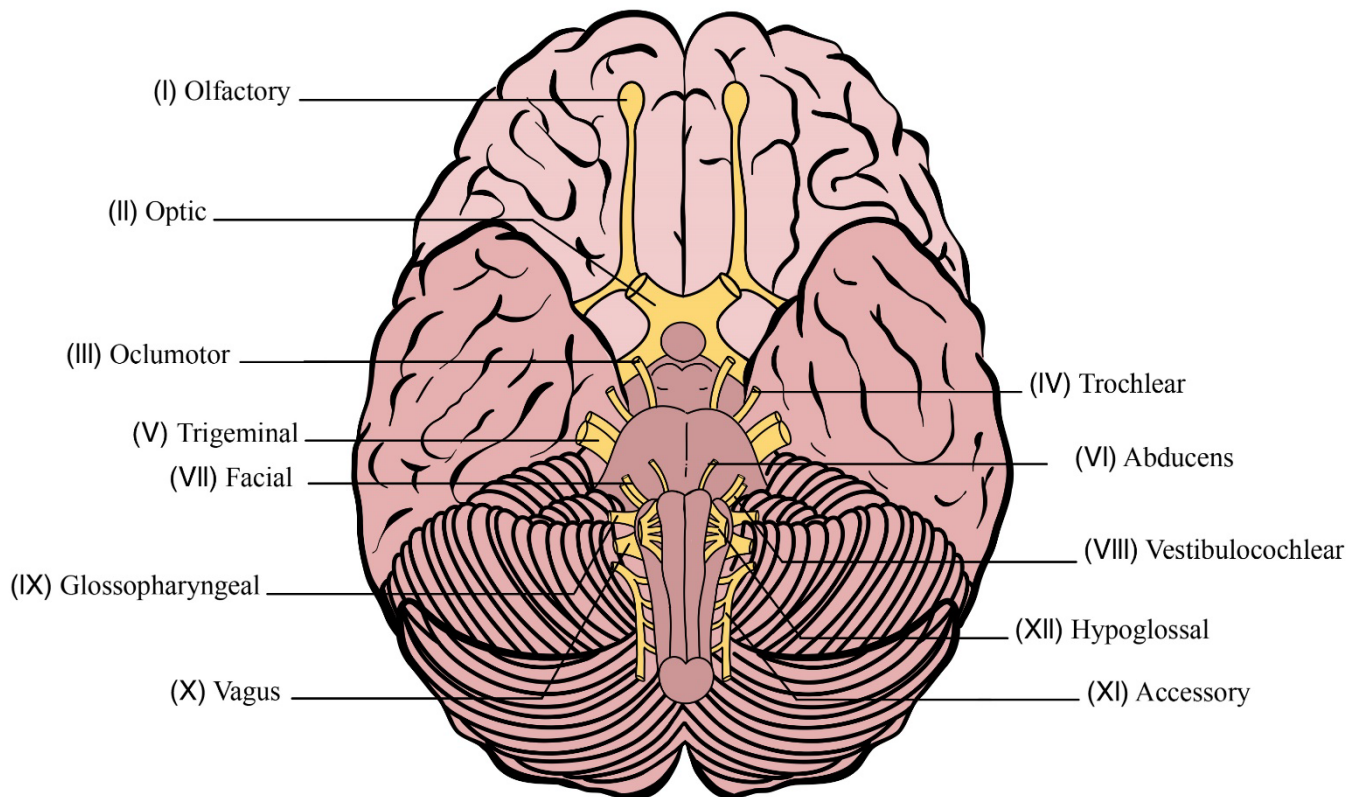
The symptoms that occurred with the strangulation incident should be separated and documented into three distinct time frames. 1) During the strangulation; 2) Immediately after the strangulation ends; 3) Currently, at the time of the exam. Once the patient has provided a history, ask any necessary clarifying questions. (See [Appendix C](#) and [Appendix D](#) for history-taking questions).

CLINICAL TIP

It is not uncommon for patients to delay seeking care by one or several days. Regardless of the timing of patient presentation, it is important to ask the same assessment questions. For example, patients may have a sore throat, neck pain, or a headache for several days after the incident, but it may be resolved by the time they come in for care. It is imperative that this information is captured this as a part of the diagnosis and treatment plan.

ASSESSMENT AND DOCUMENTATION OF PHYSICAL FINDINGS/DESCRIPTION OF INJURIES

A comprehensive physical assessment should be completed, with a focus on areas impacted by the strangulation and history provided by the patient. Thoroughly examine the head, face, eyes, ears, nose, throat, jaw line, and neck. Assess the scalp, ears, face, sclera, conjunctiva, lips, and oral cavity, including the oropharynx. Complete a cranial nerve assessment.



© International Association of Forensic Nurses 2023. May not be reproduced, published, distributed, or copied without the written permission of the International Association of Forensic Nurses.

Document the injuries on a body diagram. Describe each injury separately and include the location, shape, color, and size of the injury. Use a consistent unit of measure (i.e.: centimeters or inches) for all injuries. Note length, width, and depth of each injury, if possible. Include any statements made by the patient about the injury, i.e.: "this is where he grabbed my neck" and "that mark wasn't there before he strangled me." Attach additional pages if needed. Also describe the patient's appearance, behavior, speech, eye contact, and affect/demeanor using objective descriptors (see [Appendix B](#) for an example Assessment Tool).

Assess for and document the following signs, symptoms, and/or injury:

- Voice changes: Dysphonia (defined as hoarseness) or aphonia (defined as severe or complete loss of voice)
- Swallowing changes and tongue swelling: Dysphagia (defined as difficulty swallowing) or odynophagia (defined as painful swallowing)
- Breathing changes: Dyspnea (defined as difficulty breathing)
- Visible injuries on the neck and mastoid: Ligature marks/edema/abrasions (scratches and scrapes)/erythema/contusions
- Oral cavity injuries
- Petechiae: Eyelids/peri-orbital region/face/scalp/neck/ears/soft palate/under tongue
- Subconjunctival/Scleral hemorrhage/Scleral edema (eyes)
- Neurological findings: Ptosis/facial droop/unilateral weakness/loss of sensation/paralysis/seizure
- Assess for any mental status changes (restlessness, irritability, combativeness, amnesia, psychosis, etc.).
- Miscarriage/Pregnancy – fetal heart tones and last menstrual period
- Lung injuries: Aspiration pneumonia/pulmonary edema
- Crepitus/subcutaneous air (neck/chest/face)
- Abnormal carotid pulse
- Absence of normal crepitus felt during manipulation of cricoid cartilage
- Pain, swelling, erythema, contusion, abrasion, petechiae, bite marks, knife wounds, or gunshot wounds on any other area of the body (i.e., chest, back, upper extremities, lower extremities)

(Christe et al., 2009; Faugno, Waszak, Strack, Brooks, & Gwinn, 2013; Funk & Schuppel, 2003; Gwinn & Strack, 2013; Hawley, McClane, & Strack, 2001; Strack & McClane, 1999; Taliaferro, Hawley, McClane, & Strack, 2009).

DANGER ASSESSMENT

A lethality assessment is an evaluation that predicts the likelihood of serious injuries or death. Lethality Assessment Programs (LAP) are a common tool used by law enforcement to screen victims of domestic violence for potential lethality and connect them to service providers (Richards et al., 2020). It provides an easy and effective method to identify victims of domestic violence who are at the highest risk of being seriously injured or killed by their intimate partners (John Hopkins School of Nursing, 2023). Lethality assessments help to identify risk factors, obstacles, and resources for safety planning, provide clear language to use with patients to guide questions and conversations, and guide patient education needs. The most commonly used lethality assessment in the medical setting is the Danger Assessment.

The Danger Assessment (DA) tool was developed by Dr. Jacqueline Campbell in 1986 with consultation and content validity support from women who were assaulted by intimate partners, shelter workers, law enforcement officials and other clinical experts (Campbell, 2004; Campbell et al., 2009). This tool is used to assess for potential lethality of women in violent relationships; it has only been validated for the use of females abused by male partners. The tool consists of two parts. The first is a calendar portion designed to raise consciousness of the violence, and includes a 1-5 severity scale. It was also found that using the calendar increases accurate recall. The second part of the tool consists of 20 yes/no questions. Using the DA requires the weighted scoring and interpretation that is provided after completing the required training. This tool is often used in conjunction with a strangulation assessment, as it includes assessing for past strangulation.

The limitation of this tool is that it is not a validated risk assessment instrument for male victims or victims in a same-sex relationship (Danger Assessment, 2023). The DA-R is a validated tool to predict risk of re-assault of women who are in a same-sex relationship, and the DA can be adjusted for gender neutrality, however this impacts its validation as a risk assessment instrument. Additionally, low scores on the tool should not be overlooked, especially if patient statements include a fear of homicide.

For more information, please visit <https://www.dangerassessment.org>.

There are other tools that have been identified for use to assist with understanding risk and lethality in the context of intimate partners. When determining which tool to use in your practice consider reliability and validation and which one is appropriate for your clinical

setting (Garcia-Vergara et al., 2022). Regardless of which tool is utilized, there is still a need for ongoing analysis of the risks as there are limitations and gaps in these tools that need to be considered and explored. Overall, safety planning, thorough discharge instructions and comprehensive follow-up and referrals are imperative aspects of the assessment.

NECK MEASUREMENT

The use of a tape measure by healthcare providers to measure swelling/edema in extremities is a common practice. Although tape measuring is one of the tools used for assessing neck lymphedema in oncology, there is no gold standard for the practice, it is not used as the sole assessment tool, and it does not have excellent reliability. The reliability of using a tape measure as an assessment tool to measure neck swelling post-strangulation has not been studied.

Should neck measurement be a part of the clinical practice, the measurement needs to be reliable. Measurements should be taken in a consistent setting, by the same provider, at the same marked location on the upper, mid, and lower neck. It is important to measure the patient in the same position and using the same type of measuring tape each time so the exact location is measured later for comparison. Without a clearly defined location, the reliability of the measurement decreases, and there is a larger margin of error if the comparison measurement is obtained by someone other than the person who completed the original measurement.

Due to the lack of evidence-based research to support the use and reliability of neck measurements on patients who have been strangled, the use of a tape measure as an assessment tool post-strangulation cannot be routinely recommended. If this assessment tool is utilized, the measurement results should be interpreted with caution and not relied upon as the sole assessment for determining the presence or absence of neck edema post-strangulation. In addition, caution is advised on providing any testimony in criminal or civil court on the use of neck circumference measurement as the basis for the presence/absence of neck swelling post-strangulation.

PHOTOGRAPHS

Use your facility/community protocol. If no protocol is available, consider these guidelines:

- Take medium-range photographs of each separate injury, including cuts, bruises, swelling, lacerations, and abrasions. Work from one side of the body or extremity to the other and then top to bottom or design a workable method. Be consistent. Take “regional” shots to show injuries in the context and orientation of a body region; these photographs should include easily identifiable anatomical landmarks.
- Take closeup images of particular injuries utilizing the scale. When photographing a wound, show its relationship to another part of the body. Take at least three photographs involving a wound area. Shield uninvolved breast or genital areas when possible; highly graphic photos may be deemed inadmissible in court and make the case less credible. All injuries should be recorded with a closeup view using a macro lens or setting. Attempt to capture subtleties in texture, color, and patterned injuries caused by an object.
- In some cases, a full body photograph may be appropriate to show scope of injury or state of clothing. However, such photos should ensure as much modesty and privacy as possible through draping and other techniques.
- Follow up photographs can be taken, when possible. The length of time between initial exam and follow up is determined by patient’s need and availability. Generally, follow up photographs are taken within 24 - 72 hours of initial exam.

(Funk & Schuppel, 2003; Martin et al., 2022; Paluch, 2013; Strack & McClane, 1999).

COLLECTION OF EVIDENCE

DNA testing techniques have substantially improved in recent years and are able to detect small amounts of DNA even when touch is the only mechanism for transfer (Graham & Rutty, 2008). National best practices suggest that communities should be considering this type of evidence collection in strangulation cases (U.S. Department of Justice, 2017).

Consult your local forensic laboratory for recommendations. If no protocol is available, use the guidelines listed below.

- Collect known DNA reference sample (i.e.: buccal swab) for comparison if any swabs are collected for evidence.
- Collect swabs for dried and moist secretions (i.e., blood, saliva) and for touch DNA from the body, when indicated by the patient's history.
- Follow jurisdictional policy and local forensic laboratory recommendations for swab collection procedures.
- Collect fingernail swabs, when indicated by the patient's history and local forensic facility protocol or recommendations.
- Follow jurisdictional policy and local forensic laboratory recommendations for packaging of swabs collected (U.S. Department of Justice, 2017; Gwinn & Strack, 2013; Hawley et al., 2001).
- Use of alternate light source (ALS)/ultraviolet (UV) light for identification of potential biological fluids and/or for enhancement of visible bruises, not to be used to identify bruises that cannot be seen with the naked eye (Eldredge et al., 2012).

RADIOLOGY STUDIES (AS INDICATED BY MEDICAL PROVIDER)

Should computerized tomography (CT) scans, or other imaging, always be obtained after an adult patient reports strangulation?

Imaging allows for identification of life-threatening conditions, such as laryngeal fractures and arterial dissections, with CT angiogram (CTA) of the neck considered the gold standard (Stellpflug et al., 2022). Recent research demonstrates that vascular injury following strangulation is an infrequent finding: just 1.5% of patients had positive vascular injury on CTA following non-fatal strangulation in a study out of Australia; 2.1% in a US study (Williamson et al., 2021; Zuberi et al., 2019). Low incidence of vascular injury combined with concerns about issues such as radiation exposure (not fully understood based on limited research, particularly in cases of multiple exposures and younger patient populations) and costs incurred by the patient make it difficult to justify routine CTA in non-fatal strangulation. However, just because an issue is infrequent doesn't mean it doesn't occur, and statutory (e.g., EMTALA) and ethical obligations require clinicians to make determinations based on more than simple probabilities.

Ultimately, in the absence of well-validated protocols, clinicians need to make decisions on a case-by-case basis. “It is reasonable to pursue advanced imaging of the neck for patients with a Glasgow Coma Scale score <15, focal neurologic symptoms, clear signs of airway injury, or dysphagia (Stellpflug et al., 2022, p. 3).” Clinicians may also choose to obtain images on patients with significant visible neck injury, even in the absence of other symptoms (U.S. Department of Justice, Office on Violence Against Women, 2023).

SAFETY PLANNING

Safety planning is an ongoing process throughout any patient encounter and is centered around a provider’s detailed assessments. One of these assessments, discussed in detail previously in the toolkit, is a risk and/or lethality assessment. Utilization of a validated risk and lethality assessment tool can assist with establishing a safety plan when non-fatal strangulation occurs in the context of intimate partner violence. The knowledge that non-fatal strangulation is associated with more than six-fold odds of that patient becoming an attempted homicide, and greater than seven-fold odds of that patient becoming a completed homicide, can be used to help educate and implement a more effective strategy upon discharge. (Glass et al., 2008). Advocacy and wrap-around services are an integral role in the continuum of safety and if the criminal justice system is involved at the time of discharge, a collaborative approach can assist with safety planning. Finally, creating effective discharge instructions is an effective tool in helping patients, regardless of the context of the non-fatal strangulation, comprehend the information provided on the determined safety plan and the indications for medical follow-up and return. (See Appendix F for example Discharge Instructions). (U.S. Department of Justice, Office on Violence Against Women, 2013.) The need to establish clear communication about risk and lethality assessment findings and the implications for returning to an abuser while establishing a more permanent safety plan; signs and symptoms to be aware of after a strangulation, when to return or seek medical care, and to assist with follow-up appointments; how to follow-up or establish communication with law enforcement for reporting or when safety is at risk are all key aspects of safety planning.

