



# TRAINING INSTITUTE on STRANGULATION PREVENTION

Is a program of Alliance for HOPE International

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[www.strangulationtraininginstitute.org](http://www.strangulationtraininginstitute.org)

## The Long-Term Consequences of Strangulation Webinar Course Description

Presented by: Gael Strack, JD and William Smock, MD

September 14, 2016

There is mounting evidence in the medical literature that intimate partner violence, including strangulation, has long-term negative health consequences for survivors. This impact, what Dr. Ellen Taliaferro terms the "Pandora Effect", lingers long after the bruises fade, the bones mend, and the abuse is over. Still, many victims, their friends and relatives, and those who serve them in the domestic violence advocacy, medical and law enforcement communities fail to understand how significantly this lingering footprint of violence is affecting their well-being and ability to carry on a normal life. Dr. Smock will share the top 25 long term health consequences of strangulation and Gael Strack will discuss how professionals can mitigate their impact through advocacy and new tools.

*This project is supported all or in part by Grant No. 2014-TA-AX-K008 awarded by the Office on Violence Against Women, U.S. Department of Justice. The opinions, findings, conclusions, and recommendations expressed in this publication/program/exhibition are those of the author(s) and do not necessarily reflect the views of the Department of Justice, Office on Violence Against Women.*


### Welcome to Our Webinar!

*While waiting for the presentation to begin, please read the following reminders:*

- The presentation will begin promptly at 9:00 a.m. Pacific Time
- If you are experiencing technical difficulties, email [sarah@allianceforhope.com](mailto:sarah@allianceforhope.com)
- To LISTEN to the presentation on your phone, dial +1 (213) 929-4212
- Access Code: 198-450-664 or listen on your computer speakers
- Attendees will be muted throughout the presentation
- To send questions to the presenter during presentation:
  - Click on "Questions" in the toolbar (top right corner)
  - Type your comments & send to presenter
- There will be a Q & A session at the end of the presentation.
- The presentation will be recorded & posted on [www.strangulationtraininginstitute.com](http://www.strangulationtraininginstitute.com)
- Please complete the evaluation at the end of the presentation. We value your input.

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### "He More Than Choked Her, He Caused Brain Damage"

#### Strangulation: The Long Term Consequences

Casey Gwinn, Esq., Gael Strack, Esq. and Bill Smock, MD  
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### Your Hosts:



**Casey Gwinn, JD**  
President  
Alliance for HOPE International



**Gael Strack, JD**  
CEO  
Alliance for HOPE International

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### Thank You to Our Sponsor:

Thank you to:  
 The Office on Violence Against Women  
 for making this training possible!

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### Office on Violence Against Women

Bea Hanson  
Principal Deputy Director



Kevin Sweeney  
Program Manager



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### Alliance for HOPE Team

				
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<small>Jackie Anderson</small>	<small>Sarah Dawe</small>	<small>Maddie Orsutt</small>	<small>Gemma Serrano</small>	<small>Yolanda Ruiz</small>
				
<small>Ashley Singleton</small>				

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## Next Advanced Strangulation Course October 18-21 in Ft. Worth, Texas



**Advanced Course  
on Strangulation Prevention  
Class 8**  
San Diego, California  
August 23 - 26, 2016

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## The Reality

Casey Gwinn, Esq.

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## They are Killers



**Casey Gwinn, President,  
Family Justice Center Alliance**

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- "The most dangerous domestic violence offenders strangle their victims. The most violent rapists strangle their victims. We used to think all abusers were equal. They are not. Our research has now made clear that when a man puts his hands around a woman, he has just raised his hand and said, "I'm a killer." They are more likely to kill police officers, to kill children, and to later kill their partners. So, when you hear "He choked me", now we know you are the edge of a homicide."

## We share your heavy heart!

The NJ Coalition to End Domestic Violence Recognizes 13 Lives  
Lost to Domestic Violence in July and August



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## In Memory...



**Sgt. Paul Starzyk**

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## And we honor so many...




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## First Two Officers Killed in 2016



Officer Thomas Cottrell  
January 17, 2016  
Danville, Ohio





Officer Douglas Scott Barney  
January 17, 2016  
Greater Salt Lake, Utah

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## In Memory of:


- Corporal Bill Cooper
- Sebastian County, Arkansas
- Died August 10, 2016



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## We know officers are killed in the line of duty...

But we rarely investigate the relationship history of the killer...

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## 2013 Treasure Valley (ID) Study


- Evaluated ten officer-involved critical incidents where officer shot a suspect or suspect shot an officer
- 80% of suspects with domestic violence history
- Non-fatal strangulation history in 30%
- Based only on public records history
- More research needed
- We all should be looking for it/tracking it

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## Riverside County District Attorney's Office 2013 Study

Gerald Fineman, J.D.

- Law enforcement officers killed in the line of duty
- 1993-2013
- 50% of officers were killed by a criminal suspect with a public records act history of strangulation assault against a woman in a prior relationship

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The Journal of Emergency Medicine, Vol. 35, No. 3, pp. 329-335, 2008  
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0736-4678/8 \$-see front matter

doi:10.1016/j.jemermed.2007.02.048

### Violence: Recognition, Management and Prevention

#### NON-FATAL STRANGULATION IS AN IMPORTANT RISK FACTOR FOR HOMICIDE OF WOMEN

Nancy Glass, PhD, MPH, MEd,\* Kathryn Laughon, PhD, MS,† Jacquelyn Campbell, PhD, MS,‡ Carolyn Rebecca Block, PhD,§ Ginger Hanson, MS,¶ Phyllis W. Sharps, PhD, MS,‡ and Ellen Tellefero, PhD, MEd,¶

\*School of Nursing, Johns Hopkins University, Baltimore, Maryland; †School of Nursing, University of Virginia, Charlottesville, Virginia; ‡Illness, Crisis and Trauma Center, University of Illinois at Chicago, Chicago, Illinois; §School of Nursing, Oregon Health and Science University, Portland, Oregon; and ¶Breast After Trauma Project, Creative Communications, Hill Moon Bay, California


Report Address: Nancy Glass, PhD, MPH, MEd, School of Nursing, Johns Hopkins University, 625 N. Wolfe Street, Room 433, Baltimore, MD 21205

□ Abstract—The purpose of this study was to examine non-fatal strangulation by an intimate partner as a risk factor for major assault, or attempted or completed homicide of women. A case-control design was used to describe non-fatal strangulation among complete homicides and attempted homicides (n = 306) and abused controls (n = 427). Interviews of proxy respondents and survivors of attempted


□ Keywords—intimate partner violence; strangulation; risk of homicide

INTRODUCTION

The 1993 National Mortality Followback Survey of

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## Results of Focus Groups – Aug 2015 & Sept 2016



- Victims don't understand the impact of strangulation
  - "I never knew when I passed out I suffered a brain injury"
- Professionals need to ask
  - "No one told me"
- Professionals need to be educated
  - "If someone told me, I would have left sooner"
- Strangulation is not treated seriously
  - "They only charged a misdemeanor"
- Victims are suffering long term consequences
  - Thyroid Storm & Early Dementia
  - Spending thousands of dollars in medical costs trying to figure out what's wrong

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## The Resources

Gael Strack, Esq.

