

*The Journal of*  
**Legal Nurse  
Consulting**

Volume 15 ▲ Number 2 ▲ Spring 2004

- ▲ Air Bags: Help or Hindrance?
- ▲ Elder Neglect and Abuse: The Mandatory Reporter
- ▲ Misdiagnosis of Women with Heart Disease: Implications for the Legal Nurse Consultant
- ▲ Book Review: Nurse Practitioner's Business Practice and Legal Guide, Second Edition
- ▲ HIV Oral Testing and its Technology
- ▲ The Basic Life Support Ambulance Trip Record
- ▲ DNA: Innocence and Beyond, Part I



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### **Manuscript Submission**

The Journal accepts original articles, case studies, letters, and research. Query letters are welcomed but not required. Material must be original and never published before. A manuscript should be submitted with the understanding that it is not being sent to any other journal simultaneously. Manuscripts should be addressed to [JLNC@aalnc.org](mailto:JLNC@aalnc.org).

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Submissions are peer-reviewed by eminent professional LNCs with diverse professional backgrounds. Manuscript assistance can be provided upon request to the editor. Acceptance is based on the quality of the material and its importance to the audience.

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*The Journal of Legal Nurse Consulting* (ISSN 1080-3297) is published quarterly (Winter, Spring, Summer, and Fall) by the American Association of Legal Nurse Consultants, 401 N. Michigan Avenue, Chicago, IL 60611-4267, 877/402-2562. Members of the American Association of Legal Nurse Consultants receive a subscription to *The Journal of Legal Nurse Consulting* as a benefit of membership. Subscriptions are available to non-members for \$165 per year. Back issues are \$20 for members and \$40 per copy for non-members. Orders for back issues are subject to availability and prices are subject to change without notice. Replacements because of non-receipt will not be made after a three-month period has elapsed. Back issues more than one year old can be obtained through the *Cumulative Index to Nursing & Allied Health Literature* (CINAHL). CINAHL's customer service number is 818/409-8005. Address all subscriptions correspondence to Circulation Department, *The Journal of Legal Nurse Consulting*, 401 N. Michigan Avenue, Suite 2200, Chicago, IL 60611-4267. Include the old and new address on change requests and allow 6 weeks for the change.

The Journal of

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# LEGAL NURSE CONSULTING

Volume 15 ▲ Number 2 ▲ Spring 2004

## Features

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### **Air Bags: Help or Hindrance? . . . . .3**

*Laurie Jewett, RN CLCP*

While there is no doubt that air bags have their benefits to the driver and passenger, there is a lot of controversy surrounding it. This article is designed to give the LNC a basis to help determine merit in potential product liability cases where injury or death has occurred.

### **Elder Neglect and Abuse: The Mandatory Reporter . . . . .7**

*Tammy J. Murphy, RN*

Elder neglect and abuse is defined by state law and varies from one state to another. Massachusetts General Law, for example, defines elder abuse as “an act or omission which results in serious physical or emotional injury to an elderly person or financial exploitation of an elderly person.” All suspicion of elderly neglect and abuse must be reported.

### **Misdiagnosis of Women with Heart Disease: Implications for the Legal Nurse Consultant . . . . .11**

*Kathleen C. Ashton, PhD APRN BC and Holly Hillman, MSN RN*

Heart disease has been the leading cause of death in American women for about a hundred years. Yet women fare little better today than a century ago in terms of getting the appropriate diagnostic workup and management when presenting with symptoms of heart disease.

## Departments

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### **Editorial . . . . .2**

Developing New Frontiers

*Lynda Kopishke, MSN RN CLCP LNCC*

### **References & Resources . . . . .16**

Book Review: Nurse Practitioner’s Business Practice and Legal Guide, Second Edition

*Nancy Jaskowak Cresse, MS APRN-BC*

### **Questions & Answers . . . . .17**

What are the Queries Involved in the HIV Oral Testing and its Technology?