MULTIDISCIPLINARY RESPONSE

When establishing any protocol within your program or community, incorporation of the Multidisciplinary Team is essential for a successful implementation (U.S. Department of Justice, Office on Violence Against Women, 2013). Having incorporated a non-fatal strangulation protocol within a community response has been shown to improve response to victims with legal and medical needs being increasingly met. (Fukushima et al., 2020). This includes buy-in from team members on the full spectrum of the response such as: law enforcement, medical, prosecution, advocacy, dispatch, shelter staff, social services and whoever is appropriate for your community.

CITATIONS

Baldwin-Johnson, C. & Wiese, T. (2015). "Strangulation in Children." Responding to Strangulation in Alaska: Guidelines for Law Enforcement, Healthcare Providers, Advocates and Prosecutors. San Diego: Training Institute on Strangulation Prevention, 48-57.

Campbell, J. C. (2004). Danger assessment. Retrieved February 27, 2023, from <http://www.dangerassessment.org>

Campbell, J. C., Webster, D. W., & Glass N. (2009). The danger assessment: Validation of a lethality risk assessment instrument for intimate partner femicide. *Journal of Interpersonal Violence*, 24(4), 653–674.

Deininger-Czermak, E., Heimer, J., Tappero, C., Thali, M., & Gascho, D. (2020). Postmortem magnetic resonance imaging and postmortem computed tomography in ligature and manual strangulation. *American Journal of Forensic Medicine and Pathology*, 41(2), 97-103.

Eldredge, K., Huggins, E., & Pugh, L. C. (2012). Alternate light sources in sexual assault examinations: An evidence-based practice project. *Journal of Forensic Nursing*, 8(1), 39–44.

Ernoehazy, W., Jr. (2016, January 19). Hanging injuries and strangulation. Medscape. Retrieved May 5, 2016, from <http://www.Emedicine.com/emerg/topic227>

Funk, M., & Schuppel, J. (2003). Strangulation injuries. *WMJ: Official Publication of the State Medical Society of Wisconsin*, 102(3), 41–45.

Garcia-Vergara, E., Almeda, N., Fernandez-Navarro, F., and Becerra-Alonso, D. (2022) Risk Assessment Instruments for Intimate Partner Femicide: A Systemic Review. *Front. Psychol.* 13:896901.doi:10.3389/fpsyg.2022.896901

Gwinn, C., & Strack, G. B. (2012). Welcome to train the trainer: Part 1 of training. San Diego, CA: Training Institute on Strangulation Prevention.

Hawley, D., McClane, G. E., & Strack, G. B. (2001). A review of 300 attempted strangulation cases. Part III: Injuries in fatal cases. *The Journal of Emergency Medicine*, 21(3), 317–322.

Iserson, K. V. (1984). Strangulation: A review of ligature, manual, and postural neck compression injuries. *Annals of Emergency Medicine*, 13(3), 179–185.

Johns Hopkins School of Nursing. (2023). Danger Assessment Training and Technical Assistance Center for IPV Risk Assessment. Retrieved March 6, 2023, from <https://nursing.jhu.edu/excellence/community/da-ta-center/da-ta-center.html>

Kline-Fath, B., Seman, J., Zhang, B., & Care, M. (2021). Pediatric hanging and strangulation: Is vascular injury a true risk? *Pediatric Radiology*, 51, 1889-1894.
<https://doi.org/10.1007/s00247-021-05056-1>

Martin, M., Shute, R., Krauss, S., Gamaleldin, S., & Melton, P. (2022). "Considerations for Photographic Documentation in Sexual Assault Cases." Forensic Technology Center of Excellence, U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, Office of Investigative and Forensic Science.
<https://forensiccoe.org/private/6307bef67af52>

Marty, M., Dobay, A., Ebert, L., Winklhofer, S., Thali, M., Heimer, J., & Franckenberg, S. (2022). MRI segmentation of cervical muscle volumes in survived strangulation: Is there an association between side differences in muscle volume and the handedness of the perpetrator? A retrospective study. *Diagnostics*, 12, 743-49.

National Institute of Justice. (2017). National best practices for sexual assault kits: A multidisciplinary approach. U.S. Department of Justice.
<https://www.ojp.gov/pdffiles1/nij/250384.pdf>

Office on Violence Against Women. (2013). A national protocol for sexual assault medical forensic examinations—Adults/Adolescents. U.S. Department of Justice.
<https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf>

Office on Violence Against Women (2023). National Protocol for Intimate Partner Violence Medical Forensic Examinations. Washington, DC: U.S. Department of Justice, Office on Violence Against Women. <https://www.justice.gov/d9/2023-12/IPVMFProtocol.pdf>

Paluch, M. (2013). Strangulation in domestic violence cases: Overcoming evidentiary challenges to reduce lethality. *Developments of New York State Family Law*.

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

Prosser, D. D., Grigsby, 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. <https://doi.org/10.1016/j.radcr.2018.02.004>

Richards, T. N., Gillespie, L. K., Kafonek, K., & Johnson, M. (2020). An Examination of the Lethality Assessment Program (LAP): Perspectives on Implementation, Help-Seeking, and Victim Empowerment. *Violence Against Women*, 26(12-13), 1517-1537.
<https://doi.org/10.1177/1077801219880965>

Sauvageau, A., & Boghossian, E. (2010). Classification of asphyxia: The need for standardization. *Journal of Forensic Sciences*, 55(5), 1259-1267.

Sep, D. & Thies, K. (2007). Strangulation injuries in children. *Resuscitation*, 74, 286-391. <https://doi.org/10.1016/J.RESUSCITATION.2006.09.019>

Shields, L. B., Corey, T. B., 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.

Smith, D. J., Mills, T., & Taliaferro, E. H. (2001). Frequency and relationship of reported symptomology in victims of intimate partner violence. The effects of multiple strangulation attacks. *The Journal of Emergency Medicine*, 21(3), 323–329.

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>

Strack, G. B., & McClane, G. (1999). How to improve your investigation and prosecution of strangulation cases (2nd ed.). D. C. James (Ed.). San Diego, CA. Retrieved May 5, 2016, from http://www.ncdsv.org/images/strangulation_article.pdf

Strack, G. B., McClane, G. E., & Hawley, D. (2001). A review of 300 attempted strangulation cases. Part I: criminal legal issues. *The Journal of emergency medicine*, 21(3), 303–309. [https://doi.org/10.1016/s0736-4679\(01\)00399](https://doi.org/10.1016/s0736-4679(01)00399)

Taliaferro, E., Hawley, D., McClane, G., & Strack, G. (2009). Strangulation in intimate partner violence. In C. Mitchell & D. Anglin (Eds.), *Intimate partner violence: A health-based perspective* (pp. 217–236). New York, NY: Oxford University Press.

Wilber, L., Higley, M., Hatfield, J., Surprenant, Z., Taliaferro, E., Smith, D. J., & Paolo, A. (2001). Survey results of women who have been strangled while in an abusive relationship. *The Journal of Emergency Medicine*, 21(3), 297–302.

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>

APPENDIX A – SAMPLE POLICY AND PROCEDURE

[Download](#) a MS Word version of this policy.

Institution Name
Other identifiable information as expected under facility policy

POLICY AND PROCEDURE

Strangulation Medical Forensic Examinations in the Emergency Department	
Effective Date:	Replaces Policy:
Approval Date:	Policy Owner: Emergency Department

Introduction:

Non-fatal strangulation is a serious health concern with the potential for lifelong consequences. Defined as external pressure to the neck that occludes the airway and/or blood vessels (Midttun, 2021), strangulation impedes oxygenation and can result in acute and long-term injuries (Le Blanc-Lowvry, 2013), psychological terror (Thomas et al., 2013), brain trauma (Campbell et al., 2018), and even death (Petrosky et al., 2017).

Equipment:

- Camera
- Evidence collection supplies (swabs, sterile saline or water, envelopes, paper bags, evidence tape, chain of custody, etc.)
- Measuring standard that identifies size (centimeters or inches) and color (black and white)
- Gloves

Preparation of Equipment:

Inspect all equipment to ensure no defects, need for cleaning or expiration.

Definitions:

Strangulation: A form of asphyxia (lack of oxygen) characterized by closure of the blood vessels and/or air passages of the neck as a result of external pressure on the neck (Iserson, K., 1984; Line, Stanley, & Choi, 1985).

Medical forensic exam: A medical forensic exam (MFE) is any examination and treatment of a patient that offers/collects evidentiary material as part of the patient exam options, or has the possibility of ending up in the criminal or civil justice systems.

Policy:

In addition to the health concerns, non-fatal strangulation may necessitate collection of evidentiary specimens, safety planning and follow-up. In addition to the emergency department (ED) provider and staff, it is the expectation that when strangulation is suspected or disclosed as part of the history, the forensic nurse examiner (FNE) will be a collaborative part of the response team.

General Information:

An ED provider will provide medical screening exams for all strangulation patients. The first priority of ED personnel is to provide appropriate medical care for any life-threatening injury that may be present.

Procedure

1. Patients presenting to the ED with complaints of recent strangulation will be registered and moved to a private patient room as soon as possible.
2. Patients will be triaged to determine the need for medical treatment related to assault. Treatment of life-threatening injuries will take priority.
3. The FNE will be contacted as soon as the ED is aware of patient arrival.
4. In the event of serious/life threatening injuries, the medical forensic exam will be delayed until it can be performed without interfering with critical/trauma care.
5. After appropriate triage and emergency treatment, the Forensic Nurse Examiner (FNE) will:
 - a. Obtain consent for the exam, including photography consent
 - i. If the patient is a minor, obtain consent from a custodial parent, or by those with emergency custody of the child whenever possible
 - ii. Patient assent required for minors

- b. Discuss any mandatory reporting requirements and patient's desire to report to law enforcement
 - c. Obtain a detailed history of the strangulation
 - d. Obtain a detailed medical/surgical history
 - e. Obtain a detailed history of intimate partner violence (IPV) if applicable, including Danger Assessment
 - f. If community-based advocacy is appropriate based on patient history, as is available, introduce advocate to patient in order to connect the patient to on-going support
 - g. Conduct a complete physical exam with a detailed strangulation assessment
 - h. Obtain photographs per policy
 - i. Document complete examination using the written word and body maps/diagrams
 - j. Collect forensic/evidentiary specimens if the patient elects to do so (evidence may be collected up to 120 hours post strangulation)
 - k. Provide referrals for other services if applicable, including counseling and follow-up care
 - l. Call appropriate law enforcement agency as outlined by reporting requirements or patient preference
 - m. Package, store and transfer evidentiary specimens to law enforcement per policy
 - i. In the event law enforcement is unable to retrieve the evidence immediately after the exam, evidence may be locked in designated storage lockers following chain of custody, and retrieved by law enforcement at a later time.
 - n. Medical records, including photographs obtained during the exam will be stored and released according to facility policy
6. If the patient reports or the FNE observes any of the following during the history-taking and exam, FNE will notify the ED provider
- a. Patient reports history of loss of consciousness
 - b. Patient has a decreased level of consciousness, disorientation, or another neurological deficit

- c. Patient has evidence of trauma or bodily injury that requires intervention
- d. FNE has concerns regarding the medical needs of the patient

References:

- Campbell, J.C., Anderson, J.C., McFadgion, A., Gill, J., Zink, E., Patch, M., Callwood, G., & Campbell, D. (2018). The effects of intimate partner violence and probable traumatic brain injury on central nervous system symptoms. *Journal of Women's Health, 27*(6), 761-767. doi: 10.1089/jwh.2016.6311.
- Isernson, K. V. (1984). Strangulation: A review of ligature, manual, and postural neck compression injuries. *Annals of Emergency Medicine, 13*(3), 179–185.
- Line, W. S., Jr., Stanley, R. B., Jr., & Choi, J. H. (1985). Strangulation: A full spectrum of blunt neck trauma. *The Annals of Otology, Rhinology, and Laryngology, 94*(6), 542–546.
- Midttun, D. (2021). Involuntary loss of bowel-control in sexual assault with non-fatal strangulation: A case report. *Forensic Science International: Reports, 3*, 1-4. <https://doi.org/10.1016/j.fsir.2021.100200>
- Office on Violence Against Women. (2013). A national protocol for sexual assault medical forensic examinations—Adults/Adolescents. U.S. Department of Justice. <https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf>
- Petrosky, E., Blair, J., Betz, C., Fowler, K., Jack, S., & Lyons, B. (2017). Racial & ethnic differences in homicide of adult women and role of intimate personal violence – United States 2003-2014. *MMWR Morbidity & Mortality Weekly Report, 66*(28), 741-746. <https://doi.org/10.15585/mmwr.nm6628a1>
- Thomas, K. A., Joshi, M., & Sorenson, S. B. (2014). "Do You Know What It Feels Like to Drown?": Strangulation as Coercive Control in Intimate Relationships. *Psychology of Women Quarterly, 38*(1), 124–137. <https://doi.org/10.1177/0361684313488354>

APPENDIX B – STRANGULATION ASSESSMENT TOOL

STRANGULATION ASSESSMENT TOOL

[Download](#) a MS Word
version of this policy.

Patient Information Name
Date of Birth
Record Number
Per Facility Guidelines

Date of Strangulation:		Time of Strangulation:	
Number of times strangled:			
History (in patient's own words):			
Method/Manner of Strangulation:	☐ One hand ☐ Two hands ☐ Chokehold ☐ Approached from behind ☐ Approached from the front	☐ Ligature used ☐ Multiple strangulation attempts ☐ Jewelry on suspect's hand/wrist ☐ Jewelry on patient's neck during strangulation ☐ Other (comment)	
During strangulation, did the patient note any of the following?	☐ Loss of consciousness ☐ Incontinence of stool ☐ Being shaken ☐ Feet were lifted off the ground	☐ Incontinence of urine ☐ Bleeding (comment) ☐ Smothered in addition to being strangled With what? _____	

Since the strangulation has the patient noted any of the following symptoms?	☐ Coughing ☐ Dysphagia ☐ Lightheadedness ☐ Nose Pain ☐ Sore Throat ☐ Combativeness/irritability/restlessness ☐ Loss of Memory (comment)	☐ Drooling ☐ Odynophagia ☐ Neck Pain ☐ Nausea ☐ Crepitus/subcutaneous emphysema ☐ Voice changes (comment) ☐ Bleeding (comment)	☐ Dyspnea ☐ Headache ☐ Neck Swelling ☐ Vomiting ☐ Uncontrolled shaking ☐ Vision changes (comment) ☐ Weakness/numbness of extremities (comment)
--	--	---	---

Glasgow Coma Scale

(Circle the appropriate score for each, complete the total at the bottom)

Eye Opening	Score
Spontaneous	4
To speech	3
To pain	2
None	1

Verbal Response	Score
Oriented	5
Confused	4
Inappropriate	3
Incomprehensible	2
None	1

Motor Response	Score
Obeys Commands	6
Localizes to pain	5
Withdraws from pain	4
Flexion to pain (decorticate)	3
Extension to pain (decerebrate)	2
None	1