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## Gael Strack, J.D. CEO and Co-Founder



- "Our study proved it – most victims of strangulation will not have visible external injuries. The lack of injuries and the lack of training caused the criminal justice system to minimize strangulation. We failed victims. But now we know – it's lethal and has serious immediate and long-term health consequences."


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## In Memory of Casondra Stewart and Tamara Smith



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## Journal of Emergency Medicine



- Walking and Talking Victims
- Survey Results of Strangled Women
- Review of 300 Cases – Legal Issues
- Review of 300 Cases – Clinical Evaluation
- Review of 300 Cases – Fatal Cases
- Effect of Multiple Strangulation Attacks

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## Training Institute on Strangulation Prevention




- Project of Alliance for HOPE International
- Launched October 2011 by USDOJ, Office on Violence Against Women
- Most comprehensive training program in the U.S.
- Fee-based Training for All Professionals

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## Our Goals

- Educate:** Enhance the knowledge, understanding of professionals working with victims of domestic violence and sexual assault who are strangled;
- Improve:** identification, documentation and prosecution of strangulation cases
- Multiply:** Maximize capacity and expertise in order to develop new laws, policies and best practices among the legal, medical, and advocacy communities
- Accountability:** Increase offender accountability for the crimes they commit;
- Safety:** enhance victim safety and long term health.



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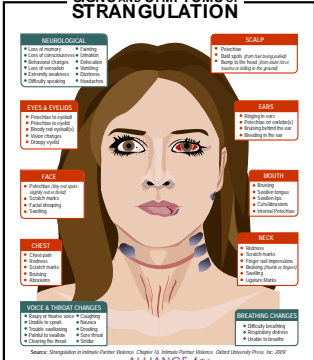
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### SIGNS AND SYMPTOMS OF STRANGULATION





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### DOMESTIC VIOLENCE REPORT

LAW • PREVENTION • PROTECTION • ENFORCEMENT • TREATMENT • HEALTH



Strangulation and Domestic Violence: The Edge of Homicide

Law Reform Targets the Crime of Strangulation



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## New iPhone APP


### "Document It"

A Mobile App to Document Non-Fatal Strangulation Cases

The mobile application will assist professionals from **all disciplines** and individuals who are "choked" by an intimate partner to document multiple incidents using:

- Photo, Video, and Audio capture
- User-friendly survey of possible symptoms and injuries
- Text area to tell the story of the incident
- Signed consent of release of information; and
- Ability to send a full report to law enforcement





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## Free On Line Training for the First Responders



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Online Strangulation Training



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### STRANGULATION ASSESSMENT CARD

SIGNS	SYMPTOMS	CHECKLIST	TRANSPORT
<ul style="list-style-type: none"> <li>• Red eyes or spots (Petechiae)</li> <li>• Neck swelling</li> <li>• Nausea or vomiting</li> <li>• Unsteady</li> <li>• Loss of lapse of memory</li> <li>• Deafened</li> <li>• Possible loss of consciousness</li> <li>• Pilois – floppy eyelids</li> <li>• Droopy face</li> <li>• Scurry</li> <li>• Tongue injury</li> <li>• Lip injury</li> <li>• Mental status changes</li> <li>• Voice changes</li> </ul>	<ul style="list-style-type: none"> <li>• Neck pain</li> <li>• Jaw pain</li> <li>• Scalp pain (from hair pulling)</li> <li>• Sore throat</li> <li>• Difficulty breathing</li> <li>• Difficulty swallowing</li> <li>• Vision changes</li> <li>• Possible loss of vision, flashing lights</li> <li>• Hearing changes</li> <li>• Light headedness</li> <li>• Headache</li> <li>• Weakness or numbness to arms or legs</li> <li>• Voice changes</li> </ul>	<p><b>S</b> <b>Scene &amp; Safety.</b> Take in the scene. Make sure you and the victim are safe.</p> <p><b>T</b> <b>Trauma.</b> The victim is traumatized. Be kind. Ask: what do you remember? See? Feel? Hear? Think?</p> <p><b>R</b> <b>Reassurance &amp; Resources.</b> Reassure the victim that help is available and provide resources.</p> <p><b>A</b> <b>Assesses.</b> Assess the victim for signs and symptoms of strangulation and TBI.</p> <p><b>N</b> <b>Notes.</b> Document your observations. Put victim statements in quotes.</p> <p><b>G</b> <b>Give.</b> Give the victim an advised about delayed consequences.</p> <p><b>L</b> <b>Loss of Consciousness.</b> Victims may not remember. Lapse of memory? Change in Kramar? Unintentional? Delegation?</p> <p><b>E</b> <b>Encourage.</b> Encourage medical attention or transport if the breathing injuries exist.</p>	<p>If the victim is Pregnant or has life-threatening injuries which include:</p> <ul style="list-style-type: none"> <li>• Difficulty breathing</li> <li>• Difficulty swallowing</li> <li>• Physical hemorrhage</li> <li>• Vision changes</li> <li>• Loss of consciousness</li> <li>• Unstead</li> <li>• Deafened</li> </ul> <p><b>DELAYED CONSEQUENCES</b></p> <p>Victims may look fine and say they are fine, but just underneath the skin there could be internal injury and/or delayed complications. Internal injury may take a few hours to be appreciated. The victim may develop delayed swelling, hematomas, vocal cord immobility, displaced laryngeal fractures, fractured hyoid bone, airway obstruction, stroke or even delayed death from a carotid dissection, blood clot, respiratory complications, or anoxic brain damage.</p> <p><small>Talavera, E., Hawley, D., McQueen, G.E. &amp; Brack, G. (2008). Strangulation in Domestic Violence. University of North Carolina Health System. Retrieved from: <a href="http://www.unc.edu/healthsystem/strangulation/">http://www.unc.edu/healthsystem/strangulation/</a></small></p> <p><small>This project is supported by a grant from the North Carolina Department of Justice, Office of the Attorney General, Office of the State Auditor, and the Office of the State Treasurer.</small></p>


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### ADVISAL TO PATIENT

- After a strangulation assault, you can experience internal injuries with a delayed onset of symptoms, usually within 72 hours. These internal injuries can be serious or fatal.
- Stay with someone you trust for the first 24 hours and have them monitor your signs and symptoms.
- Seek medical attention or call 911 if you have any of the following symptoms: difficulty breathing, trouble swallowing, swelling to your neck, pain to your throat, hoarseness or voice changes, blurred vision, continuous or severe headaches, seizures, vomiting or persistent cough.
- The cost of your medical care may be covered by your state's victim compensation fund. An advocate can give you more information about this resource.
- The National Domestic Violence Hotline number is 1-888-789-SAFE.

