

# DV and Strangulation, Fatal and Nonfatal

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# DISCLOSURES/DISCLAIMERS

I have no financial disclosures to make

## FAMILY DOCTOR

25 Years Indian Health Service

Also Trained in Epidemiology

Working on Intimate Partner Violence (IPV) in  
healthcare setting 20+ years

No special training in TBI

Medical Aspects of Strangulation training by the  
Training Institute for the Prevention of Strangulation

# Objectives

1. For the domestic violence victim of nonfatal strangulation, what are the odds of her being murdered at a later date by the perpetrator?
2. Surveys of women seeking domestic violence advocacy services, and women living in shelter, show that \_\_\_\_\_% report being strangled 3-5 times, and \_\_\_\_\_ % report being strangled more than 5 times.
3. State 3 potential intermediate and long-term consequences of nonfatal strangulation.

# Strangulation terms

- Choking or “choked out”
- “The choking game”
- Sex enhancement

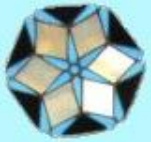




[https://www.youtube.com/watch?v=uhf5fzEqETU&feature=em-share\\_video\\_user](https://www.youtube.com/watch?v=uhf5fzEqETU&feature=em-share_video_user)

# Strangulation

- Manual from in front or behind
- With forearm from behind
- Ligature - e.g. cord or wire
- Hanging





# Strangulation in DV

## What's it mean?

Prior non-fatal strangulation —>  
6X greater odds  
of becoming an attempted homicide\*

\* (OR 6.70, 95% CI 3.91–11.49)

Journal of Emergency Medicine, 2008 October ; 35(3): 329–335.  
doi:10.1016/j.jemermed.2007.02.065)

# Strangulation in DV

## What's it mean?

Prior non-fatal strangulation —>  
> 7X odds  
of becoming a completed homicide\*

\*(OR 7.48 95% CI 4.53–12.35)

Journal of Emergency Medicine, 2008 October ; 35(3): 329–335.

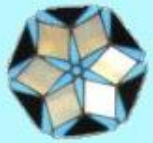
doi:10.1016/j.jemermed.2007.02.065)




# Strangulation in DV

## What's it mean?

43% of IPV victims killed had been strangled by their partner in the previous year





# Strangulation in DV

## What's it mean?

“The minute you put pressure on someone's neck, you are really announcing that you are a killer.”

Casey Gwinn, Family Justice Center Alliance



# Strangulation Prevalence in IPV

Emergency Room - 27% Strangulation<sup>^</sup>  
Community Sample – 54%<sup>#</sup>

<sup>^</sup> Wilbur, L., Higley, M., Hatfield, J., Surprenant, Z., Taliaferro, E., Smith, D. J., Jr., & Paolo, A. (2001). Survey results of women who have been strangled while in an abusive relationship. *Journal of Emergency Medicine*, 21, 297-302

<sup>#</sup> Sutherland, C. A., Bybee, D. I., & Sullivan, C. M. (2002). Beyond bruises and broken bones: The joint effects of stress and injuries on battered women's health. *American Journal of Community Psychology*, 30, 609-636




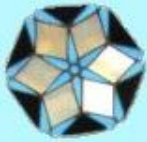



# Prevalence of Multiple Strangulation

34% = 3 – 5x

23% > 5x

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 attempted strangulation attacks. *Journal of Emergency Medicine*, 21, 323-329





# Strangulation in DV and SA

## What's it mean?

DV - 38% reported Strangulation

SA - 12%

Mcquown, et. al. Am. Journal of Emergency Medicine 34 (2016)

8.4x more likely if sexually assaulted  
by intimate partner

Zilkens, et. al. Journal of Forensic and Legal Medicine 43 (2016)



# TBI's and Strangulation are common in NM



Statewide from SANE\* statistics

All ages



Female and male




Head/neck injury = 158

Strangulation = 132




B. Caponera DV in NM 2013



\*Note: SANE is the only organization reporting to B. Caponera that records numbers of strangulations.