Total Score	
-------------	--

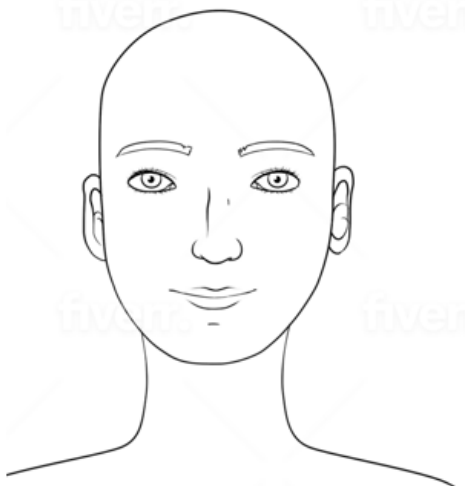
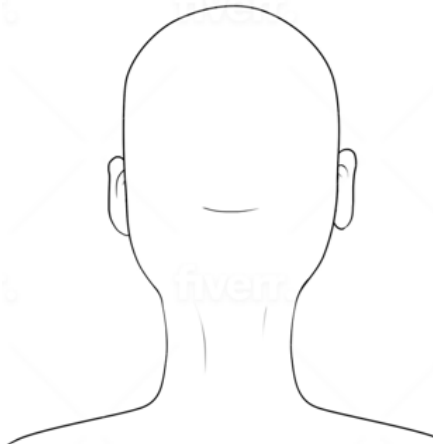
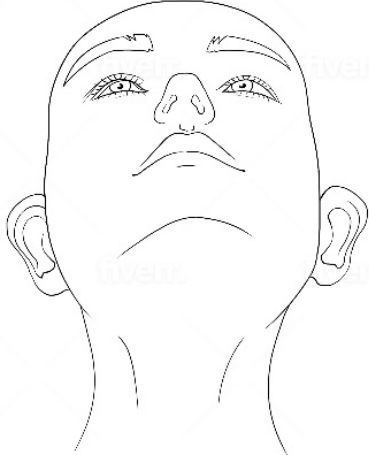
Respiratory Assessment	O2 Saturation: Time:___ Level:___ Time:___ Level:___		Lung Sounds:
Cardiac Assessment	Heart Rate: Time:___ Rate:___ Time:___ Rate:___	Heart sounds:	Abnormal carotid pulse: ☐ Yes (describe) ☐ No
Neurologic findings:	☐ Ptosis ☐ Paralysis ☐ Facial Droop ☐ Loss of sensation ☐ Unilateral weakness ☐ Other (describe):		
Petechiae	☐ Facial ☐ External ears ☐ Ear canal ☐ Left ☐ Right ☐ Eyes ☐ Conjunctival ☐ Mouth ☐ Neck ☐ Other (describe):		
Other	☐ Tongue injury (see diagrams) ☐ Oral cavity injury (see diagrams) ☐ Subconjunctival hemorrhage (see diagrams) ☐ Absence of normal crepitus felt during manipulation of cricoid cartilage ☐ Visible injury (see diagrams) ☐ Digital photographs taken		
Patient Pregnancy Status	☐ Yes ☐ No # of weeks ____	Fetal Heart Rate/NST: _____ Fetal Movement: _____	Pregnancy-related symptoms during or since the strangulation:

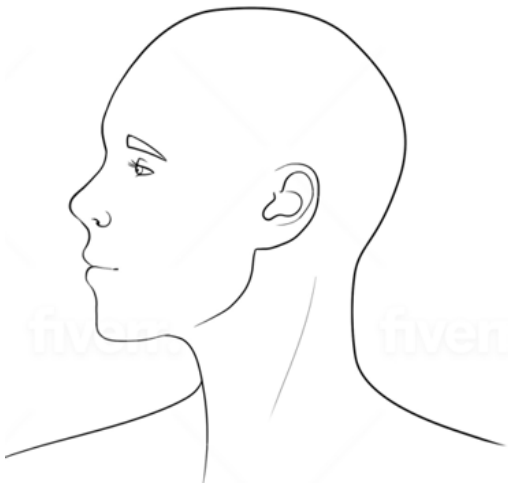
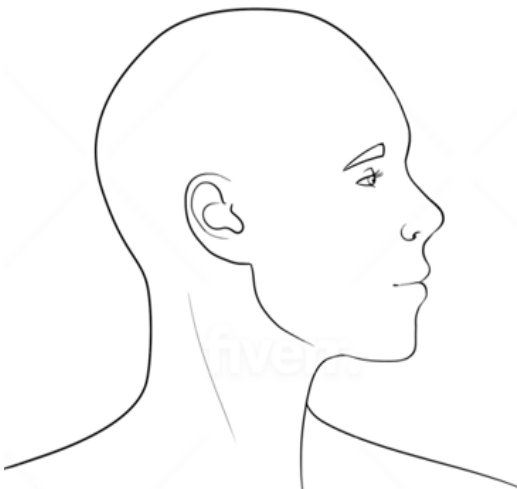
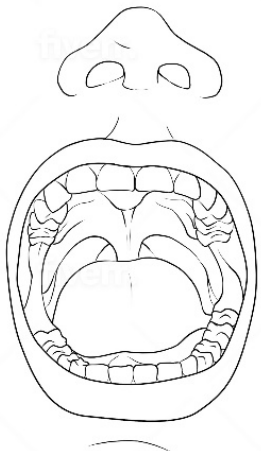
Cranial Nerve Assessment

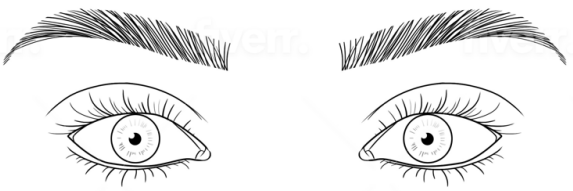
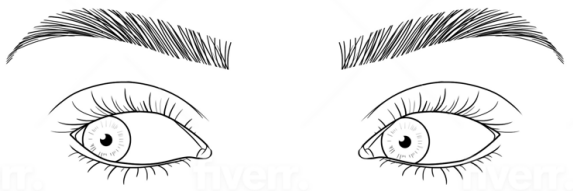
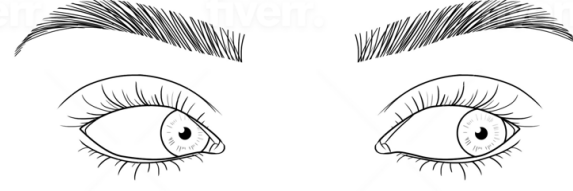
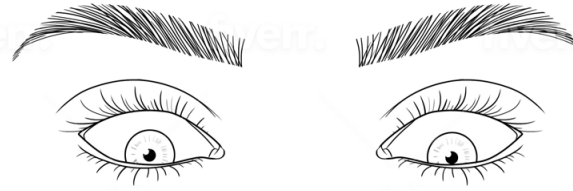
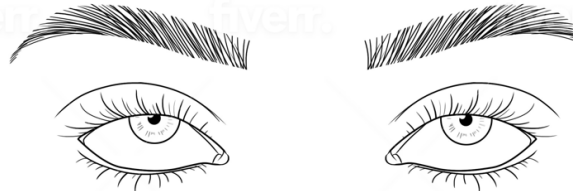
CN I: Olfactory Function: Convey sense of smell.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test each nostril with substances of known odors. Comments for Exceptions:
CN II: Optic Function: Transmits visual information.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test visual fields (outer, inner, right, left) of each eye. Comments for Exceptions:
CN III: Oculomotor Function: Coordinates eye movement.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test the six cardinal positions of gaze. Comments for Exceptions:
CN IV: Trochlear Function: Coordinates eye movement.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test the six cardinal positions of gaze. Comments for Exceptions:
CN V: Trigeminal Function: Provides sensation to the skin of the face and also controls the muscles of mastication.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test sensation with a dull object in all areas of the face. Comments for Exceptions:
CN VI: Abducens Function: Coordinates eye movement.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test the six cardinal positions of gaze. Comments for Exceptions:

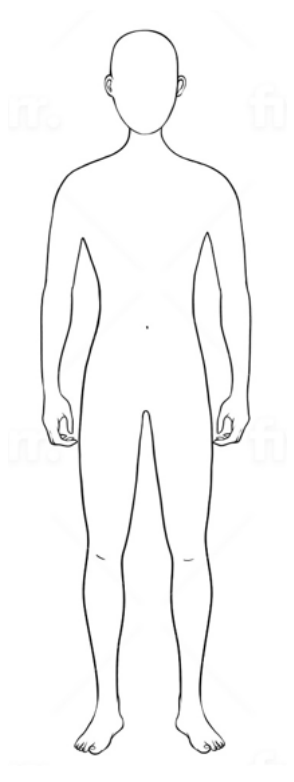
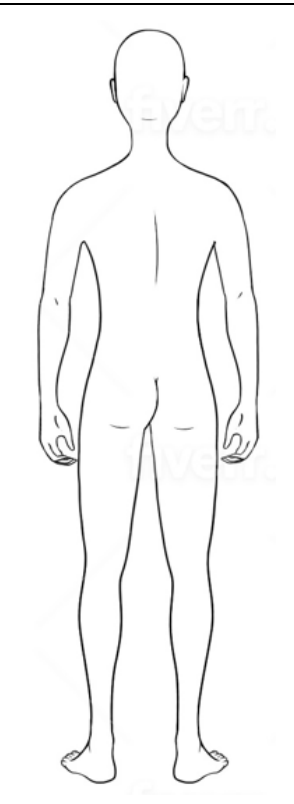
CN VII: Facial Function: Coordinates facial movements and expression	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test facial symmetry with movement (smiling, raise eyebrows, etc.) Comments for Exceptions:
CN VIII: Acoustic Function: Coordinates hearing and balance.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test hearing by rubbing fingers together by each ear. Assess balance in patient movements; note c/o dizziness. Comments for Exceptions:
CN IX: Glossopharyngeal Function: Provides sensory innervation to the oropharynx and back of the tongue.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test gag reflex. Assess soft palate and uvula. Comments for Exceptions:
CN X: Vagus Function: Assists in coordinating pharyngeal muscles; serves as the major supply nerve to the recurrent laryngeal nerve.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test ability to swallow. Listen for voice changes (note c/o voice changes, hoarseness). Comments for Exceptions:
CN XI: Spinal Accessory Function: Coordinates neck and shoulder movements.	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test movements by shrugging shoulders and turn head against resistance. Comments for Exceptions:
CN XII: Hypoglossal Function: Coordinates movement of the tongue	☐ Within Defined Limits ☐ Exceptions to Within Defined Limits Assessment: Test tongue symmetry Comments for Exceptions:

Please indicate all injuries that were identified during the assessment on the body diagrams

	Description
	Description
	Description

	Description
	Description
	Description

	Description
	Description
	Description
	Description
	Description

[illegible][illegible]



Description

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface. There is no handwriting or other markings on the paper.

Description

[illegible]

Photo-documentation of findings: ☐ Yes ☐ No

Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Forensic Nurse Examiner Signature _____

Date _____

APPENDIX C – SAMPLE STRANGULATION PROTOCOL

Status

PolicyStat ID



Implementation

Last Reviewed

Effective

Last Revised

Next Review

Owner Tara Henry,
Nurse Manager

Department Forensic Nursing
Area Services

Applicability

Strangulation Assault, Forensics

Historical Number:

PURPOSE/SCOPE:

To provide the Forensic Nurse Examiner with a guideline for preventing or treating soft tissue swelling of the neck and/or throat after manual or ligature strangulation assault.

PRINCIPLE:

Patients who have experienced manual or ligature strangulation are at risk for soft tissue neck and throat swelling post assault which can lead to a compromised airway. Forensic Nurse Examiners have specialized training in the care of patients who have experienced manual and ligature strangulation assault. All patients presenting to FNSP with a history of strangulation assault will be assessed for emergent and urgent medical complications of strangulation. Patients exhibiting symptoms of soft tissue neck or throat swelling will be treated to prevent worsening of symptoms and airway compromise. Patients who are not exhibiting symptoms of soft tissue neck or throat swelling will be treated prophylactically to decrease risk of airway compromise.

PROCEDURE:

1. Assess patient for **emergent and urgent medical complications** post strangulation
 - a. Initial triage must include a focused history and assessment of:
 - i. Neurological status for signs/symptoms of altered mental status, stroke, and carotid dissection
 - ii. Respiratory status for signs/symptoms airway compromise or respiratory distress
 - iii. Cervical spine for signs/symptoms of fracture or subluxation

- b. If life threatening injury or compromise is present, call 9-911, or instruct someone else at FNSP to activate Emergency Medical Services (EMS)/Paramedics
 - c. If the airway is not patent, or the patient has ineffective respiratory effort, refer to the Adult BLS algorithm.
 - i. Apply oxygen via non-rebreather mask at 15 LPM
 - ii. Perform rescue breathing, if indicated
 - d. If cervical spine fracture suspected, apply C-Collar
 - e. Upon EMS arrival, provide a verbal report and transfer care to EMS personnel.
 - f. Call the Emergency Department of the hospital the patient is being taken to and give report to an Emergency Department Physician or Advanced Practice Provider
 - g. Notify Assistant Clinical Manager of incident as soon as possible after patient has been transferred to EMS and report to Emergency Department has been provided.
 - h. Once the patient is stabilized at the receiving medical facility, the Assistant Clinical Manager or assigned delegate, in collaboration with law enforcement (if involved), will determine when to proceed with the medical-forensic exam.
 - i. Document the incident in the medical forensic record, including:
 - i. Date and time of event
 - ii. Patient's signs and symptoms
 - iii. Physical assessment
 - iv. Nursing interventions
 - v. FNSP staff or interdisciplinary agency personnel involved
 - vi. Transfer of care to EMS
 - vii. Report to Emergency Department
2. If patient is **pregnant**, also follow FNSP Pregnant Patient guideline for evaluation of emergent/ urgent pregnancy related medical needs
 3. If **NO emergent or urgent medical complications are present on initial triage**, patient may remain at FNSP and continue with the medical forensic examination process.
 - a. Monitor patient for changes in signs and symptoms and reassess for emergent and urgent medical complications if indicated. Obtain written and verbal consent from patient to provide treatment
 4. Determine the patient's medication allergies and current medications
 5. Obtain a set of vital signs, including O2 saturation
 - a. Recheck vital signs and O2 saturation if abnormal or there is a change in patient's status
 6. Obtain a strangulation focused medical history that includes, at minimum, the following:
 - a. Method of strangulation act
 - b. Patient and suspects position during the strangulation
 - c. Number of times patient strangled
 - d. Did patient's head impact floor/wall/ground while being strangled
 - e. Was patient's head/neck shaken during the strangulation

- f. Statements made by the suspect during the strangulation
 - g. How did the strangulation act stop
 - h. Was the patient also suffocated
 - i. What was the patient thinking during the strangulation
 - j. Symptoms patient felt **during and immediately after** the strangulation:
 - i. Neurological changes
 - ii. Breathing changes
 - iii. Vision changes
 - iv. Hearing changes
 - v. Voice changes
 - vi. Swallowing changes
 - vii. Pain
 - viii. Other (e.g., pressure in head, incontinence of bowel or bladder)
 - k. Symptoms patient is currently feeling at time of examination
 - i. Neurological changes
 - ii. Breathing changes
 - iii. Vision changes
 - iv. Hearing changes
 - v. Voice changes
 - vi. Swallowing changes
 - vii. Pain
7. Perform a physical assessment of the head, face, and neck for signs of external and internal injury from the strangulation. Physical assessment must include the following:
- a. Neurological assessment including cranial nerves II-VII
 - b. Cervical spine assessment
 - c. Eye assessment including visual acuity with Snellen chart
 - d. Ear assessment including tympanic membranes
 - e. Soft tissue neck/throat assessment for tenderness, subcutaneous emphysema, or crepitus
 - f. Skin assessment for visible external injuries
 - g. Cardiac and lung assessment with stethoscope
8. If **neck pain or tenderness, difficult or painful swallowing, hoarse voice, or difficulty speaking ARE PRESENT, or if patient REPORTS sensation of soft tissue neck swelling** and not allergic:
- a. Administer Dexamethasone 10mg intramuscularly (IM) as a single dose AND Ketorolac 30mg intramuscularly (IM) as a single dose AND Acetaminophen 975mg orally as a single dose

- i. If patient declines IM injections:
 - 1. Discuss patient's concerns with IM injection
 - 2. Provide further education on the purpose of IM medication administrationIf, after further education, the patient continues to decline IM injections, the Forensic Nurse Examiner may administer the Dexamethasone 10mg intramuscular fluid orally as a single dose AND Ibuprofen 800mg orally as a single dose AND Acetaminophen 975mg orally as a single dose
 - b. Patient may remain at FNSP for the medical forensic examination if life threatening injury or compromise (refer to 1a-f & 2) are not present.
9. If **neck pain or tenderness, difficult or painful swallowing, hoarse voice, and difficulty speaking are NOT PRESENT, the patient DENIES sensation of soft tissue neck swelling, AND the strangulation assault occurred LESS THAN 24 HOURS prior to exam**, provide prophylactic treatment to prevent soft tissue neck or throat swelling and decrease risk of airway compromise.
- a. Administer Dexamethasone 10mg intramuscularly (IM) as a single dose, if not allergic
 - i. If patient declines IM injections:
 - 1. Discuss patient's concerns with IM injection
 - 2. Provide further education on the purpose of IM medication administration
 - 3. If, after further education, the patient continues to decline IM injection, the Forensic Nurse Examiner may administer the Dexamethasone 10mg intramuscular fluid orally as a single dose
10. If, after assessing patient's current signs and symptoms, the Forensic Nurse Examiner is concerned the patient **currently has a medical complication of strangulation that requires further diagnostic testing BEFORE completing the medical forensic examination**, refer patient to the Emergency Department of their choice.
- a. Treat with Dexamethasone, Ketorolac, and Acetaminophen, if indicated, prior to discharging patient from FNSP to the ED
 - b. The patient may be transported to the ED by law enforcement if medically stable
 - c. Call the Emergency Department of the hospital that the patient is being taken to and give report to an Emergency Department Physician or Advanced Practice Provider
 - d. Once the patient is medically cleared by the receiving medical facility, the Forensic Nurse Examiner may proceed with the medical forensic examination.
11. If the patient is **medically stable and does NOT require further diagnostic testing BEFORE completing the medical forensic examination**, the patient may remain at FNSP and continue with medical forensic examination process.
- a. Treat with Dexamethasone, Ketorolac, and Acetaminophen, if indicated
 - b. Monitor patient for changes in signs and symptoms and reassess for evolving medical complications if indicated.