### NOTICE TO MEDICAL PROVIDER

- In patients with a history of a loss of consciousness, loss of bladder or bowel control, vision changes or petechial hemorrhage, medical providers should evaluate the carotid and vertebral arteries, bony/cartilaginous and soft tissue neck structures and the brain for injuries. A list of medical references is available at [www.strangulationtraininginstitute.com](http://www.strangulationtraininginstitute.com)
- Life-threatening injuries include evidence of petechial hemorrhage, loss of consciousness, unimpaired, defecation and/or visual changes. If your patient exhibits any of the above symptoms, medical/radiographic evaluation is strongly recommended. Radiographic testing should include a CT angiography of carotid/vertebral arteries (most sensitive and preferred study for vessel evaluation) or CT neck with contrast, or MRAMRI of neck and brain.
- ED/Hospital observation should be based on severity of symptoms and reliable home monitoring.
- Consult Neurology, Neurosurgery and/or Trauma Surgery for admission.
- Consider an ENT consult for laryngeal trauma with dysphonia, odynophagia, dyspnea.
- Discharge home with detailed instructions to return to ED if neurological signs/symptoms, dyspnea, dysphonia or odynophagia develops or worsens.

  
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## Dr. Ellen Taliaferro: DVD & Webinar




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## Dr. Ellen Taliaferro

### Pandora Effect

Addressing the Health Consequences of Domestic Violence

*Dr. Ellen Taliaferro*

Author: Ellen Taliaferro, MD

ISBN: 978-1-938111-00-0

Price: \$29.95

### Physician's Guide to IPV

**The Physician's Guide To Intimate Partner Violence And Abuse**


A Reference for All Health Care Professionals

How to Ask the Right Questions and Manage Abuse

Author: Ellen Taliaferro, MD


ISBN: 978-1-938111-01-7


Price: \$29.95


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## Webinar on Behaviors of Strangulation Victims

- Ret. Det. Sylvia Vella, Ph.D SDPD
- Completed her dissertation May 2013
- Focused on the long term consequences on strangulation
- Qualitative study of 13 victims/clients
- 100% had PTSD
- Need for research to find out the best way to treat victims of strangulation




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## With Special Thanks & Admiration to National Advisory Board - 2012 & 2016



- A national group of experts & faculty assist the Alliance in the development of courses, materials, provide technical assistance and participate in training.
- Board members consist of physicians, nurses, prosecutors, defense attorneys, civil attorneys, law enforcement, advocates, probation and judges.


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### Dr. Bill Smock, Louisville Metro PD Police Surgeon, Louisville, KY



- The brain is the primary organ targeted when someone is strangled.
- It's critical for the victims, first responders, doctors and nurses that take care of these patients to recognize and understand the long-term consequences of depriving the brain of oxygenated blood.

### Living Forensics Team from Louisville, Kentucky



### Definition

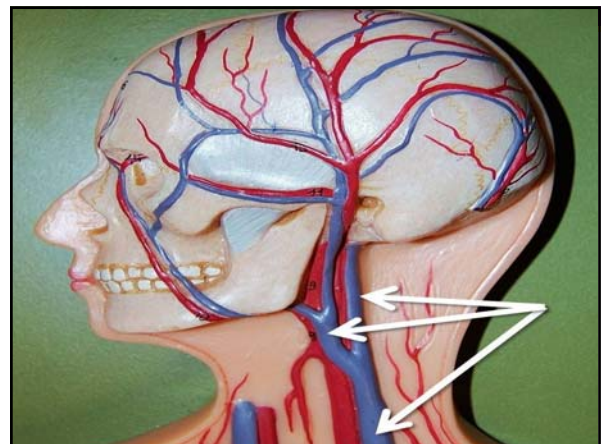
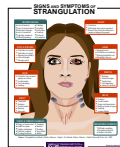
- Strangulation is a form of asphyxia characterized by closure of the blood vessels and/or air passages of the neck as a result of external pressure on the neck

### Key Terms

- Asphyxia (as-phyx-i-a):
  - A condition arising when the body is deprived of oxygen causing unconsciousness or death; suffocation.
- Anoxia (a-nak-se-a):
  - Absence of oxygen supply to tissue
- Hypoxia (hy-pox-i-a):
  - Deficiency in the amount of oxygen reaching the tissue.

### What is the difference between anoxia and hypoxia?


- Examples?
- Time of onset?
- Oxygen levels?
- Time to brain cell death?
- Time to cessation of respirations?





### Fact or Fiction?

- The cessation of respiratory effort due to an anoxic insult (occlusion of the carotid arteries) will occur in:
  - A) 1 to 2.5 minutes
  - B) 2.5 to 4 minutes
  - C) Greater than 4 minutes



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ORIGINAL ARTICLE

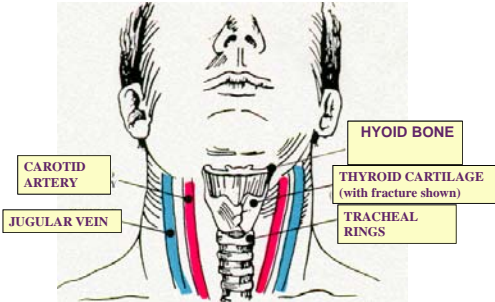
### Agonal Sequences in 14 Filmed Hangings With Comments on the Role of the Type of Suspension, Ischemic Habituation, and Ethanol Intoxication on the Timing of Agonal Responses


*Anny Sauvageau, MD, MSc,\* Romano LaHarpe, MD,† David King, MD,‡ Graeme Dowling, MD,\* Sam Andrews, MD,§ Sean Kelly, MD,¶ Corinne Ambrosi, MD,|| Jean-Pierre Guay, PhD,|| and Vernon J. Geberth, MS, MPS for the Working Group on Human Asphyxia*

- Unconscious: 10 +/- 3 seconds
- Anoxic convulsions: 14 +/- 3 seconds
- Loss of muscle tone: 77 +/- 25 seconds
- Last respiration: 62 to 157 seconds


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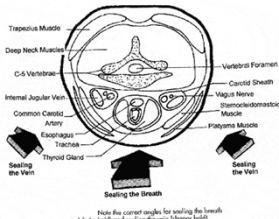
### Vessels: arteries & veins





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### Common Pathways to Unconsciousness


- Lack of oxygen to brain:
  - Occlusion of blood flow:
    - carotid arteries (direct)
    - jugular veins (venous backup, stagnant hypoxia)
  - Occlusion of airway: trachea
  - Stimulation of vagus nerve:
    - Decrease in BP
    - Decrease in heart rate




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### Fact or Fiction?