# TBI's and Concussion are common in NM



SANE statistics




Statewide



Adult Women



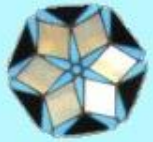
Head/neck injury = 91 per year



Strangulation = 78 per year

# How much pressure does it take?

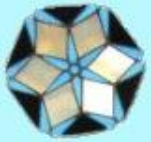
- 11 pounds per square in (psi) of pressure on both carotids for 6.8 seconds —> unconsciousness from anterior
- 4.4 psi for 10 seconds Lateral neck



# How much pressure does it take?

## Tracheal Occlusion

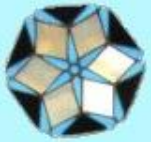
- 33 psi to completely occlude trachea
- 33+ psi to fracture tracheal cartilage



How much is 11 psi?



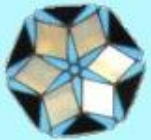
This is 80-100 pounds!



How much is 11 psi?



This is 20 pounds!



# Trigger Alert






# Consequences

- Short-term (seconds to minutes)
- Intermediate (hours to days, assuming survival)
- Longterm (days to weeks)





# Consequences - short-term Acute Death d/t Anoxic/Hypoxic Brain Cell Death

Compression/occlusion of

- Carotids
- Jugulars
- Vertebrales (16.5 – 66 psi needed)
- Trachea



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





Consequences - short-term


Acute Death d/t

Anoxic/Hypoxic Brain Cell Death




Compression of baroreceptors in carotid sinus and body →

- 
- ✦ Decreased heart rate and blood pressure
  - ✦ Cardiac arrhythmias
- 



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





# Consequences - short-term Acute Anoxic Encephalopathy

Cytotoxic Brain Edema

Occurs in seconds to minutes

Oechmichen M, et al, Cerebral Hypoxia and Ischemia: the Forensic Point of View: A Review; J Forensic Science, July 2006 Vol 51, No 4:880-87



# Consequences - short-term

- ~ 7 seconds --> unconscious
- If pressure released immediately consciousness will be regained within 10 seconds
- 15+ seconds --> loss of bladder control
- 30+ seconds --> loss of bowel control
- ~50 seconds - "bounce back" mechanisms are inoperative
- Tonic-clonic movements
- Loss of memory

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



# Consequences - short-term Acute Anoxic Encephalopathy

Areas most sensitive to hypoxia/anoxia

- ✦ Hippocampus\*
- ✦ Parieto-occipital-temporal cortex
- ✦ Purkinje fibers
- ✦ Amygdala
- ✦ Caudate, thalamic and lentiform nuclei

Wolstenholme N, Moore B, Clinical Manifestations of Anoxic Brain Injury. Progress in Neurology and Psychiatry 8-13



# Consequences - Intermediate

If she makes it to the ER, what next?



A vertical column of seven decorative blue circular patterns is located on the left side of the slide. The patterns vary in design, including concentric circles, star-like shapes, and geometric designs.

# Strangulation Study Findings

Study of 300 strangulation cases in San Diego:

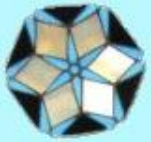
50% had no visible injuries

35% insignificant to minor visible injuries

15% significant injuries.

## 50% - Why no bruising?

- Broad soft ligature or forearm - Force is applied over a wide area
- Manual grip is held in one place without any shifting. No extravasation will occur from the damaged vessels
- Rapid death due to reflex cardiac arrest. - Bruising and petechiae will not have time to develop



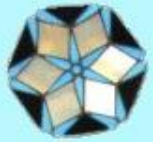
# Signs & Symptoms

- A period of dizziness
- Felt stunned or disoriented
- Seen stars or spots (visual impairment)
- Loss of consciousness or blacked out
- Loss of memory

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

# Evidence of Alterations of Consciousness = Anoxic Injury

- Standing up one minute then waking up on the floor
- Bowel or bladder incontinence
- Unexplained bump on head



# Signs & Symptoms

Involuntary  
urination or  
defecation  
(sphincter  
incontinence)

This woman was within  
seconds-minutes of  
dying.