*Beatrice McCartney-Schnoblen, RNC MSA*

### **A Closer Look . . . . .18**

The Basic Life Support Ambulance Trip Record

*M. Thomas Quail, MS Ed RN NREMT*

### **Forensics Corner . . . . .22**

DNA: Innocence and Beyond, Part I

*Lisa M. Schwind, RN, Esquire*



# Developing New Frontiers

As I sit in my office and hear the birds singing outside, I am reminded that spring is here. Each spring, I feel as if I've survived the barren winter. I look forward to new things, new beginnings, and renewed energy. As I reflect on how best to contribute to *The Journal of Legal Nurse Consulting*, I find resources and ideas just finger-widths away. I am reminded of the talented Editorial Board and am thankful that this group is focused on enrichment of the JLNC. Following a particularly productive conference call, I realized that the time is now for legal nurse consultants to build their practice and take the forefront in developing new frontiers for LNCs.

I recognize that, as a group, legal nurse consultants constitute a powerful wave for the expansion of the role of nursing in society. I also realize this opportunity brings with it responsibility. For this reason, I decided to dedicate this column to providing opportunities for readers to participate in sharing how they have developed new roles as LNCs. In the next issue of the JLNC, we will be looking to publish short vignettes portraying LNC practice settings. I hope to stimulate discussion on all of our parts regarding undefined areas of practice within and outside the traditional medical legal setting. I encourage all LNCs who have diversified their practices to send a short e-mail to me at [Lynda.Kopishke@state.de.us](mailto:Lynda.Kopishke@state.de.us). I'd like to hear how your practice setting has expanded, and I am interested in what you see as the future of legal nurse consulting.

Additionally, I ask that you consider writing for the JLNC. One of the best ways to expand our profession is to share information. The editorial board has made a commitment to assist in developing articles from first time authors. For those who commit to write an article for the JLNC, a mentor will be assigned. The role of the mentor is to assist the author with content suggestions, assistance with APA format and to provide a contact for the author through the writing cycle. Listed below are hot topics for which authors are sought. Special thanks to Regina Noonan for her hard work in compiling this list!

I invite those budding authors out there who feel intimidated by the writing process to ask for a mentor, write an article, and join the wave of LNCs who will establish our future!

*Lynda Kopishke*

## Hot Topics, Authors Needed for Future JLNC Issues

### Product Liability

Lead poisoning  
Ephedra  
Latex gloves - Latex sensitivities: An update  
Contraception - new morning after pill

### Law

Jury Theories - Jury Selection Process, aspects of jury psychology  
Qui Tam and Whistle-blower Litigation  
Daubert Update  
Conflict of Interest

### Toxic Tort

Mold Litigation  
Carbon dioxide poisoning  
Mercury poisoning

### HIV Litigation

### Reproductive Litigation

Frozen embryos/Stem Cells  
Sperm and egg banks, issues in liability  
Organ donation/transplant - process, standards, any potential liability issues  
Wrongful Birth  
Mental retardation and contraception  
In-utero drug exposure

### Workers Compensation Litigation

Drug Testing - workplace, athletes  
Drug testing: medical, legal, and ethical issues  
Calculating Damages for Pain and Suffering

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# Air Bags: Help or Hindrance?

Laurie Jewett, RN CLCP

## KEY WORDS

Air Bags, Automobiles, Motor Vehicle Accident Claims

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*Air bags are designed to keep your head, neck, and chest from slamming into the dash, steering wheel, or windshield in a front-end crash. While there is no doubt that air bags, coupled with seat and shoulder belts, have their benefits to the driver and passenger, there is a lot of controversy surrounding it. This article is designed to give the legal nurse consultant more information relating to air bags and a basis to help determine merit in potential product liability cases where injury or death has occurred.*

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Air bags are fabric bags that are filled quickly with a gas to provide supplemental protection for vehicle passengers during some collisions. General Motors first brought air bag technology to the market in the early 1970s, but few air bag-equipped cars were sold, and the idea was shelved for lack of consumer interest. During the Carter years, the National Highway Traffic Safety Administration (NHTSA) browbeat the auto makers for not pushing air bags more aggressively (Eric Peters, *Washington Times*, 6/7/99) and, in 1997, mandated that all new cars be equipped with air bags on the driver's side as well as the passenger side in all passenger automobiles.