- The average time required to render an adult male unconscious from occlusion of the carotid arteries is:
  - A) 6.8 seconds
  - B) 10.8 seconds
  - C) 14.8 seconds
  - D) 18.8 seconds
  - E) Unknown, no controlled studies


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### Anoxic Progression

- 6.8 seconds – unconscious (brain cells begin to die)
- 15+ seconds – loss of bladder control
- 30+ seconds – loss of bowel control
- ?? seconds – point of no return: “brain dead”/coma
- Amount of brain cell death will depend on the location of oxygen deprivation in the brain, length of unconsciousness, age, prior anoxic episodes.
- 1 - 2.5 Minutes – death (no controlled human studies but videos of deaths)


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# Vessel Occlusion

- **Carotid artery occlusion**
  - Anterior/lateral neck
  - 11 pounds of pressure for > 6.8 seconds
- **Jugular vein occlusion**
  - Anterior/Lateral neck
  - 4.4 pounds of pressure (positional hanging, i.e. belt on door knob, occludes veins but not carotids)




**UNCONSCIOUSNESS**

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# Examples of Applied Pressure


- Handgun trigger pull: 6 psi
- Opening of soda can: 20 psi
- Adult male hand shake: 80-100 psi
- Maximum adult male hand shake: 160-180 psi
- Source: Dr. Bill Smock, Louisville Metro Police Department



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# Tracheal Occlusion

- Usually minor (if any) role in causing death (as opposed to fracture of the trachea)
- 33 pounds of pressure to completely occlude
- At least 33 pounds of pressure or more to fracture tracheal cartilage



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# SEQUENCE:

- Consciousness
- ↓
- Unconsciousness
- ↓
- Death

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Anoxia: “absence of oxygen supply to tissue”

Neurons lost per second = 32,000

Synapses lost per second = 230 million

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# Neurologic Insult to Brain

ACUTE ARREST OF CEREBRAL CIRCULATION IN MAN

LIEUTENANT RALPH ROSSEN (MC), U.S.N.R.\*


HERMAN KABAT, M.D., Ph.D.  
BETHESDA, MD.  
AND  
JOHN P. ANDERSON  
RED WING, MINN.

Archives of Neurology and Psychiatry, 1944 Vol. 50, 5

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### “Acute Arrest of Cerebral Circulation in Man”

- “Acute arrest of circulation in the human brain was studied in 11 schizophrenic patients and in 126 normal young male subjects (inmates)”
- More than 500 controlled strangulations
- “The neurons in the brain are the cells of the body most sensitive to anoxia.”



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### Anoxic (lack of oxygen) Injury

- “Anoxic Convulsions: These seizures were of a generalized tonic and clonic type; they were usually relatively mild and rarely continued more than six to eight seconds.”
- “The convulsion was preceded by loss of consciousness”
- “had no memory of it (seizure)”



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- “The average time from arrest of cerebral circulation to loss of consciousness in normal young men: six and eight-tenths seconds.”
- “This coincides with the sudden appearance of the delta wave in the electroencephalogram.”



*Time is brain!*


Acute Arrest of Cerebral Circulation in Man.  
Rosen R, H. Kabat and JP Anderson,  
Archives of Neurology and Psychiatry, Vol. 50, No. 5, pp. 510- 528, 1944.


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### Evidence of Alterations of Consciousness = Anoxic Injury


Brain Injury in Battered Women, Journal of Consulting and Clinical Psychology, 2003, Vol. 71, No. 4, 797-804


- A period of dizziness
- Felt stunned or disoriented
- Seen stars or spots (visual impairment)
- Loss of consciousness or blacked out
- Loss of memory
- Standing up one minute then waking up on the floor
- Change of location
- Bowel or bladder incontinence
- Unexplained bump on head


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### Symptoms of (anoxia or hypoxia)

- Behavioral Changes
  - Early: Restlessness and violence
    - Hostile toward officers at the scene
    - “She woke up fighting”
  - Long term:
    - Psychosis
    - Amnesia
    - Changes in personality
    - Progressive dementia




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## Dr. Smock’s Top 25 Medical Consequences Resulting from Strangulation and Lateral Vascular Neck Restraint


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## 1. Acute Death

- Compression of blood vessels: jugular veins (2.86 - 4.4 pounds of pressure), carotid artery (11 pounds of pressure) and vertebral arteries (16.5 - 66 pounds of pressure)
- anoxic/hypoxic brain cell death

Kornblum RN, Medical Analysis of Police Choke Holds and General Neck Trauma Part 2, Trauma, 1986, 1:13-64



## 2. Acute Death

- Compression/occlusion of trachea: minimum of 34.5 pounds of pressure on trachea
- anoxic/hypoxic brain cell death

Kornblum RN, Medical Analysis of Police Choke Holds and General Neck Trauma Part 1, Trauma, 1986, 5:7-64

## 3. Acute Death

- Vagal stimulation from pressure on baroreceptors in the carotid sinus and carotid body results in a significant decrease heart rate, blood pressure or development of cardiac arrhythmia
- Anoxic/hypoxic brain cell death. Unable to perfuse the brain

B Schrag et al, "Death caused by cardioinhibitory reflex cardiac arrest-A systematic review of cases", Forensic Science International, 2011; 207:77-83

## 4. Delayed Death

- Anoxic/hypoxic brain cell death
- Multisystem organ failure
- Hours to days to months post strangulation/"choke hold"
- Many victims appeared "normal"

Dooling EC, Richardson EP: Delayed Encephalopathy After Strangling: Arch Neurol 1976;33:196-9

## 5. Acute Ischemic Stroke

- Blockage of the carotid arteries results in brain cell death
- Blockage of a single artery kills 32,000 neurons/second, 230 million synapses/second and 218 yards of myelinated fibers/second (X2 for two arteries)

JL Saver, "Time is Brain-Quantified", Stroke, 2006;37:263-266

## 5. Acute Thrombotic Stroke (Cont.)

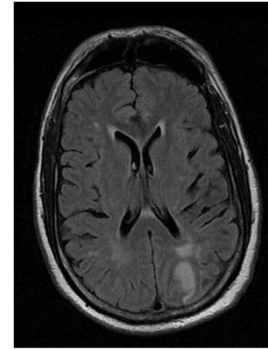
- Kentucky police officer developed acute stroke symptoms within 10 minutes after lateral vascular neck restraint training (tapped out while still conscious)\*
- Florida Police Academy instructor developed stroke symptoms after lateral vascular neck restraint training

\*Law enforcement officer evaluated by Dr. Bill Smock, 2015

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## 6. Delayed Cryptogenic Strokes

- Cerebral infarcts from prior anoxic brain damage
- Occur months to years after the anoxic damage from strangulation or “choke hold”

Strack GB et al, Why Didn't Someone Tell Me? Health Consequences of Strangulation Assaults for Survivors, 2014, Domestic Violence Report; 19(6):87-90.