# Survey Results of Women Who Have Been Strangled While in an Abusive Relationship

## Medical symptoms experienced by victims

- Difficulty breathing: 85%
- Scratches on neck: 44%
- Dysphagia: 44%
- Voice change: 45%
- Loss of consciousness: 17%

N = 62 victims surveyed, 42 were strangled.

J Emerg Med. 2001 Oct;21(3):297-302.



# Survey Results of Women Who Have Been Strangled While in an Abusive Relationship

- Facial palsy 10%
- L or R sided weakness: 18%
- Memory deficit: 31%
- Suicidal ideation: 31%

# Day 1



Courtesy of Fresno PD

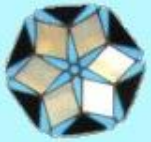



Day 2





Day 2











# Consequences - Intermediate



## Delayed Death/Disability

– hours to months

- 
- 
- ✦ Multisystem Organ Failure– many victims appeared “normal” in ER
  - ✦ Acute Ischemic Stroke
  - ✦ Acute Thrombotic Stroke
  - ✦ Delayed Cryptogenic Stroke d/t carotid dissection
  - ✦ Carotid Artery Hematoma
- 
- 
- 



# Consequences - Intermediate






Delayed Death/Disability




– hours to months



Airway Swelling/Respiratory Failure

- 
- ✦ Pharyngeal, supraglottic, subglottic and laryngeal edema
  - ✦ Gradual swelling → Respiratory Failure  
> 36 hours post strangulation or choke hold
  - ✦ Thyroid Storm
- 
- 





# Consequences - Intermediate



Delayed Death/Disability



– hours to months




Airway Swelling/Respiratory Failure




✦ Vocal Cord Paralysis

✦ Dysphagia

✦ Odynophagia



✦ Hypopharyngeal Rupture →  
pneumopericardium





# Consequences - Longterm

Delayed Death/Disability  
– months - years

- ✦ Tinnitus
- ✦ Acquired Glottic and Subglottic Stenosis
- ✦ PTSD
- ✦ Suicide

# What to do?

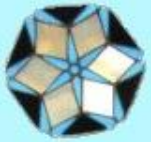
1. High index of suspicion
2. Ask questions - don't just take victim's statements at face value. (She may not remember what happened.)

E.g. “How long have you had hoarseness/sore throat/difficult or painful swallowing?”

3. **MUST** ask direct question about urinary or fecal incontinence - She may be too embarrassed to mention it.

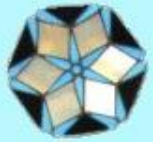
# Careful exam

4. Question any neck mark - don't assume hickey.
5. Visible Petechiae indicate more internally.
6. Beware and warn patient -  
Soft tissue neck swelling can increase for hours – days!

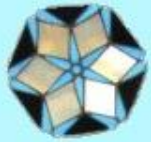





# To Do?

1. Pulse oximetry
2. Soft tissue neck films (X-ray)
  - subcutaneous emphysema
  - soft tissue swelling
3. Cervical spines (Neck X-ray)
  - hyoid fracture
4. Chest X-ray
  - soft tissue swelling



# To Do?



5. CT angio of carotid/vertebral arteries (GOLD STANDARD) for eval of vessels and bony/cartilaginous structures, less sensitive for soft tissue, OR


6. CT neck w/ contrast – good for bony/cartilaginous structures, OR

7. MRA of neck - best for soft tissue trauma

8. MRI of neck - best study for soft tissue trauma



# To Do?

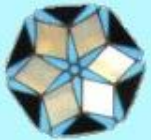


9. MRI/MRA of brain – anoxic brain injury, stroke, and intracerebral petechial hemorrhage

10. *Not recommended* – Carotid dopplers – does not evaluate proximal internal carotids, or vertebrals



So she survives  
What next after the physical injuries  
heal?



# Anoxic Brain Injury



Physical



Cognitive



Behavioral/Emotional





“No head injury is so serious  
that it should be despaired of  
nor so trivial that it can be ignored.”