12. Document strangulation history and assessment on FNSP medical forensic examination chart forms.
13. Photograph head, neck, and facial findings according to FNSP Forensic Photography guideline
14. Discharge instructions must include written and verbal instructions for the patient to **follow up in the Emergency Department of their choice if they have any worsening of current signs/ symptoms or new signs/symptoms of neurological, respiratory, or soft tissue neck conditions.**
15. Schedule the patient to return to FNSP in 48 hours for a Follow-Up Examination to re-evaluate and document evolving and/or resolving signs and symptoms of strangulation.
16. Referrals to follow up with Otolaryngology, Ophthalmology, Neurology, or other medical specialists will be made on a case-by-case basis depending the signs and symptoms patient is experiencing post strangulation.

CROSS REFERENCES:

1. FNSP Cardiac/Pulmonary Arrest Guideline
2. FNSP Pregnant Patient Guideline
3. FNSP Forensic Photography Guideline
4. FNSP Pain Management Guideline

REFERENCES

1. International Association of Forensic Nurses (2013). Atlas of Sexual Violence (T. Henry, Ed.) St. Louis, MO: Elsevier Mosby
2. Nursing 2022 Drug Handbook 42 ed. Lippincott Williams & Wilkins. Philadelphia

APPENDIX D – SAMPLE HISTORY-TAKING QUESTIONS FOR THE ADULT/ADOLESCENT PATIENT

[Download](#) a MS Word version of these questions.

EXAMPLE QUESTIONS FOR THE ADULT/ADOLESCENT PATIENT

METHOD/MANNER OF STRANGULATION

- How many hands were used? One, two? Were you placed in a chokehold? Was there a combination of these?
- Were you approached from the front, behind, or side? Was there combination of approaches?
- How many times were you strangled?
- Were you smothered in addition to the strangulation?
- Was a ligature used to strangle you?
- Were you wearing any jewelry around your neck at the time? Was the suspect (or insert name) wearing any jewelry on their hands or wrists?
- Were you lifted off the ground or suspended by your neck?

DURING THE STRANGULATION

- Did you have difficulty breathing?
- Did you have difficulty swallowing?
- Did you feel any increased pressure in your head or eyes?
- Did you feel any pain in your neck or throat?
- Were you able to talk? If so, did you have any difficulty? Did your voice sound normal?
- Did you have any changes to your vision (seeing spots, tunnel vision, blurry vision, everything going black, etc.)?
- Did you have any changes to your hearing (roaring, ringing, etc.)?
- Did you become dizzy or lightheaded?
- Did you bite your tongue or the inside of your mouth?
- Did you lose consciousness (passed out, blacked out, etc.)?
- Did you experience any mental status changes (restlessness, combativeness, amnesia, psychosis, etc.)?

- Did you lose control of urine or stool?
- Is there anything else you want to tell me about?

IMMEDIATELY AFTER THE STRANGULATION

- Did you have a cough?
- Did you have trouble swallowing?
- Did you have a sore throat?
- Did you have any changes to your voice (hoarseness, raspy, or complete loss)?
- Did you have any changes to your vision (seeing spots, tunnel vision, blurry vision, everything going black, etc.)?
- Did you have any changes to your hearing (roaring, ringing, diminishment, etc.)?
- Did you have any changes to your breathing (difficulty or inability to breathe)?
- Did you become dizzy or lightheaded?
- Did you lose consciousness?
- Did you experience any mental status changes (restlessness, combativeness, amnesia, psychosis, etc.)?
- Did you vomit? If so, how many times?
- Did you have any neck pain?
- Did you have a headache?
- Did you have any weakness/numbness/paralysis of any of your extremities?

If the patient is pregnant:

- Did you have any abdominal cramping/pain, vaginal discharge, or bleeding?
- Did the baby move as they normally do?

AT THE TIME OF THE EXAM

- Do you have a cough?
- Do you have a sore throat?
- Are you having trouble swallowing, or does it hurt to swallow?
- Do you have any changes to your voice (hoarseness, raspy, or complete loss)?
- Do you have any changes to your vision (seeing spots, tunnel vision, blurry vision, everything going black, etc.)?
- Do you have any changes to your hearing (roaring, ringing, diminishment, etc.)?

- Do you have any changes to your breathing (difficulty or inability to breathe)?
- Are you dizzy or lightheaded?
- Do you have a headache?
- Did you have any neck pain?
- Did you have any weakness/numbness/paralysis of any of your extremities?

If the patient is pregnant:

- Are you having any abdominal cramping/pain, vaginal discharge, or bleeding?
- Is the baby moving normally?

APPENDIX E - SAMPLE HISTORY-TAKING QUESTIONS FOR THE PEDIATRIC PATIENT

[Download](#) a MS Word version of these questions.

EXAMPLE QUESTIONS FOR THE PEDIATRIC PATIENT

Typically, children four years old and under don't have the cognitive development necessary to answer the questions in this example tool. Even once the child reaches 5 years and higher, some of the questions below may not be developmentally appropriate. It is critical that the forensic nurse be able to assess patient development in relation to the appropriateness of the question examples shown here.

Modify the questions below to meet the developmental level of the child, including:

- 1) Tell me about what you felt while the strangulation (**use patient's terminology**) was happening;
- 2) Tell me about what you felt right after the strangulation (**use patient's terminology**); and
- 3) Tell me about how you feel right now (today), documenting patient's words/descriptions.

METHOD/MANNER OF STRANGULATION

- How many hands were used? One, two? Did (insert name or relation to child) put their arm around your neck? Was anything else put around your neck (assessing for use of a ligature)?
- Was (insert name or relation to child) in front of you, behind you, or on the side of you?
- How many times did this happen?
- Did your mouth get covered?
- Were you wearing a necklace around your neck when this happened? Was (insert name or relation to child) wearing any jewelry on their hands or wrists?
- Were you lifted off the ground by your neck?

DURING THE STRANGULATION

- How was your breathing when this was happening?
- How was your swallowing when this was happening?
- How did your head feel when this was happening?
- How did your eyes feel when this was happening?

- How did your neck feel when this was happening?
- How did your throat feel when this was happening?
- Could you/how did it sound when you talked when this was happening?
- Could you/how did you see when this was happening?
- Could you/how did you hear when this was happening?
- How did your ears feel when this was happening?
- Did you fall asleep or feel sleepy when this was happening?
- Did you go potty or pee/poop in your pants (use patient's terminology) when this was happening?
- Is there anything else you want to tell me about?

IMMEDIATELY AFTER THE STRANGULATION

- Right after this happened, did you have a cough?
- Right after this happened, tell me how it felt when you swallowed.
- Did you have a sore throat right after this happened?
- Tell me how it felt/sounded when you talked.
- Were you able to see okay right after this happened?
- Could you hear okay right after this happened?
- Tell me how your breathing felt right after this happened. How did your head feel right after this happened?
- Did you fall asleep/faint/pass out right after this happened? (use age-appropriate terminology)?
- Right after this happened, did you vomit/throw up? If so, how many times?
- How did your neck feel right after this happened? Right after this happened, did you have a headache?
- How did your arms and legs feel right after this happened?
- If able, ask caregiver/person accompanying child about any mental status changes (restlessness, combativeness, amnesia, psychosis, etc.).

AT THE TIME OF THE EXAM

- Do you have a cough?
- Do you have a sore throat?
- Tell me about how it feels when you swallow. Are you having trouble swallowing, or does it hurt to swallow?

- Tell me about how it feels/sounds when you talk.
- Can you see everything okay?
- Can you hear like you always do?
- How does your breathing feel?
- Are you dizzy or lightheaded?
- How does your head feel?
- How does your neck feel?
- How do your arms and legs feel?

APPENDIX F – SAMPLE DISCHARGE INSTRUCTIONS

[Download](#) a MS Word version of these discharge instructions.

Patient Information
Name
Date of Birth
Record Number
Per Facility Guidelines

DISCHARGE INSTRUCTIONS

_____ was examined and treated for strangulation today by _____.

Phone number _____.

The responding law enforcement agency/officer was _____, and your case number is _____. Phone number _____.

You consented to the collection of evidence. Your nurse will not get the results of evidence analysis, so you will need to follow up with the law enforcement agency listed above.

The responding advocacy agency/advocates was _____.

Phone number _____.

Strangulation causes a lack of oxygen because it closes the blood vessels in the neck and/or the airway. Health complications can appear immediately or may develop a few days after a strangulation event. Please call 911 or go to the nearest emergency department if you notice any of the following:

- Problems breathing
- Difficulty breathing while lying down
- Shortness of breath
- Persistent cough
- Coughing up blood
- Loss of consciousness or “passing out”
- Changes in your voice
- Left- or right-sided weakness, numbness, or tingling
- Difficulty speaking
- Difficulty swallowing, a lump in your throat, or muscle spasms in your throat or neck
- Swelling to your throat, neck, or tongue
- Behavioral changes, memory loss, or confusion
- Increasing neck pain
- Drooping eyelid

- Difficulty speaking or understanding speech
- Difficulty walking or sudden loss of balance or coordination
- Sudden confusion or decrease in level of consciousness
- Increasing or severe headache not relieved by pain medication
- Dizziness, lightheadedness or changes in your vision
- Pinpoint red or purple dots on your face or neck, or burst blood vessels in your eye
- Seizures
- Thoughts of harming yourself or others

If you are pregnant, report the strangulation and any of the following symptoms to your doctor immediately:

- Decreased movement of the baby
- Vaginal spotting or bleeding
- Abdominal pain
- Contractions

Follow-up Recommendations

Please return to the Emergency Department/Forensic Nurse Examiner Program on _____ for a follow-up examination.

Please follow up with the advocacy agency above for safety planning and additional resources.

Please contact the law enforcement agency above for questions or concerns regarding your legal case.

Forensic Nurse: _____ Phone: _____

APPENDIX G – COMPREHENSIVE BIBLIOGRAPHY

- Abrahams, N., Jewkes, R., Martin, L. J., Mathews, S., Vetten, L., & Lombard, C. (2009). Mortality of women from intimate partner violence in South Africa: A national epidemiological study. *Violence and Victims, 24*(4), 546–556.
- Ahmed, S., Ackerman, V., Faught, P., & Langston, C. (2008). Profound hypoxemia and pulmonary hypertension in a 7-month-old infant: Late presentation of alveolar capillary dysplasia. *Pediatric Critical Care Medicine: A Journal of the Society of Critical Care Medicine and the World Federation of Pediatric Intensive and Critical Care Societies, 9*(6), e43–e46.
- Aihara, M. (2011). Continuous facial pain after hitting the face: Diagnostic pitfall. *The Journal of Trauma, 71*(4), E100.
- Allen, E., Minutello, K., & Murcek, B. W. (2021). Anatomy, head and neck, larynx recurrent laryngeal nerve. StatPearls, *National Library of Medicine*.
<https://www.ncbi.nlm.nih.gov/books/NBK470179/>
- American Nurses Association (ANA). (2010). *Nursing's social policy statement* (3rd ed.). Silver Spring, MD: Nursesbooks.org.
- Andrew, T. A., & Fallon, K. K. (2007). Asphyxial games in children and adolescents. *The American Journal of Forensic Medicine and Pathology, 28*(4), 303–307.
- Anscombe, A., & Knight, B. (1996). Case report. Delayed death after pressure on the neck: Possible causal mechanisms and implications for mode of death in manual strangulation discussed. *Forensic Science International, 78*(3), 193–197.
- Asamura, H., Ito, M., & Fukushima, H. (2009). An unusual suicide case of the combination of asphyxia. *The American Journal of Forensic Medicine and Pathology, 30*(2), 215–216.
- Asamura, H., Oki, T., Masao, O., & Fukushima, H. (2010). Unusual body posture after death leading to signs of strangulation. *The American Journal of Forensic Medicine and Pathology, 31*(2), 195–197.
- Atilgan, M. (2010). A case of suicidal ligature strangulation by using a tourniquet method. *The American Journal of Forensic Medicine and Pathology, 31*(1), 85–86.
- Atkins, B. Z., Abbate, S., Fisher, S. R., & Vaslef, S. N. (2004). Current management of laryngotracheal trauma: Case report and literature review. *Journal of Trauma and Acute Care Surgery, 56*(1), 185–190.

- Azmak, D. (2006). Asphyxial deaths: A retrospective study and review of the literature. *The American Journal of Forensic Medicine and Pathology*, 27(2), 134–144.
- Baier, W., Burnett, B. A., Payne, M., Warnett, J. M., & Williams, M. A. (2020). Using micro-computed tomography to examine the larynx in cases of suspected strangulation—a comparison of case findings and control images. *International journal of legal medicine*, 134(4), 1441–1450. <https://doi.org/10.1007/s00414-019-02194-y>
- Behrendt, N., & Modvig, J. (1995). The lethal paraphiliac syndrome: Accidental autoerotic deaths in Denmark 1933–1990. *The American Journal of Forensic Medicine and Pathology*, 16(3), 232–237.
- Bergin, A., & Berkowitz, R. (2012). Domestic violence in military families: Non-fatal strangulation. *Maryland Medicine: MM: A Publication of MEDCHI, the Maryland State Medical Society*, 13(3), 19, 29.
- Berrios, D. C., & Grady, D. (1991). Domestic violence. Risk factors and outcomes. *The Western Journal of Medicine*, 155(2), 133–135.
- Berzlanovich, A. M., Schopfer, J., & Keil, W. (2012). Deaths due to physical restraint. *Deutsches Arzteblatt International*, 109(3), 27–32.
- Betz, P., Hausmann, R., & Eisenmenger, W. (1998). A contribution to a possible differentiation between SIDS and asphyxiation. *Forensic Science International*, 91(2), 147–152.
- Bichard, H., Byrne, C., Saville, C., & Coetzer, R. (2021). The neuropsychological outcomes of non-fatal strangulation in domestic and sexual violence: A systematic review. *Neuropsychological rehabilitation*, 1–29. Advance online publication. <https://doi.org/10.1080/09602011.2020.1868537>
- Blanco Pampin, J., Morte Tamayo, N., Hinojal Fonseca, R., Payne-James, J. J., & Jerreat, P. (2002). Delayed presentation of carotid dissection, cerebral ischemia, and infarction following blunt trauma: Two cases. *Journal of Clinical Forensic Medicine*, 9(3), 136–140.
- Block, C. R. (2000). The Chicago women's health risk study: Risk of serious injury or death in intimate violence: A collaborative research project. *Illinois Criminal Justice Information Authority*. <https://www.ojp.gov/pdffiles1/nij/grants/184511.pdf>
- Bockholdt, B., Maxeiner, H., & Hegenbarth, W. (2005). Factors and circumstances influencing the development of hemorrhages in livor mortis. *Forensic Science International*, 149(2), 133–137.
- Bockholdt, B., Hempelmann, M., & Maxeiner, H. (2003). Experimental investigations of fractures of the upper thyroid horns. *Legal Medicine (Tokyo, Japan)*, 5, S252–S255.