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## 7. Acute Anoxic Encephalopathy

- Brain damage from blockage of blood flow to and from brain
- Brain damage from decrease oxygen levels in circulating blood
- “cytotoxic brain edema within seconds to minutes”

M Oechmichen et al“Cerebral Hypoxia and Ischemia: The Forensic Point of View: A Review; J Forensic Science, July, 2006, Vol. 51, No. 4:880-887

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## 7. Acute Anoxic Encephalopathy (Cont.)

- Hippocampus, parieto-occipital-temporal cortex, cerebellar purkinje cells, amygdala, caudate nucleus, lentiform nucleus, thalamic nuclei most sensitive
- Brainstem (medulla-breathing center), hypothalamus and basal forebrain more resistant

Wolstenholme N, Moore, B: The Clinical Manifestations of Anoxic Brain Injury; Progress in Neurology and Psychiatry, 8, 12

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## Hippocampus



- The hippocampus is critical for forming memory, organizing and storing.
- Hippocampus is very sensitive to lack of oxygen.
- If no blood flow, the brain is NOT working.
- No blood flow. No memory.
- No memory means damage to hippocampus.

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## 8. Delayed Anoxic Encephalopathy

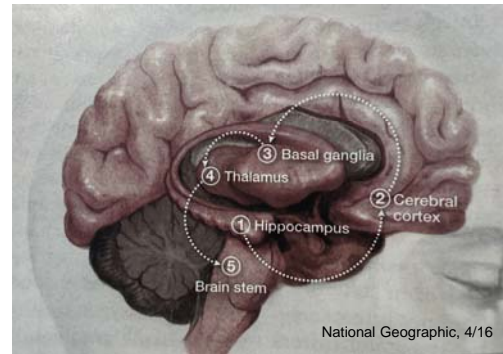
- Brain damage manifests days to weeks after strangulation/choke hold:
  - Blindness
  - Choreoathetosis (movement disorder)
  - Dystonia (movement disorder)
  - Pseudobulbar paralysis
  - Victim appeared "normal"

Dooling EC, Richardson EP: Delayed Encephalopathy After Strangling: Arch Neurol, 1976;33:196-9

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## Symptoms of (anoxia or hypoxia)

- Evidence of brain injury from strangulation will include problems with:
  - Memory
  - Concentration
  - Sleep
  - Headaches
  - Depression and
  - Anxiety



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## 9. Cervical Spine Injury

- Tear of anterior and posterior longitudinal ligaments
- Spinous process fractures
- Epidural spinal cord hemorrhage
- Spinal cord contusion

Kornblum RN, Medical Analysis of Police Choke Holds and General Neck Trauma Part 2, Trauma, 1986, 1:13-64

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## 9. (cont.)

- Vertebral body fracture/dislocation (victims were lifted off the ground while in lateral vascular neck restraint)

Kornblum RN, Medical Analysis of Police Choke Holds and General Neck Trauma Part 2, Trauma, 1986, 1:13-64

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## 10. Seizures

- Anoxic convulsions: tonic clonic contraction of muscle groups within 1-3 seconds after loss of consciousness\*
- Abnormal brainwave activity, Delta waves, are seen with the onset of loss of consciousness

\*Sauvageau A et al "Agonal Sequences in 14 Filmed Hangings...", Am J Forensic Med Pathol; 2011;32:104-107

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## 10. (cont.)

- Hypoxic Seizures: “Choking Game”
  - “Sleeper hold”
  - “Cerebral anoxia”
  - “this often results in loss of consciousness and sometimes an hypoxic seizure”\*

\*Clinical Pediatrics, 49(3)274-279

## 11. Spincter Incontinence

- Anoxia of at least 15 seconds resulted in loss of bladder sphincter tone (involuntary urination)
- Anoxia of at least 30 seconds resulted in loss of rectal sphincter tone (involuntary defecation)



## 12. Carotid Artery Dissection

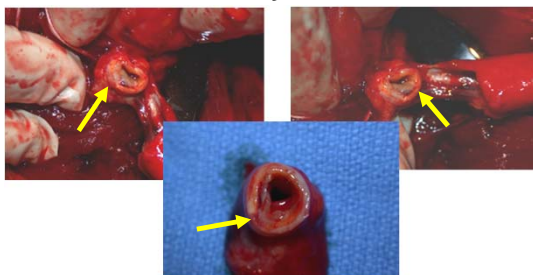
- Unilateral and bilateral
- Pressure applied to the carotid arteries during strangulation and “choke holds” results in damage (tears) within the vessel
- Death, stroke, long-term therapy

Clarot F et al: Fatal and non-fatal bilateral delayed carotid artery dissection after manual strangulation; Forensic Science International; 2005, 149:143-150.

## Carotid Dissection



## Carotid Artery Dissection



Dissections occurred in patients who appeared “fine” and were discharged without an evaluation of the carotids or vertebral arteries.





### 13. Carotid Artery Hematoma

- Rupture of the carotid artery permits leakage of blood into the surrounding tissue, creating a hematoma
- Rupture of the hematoma can cause rapid death, days to weeks after strangulation or “choke hold”

Dayapala A et al: An Uncommon Delayed Sequela After Pressure on the Neck: \ An autopsy case report, Am J Forensic Med Pathol;2012, 33(1):80-2.

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### 14. Jugular Venous Thrombosis

- Damage to the jugular vein results in the formation of a thrombus (blood clot) within the vessel

Emmerich J, Fiessinger JN: The Lancet: 1999;354:160.

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### 15. Airway Swelling/Respiratory Failure

- Pharyngeal, supraglottic, subglottic and laryngeal edema has created life-threatening airway obstruction
- Respiratory failure secondary to swelling >36 hours post strangulation or application of “choke hold”

Kuriloff DB, Pincus RL: Delayed Airway Obstruction and Neck Abscess Following Manual Strangulation. Ann Otol Rhinol Laryngol. 1989;98:824-7.

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### 16. Thyroid Storm

- Compression of the thyroid gland can cause the release of excess thyroid hormone resulting in thyrotoxicosis
- Life-threatening symptoms: agitation, hyperthermia, tachycardia, multi-system organ failure

Ramirez J et al, Thyroid Storm Induced by Strangulation, Southern Medical Journal, 2004;97(6):608-610

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### 17. Vocal Cord Paralysis (Aphonia)

- Unilateral or bilateral injury to the recurrent laryngeal nerve from pressure applied during strangulation
- Aphonia can be temporary or permanent

Peppard SB. Transient vocal paralysis following strangulation injury. Laryngoscope 1982;92:31-33.

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## 18. Fracture of the Hyoid Bone

- Fractures of the hyoid bone occur from the application of pressure to the area above the larynx
- Hyoid fractures are seen in both surviving and fatal victims of strangulation

Line WS et al: Strangulation: A Full Spectrum of Blunt Neck Trauma; Ann Otol Rhinol Laryngol, 1985, 94:542-46.