**Hippocrates** C. 415 BC



# Patient Barriers

“TBI may be the missing link between what we know about IPV and some challenges of abused women” (and challenges to their caregivers)

Jacquelyn C. Campbell, PhD, RN, FAAN

# Anoxic Brain Injury

Temporary interruption of oxygen supply to all of brain

- Near-drowning
- Suffocation - e.g. with hands over mouth and nose, or with a pillow
- Strangulation



# POSTCONCUSSION SYNDROME

DSM-IV-TR

1. Headaches\*
2. Apathy/lack of Spontaneity
3. Dizziness/vertigo
4. Personality changes
5. Fatigue
6. Irritability
7. Anxiety/depression
8. Insomnia/disturbed sleep

\* 30-90% vs. 3-5% general population



# POSTCONCUSSION SYNDROME

Loss of memory - included in ICD-10

Also Common

- Noise sensitivity





# RISK FACTORS FOR ONGOING DISABILITY

Female

Assault

“Considerable Pre-injury Stress”




# Treatment Studies Rare

(Both studies were of IPV-related strangulation)

Only 29% or 39% of women got medical  
treatment

1. Wilbur, L., Higley, M., Hatfield, J., Surprenant, Z., Taliaferro, E., Smith, D. J., Jr., & Paolo, A. (2001). Survey results of women who have been strangled while in an abusive relationship. *Journal of Emergency Medicine*, 21, 297-302
2. 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 attempted strangulation attacks. *Journal of Emergency Medicine*, 21, 323-329



“Overall, current research suggests that TBIs are sustained often by women experiencing IPV, likely occur over multiple incidents, and are unlikely to be reported or treated in medical settings.”

Laura E. Kwako, Nancy Glass, Jacquelyn Campbell, Kristal C. Melvin, Taura Barr, and Jessica M. Gill. *TRAUMA, VIOLENCE, & ABUSE* 12(3) 115-126 Traumatic Brain Injury in Intimate Partner Violence: A Critical Review of Outcomes and Mechanisms

Treatment

# Patient Education





# Maine Shelter Survey

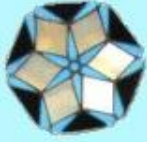
N = 151




September, October and November of 2011




Maine Coalition to End Domestic Violence




State-wide survey of domestic violence survivors



Strangled by an intimate partner

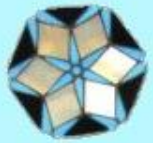


Survivors (if not in need of emergency response) were offered a chance to complete a brief survey



# Maine Shelter Survey

Survivors understood the powerful impact on emotional wellbeing and on behavior change,  
But not the serious medical consequences.



A vertical column of seven decorative blue circular patterns is located on the left side of the slide. The patterns vary in design, including sunburst, floral, and geometric motifs.

# Maine Shelter Survey

Survivors reported that professionals, for the most part, just did not ask about strangulation.

This included advocates, law enforcement, medical professionals and family members.









# Treatment



“What’s good for the heart is good for the brain”

- 
1. Aerobic exercise
  2. Weight loss
  3. Sleep Hygiene
  4. Obstructive Sleep Apnea
  5. Smoking
  6. Alcohol
  7. Other drugs
- 
- 
- 



# Treatment

Refer to DV Advocacy Organization

Treat psychological symptoms as you would  
in absence of brain injury

Davin Quinn, MD (UNMH Psych) ECHO

Talk <https://youtu.be/q-XayP02Tc4>



# Treatment

Consider referrals for:

Neuropsychological Testing

Cognitive Rehab

Speech Therapy

Behavioral Health Counseling

Brain Injury Support Group such as

Brain Injury Alliance of NM - [BIANM.ORG](http://BIANM.ORG)



# Acknowledgements

Training Institute on Strangulation  
Prevention –  
[Strangulationtraininginstitute.com](http://Strangulationtraininginstitute.com)

Elena Giacci - (Albuquerque) Mayor's Anti-  
domestic and sexual violence Task Force

Gail Starr, RN - Albuquerque SANE

**Thank You!**

**Questions?**