- Bockholdt, B., & Maxeiner, H. (2002). Hemorrhages of the tongue in the postmortem diagnostics of strangulation. *Forensic Science International*, 126(3), 214–220.
- Bohnert, M., Faller-Marquardt, M., Lutz, S., Amberg, R., Weisser, H., & Pollak, S. (2001). Transfer of biological traces in cases of hanging and ligature strangulation. *Forensic Science International*, 116(2), 107–115.
- Bouwer, C., & Stein, D. (1999). Panic disorder following torture by suffocation is associated with predominantly respiratory symptoms. *Psychological Medicine*, 29(1), 233–236.
- Breitmeier, D., Mansouri, F., Albrecht, K., Böhm, U., Tröger, H., & Kleemann, W. (2003). Accidental autoerotic deaths between 1978 and 1997: Institute of legal medicine, medical school Hannover. *Forensic Science International*, 137(1), 41–44.
- Brenner, D. J. (2002). Estimating cancer risks from pediatric CT: Going from the qualitative to the quantitative. *Pediatric Radiology*, 32(4), 228–231.
- Briddell, J., Mallon, A., & DeFatta, R. A., Chowdhury, F., & Nagorsky, M. (2012). Dysphagia after strangulation. *Ear, Nose & Throat Journal*, 91(9), E30–E31.
- Brodsky, J. B., & Lemmens, H. J. (2003). Left double-lumen tubes: Clinical experience with 1,170 patients. *Journal of Cardiothoracic and Vascular Anesthesia*, 17(3), 289–298.
- Browning, S., & Whittet, H. (2000). A new and clinically symptomatic variant of thyroid cartilage anatomy. *Clinical Anatomy*, 13(4), 294–297.
- Bugeja, L., Rowse, J., Cunningham, N., & Parkin, J. A. (2022). Non-fatal strangulation and COVID-19 common symptoms and signs: considerations for medical and forensic assessment. *Forensic science, medicine, and pathology*, 10.1007/s12024-022-00460-x. Advance online publication. <https://doi.org/10.1007/s12024-022-00460-x>
- Busse, W. W., Wanner, A., Adams, K., Reynolds, H. Y., Castro, M., Chowdhury, B., & Sullivan, E. J. (2005). Investigative bronchoprovocation and bronchoscopy in airway diseases. *American Journal of Respiratory and Critical Care Medicine*, 172(7), 807–816.
- Butz, R. O. (1968). Length and cross-section growth patterns in the human trachea. *Pediatrics*, 42(2), 336–341.
- Byard, R. W., Hucker, S. J., & Hazelwood, R. R. (1993). Fatal and near-fatal autoerotic asphyxia episodes in women: Characteristic features based on a review of nine cases. *The American Journal of Forensic Medicine and Pathology*, 14(1), 70.
- Byard, R. W., & Winskog, C. (2012). Autoerotic death: Incidence and age of victims—A population-based study. *Journal of Forensic Sciences*, 57(1), 129–131.

- Campbell, J. C. (2002). Health consequences of intimate partner violence. *The Lancet*, 359(9314), 1331–1336.
- Campbell, J. C., Glass, N., Sharps, P. W., Laughon, K., & Bloom, T. (2007). Intimate partner homicide: Review and implications of research and policy. *Trauma, Violence & Abuse*, 8(3), 246–269.
- Campbell, J. C., Webster, D. W., & Glass N. (2009). The danger assessment: Validation of a lethality risk assessment instrument for intimate partner femicide. *Journal of Interpersonal Violence*, 24(4), 653–674.
- Campobasso, C. P., Colonna, M. F., Carabellese, F., Grattagliano, I., Candelli, C., Morton, R. J., & Catanesi, R. (2009). A serial killer of elderly women: Analysis of a multi-victim homicide investigation. *Forensic Science International*, 185(1), e7–e11.
- Cannon, L. M., Bailey, J. M., Ernst, S. D., St Ivany, A., Bevilacqua, K. G., Scheiman, L., & Munro-Kramer, M. L. (2020). Examining trends in non-fatal strangulation among sexual assault survivors seeking Sexual Assault Nurse Examiner care from 2002 to 2017. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, 149(1), 106–107. <https://doi.org/10.1002/ijgo.13058>
- Car, M. (2000). Increasing awareness about possible neurological alterations in brain status secondary to intimate violence. *Brain Injury Source*, 4(2), 30–37. Retrieved May 5, 2016, from http://www.doj.state.or.us/victims/pdf/increasing_awareness_about_possible_neurological_alterations.pdf
- Carson, D., & Pounder, D. (1996). Transport strangulation. *Forensic Science International*, 82(2), 191–192.
- Cartwright, N. E. K., Hussin, H. M., Biswas, S., Majid, M. A., Potts, M. J., Kabala, J., & Mayer, E. J. (2007). Subperiosteal orbital hemorrhage following self-strangulation. *Annals of Ophthalmology*, 39(4), 345–347.
- Chan, T. C., Vilke, G. M., & Neuman, T. (1998). Re-examination of custody restraint position and positional asphyxia. *The American Journal of Forensic Medicine and Pathology*, 19(3), 201–205.
- Chang, A. B., Moloney, G. E., Harms, P. J., & Masters, I. B. (2004). Endoscopic intratracheal carbon dioxide measurements during pediatric flexible bronchoscopy. *Paediatric Anaesthesia*, 14(8), 650–655.
- Cheddie, S., Pillay, B., & Goga, R. (2013). Bilateral blunt carotid artery injury: A case report and review of the literature. *South African Journal of Surgery*, 51(2), 77–83.

- Chou, F., & Conway, M. D. (1998). History of ocular anesthesia. *Ophthalmology Clinics*, 11(1), 1–9.
- Christe, A., Oesterhelweg, L., Ross, S., Spendlove, D., Bolliger, S., Vock, P., & Thali, M. J. (2010). Can MRI of the neck compete with clinical findings in assessing danger to life for survivors of manual strangulation? A statistical analysis. *Legal Medicine (Tokyo, Japan)*, 12(5), 228–232.
- Christe, A., Thoeny, H., Ross, S., Spendlove, D., Tshering, D., Bolliger, S., & Oesterhelweg, L. (2009). Life-threatening versus non-life-threatening manual strangulation: Are there appropriate criteria for MR imaging of the neck? *European Radiology*, 19(8), 1882–1889.
- 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(2), 143–150.
- Cole, F. (1957). Pediatric formulas for the anesthesiologist. *AMA Journal of Diseases of Children*, 94(6), 672–673.
- Collins, K. A., & Presnell, S. E. (2006). Elder homicide: A 20-year study. *The American Journal of Forensic Medicine and Pathology*, 27(2), 183–187.
- Comer, B. T., & Gal, T. J. (2012). Recognition and management of the spectrum of acute laryngeal trauma. *The Journal of Emergency Medicine*, 43(5), e289–e293.
- Cotton, R. T. (1984). Pediatric laryngotracheal stenosis. *Journal of Pediatric Surgery*, 19(6), 699–704.
- Crosby, S. S., Mohan, S., Di Loreto, C., & Spiegel, J. H. (2010). Head and neck sequelae of torture. *The Laryngoscope*, 120(2), 414–419.
- Danger Assessment. (2023). FAQs. Danger Assessment. <https://www.dangerassessment.org/FAQ.aspx>
- Davies, S. J. (2010). "C3, 4, 5 keeps the diaphragm alive." Is phrenic nerve palsy part of the pathophysiological mechanism in strangulation and hanging? Should diaphragm paralysis be excluded in survived cases? A review of the literature. *The American Journal of Forensic Medicine and Pathology*, 31(1), 100–102.
- Davison, A. M., & Williams, E. J. (2012). Microscopic evidence of previous trauma to the hyoid bone in a homicide involving pressure to the neck. *Forensic Science, Medicine, and Pathology*, 8(3), 307–311.

- Dayapala, A., Samarasekera, A., & Jayasena, A. (2012). An uncommon delayed sequela after pressure on the neck: An autopsy case report. *The American Journal of Forensic Medicine and Pathology*, 33(1), 80–82.
- Dean, R., & Mulligan, J. (2009). Providing first aid and assisting forensic investigations. *Nursing Standard*, 24(8), 35.
- Delmonte, C., & Capelozzi, V. L. (2001). Morphologic determinants of asphyxia in lungs: A semi-quantitative study in forensic autopsies. *The American Journal of Forensic Medicine and Pathology*, 22(2), 139–149.
- Demierre, N., Wyler, D., Zollinger, U., Bolliger, S., & Plattner, T. (2009). Elevated body core temperature in medico-legal investigation of violent death. *The American Journal of Forensic Medicine and Pathology*, 30(2), 155–158.
- Demirci, S., Dogan, K. H., Erkol, Z., & Deniz, I. (2009). A series of complex suicide. *The American Journal of Forensic Medicine and Pathology*, 30(2), 152–154.
- Demirci, S., Dogan, K. H., Erkol, Z., & Gunaydin, G. (2009). Suicide by ligature strangulation: Three case reports. *The American Journal of Forensic Medicine and Pathology*, 30(4), 369–372.
- Di Nunno, N., Costantinides, F., Conticchio, G., Mangiatordi, S., Vimercati, L., & Di Nunno, C. (2002). Self-strangulation: An uncommon but not unprecedented suicide method. *The American Journal of Forensic Medicine and Pathology*, 23(3), 260–263.
- DiMaio, V. J. (2000). Homicidal asphyxia. *The American Journal of Forensic Medicine and Pathology*, 21(1), 1–4.
- Di Paolo, M., Guidi, B., Bruschini, L., Vessio, G., Domenici, R., & Ambrosino, N. (2009). Unexpected delayed death after manual strangulation: Need for care examination in the emergency room. *Monaldi Archives for Chest Disease*, 71(3), 132–134.
- Douglas, H., & Fitzgerald, R. B. (2014). Strangulation, domestic violence and the legal response. *Sydney Law Review*, 36(2), 231–254.
- Downing, R. (2006). Manual and ligature strangulation. *On the Edge*, 12(2), 1.
- Duband, S., Timoshenko, A. P., Morrison, A. L., Prades, J. M., Debout, M., & Peoc'h, M. (2009). Ear bleeding: A sign not to be underestimated in cases of strangulation. *The American Journal of Forensic Medicine and Pathology*, 30(2), 175–176.
- Dutton, D. G. (2002). Personality dynamics of intimate abusiveness. *Journal of Psychiatric Practice*, 8(4), 216–228.

- Eckel, H. E., Sprinzl, G. M., Koebke, J., Pototschnig, C., Sittel, C., & Stennert, E. (1999). Morphology of the human larynx during the first five years of life studied on whole organ serial sections. *Annals of Otology, Rhinology & Laryngology*, 108(3), 232–238.
- Egge, M. K., Berkowitz, C. D., Toms, C., & Sathyavagiswaran, L. (2010). The choking game: A cause of unintentional strangulation. *Pediatric Emergency Care*, 26(3), 206–208.
- Eldredge, K., Huggins, E., & Pugh, L. C. (2012). Alternate light sources in sexual assault examinations: An evidence-based practice project. *Journal of Forensic Nursing*, 8(1), 39–44.
- Ely, S. F., & Hirsch, C. S. (2000). Asphyxial deaths and petechiae: A review. *Journal of Forensic Sciences*, 45(6), 1274–1277.
- Ernoehazy, W., Jr. (2016, January 19). Hanging injuries and strangulation. *Medscape*. Retrieved May 5, 2016, from <http://www.Emedicine.com/emerg/topic227>
- Fais, P., Giraudo, C., Viero, A., Miotto, D., Bortolotti, F., Tagliaro, F., Montisci, M., & Cecchetto, G. (2016). Micro computed tomography features of laryngeal fractures in a case of fatal manual strangulation. *Legal Medicine (Tokyo, Japan)*, 18, 85–89. doi: 10.1016/j.legalmed.2016.01.001.
- Fantinato, C., Gill, P., & Fonneløp, A.E. (2022). Non-self-DNA on the neck: A 24-hours time-course study. *Forensic Science International: Genetics*, 57(102661), 1–10. doi: 10.1016/j.fsigen.2022.102661.
- Faugno, D., Waszak, D., Strack, G. B., Brooks, M. A., & Gwinn, C. G. (2013). Strangulation forensic examination: Best practice for health care providers. *Advanced Emergency Nursing Journal*, 35(4), 314–327.
- Fernando, T., & Byard, R. W. (2013). Positional asphyxia without active restraint following an assault. *Journal of Forensic Sciences*, 58(6), 1633–1635.
- Fieguth, A., Albrecht, U., Bertolini, J., & Kleemann, W. (2003). Intracartilaginous haemorrhagic lesions in strangulation? *International Journal of Legal Medicine*, 117(1), 10–13.
- Fieguth, A., Franz, D., Lessig, R., & Kleemann, W. J. (2003). Fatal trauma to the neck: Immunohisto-chemical study of local injuries. *Forensic Science International*, 135(3), 218–225.
- Fineron, P. W., Turnbull, J. A., & Busuttil, A. (1995). Fracture of the hyoid bone in survivors of attempted manual strangulation. *Journal of Clinical Forensic Medicine*, 2(4), 195–197.
- Firdose, R., & Elamin, E. M. (2004). Pulmonary edema secondary to dynamic tracheal collapse. *Journal of Bronchology & Interventional Pulmonology*, 11(2), 118–121.

- Fisher, J. W., & Shelton, A. J. (2006). Survivors of domestic violence: Demographics and disparities in visitors to an interdisciplinary specialty clinic. *Family & Community Health*, 29(2), 118–130.
- Fitzsimons, M. G., Peralta, R., & Hurford, W. (2005). Cricoid fracture after physical assault. *Journal of Trauma and Acute Care Surgery*, 59(5), 1237–1238.
- Fortune, S. A., & Hawton, K. (2005). Deliberate self-harm in children and adolescents: A research update. *Current Opinion in Psychiatry*, 18(4), 401–406.
- Fracasso, T., & Pfeiffer, H. (2008). Simon's bleedings in case of incomplete hanging: A case report. *The American Journal of Forensic Medicine and Pathology*, 29(4), 352–353.
- Funk, M., & Schuppel, J. (2003). Strangulation injuries. *WMJ: Official Publication of the State Medical Society of Wisconsin*, 102(3), 41–45.
- Garcia-Vergara, E., Alemda, N., Fernández-Navarro, F., & Becerra-Alonso, D. (2022). Risk Assessment Instruments for Intimate Partner Femicide: A Systematic Review. *Front. Psychol.* 13:896901. 10.3389/fpsyg.2022.896901
- Geddes, J., & Whitwell, H. (2004). Inflicted head injury in infants. *Forensic Science International*, 146(2), 83–88.
- Geevasinga, N., Archer, J. S., & Ng, K. (2014). Choking, asphyxiation and the insular seizure. *Journal of Clinical Neuroscience: Official Journal of the Neurosurgical Society of Australasia*, 21(4), 688–689.
- Giger, R., Friedrich, J. P., Dulguerov, P., & Landis, B. N. (2004). Pneumo-pericardium after manual strangulation. *The American Journal of Medicine*, 116(11), 788–790.
- Gill, J. R., Cavalli, D. P., Ely, S. F., & Stahl-Herz, J. (2013). Homicidal neck compression of females: Autopsy and sexual assault findings. *Academic Forensic Pathology*, 3(4), 454–457.
- Gilkeson, R., Ciancibello, L. M., Hejal, R. B., Montenegro, H. D., & Lange, P. (2001). Tracheobronchomalacia: Dynamic airway evaluation with multidetector CT. *American Journal of Roentgenology*, 176(1), 205–210.
- Glass, N., Laughon, K., Campbell, J., Block, C. R., Hanson, G., Sharps, P. W., & Taliaferro, E. (2008). Non-fatal strangulation is an important risk factor for homicide of women. *The Journal of Emergency Medicine*, 35(3), 329–335.
- Godin, A., Kremer, C., & Sauvageau, A. (2012). Fracture of the cricoid as a potential pointer to homicide: A 6-year retrospective study of neck structures fractures in hanging victims. *The American Journal of Forensic Medicine and Pathology*, 33(1), 4–7.