### Strangulation Pathophysiology

Less common medical problems after strangulation



- 34 y/o female manually strangled 24 hours prior
- Neck pain and difficulty swallowing
- Exam revealed finger-tip bruises
- Xray showed fractured Hyoid Bone

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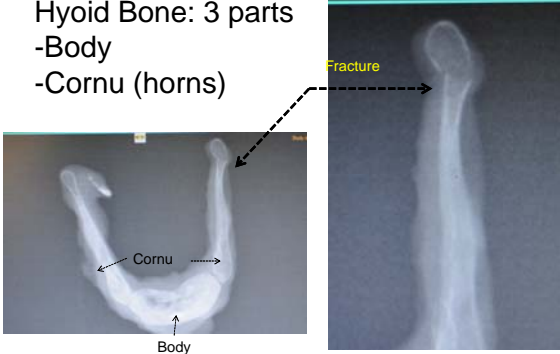
### Symptoms of Hyoid Fracture

- Asymptomatic
- Pain which is sharp and increases during swallowing
- Pain upon palpation
- Dysphagia which is aggravated by swallowing solid foods
- Dysphonia which presents as a lower pitched nasal or raspy tone and can decrease to a whisper
- Dyspnea can also be a hallmark sign
  - Isolated Fracture of the Hyoid Bone, M. Bagnoli, S. Leban, F. Willaims, J. Oral Maxillofac Sur 46:326-238, 1988

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### Hyoid Bone: 3 parts

- Body
- Cornu (horns)



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### 19. Thyroid Cartilage Fracture

- Fractures of the thyroid cartilage occur from the application of pressure on the larynx
- 34-76 pounds of pressure to fracture the thyroid cartilage
- Life-threatening airway obstruction

Stanley RB, DG Hanson: Manual Strangulation Injuries of the Larynx; Arch Otolaryngol, 1983;109:344-347.

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## 20. Fracture of the Cricoid Cartilage

- Fractures of the cricoid cartilage occur from the application of pressure on the larynx
- 45.76 pounds of pressure to fracture the cricoid cartilage
- Life-threatening airway obstruction

Stanley RB, DG Hanson: Manual Strangulation Injuries of the Larynx; Arch Otolaryngol, 1983;109:344-347.

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## 21. Dysphagia/Odynophagia

- Difficulty swallowing, painful swallowing or inability to swallow after strangulation or application of a “choke hold”
- Causes can include: fractures of: hyoid bone, cricoid or thyroid cartilage, hematoma, soft-tissue swelling

Briddell J et al, Dysphagia after strangulation; Ear, Nose & Throat Journal, 2012;91(9):30-31

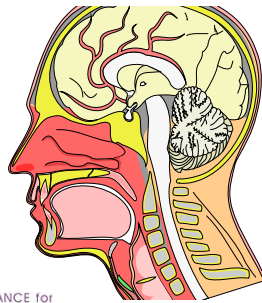
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## Symptoms of Laryngeal Injury

- Swallowing Changes
  - Due to larynx injury
  - Difficult to swallow (dysphagia)
  - Painful to swallow (odynophagia)



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## 22. Hypopharyngeal Rupture

- Tearing of the structures in the upper airway can result in leakage of air or secretions into the chest cavity
- Pneumopericardium (air surrounding the heart) has occurred during a strangulation-induced hypopharyngeal rupture\*

\*Giger R, Pneumopericardium After Manual Strangulation, Am Journal Med, 2004;116,116-118

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## 23. Tinnitus (ringing in ears)

- Aneurysm of carotid artery from a ligature strangulation resulted in nerve injury
- Symptoms were present for 3 years after the strangulation

YadollahiKhaless G et al, Tinnitus 3 Years After Strangulation, Journal of Nervous And Mental Disease;2015;203(2)154-55.

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## 24. Acquired Glottic and Subglottic Stenosis

- Damage to the larynx and trachea during strangulation can result in the scarring and narrowing of the larynx and trachea

Pookamala S et al, Acquired subglottic stenosis: aetiological profile and treatment Results. Journal of Laryngology and Otology, 2014;128, 641-648

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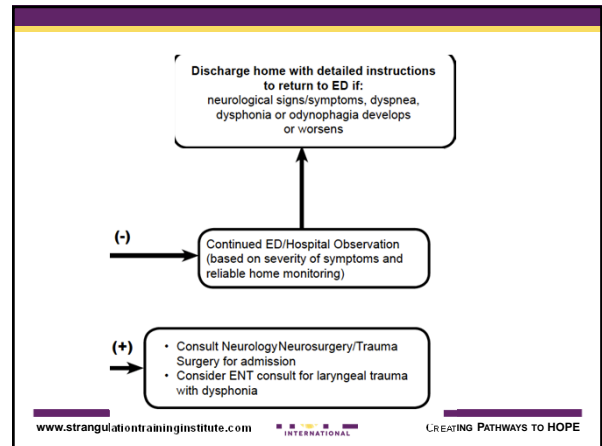
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### Recommended Radiographic Studies to Rule Out Life-Threatening Injuries\* (including delayed presentations of up to 6 months)

- **CT Angio of carotid/vertebral arteries** (GOLD STANDARD for evaluation of vessels and bony/cartilaginous structures, less sensitive for soft tissue trauma) *or*
- **CT neck with contrast** (less sensitive than CT Angio for vessels, good for bony/cartilaginous structures) *or*
- **MRA of neck** (less sensitive than CT Angio for vessels, best for soft tissue trauma) *or*
- **MRI of neck** (less sensitive than CT Angio for vessels and bony/cartilaginous structures, best study for soft tissue trauma) *or*
- **MRI/MRA of brain** (most sensitive for anoxic brain injury, stroke symptoms and intercerebral petechial hemorrhage)
- **Carotid Doppler Ultrasound** (NOT RECOMMENDED: least sensitive study, unable to adequately evaluate vertebral arteries or proximal internal carotid).

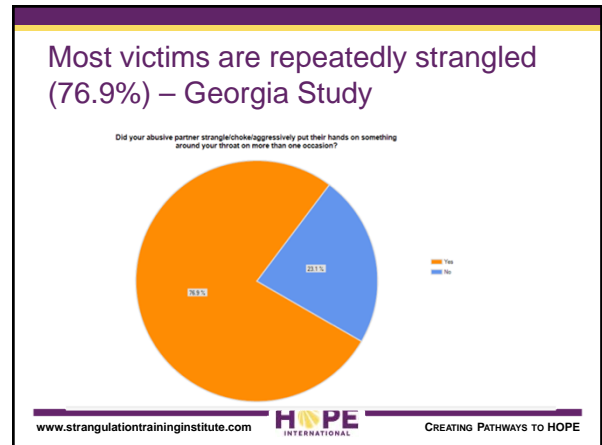
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## The Advocacy

Casey Gwinn, Esq. & Gael Strack, Esq.

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### Consequences of Multiple Strangulation Assaults

- Victims who sustain multiple strangulation events have increased frequencies of dizziness, memory loss, nightmares, tinnitus, and unilateral weakness. (Wilbur 2002)

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### It's Torture

- “Nonfatal strangulation might well be the domestic violence equivalent of water boarding.”
- Both leave few marks, can result in loss of consciousness, used to assert dominance and authority of life of the other, create intense fear and potentially result in death and can be used repeatedly.

Sorenson SB, Joshi M, Sivitz E: A systematic review of the epidemiology of nonfatal strangulation, a human rights and health concern. Amer Public Health 104 (No. 11): e54-e61, Nov 2014 (peer reviewed).

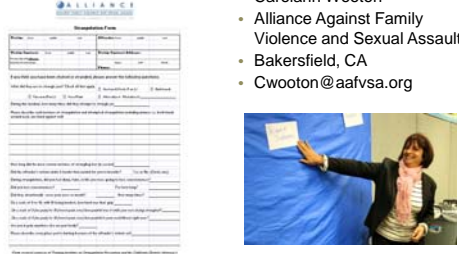
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## Strangulation Victims are at High Risk of Suicide

- The risk factors for suicide include female gender, low socio-economic status, lack of education, unemployment, increasing age, being married, not working outside of the home, and domestic violence.
- [www.medscape.com](http://www.medscape.com)
- From:
  - Physical/Sexual Abuse
  - PTSD
  - Brain Trauma/Injury
- 17% of all victims seeking services at the San Diego FJC have attempted or contemplated suicide per the Danger Assessment Tool (Alliance Evaluation Study of SDFJC Clients)**

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## New Way to Provide Safety Planning – At Intake



- Carolann Wooton
- Alliance Against Family Violence and Sexual Assault
- Bakersfield, CA
- [Cwootton@aafvsa.org](mailto:Cwootton@aafvsa.org)

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## Help Your Clients/Victims Seek Medical Attention

- Assess for Strangulation as part of client intake
- Help your client understand the dangers of anoxic insults to the brain
- Identify victims needing immediate medical attention
- Provide the client with the pre-hospital strangulation card
- Provide the client with the Medical/Radiographic Evaluation Guidelines so they can advocate for themselves (if the provider has not been trained)

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## HELPS

H Have you ever HIT your Head or been HIT on the Head?  Yes  No  
 Note: Instruct client to think about all incidents that may have occurred at any age, even those that did not seem serious: vehicle accidents, falls, assault, abuse, sports, etc. Screen for domestic violence and child abuse. A TBI can also occur from violent shaking of the head, such as shaking or being shaken in a crib.

E Were you ever seen in the Emergency room, hospital, or by a doctor because of an injury to your head?  Yes  No  
 Note: Many people are seen for treatment. However, there are those who cannot afford treatment, or who do not think they require medical attention.

L Did you ever lose consciousness or experience a period of being dazed and confused?  Yes  No  
 Note: While significant in helping to determine the extent of the injury, many people with minor brain injury may not lose consciousness, yet still have difficulties as a result of their injury.

P Do you experience any of these Problems in your daily life?  Yes  No  
 Note: Other problems may include: visual, auditory, sensory impairments, paralysis, weakness of any extremity, balance problems, fatigue, apathy, irritability, mood swings, irritability, decreased self awareness, decreased ability to learn new information or retrieve old information, shift from one topic to another, set goals or plan tasks, monitor own behavior and difficulty with abstract thinking.

<input type="checkbox"/> headaches	<input type="checkbox"/> difficulty reading, writing, calculating
<input type="checkbox"/> dizziness	<input type="checkbox"/> poor problem solving
<input type="checkbox"/> anxiety	<input type="checkbox"/> difficulty performing your job/school work
<input type="checkbox"/> depression	<input type="checkbox"/> change in relationships with others
<input type="checkbox"/> difficulty concentrating	<input type="checkbox"/> poor judgment (being fired from job, arrests, fights)
<input type="checkbox"/> difficulty remembering	

S Any significant Sicknesses?  Yes  No  
 Note: Traumatic brain injury implies a physical blow to the head, but acquired brain injury may also be caused by medical conditions, such as brain tumor, meningitis, stroke, head attack, seizures, high fever, etc. Also screen for instances of oxygen deprivation such as near drowning or near suffocation.

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## Rehabilitation Options




- Speech-Language Pathologist** – helps verbal communication.
- Neuropsychologist** - determines how the brain is involved in difficulties.
- Occupational Therapist** - helps structure day to day tasks.
- Physical Therapists** - helps physical functions, balance and movement.

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## Strategies for working with victims with possible brain injuries:

- Write everything down - **IF ITS SAFE**
- Help develop a memory system using phone, calendar with checklists
- Break tasks into small, tangible steps
- Allow extra time for completing tasks
- Provide feedback *immediately, respectfully and positively*
- Minimize distractions
- Keep meetings short and direct
- Speak slowly
- You may need to repeat questions
- You may need to seek immediate medical attention




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**How to Reach Us**  
www.familyjusticecenter.com  
www.strangulationtraininginsitute.com

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# TRAINING INSTITUTE on STRANGULATION PREVENTION

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## Questions from Webinar: The Long-Term Consequences of Strangulation on Sept. 14, 2016 Answered by Dr. William Smock

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**Q:** Did she undergo surgery to rectify the injuries?

**A:** No, most carotid dissections are managed medically with anticoagulants

**Q:** Would you say that it is likely that a majority of strangulations actually show NO external injury?

**A:** It is around +/- 50% will have no visible external trauma

**Q:** Are the use of steroids prophylactically recommended for all strangulation victims? If so, can you share the protocol and references?

**A:** This is a clinical call, there are no studies which describe the benefits of steroids in strangulation victims. I do not see a down side to a short course of steroids.

**Q:** As an advocate can our clients use CICF funds for the charges for these tests? In a rural area in Virginia where most clients don't have insurance.

**Q:** How does the provider know which of these images is best? Or are you recommending imaging soft tissue of the neck, blood vessels, AND brain on every strangulation survivor?

**A:** The clinician, based upon the history and physical findings, should order the most appropriate test or tests. If the strangulation patient presents with symptoms or a history as outlined in the protocol, i.e. LOC and no CNS symptoms, the CTA of the neck is the most sensitive and appropriate test. If the strangulation patient presents with stroke-like symptoms and a history of LOC then a CTA of the neck and an MRI of the brain would be indicated.

**Q:** I have sent many patients to the ER and they aren't taken seriously. Can I get the Radiographic Assessment Pathway in printed format anywhere so I can give it to the patient to give to the ER doctors?

**A:** Yes, the protocol is available and can be downloaded and distributed to your ER staff.

**Q:** When patient presents with dysphonia/raspy voice in the ED what do you recommend best diagnostics? Would you consult ENT for possible laryngoscopy to view vocal cords?