- Goodman, R. A., Mercy, J. A., & Rosenberg, M. L. (1986). Drug use and interpersonal violence. Barbiturates detected in homicide victims. *American Journal of Epidemiology*, 124(5), 851–855.
- Gosink, P. D., & Jumbelic, M. I. (2000). Autoerotic asphyxiation in a female. *The American Journal of Forensic Medicine and Pathology*, 21(2), 114–118.
- Goudy, S. L., Miller, F. B., & Bumpous, J. M. (2002). Neck crepitation: Evaluation and management of suspected upper aerodigestive tract injury. *The Laryngoscope*, 112(5), 791–795.
- Gowens, P. A., Davenport, R. J., Kerr, J., Sanderson, R. J., & Marsden, A. K. (2003). Survival from accidental strangulation from a scarf resulting in laryngeal rupture and carotid artery stenosis: The "Isadora Duncan syndrome." A case report and review of literature. *Emergency Medicine Journal: EMJ*, 20(4), 391–393.
- Graham, E. A. M., & Rutty, G. N. (2008). Investigation into "normal" background DNA on adult necks: Implications for DNA profiling of manual strangulation victims. *Journal of Forensic Sciences*, 53(5), 1074–1082.
- Grattagliano, I., Troccoli, G., Zelano, C., & Catanesi, R. (2013). Incaprettamento: An unusual homicide by ligature strangulation. *International Journal of Criminology and Sociology*, 2, 10–12.
- Gupta, B., Sinha, C., Kumar, A., Dey, C., Ramchandani, S., Kumar, S., & Misra, M. (2012). Perioperative management of laryngotracheobronchial injury: Our experience in a level 1 trauma centre. *European Journal of Trauma and Emergency Surgery*, 38(5), 553–561.
- Gwinn, C., & Strack, G. B. (2012). *Welcome to train the trainer: Part 1 of training*. San Diego, CA: Training Institute on Strangulation Prevention.
- Hackett, A. M., & Kitsko, D. J. (2013). Evaluation and management of pediatric near-hanging injury. *International Journal of Pediatric Otorhinolaryngology*, 77(11), 1899–1901.
- Häkkänen, H. (2005). Homicide by ligature strangulation in Finland: Offence and offender characteristics. *Forensic Science International*, 152(1), 61–64.
- Hanna, S. (2004). A study of 13 cases of near-hanging presenting to an accident and emergency department. *Injury*, 35(3), 253–256.
- Hansen, S. H. (2001). Laryngeal crepitus: An aid to diagnosis in non-fatal strangulation. *Medicine, Science, and the Law*, 41(4), 284–286.
- Härm, T., & Rajs, J. (1981). Types of injuries and interrelated conditions of victims and

assailants in attempted and homicidal strangulation. *Forensic Science International*, 18(2), 101–123.

Hartlaub, T., Castro, B., & Frey, M. (2022). Nonfatal Strangulation: More Than Meets the Eye. *Journal of forensic nursing*, 18(3), 189–192. <https://doi.org/10.1097/JFN.0000000000000391>

Hawley, D. A. (2002, June). *Death by strangulation*. Paper presented at the conference: How to Improve Your Investigation and Prosecution of Domestic Violence and Strangulation Cases. Delaware, OH.

Hawley, D. A. (n.d.). *Forensic medical findings in fatal and non-fatal intimate partner strangulation assaults*. Retrieved on May 6, 2016, from <http://dhss.alaska.gov/ocs/Documents/childrensjustice/strangulation/16.%20Forensic%20Medical%20Findings%20in%20Fatal%20and%20Non-Fatal%20Intimate%20Partner%20Strangulation%20Assaults%20-%20Hawley%20-%202012.pdf>

Hawley, D. A., McClane, G. E., & Strack, G. B. (2001). A review of 300 attempted strangulation cases. Part III: Injuries in fatal cases. *The Journal of Emergency Medicine*, 21(3), 317–322.

Hibbert, M., Lannigan, A., Raven, J., Landau, L., & Phelan, P. (1995). Gender differences in lung growth. *Pediatric Pulmonology*, 19(2), 129–134.

Hinderliter, D., Doughty, A. S., Delaney, K., Pitula, C. R., & Campbell, J. (2003). The effect of intimate partner violence education on nurse practitioners' feelings of competence and ability to screen patients. *Journal of Nursing Education*, 42(10), 449–454.

Ho, L. Y., & Abdelghani, W. M. (2007). Valsalva retinopathy associated with the choking game. *Seminars in Ophthalmology*, 22(2), 63–65.

Holbrook, D. S., & Jackson, M. C. (2013). Use of an alternative light source to assess strangulation victims. *Journal of Forensic Nursing*, 9(3), 140–145.

Hoo, A., Dezateux, C., Hanrahan, J. P., Cole, T. J., Tepper, R. S., & Stocks, J. (2002). Sex-specific prediction equations for V maxFRC in infancy: A multicenter collaborative study. *American Journal of Respiratory and Critical Care Medicine*, 165(8), 1084–1092.

Hori, A., Hirose, G., Kataoka, S., Tsukada, K., Furui, K., & Tonami, H. (1991). Delayed post anoxic encephalopathy after strangulation serial neuroradiological and neurochemical studies. *Archives of Neurology*, 48(8), 871–874.

Horn, B. K., & Schunck, B. G. (1981). Determining optical flow. In *1981 Technical Symposium East* (pp. 319–331). Bellingham, WA: International Society for Optics and Photonics.

- Hoyt, C. A. (2006). Integrating forensic science into nursing processes in the ICU. *Critical Care Nursing Quarterly*, 29(3), 259–270.
- Huxley, A. K., Froede, R. C., & Birkby, W. H. (2001). Strangulation of pregnant woman leads to one first-degree murder indictment for the death of the mother: A medicolegal reconsideration of maternal/fetal homicide. *The American Journal of Forensic Medicine and Pathology*, 22(1), 51–54.
- Iacovou, E., Nayar, M., Fleming, J., & Lew-Gor, S. (2011). A pain in the neck: A rare case of isolated hyoid bone trauma. *Journal of Surgical Case Reports*, 7, 3.
- Ibsen, L. M., & Koch, T. (2002). Submersion and asphyxial injury. *Critical Care Medicine*, 30(11), S402–S408.
- Iserson, K. V. (1984). Strangulation: A review of ligature, manual, and postural neck compression injuries. *Annals of Emergency Medicine*, 13(3), 179–185.
- Ishida, K., Zhu, B., Quan, L., Fujita, M., & Maeda, H. (2000). Pulmonary surfactant-associated protein A levels in cadaveric sera with reference to the cause of death. *Forensic Science International*, 109(2), 125–133.
- Janssen, W., Koops, E., Anders, S., Kuhn, S., & Püschel, K. (2005). Forensic aspects of 40 accidental autoerotic deaths in northern Germany. *Forensic Science International*, 147, S61–S64.
- Jesseph, J. E., & Merendino, K. A. (1957). The dimensional interrelationships of the major components of the human tracheobronchial tree. *Surgery, Gynecology & Obstetrics*, 105(2), 210–214.
- Joshi, M., Thomas, K. A., & Sorenson, S. B. (2012). "I didn't know I could turn colors": Health problems and health care experiences of women strangled by an intimate partner. *Social Work in Health Care*, 51(9), 798–814.
- Kanchan, T., Raghavendra Babu, Y. P., Atreya, A., & Acharya, J. (2016). Ligature mark on the face – Forensic implications. *The Medico Legal Journal*, 84(3), 138–141. doi: 10.1177/0025817216630658.
- Karch, D. L., Logan, J. E., McDaniel, D., Parks, S., Patel, N., & Centers for Disease Control and Prevention (CDC). (2012). Surveillance for violent deaths—National Violent Death Reporting System, 16 states, 2009. *Morbidity and Mortality Weekly Report. Surveillance Summaries*, 61(6), 1–43.
- Kaufman, H. J., Ciraulo, D. L., & Burns, R. P. (1999). Traumatic fracture of the hyoid bone: Three case presentations of cardiorespiratory compromise secondary to missed diagnosis. *The American Surgeon*, 65(9), 877–880.

- Kempton, M., Ross, S., Spendlove, D., Flach, P., Preiss, U., Thali, M., & Bolliger, S. (2009). Post-mortem imaging of laryngohyoid fractures in strangulation incidents: First results. *Legal Medicine (Tokyo, Japan)*, 11(6), 267–271.
- Kerby, J. D., May, A. K., Gomez, C. R., & Rue, L. W., III. (2000). Treatment of bilateral blunt carotid injury using percutaneous angioplasty and stenting: Case report and review of the literature. *Journal of Trauma and Acute Care Surgery*, 49(4), 784–787.
- Khimenko, L. P., Esham, H. R., & Ahmed, W. (2000). Spontaneous internal carotid artery dissection. *Southern Medical Journal*, 93(10), 1011–1016.
- Khokhlov, V. D. (2001). Calculation of tension exerted on a ligature in incomplete hanging. *Forensic Science International*, 123(2), 172–177.
- Khokhlov, V. D. (1996). The mechanisms of the formation of injuries to the hyoid bone and laryngeal and tracheal cartilages in compression of the neck. [Mekhanizmy obrazovaniia povrezhdenii pod''iazychnoi kosti, khriashchei gortani i trakhei pri sdavlenii shei] *Sudebno-Meditsinskaia Ekspertiza*, 39(3), 13–16.
- Kiani, S. H., & Simes, D. C. (2000). Delayed bilateral internal carotid artery thrombosis following accidental strangulation. *British Journal of Anaesthesia*, 84(4), 521–524.
- King, G. G., Brown, N. J., Diba, C., Thorpe, C. W., Munoz, P., Marks, G. B., & Salome, C. M. (2005). The effects of body weight on airway calibre. *The European Respiratory Journal*, 25(5), 896–901.
- Kleemann, W.J., Wiechern, V., Schuck, M., & Tröger, H. (1995). Intrathoracic and subconjunctival petechiae in sudden infant death syndrome (SIDS). *Forensic Science International*, 72(1), 49–54.
- Kleinsasser, N. H., Priemer, F. G., Schulze, W., & Kleinsasser, O. F. (2000). External trauma to the larynx: Classification, diagnosis, therapy. *European Archives of Oto-Rhino-Laryngology*, 257(8), 439–444.
- Klopfstein, U., Kamber, J., & Zimmermann, H. (2010). "On the way to light the dark": A retrospective inquiry into the registered cases of domestic violence towards women over a six year period with a semi-quantitative analysis of the corresponding forensic documentation. *Swiss Medical Weekly*, 140, w13047.
- Knight, J. A., & Taft, C. T. (2004). Assessing neuropsychological concomitants of trauma and PTSD. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (2nd ed.) (pp. 344–388). New York, NY: Guilford Press.
- Knox Cartwright, N. E., Hussin, H. M., Biswas, S., Majid, M. A., Potts, M. J., Kabala, J., & Mayer,

- E. J. (2007). Subperiosteal orbital hemorrhage following self-strangulation. *Annals of Ophthalmology (Skokie, Illinois)*, 39(4), 345–347.
- Koh, M. S., Hsu, A. A. L., & Eng, P. (2003). Negative pressure pulmonary edema in the medical intensive care unit. *Intensive Care Medicine*, 29(9), 1601–1604.
- Kohli, A., Verma, S., & Agarwal, B. (1996). Accidental strangulation in a rickshaw. *Forensic Science International*, 78(1), 7–11.
- Kristensen, M. E., Lynnerup, N., & Sejrsen, B. (2006). Comparison of hand marks in manual strangulation: An experimental study. *Journal of Forensic Sciences*, 51(2), 381–385.
- Kwako, L. E., Glass, N., Campbell, J., Melvin, K. C., Barr, T., & Gill, J. M. (2011). Traumatic brain injury in intimate partner violence: A critical review of outcomes and mechanisms. *Trauma, Violence & Abuse*, 12(3), 115–126.
- Lambe, A., Püschel, K., & Anders, S. (2009). Extensive petechiae in attempted self-strangulation. *Journal of Forensic Sciences*, 54(1), 212–215.
- Langevin, R., Ben-Aron, M., Wright, P., Marchese, V., & Handy, L. (1988). The sex killer. *Annals of Sex Research*, 1(2), 263–301.
- Laughon, K., Glass, N., & Worrell, C. (2009). Review and analysis of laws related to strangulation in 50 states. *Evaluation Review*, 33(4), 358–369.
- Laughon, K., Renker, P., Glass, N., & Parker, B. (2008). Revision of the abuse assessment screen to address nonlethal strangulation. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 37(4), 502–507.
- Le Blanc-Louvry, I., Papin, F., Vaz, E., & Proust, B. (2013). Cervical arterial injury after strangulation—Different types of arterial lesions. *Journal of Forensic Sciences*, 58(6), 1640–1643.
- Lees, S., Phimister, D., Broughan, C., Dignon, A., & Brown, M. (2013). Domestic violence: The base of the iceberg. *British Journal of Midwifery*, 21(7), 493–498.
- Li, D., Ishikawa, T., Quan, L., Zhao, D., Michiue, T., Zhu, B., & Maeda, H. (2010). Morphological analysis of astrocytes in the hippocampus in mechanical asphyxiation. *Legal Medicine (Tokyo, Japan)*, 12(2), 63–67.
- Li, D., Zhu, B., Ishikawa, T., Zhao, D., Michiue, T., & Maeda, H. (2006). Immunohistochemical distribution of S-100 protein in the cerebral cortex with regard to the cause of death in forensic autopsy. *Legal Medicine (Tokyo, Japan)*, 8(2), 78–85.
- Li, W., Liu, D., Gallina, K., & Zhou, Y. (2016, February 24). Delayed death caused by

haematoma after manual strangulation: A rare case. *The British Journal of Oral and Maxillofacial Surgery*. doi:10.1016/j.bjoms.2016.02.004.

- Lin, P., & Gill, J. R. (2011). Homicides of pregnant women. *The American Journal of Forensic Medicine and Pathology*, 32(2), 161–163.
- Linden, J. A., Lewis-O'Connor, A., & Jackson, M. C. (2007). Forensic examination of adult victims and perpetrators of sexual assault. (2008). In J. S. Olshaker, M. C. Jackson & W. S. Smock (Eds.), *Forensic emergency medicine* (2nd ed.) (pp. 85–125). Philadelphia, PA: Lippincott, Wilkins & Williams.
- Line, W. S., Jr., Stanley, R. B., Jr., & Choi, J. H. (1985). Strangulation: A full spectrum of blunt neck trauma. *The Annals of Otology, Rhinology, and Laryngology*, 94(6), 542–546.
- Linkletter, M., Gordon, K., & Dooley, J. (2010). The choking game and YouTube: A dangerous combination. *Clinical Pediatrics*, 49(3), 274–279.
- Lombardi, M., Canter, J., Patrick, P. A., & Altman, R. (2015). Is fluorescence under an alternate light source sufficient to accurately diagnose subclinical bruising? *Journal of Forensic Sciences*, 60(2), 444–449.
- Losek, J. D., Tecklenburg, F. W., & White, D. R. (2008). Blunt laryngeal trauma in children: Case report and review of initial airway management. *Pediatric Emergency Care*, 24(6), 370–373.
- Lupascu, C., Lupascu, C., & Beldiman, D. (2003). Mechanical asphyxia by three different mechanisms. *Legal Medicine (Tokyo, Japan)*, 5(2), 110–111.
- MacDonald, Z., Eagles, D., Yadav, K., Muldoon, K., & Sampsel, K. (2021). Surviving strangulation: evaluation of non-fatal strangulation in patients presenting to a tertiary care sexual assault and partner abuse care program. *CJEM*, 23(6), 762–766. <https://doi.org/10.1007/s43678-021-00176-x>
- Madea, B., Schmidt, P., Kernbach-Wighton, G., & Doberentz, E. (2015). Strangulation--Suicide at the wheel. *Legal Medicine (Tokyo, Japan)*, 17(6), 512–516. doi: 10.1016/j.legalmed.2015.11.001.
- Maguire, S. A., Watts, P. O., Shaw, A. D., Holden, S., Taylor, R. H., Watkins, W. J., & Kemp, A. M. (2013). Retinal haemorrhages and related findings in abusive and non-abusive head trauma: A systematic review. *Eye (London, England)*, 27(1), 28–36.
- Maher, J. L., Mahabir, R. C., & Read, L. A. (2011). Acute macroglossia in the pediatric patient: Worth a look. *Pediatric Emergency Care*, 27(10), 948–949.
- Makwana, N., Evans, H. M., Moore, D., & Berry, K. (2001). Two cases of near asphyxiation in

children, using non-releasing plastic garden ties. *Emergency Medicine Journal: EMJ*, 18(3), 229–230.

Malek, A. M., Higashida, R. T., Halbach, V. V., Dowd, C. F., Phatouros, C. C., Lempert, T. E., & Stoney, R. (2000). Patient presentation, angiographic features, and treatment of strangulation-induced dissection of the internal carotid artery: Report of three cases. *Journal of Neurosurgery*, 92(3), 481–487.

Malek, A. M., Higashida, R. T., Phatouros, C. C., & Halbach, V. V. (1999). A strangled wife. *The Lancet*, 353(9161), 1324.

Mansell, A. L., Bryan, A. C., & Levison, H. (1977). Relationship of lung recoil to lung volume and maximum expiratory flow in normal children. *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, 42(6), 817–823.

Mansfield, M., & McGinty, J. S. (2008). Responding to hanging injuries. *Nursing2008*, 38(5), 56cc1, 56cc3.

Martz, D. (2003). Behavioral treatment for a female engaging in autoerotic asphyxiation. *Clinical Case Studies*, 2(3), 236–242.

Marx, J., Walls, R., & Hockberger, R. (2014). *Rosen's emergency medicine—Concepts and clinical practice*. Philadelphia, PA: Elsevier.

Masters, I., Chang, A., Patterson, L., Wainwright, C., Buntain, H., Dean, B., & Francis, P. (2002). Series of laryngomalacia, tracheomalacia, and bronchomalacia disorders and their associations with other conditions in children. *Pediatric Pulmonology*, 34(3), 189–195.

Masters, I. B., & Cooper, P. (2002). Paediatric flexible bronchoscopy. *Journal of Paediatrics and Child Health*, 38(6), 555–559.

Masters, I. B., Eastburn, M. M., Francis, P. W., Wootton, R., Zimmerman, P. V., Ware, R. S., & Chang, A. B. (2005). Quantification of the magnification and distortion effects of a pediatric flexible video-bronchoscope. *Respiratory Research*, 6, 16.

Masters, I. B., Eastburn, M. M., Wootton, R., Ware, R. S., Francis, P. W., Zimmerman, P. V., & Chang, A. B. (2005). A new method for objective identification and measurement of airway lumen in paediatric flexible videobronchoscopy. *Thorax*, 60(8), 652–658.

Maxeiner, H. (1998). "Hidden" laryngeal injuries in homicidal strangulation: How to detect and interpret these findings. *Journal of Forensic Sciences*, 43(4), 784–791.

Maxeiner, H., & Bockholdt, B. (2003). Homicidal and suicidal ligature strangulation—A comparison of the post-mortem findings. *Forensic Science International*, 137(1), 60–66.

- Maxeiner, H., & Jekat, R. (2010). Resuscitation and conjunctival petechial hemorrhages. *Journal of Forensic and Legal Medicine*, 17(2), 87–91.
- McClane, G. E., Strack, G. B., & Hawley, D. (2001). A review of 300 attempted strangulation cases. Part II: Clinical evaluation of the surviving victim. *The Journal of Emergency Medicine*, 21(3), 311–315.
- McClave, J. L., Russell, P. J., Lyren, A., O'Riordan, M. A., & Bass, N. E. (2010). The choking game: Physician perspectives. *Pediatrics*, 125(1), 82–87.
- McKee, G. B., Gill-Hopple, K., Oesterle, D. W., Daigle, L. E., & Gilmore, A. K. (2020). New Perspectives on Risk Factors for Non-fatal Strangulation and Post-assault Imaging. *Journal of interpersonal violence*, 886260520966673. Advance online publication. <https://doi.org/10.1177/0886260520966673>
- McLean, M. (2012). Have you missed signs in a victim of strangulation? *Alberta RN/Alberta Association of Registered Nurses*, 68(3), 18–19.
- McNeil, M. L., Amodi, H., & Brown, T. F. (2010). 30-year delayed presentation of hyoid strangulation fracture. *Journal of Otolaryngology - Head & Neck Surgery = Le Journal d'Oto-Rhino-Laryngologie et de Chirurgie Cervico-Faciale*, 39(5), E26–E27.
- Mcquown, C., Frey, J., Steer, S., Fletcher, G. E., Kinkopf, B., Fakler, M., & Prulhiere, V. (2016). Prevalence of strangulation in survivors of sexual assault and domestic violence. *The American Journal of Emergency Medicine*, 34(7), 1281–1285. doi: 10.1016/j.ajem.2016.04.029.
- Melkane, A. E., Matar, N. E., Haddad, A. C., & Zoghbi, A. C. (2010). Suicidal hanging attempt: Poor symptoms for a potentially lethal injury. *The Journal of Trauma*, 69(4), E36.
- Messing, J. T., Campbell, J., AbiNader, M. A., & Bolyard, R. (2020). Accounting for Multiple Nonfatal Strangulation in Intimate Partner Violence Risk Assessment. *Journal of interpersonal violence*, 886260520975854. Advance online publication. <https://doi.org/10.1177/0886260520975854>
- Messing, J. T., Thomas, K. A., Ward-Lasher, A. L., & Brewer, N. Q. (2021). A Comparison of Intimate Partner Violence Strangulation Between Same-Sex and Different-Sex Couples. *Journal of interpersonal violence*, 36(5-6), 2887–2905. <https://doi.org/10.1177/0886260518757223>
- Miao, J., Su, C., Wang, W., Lin, H., Li, H., Lei, G., Li, Z. (2009). Delayed parkinsonism with a selective symmetric basal ganglia lesion after manual strangulation. *Journal of Clinical Neuroscience*, 16(4), 573–575.

- Milligan, N., & Anderson, M. (1980). Conjugal disharmony: A hitherto unrecognised cause of strokes. *British Medical Journal*, 281(6237), 421–422.
- Miziara, I. D., & Bertaccini, F. (2011). Three different mechanisms of death: An unusual form of a child murder by asphyxia. *The American Journal of Forensic Medicine and Pathology*, 32(2), 164–165.
- Molacek, J., Baxa, J., Houdek, K., Ferda, J., & Treska, V. (2010). Bilateral post-traumatic carotid dissection as a result of a strangulation injury. *Annals of Vascular Surgery*, 24(8), 1133. e9–e11.
- Mortelmans, L. J., Jutten, G. C., & Coene, L. (2003). Acute post-traumatic tension gastro thorax, a tension pneumothorax-like injury. *European Journal of Emergency Medicine*, 10(4), 344–346.
- Moshirfar, M., Betts, B. S., Hsu, M., Holz, H. A., & McEntire, W. (2011). Bilateral total descemet's membrane detachments after strangulation. *Clinical Ophthalmology (Auckland, New Zealand)*, 5, 1221–1222.
- Müller, E., Franke, W. G., & Koch, R. (1997). Thyreoglobulin and violent asphyxia. *Forensic Science International*, 90(3), 165–170.
- National Institute of Justice. (2017). National best practices for sexual assault kits: A multidisciplinary approach. U.S. Department of Justice. <https://www.ojp.gov/pdffiles1/nij/250384.pdf>
- Neto, H. S., Neville, I. S., Beer-Furlan, A., Tavares, W. M., Teixeira, M. J., & Paiva, W. S. (2014). Hemodynamic stroke caused by strangulation. *International Journal of Clinical and Experimental Medicine*, 7(9), 2932.
- Nichols, S. D., McCarthy, M. C., Ekeh, A. P., Woods, R. J., Walusimbi, M. S., & Saxe, J. M. (2009). Outcome of cervical near-hanging injuries. *The Journal of Trauma*, 66(1), 174–178.
- Nicoucar, K., Popova, N., Becker, M., & Dulguerov, P. (2008). Pseudo aneurysm of the external carotid artery after a blunt facial trauma. *The Journal of Trauma*, 65(3), E24–E27. doi:10.1097/01.ta.0000209400.14212.a7
- Nikolic, S., Micic, J., Atanasijevic, T., Djokic, V., & Djonic, D. (2003). Analysis of neck injuries in hanging. *The American Journal of Forensic Medicine and Pathology*, 24(2), 179–182.
- Niort, F., Godio-Raboutet, Y., Torrents, R., Adalian, P., Leonetti, G., Piercecchi-Marti, M. D., & Thollon, L. (2015). Transmission of force to the hyoid bone during manual strangulation: Simulation using finite element numerical models. *Forensic Science International*, 257, 420–424. doi: 10.1016/j.forsciint.2015.10.013.

- O'Connor, P. J., Russell, J. D., & Moriarty, D. C. (1998). Anesthetic implications of laryngeal trauma. *Anesthesia & Analgesia*, 87(6), 1283–1284.
- Office on Violence Against Women. (2013). A national protocol for sexual assault medical forensic examinations—Adults/Adolescents. U.S. Department of Justice. <https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf>
- Office on Violence Against Women (2023). National Protocol for Intimate Partner Violence Medical Forensic Examinations. Washington, DC: U.S. Department of Justice, Office on Violence Against Women. <https://www.justice.gov/d9/2023-12/IPVMFEProtocol.pdf>
- Oh, J. H., Min, H. S., Park, T. U., Sang, J. L., & Kim, S. E. (2007). Isolated cricoid fracture associated with blunt neck trauma. *Emergency Medicine Journal*, 24(7), 505–506.
- Okazaki, J., Isono, S., Hasegawa, H., Sakai, M., Nagase, Y., & Nishino, T. (2004). Quantitative assessment of tracheal collapsibility in infants with tracheomalacia. *American Journal of Respiratory and Critical Care Medicine*, 170(7), 780–785.
- Oxford, C. M., & Ludmir, J. (2009). Trauma in pregnancy. *Clinical Obstetrics and Gynecology*, 52(4), 611–629.
- Paluch, M. (2013). Strangulation in domestic violence cases: Overcoming evidentiary challenges to reduce lethality. Developments of New York State Family Law.
- Pampin, J. B., Tamayo, N. M., Fonseca, R. H., Payne-James, J., & Jerreat, P. (2002). Delayed presentation of carotid dissection, cerebral ischemia, and infarction following blunt trauma: Two cases. *Journal of Clinical Forensic Medicine*, 9(3), 136–140.
- Parks, S. E., Johnson, L. L., McDaniel, D. D., Gladden, M., & Centers for Disease Control and Prevention (CDC). (2014). Surveillance for violent deaths—National Violent Death Reporting System, 16 states, 2010. *Morbidity and Mortality Weekly Report. Surveillance Summaries*, 63(1), 1–33.
- Patch, M., Anderson, J. C., Alexander, K. A., Somoano, F. A., Kelen, G., Holbrook, D. S., & Campbell, J. C. (2022). Didn't put a label on it: Examining intimate partner strangulation within a diagnostic framework. *Journal of advanced nursing*, 10.1111/jan.15380. Advance online publication. <https://doi.org/10.1111/jan.15380>
- Patil, R. D., Bhambure, N. M., More, N., Athawale, A., & Shah, A. C. (1994). Survival after attempted strangulation. *The Journal of the Association of Physicians of India*, 42(8), 644–645.

- Pego-Reigosa, R., Lopez-Lopez, S., Vazquez-Lopez, M. E., Armesto-Perez, V., Branas-Fernandez, F., Martinez-Vazquez, F., & Cortes-Laino, J. A. (2005). Sea wave-induced internal carotid artery dissection. *Neurology*, 64(11), 1980.
- Pereira, F. L., Filho, L. I., Pavan, A. J., Farah, G. J., Goncalves, E. A., Veltrini, V. C., & Camarini, E. T. (2007). Styloid-stylohyoid syndrome: Literature review and case report. *Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and Maxillofacial Surgeons*, 65(7), 1346–1353.
- Plattner, T., Bolliger, S., & Zollinger, U. (2005). Forensic assessment of survived strangulation. *Forensic Science International*, 153(2), 202–207.
- Pollanen, M. S., & McAuliffe, D. N. (1998). Intra-cartilaginous laryngeal haemorrhages and strangulation. *Forensic Science International*, 93(1), 13–20.
- Pollanen, M. S. (2000). A triad of laryngeal hemorrhages in strangulation: A report of eight cases. *Journal of Forensic Sciences*, 45(3), 614–618.
- Pollanen, M. S., Bulger, B., & Chiasson, D. A. (1995). The location of hyoid fractures in strangulation revealed by xeroradiography. *Journal of Forensic Sciences*, 40(2), 303–305.
- Pollanen, M. S., & Chiasson, D. A. (1996). Fracture of the hyoid bone in strangulation: Comparison of fractured and un-fractured hyoids from victims of strangulation. *Journal of Forensic Sciences*, 41(1), 110–113.
- Pollanen, M. S., & Ubelaker, D. H. (1997). Forensic significance of the polymorphism of hyoid bone shape. *Journal of Forensic Sciences*, 42(5), 890–892.
- Poquet, E., Dibiane, A., Jourdain, C., el-Amine, M., Jacob, A., & Escure, M. N. (1995). Blunt injury of the larynx by hanging. X-ray computed tomographic aspect. [Traumatisme ferme du larynx par pendaison. Aspect scanographique a propos d'un cas] *Journal De Radiologie*, 76(2–3), 107–109.
- Porr, J., Laframboise, M., & Kazemi, M. (2012). Traumatic hyoid bone fracture—a case report and review of the literature. *The Journal of the Canadian Chiropractic Association*, 56(4), 269.
- Porzionato, A., Macchi, V., Rodriguez, D., & De Caro, R. (2007). Airway obstruction by laryngeal masses in sudden and homicidal deaths. *Forensic Science International*, 171(1), e15–e20.
- Pritchard, A. J., Reckdenwald, A., & Nordham, C. (2015, December 30). Nonfatal strangulation as part of domestic violence: A review of research. *Trauma, Violence & Abuse*. doi: 10.1177/1524838015622439.