**A:** The most important step is to rule-out life-threatening injuries in the neck. The CTA can assess the carotid and vertebral arteries. The test will also see any fractures or significant soft tissue hematomas. The severity of the dysphonia should dictate if an ENT consult is needed in the ER or can be completed as an outpatient.





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**Q:** I just had a DV patient who was strangled and she told me that he had a history of assaults on law enforcement, so the research on the relation between DV assaults and officer homicides is very sobering.

**Q:** Earlier I believe someone cited that victims are 750% more likely to die -more likely to be shot later. I just heard 7.5% more likely to die. Can you please clarify?

**A:** You can download the article. 750% is the same as 7.5X.

**Q:** Are Dr. Smock's references available in a single list?

**A:** The references are available for download and were included with the Dropbox link.

**Q:** Is it possible to bring an advance strangulation training to my community? How complicated is it to arrange? Ballpark costs associated?

**A:** Yes, please email [TISP@allianceforhope.com](mailto:TISP@allianceforhope.com) or use the website form here:  
<http://www.strangulationtraininginstitute.com/training/request-training/>

**Q:** What is the website to obtain the current strangulation laws in the US?

**A:** [http://www.bwjp.org/assets/documents/pdfs/strangulation\\_laws\\_chart\\_2014.pdf](http://www.bwjp.org/assets/documents/pdfs/strangulation_laws_chart_2014.pdf)

**Q:** What's the best way to educate the physicians at my local ED for the patients I send to them after their SANE exam. (I work there also and discussing strangulation with them gets nothing but eye rolls.)

**Q:** Where do we find the questionnaire for the EMS workers, from the first part of the webinar? it looked like a checklist.

**A:** The EMS form can be downloaded.

**Q:** While discussing the physiological damage of strangulation in adult women. in children are they likely to recover from the same physiological harm such as stroke, dissection, etc.?

**A:** The conventional thinking is that children's brains, because they are still developing, are more sensitive to anoxic insults. Children do stroke and demonstrate anoxic damage, just as adults do. However, no controlled studies.



## **William S. Smock, MD, MS, FACEP, FAAEM**

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The Clinical Forensic Medical Program

Director and Police Surgeon

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Dr. Bill Smock is the Police Surgeon and directs the Clinical Forensic Medicine Program for the Louisville Metro Police Department. He graduated from Centre College in Danville, Kentucky in 1981 and obtained a Master's degree in Anatomy from the University of Louisville in 1987. Bill graduated from the University of Louisville, School of Medicine in 1990 and completed a residency in emergency medicine at the University of Louisville in 1993.

In 1994 he became the first physician in the United States to complete a post-graduate fellowship in Clinical Forensic Medicine. Dr. Smock was an Assistant Medical Examiner with the Kentucky Medical Examiner's Office from 1991 to 1997. Bill joined the faculty at University of Louisville's Department of Emergency Medicine in 1994 and was promoted to the rank of full professor in 2005. Dr. Smock is currently a Clinical Professor of Emergency Medicine at the University of Louisville, School of Medicine and regularly takes medical students on mission trips to Africa.

Bill has edited 3 textbooks on clinical forensic medicine and published more than 30 chapters and articles on forensic and emergency medicine. He is an internationally recognized forensic expert and trains nurses, physicians, law enforcement officers and attorneys in multiple fields including: officer-involved shootings, strangulation, gunshot wounds, injury mechanisms and motor vehicle trauma. Dr. Smock is also the Police Surgeon for the Jeffersontown, Kentucky and St. Matthews, Kentucky Police Departments. He also serves as a sworn tactical physician and detective for the Floyd County Indiana Sheriff's Department.



## **Gael Strack, Esq.**

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Gael B. Strack is the Chief Executive Officer and Co-Founder for Alliance for HOPE International. Programs of the Alliance include: National Family Justice Center Alliance, Training Institute on Strangulation Prevention, Camp HOPE America, Justice Legal Network and VOICES Survivor Network.

- The National Family Justice Center Alliance provides consulting to over 150 existing and pending Family Justice Centers across the world, helping communities open and sustain their Family Justice Center. [www.familyjusticecenter.org](http://www.familyjusticecenter.org)
- The Training Institute on Strangulation Prevention provides basic and advanced training on strangulation prevention to 5,000 professionals annually. [www.strangulationtraininginstitute.com](http://www.strangulationtraininginstitute.com).
- The Justice Legal Network is an innovative public interest law firm made up solo attorneys who have pledged to work with the Alliance in providing civil legal services to victims and their children.
- Camp HOPE America, under the leadership of Casey Gwinn, provides summer camping, mentoring, hope and healing to children exposed to violence.
- The VOICES Survivor Network is comprised of survivors who volunteer their time to provide awareness, education, outreach and feedback to their local Family Justice Center.

Prior to launching the Alliance for Hope with Casey Gwinn, Gael served as the Founding Director of the San Diego Family Justice Center from October 2002 through May 2007. In that capacity, she worked closely with 25 on-site agencies (government and non-profit) who came together in 2002 to provide services to victims of domestic violence and their children from one location. The San Diego Family Justice Center was featured on Oprah in January 2003, recognized as a model program by President Bush and was the inspiration for the President's Family Justice Center Initiative launched in Oct 2003.

Prior to her work at the Family Justice Center, Gael was a prosecutor at the San Diego City Attorney's Office. She joined the office in 1987 and served in many capacities including Head Deputy City Attorney responsible for the Child Abuse and Domestic Violence Unit. Gael has also worked as a deputy public defender and a deputy county counsel for the San Diego County Counsel's office handling juvenile dependency matters. She graduated from Western State College of Law in December 1985.

Gael is a former board member of the California Partnership to End Domestic Violence, past President of the San Diego Domestic Violence Council and former commissioner of the ABA's Commission on Domestic Violence. In her spare time, Gael is an adjunct law professor for California Western School of Law teaching "Domestic Violence and the Law." Gael has been honored with numerous awards, including San Diego Attorney of the Year for 2006 and most recently by United States Attorney General Eric Holder as the 2010 Recipient of the National Crime Victim Service Award for Professional Innovation in Victim Services.

Gael has also co-authored a series of strangulation articles in the Journal of Emergency Medicine, the National College of District Attorney's Practical Prosecutor, and the Journal of the California Dental Association. Gael has co-authored five books with Casey Gwinn, JD, on the Family Justice Center movement including a Guide to Co-Located Services in the Middle East and in Mexico. Gael has also co-authored a book with Judi Adams, called "The Big Girls Club – Little Girl Rules for the Big Girl Workplace" which describes the ten rules of friendship that can help women thrive and succeed in the changing workplace.



## **Certificate of Attendance**

Webinar Training:  
The Long-Term Consequences of Strangulation  
Presented by William S. Smock, MD, MS, FACEP, FAAEM  
September 14, 2016  
1.5 Training Hours

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*Gail Strack*

Co-Founder and CEO  
Alliance for HOPE International  
Director, Training Institute on Strangulation Prevention