- Purvin, V. (1997). Unilateral Headache and Ptosis in a 30-Year-Old Woman. *Survey of Ophthalmology*, 42(2), 163–168.
- Putaala, J., Kurkinen, M., Tarvos, V., Salonen, O., Kaste, M., & Tatlisumak, T. (2009). Silent brain infarcts and leukoaraiosis in young adults with first-ever ischemic stroke. *Neurology*, 72(21), 1823–1829.
- Putaala, J., Metso, A. J., Metso, T. M., Konkola, N., Kraemer, Y., Haapaniemi, E., & Tatlisumak, T. (2009). Analysis of 1008 consecutive patients aged 15 to 49 with first-ever ischemic stroke: The Helsinki young stroke registry. *Stroke; a Journal of Cerebral Circulation*, 40(4), 1195–1203.
- Ramirez, J. I., Petrone, P., Kuncir, E. J., & Asensio, J. A. (2004). Thyroid storm induced by strangulation. *Southern Medical Journal*, 97(6), 608–610.
- Rasmussen, E. R., Larsen, P. L., Andersen, K., Larsen, M., Qvortrup, K., & Hougen, H. P. (2013). Petechial hemorrhages of the tympanic membrane in attempted suicide by hanging: A case report. *Journal of Forensic and Legal Medicine*, 20(2), 119–121.
- Re, L., Birkhoff, J. M., Sozzi, M., Andrello, L., & Osculati, A. M. (2015). The choking game: A deadly game. Analysis of two cases of “self-strangulation” in young boys and review of the literature. *Journal of Forensic and Legal Medicine*, 30, 29–33.
- Reckdenwald, A., Powell, K. M., & Martins, T. (2022). Forensic documentation of non-fatal strangulation. *Journal of forensic sciences*, 67(2), 588–595.
<https://doi.org/10.1111/1556-4029.14958>
- Reid, L. A., Dunn, M., Mckeown, D. W., & Oglesby, A. J. (2011). Surgical airway in emergency department intubation. *European Journal of Emergency Medicine: Official Journal of the European Society for Emergency Medicine*, 18(3), 168–171.
- Richards, T. N., Gillespie, L. K., Kafonek, K., & Johnson, M. (2020). An Examination of the Lethality Assessment Program (LAP): Perspectives on Implementation, Help-Seeking, and Victim Empowerment. *Violence Against Women*, 26(12–13), 1517–1537.
<https://doi.org/10.1177/1077801219880965>
- Richards, C. E., & Wallis, D. N. (2005). Asphyxiation: A review. *Trauma*, 7(1), 37–45.
- Robison, D., & Hunt, S. (2005). Sudden In-custody death syndrome. *Advanced Emergency Nursing Journal*, 27(1), 36–43.

- Rozycki, H. J., Van Houten, M. L., & Elliott, G. R. (1996). Quantitative assessment of intrathoracic airway collapse in infants and children with tracheobronchomalacia. *Pediatric Pulmonology*, 21(4), 241–245.
- Saha, A., Bansal, A., & Kaur, S. (2010). Post obstructive pulmonary edema following accidental strangulation. *Indian Journal of Pediatrics*, 77(5), 584–584.
- Sauvageau, A., & Boghossian, E. (2010). Classification of asphyxia: The need for standardization. *Journal of Forensic Sciences*, 55(5), 1259–1267.
- Sauvageau, A., & Racette, S. (2006). Autoerotic deaths in the literature from 1954 to 2004: A review. *Journal of Forensic Sciences*, 51(1), 140–146.
- Sauvageau, A., Ambrosi, C., & Kelly, S. (2012). Autoerotic nonlethal filmed hangings: A case series and comments on the estimation of the time to irreversibility in hanging. *The American Journal of Forensic Medicine and Pathology*, 33(2), 159–162.
- Sauvageau, A., & Yesovitch, R. (2006). Choking on toilet paper: An unusual case of suicide and a review of the literature on suicide by smothering, strangulation, and choking. *The American Journal of Forensic Medicine and Pathology*, 27(2), 173–174.
- Schmidt, P., & Madea, B. (1995). Homicide in the bathtub. *Forensic Science International*, 72(2), 135–146.
- Schroeder, U., Motzko, M., Wittekindt, C., & Eckel, H. (2003). Hoarseness after laryngeal blunt trauma: A differential diagnosis between an injury to the external branch of the superior laryngeal nerve and an arytenoid subluxation. A case report and literature review. *European Archives of Oto-Rhino-Laryngology*, 260(6), 304–307.
- Sep, D., & Thies, K. (2007). Strangulation injuries in children. *Resuscitation*, 74(2), 386–391.
- Sethi, P. K., Sethi, N. K., Torgovnick, J., & Arsur, E. (2012). Delayed left anterior and middle cerebral artery hemorrhagic infarctions after attempted strangulation: A case report. *The American Journal of Forensic Medicine and Pathology*, 33(1), 105–106.
- Sharma, B., Harish, D., Sharma, A., Sharma, S., & Singh, H. (2008). Injuries to neck structures in deaths due to constriction of neck, with a special reference to hanging. *Journal of Forensic and Legal Medicine*, 15(5), 298–305.
- Sheridan, D. J., & Nash, K. R. (2007). Acute injury patterns of intimate partner violence victims. *Trauma, Violence & Abuse*, 8(3), 281–289.
- Shetty, U., Deepak, M., Hussain, S. A., Usmani, H., Osama, M., Pereira, K. G., & Menezes, R. G. (2016). Survival following accidental scarf strangulation. *The Medico-Legal Journal*, 84(3), 150–152. doi: 10.1177/0025817216643443.

- Shields, L. B., Hunsaker, D. M., & Hunsaker, J. C., III. (2005). Autoerotic asphyxia: Part I. *The American Journal of Forensic Medicine and Pathology*, 26(1), 45–52.
- Shields, L. B., Hunsaker, D. M., Hunsaker, J. C., III., Wetli, C. V., Hutchins, K. D., & Holmes, R. M. (2005). Atypical autoerotic death: Part II. *The American Journal of Forensic Medicine and Pathology*, 26(1), 53–62.
- 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.
- Shumaker, D., Kottamasu, S., Preston, G., & Treloar, D. (1988). Acute pulmonary edema after near strangulation. *Pediatric Radiology*, 19(1), 59–60.
- Singh, B., Kumar, S., & Kumar, V. (2003). Blunt laryngotracheal injury following accidental strangulation. *Injury*, 34(12), 937–939.
- Smith, D. J., Jr., Mills, T., & Taliaferro, E. H. (2001). Frequency and relationship of reported symptomology in victims of intimate partner violence: The effect of multiple strangulation attacks. *The Journal of Emergency Medicine*, 21(3), 323–329.
- Snider, C., Webster, D., O'Sullivan, C. S., & Campbell, J. (2009). Intimate partner violence: Development of a brief risk assessment for the emergency department. *Academic Emergency Medicine*, 16(11), 1208–1216.
- Sorenson, S. B., 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(11), e54–e61.
- Stanley, R. B., & Hanson, D. G. (1983). Manual strangulation injuries of the larynx. *Archives of Otolaryngology*, 109(5), 344–347.
- Stapczynski, J. S. (2010). Strangulation injuries. *Emergency Medicine Reports*, 31(17), 193–203.
- Stark, P., & Stark, H. E. (2010). Pulmonary manifestations of trauma. *Contemporary Diagnostic Radiology*, 33(16), 1–6.
- Stewart, D. E., Gagnon, A. J., Merry, L. A., & Dennis, C. (2012). Risk factors and health profiles of recent migrant women who experienced violence associated with pregnancy. *Journal of Women's Health*, 21(10), 1100–1106.
- Strack, G. B., & Gwinn, C. (2011). On the edge of homicide: Strangulation as a prelude. *Criminal Justice*, 26, 32.

- Strack, G. B., & McClane, G. (1999). *How to improve your investigation and prosecution of strangulation cases* (2nd ed.). D. C. James. (Ed.). San Diego, CA. Retrieved May 5, 2016, from http://www.ncdsv.org/images/strangulation_article.pdf
- Strack, G. B., McClane, G. E., & Hawley, D. (2001). A review of 300 attempted strangulation cases. Part I: Criminal legal issues. *The Journal of Emergency Medicine*, 21(3), 303–309.
- Sugar, N., Fine, D., & Eckert, L. (2004). Physical injury after sexual assault: Findings of a large case series. *American Journal of Obstetrics and Gynecology*, 190(1), 71–76.
- Tabata, N. (1998). Morphological changes in traumatized skeletal muscle: The appearance of opaque fibers of cervical muscles as evidence of compression to the neck. *Forensic Science International*, 96(2), 197–214.
- Taliaferro, E., Hawley, D., McClane, G., & Strack, G. (2009). Strangulation in intimate partner violence. In C. Mitchell & D. Anglin (Eds.), *Intimate partner violence: A health-based perspective* (pp. 217-236). New York, NY: Oxford University Press.
- Taliaferro, E., Mills, T., & Walker, S. (2001). Walking and talking victims of strangulation. Is there a new epidemic? A commentary. *The Journal of Emergency Medicine*, 21(3), 293–295.
- Taniguchi, T., Saito, S., Mizukoshi, Y., Goto, Y., & Inaba, H. (2002). Multiple organ failure after strangulation injury. *Intensive Care Medicine*, 28(8), 1193.
- Taslimi, R., Daneshbod, Y., & Mirfazaelian, H. (2013). Facial petechia as a sign of strangulation in trauma victims. *Emergency Medicine Journal: EMJ*, 30(4), 311.
- Taussig, L. M., Cota, K., & Kaltenborn, W. (1981). Different mechanical properties of the lung in boys and girls 1–4. *American Review of Respiratory Disease*, 123(6), 640–643.
- Thomas, J. A., Ware, T. M., & Counselman, F. L. (2002). Internal carotid artery pseudo aneurysm masquerading as a peritonsillar abscess. *The Journal of Emergency Medicine*, 22(3), 257–261.
- Thomas, K. A., Joshi, M., & Sorenson, S. B. (2014). “Do you know what it feels like to drown?” Strangulation as coercive control in intimate relationships. *Psychology of Women Quarterly*, 38, 124–137.
- Toblin, R. L., Paulozzi, L. J., Gilchrist, J., & Russell, P. J. (2008). Unintentional strangulation deaths from the “choking game” among youths aged 6–19 years—United States, 1995–2007. *Journal of Safety Research*, 39(4), 445–448.

- Tough, S. C., Butt, J. C., & Sanders, G. L. (1994). Autoerotic asphyxial deaths: Analysis of nineteen fatalities in Alberta, 1978 to 1989. *The Canadian Journal of Psychiatry/La Revue Canadienne De Psychiatrie*, 39(3), 157–160.
- Tournel, G., Hubert, N., Rougé, C., Hédouin, V., & Gosset, D. (2001). Complete autoerotic asphyxiation: Suicide or accident? *The American Journal of Forensic Medicine and Pathology*, 22(2), 180–183.
- Trevillion, K., Agnew-Davies, R., & Howard, L. M. (2013). Healthcare professionals' response to domestic violence. *Primary Health Care*, 23(9), 34–42.
- Turillazzi, E., D'Errico, S., Neri, M., & Fineschi, V. (2006). An unusual mechanical asphyxia in a homicide-suicide case by smothering and strangulation. *The American Journal of Forensic Medicine and Pathology*, 27(2), 166–168.
- Turkel, A. (2007). "And then he choked me." *Understanding and Investigation Strangulation. Update: American Prosecutor's Research Institute*, 20, 1–2.
- Ullrich, N. J., & Goodkin, H. P. (2015, June 30). The "choking game" and other strangulation activities in children and adolescents. *UptoDate*. Retrieved May 11, 2016, from <http://www.uptodate.com/contents/inherited-susceptibility-to-breast-and-ovarian-cancer-next-generation-sequencing-panels/abstract/103>
- Vanezis, P., Claydon, S., M. Chapman, R. C., & al-Alousi, L. M. (1993). Internal carotid artery thrombosis following manual strangulation. *Medicine, Science, and the Law*, 33(1), 69–71.
- Verma, S. (2007). Pediatric and adolescent strangulation deaths. *Journal of Forensic and Legal Medicine*, 14(2), 61–64.
- Vilke, G. M., & Chan, T. C. (2011). Evaluation and management for carotid dissection in patients presenting after choking or strangulation. *The Journal of Emergency Medicine*, 40(3), 355–358.
- Wahlen, B. M., & Thierbach, A. R. (2002). Near-hanging. *European Journal of Emergency Medicine*, 9(4), 348–350.
- Wailoo, M. P., & Emery, J. L. (1982). Normal growth and development of the trachea. *Thorax*, 37(8), 584–587.
- Walsh, F. M., Stahl, C. J., III., Unger, H. T., Liliensern, O. C., & Stephens, R. G., III. (1977). Autoerotic asphyxial deaths: A medicolegal analysis of forty-three cases. *Legal Medicine Annual*, 155–182.

- Wang, Q., Ishikawa, T., Michiue, T., Zhu, B., Guan, D., & Maeda, H. (2012). Intrapulmonary aquaporin-5 expression as a possible biomarker for discriminating smothering and choking from sudden cardiac death: A pilot study. *Forensic Science International*, 220(1), 154–157.
- Wang, W., Kong, L., Dong, R., & Zhao, H. (2007). Fracture of the hyoid bone associated with atlantoaxial subluxation: A case report and review of the literature. *The American Journal of Forensic Medicine and Pathology*, 28(4), 345–347.
- Wehner, F., Martin, D. D., & Wehner, H. (2004). Asphyxia due to pacifiers—Case report and review of the literature. *Forensic Science International*, 141(2), 73–75.
- Wheeler, A., New York State Division of Criminal Justice Services, Office of Justice Research & Performance. (2012). *Arrests and arraignments involving strangulation offenses Nov. 11, 2010–June 30, 2012*. Albany, NY: NY State Division of Criminal Justice Services. Retrieved May 6, 2016, from <http://www.criminaljustice.ny.gov/pio/research-update-strangulation-apr2012.pdf>
- White, J. K., & Carver, J. (2012). Self-induced vomiting as a probable mechanism of an isolated hyoid bone fracture. *The American Journal of Forensic Medicine and Pathology*, 33(2), 170–172.
- Wiegand, P., & Kleiber, M. (1997). DNA typing of epithelial cells after strangulation. *International Journal of Legal Medicine*, 110(4), 181–183.
- Wilbur, L., Higley, M., Hatfield, J., Surprenant, Z., Taliaferro, E., Smith, D. J., & Paolo, A. (2001). Survey results of women who have been strangled while in an abusive relationship. *The Journal of Emergency Medicine*, 21(3), 297–302.
- Wilson, M., Spike, E., Karystianis, G., & Butler, T. (2022). Nonfatal Strangulation During Domestic Violence Events in New South Wales: Prevalence and Characteristics Using Text Mining Study of Police Narratives. *Violence against women*, 28(10), 2259–2285. <https://doi.org/10.1177/10778012211025993>
- Wilson, J. S., West, J. F., Messing, J. T., Brown, S., Patchell, B., & Campbell, J. C. (2011). Factors related to posttraumatic stress symptoms in women experiencing police-involved intimate partner violence. *Advances in Nursing Science*, 34(3), E14–E28.
- Wu, M., Tsai, Y., Lin, M., Hsu, I., & Fong, Y. (2004). Complete laryngotracheal disruption caused by blunt injury. *The Annals of Thoracic Surgery*, 77(4), 1211–1215.
- Yacobi, Y., Tsivian, A., & Sidi, A. A. (2007). Emergent and surgical interventions for injuries associated with eroticism: A review. *The Journal of Trauma*, 62(6), 1522–1530.

- Yen, K., Thali, M. J., Aghayev, E., Jackowski, C., Schweitzer, W., Boesch, C., & Sonnenschein, M. (2005). Strangulation signs: Initial correlation of MRI, MSCT, and forensic neck findings. *Journal of Magnetic Resonance Imaging*, 22(4), 501–510.
- Yen, K., Vock, P., Christe, A., Scheurer, E., Plattner, T., Schön, C., & Thali, M. J. (2007). Clinical forensic radiology in strangulation victims: Forensic expertise based on magnetic resonance imaging (MRI) findings. *International Journal of Legal Medicine*, 121(2), 115–123.
- Zilkens, R. R., Phillips, M. A., Kelly, M. C., Mukhtar, S. A., Semmens, J. B., & Smith, D. A. (2016). Non-fatal strangulation in sexual assault: A study of clinical and assault characteristics highlighting the role of intimate partner violence. *Journal of forensic and legal medicine*, 43, 1–7. <https://doi.org/10.1016/j.jflm.2016.06.005>