Those first-generation air bags were designed to halt the forward momentum of an unbuckled front seat passenger. The air bags deployed at speeds up to 200 miles per hour, opening violently, within a fraction of a second. The force of the deployment could (and did) snap necks, tear out eyeballs and otherwise maim and kill. The elderly, small-statured women and young children, particularly infants, were especially vulnerable (Peters, 1999). As long ago as 1972, Ford Motor Company recommended a warning placard be affixed to the crash pad directly in front of the right front passenger to warn of hazards associated with the air bag. This recommendation was turned down.

Thousands have been injured, many of them severely and permanently, as a result of the rapid deployment, the angle at which the air bag strikes the person, and the proximity of the passenger and driver's hands, arms and fingers to the rocketing air bag. While the NHTSA estimates that the combination of an air bag in addition to a lap and shoulder belt reduces the risk of serious head injury by 75%, compared with a 38% reduction for seat belts alone, further investigation reveals that air bags can often be the cause of a multitude of injuries (National Highway Traffic Safety Administration). Let's look at the physics involved.

## Mechanics

Typically, air bags deploy at a rate of between 144 and 211 mph; this amount of concentrated force is more than six times the established human tolerance level. Since the air bag was designed for a male who is 5 foot, 8 inches and

weighs 180 pounds, smaller women, children and the elderly are at a greater risk, since they do not fit that criteria. Activated air bags can inflict both minor and severe injuries, including death.

The driver's side air bag module is located within the center of the vehicle's steering wheel and may be covered by a variety of materials, including thermoplastic, rigid urethane foam covered with polyvinyl, or rigid metal plates covered with foam and vinyl. At the moment of deployment, the cover splits along seams intentionally weakened in manufacture and rapidly opens outward to allow the air bag to inflate. If the driver has his hands in the traditional "10 o'clock and 2 o'clock" positions, typically the thumbs are inward toward the deployment site. When the air bag deploys at a rate of approximately 160mph, the force has been known to shear the thumbs off the hand, resulting in amputation.

**Case Scenario One:** A 25 year old woman, 5 feet and 3 inches tall and 115 pounds, was the driver of a 1991 Ford Taurus when the vehicle left the roadway and traveled down the highway median until it struck the leading edge of a concrete barrier in a head-on collision. The woman was wearing the lap-shoulder belt. She gripped the steering wheel in a bracing maneuver which resulted in the placement of her thumb over the right edge of the air bag module cover. Along with scratches and bruises to her chest and arms, she sustained a 75% tearing away of her thumb at the metacarpophalangeal joint. Her thumb remained connected to her hand by only a small piece of connective tissue. The car sustained moderate front-end damage.

**Case Scenario Two:** A 52 year old woman, 5 feet 1 inch tall and 125 pounds, was the operator of a Ford Taurus that was attempting to make a left turn when it was struck by an oncoming vehicle. The speed was 5 mph. The driver was wearing a lap-shoulder seat belt. Her right forearm was across the air bag module cover as she was turning the steering wheel when the air bag deployed. She sustained multiple fractures of the upper arm, including severely pulverized fractures of both upper arm bones, dislocation of elbow, and fracture of upper arm bone connected to the shoulder. Damage to the front bumper was minor.



## Injuries

The Department of Emergency Medicine at the University of Louisville and the Kentucky Medical Examiner's Office have conducted a study to identify and describe injuries and injury patterns associated with air bag deployment. More than 10 years of clinical experience and study indicates that an occupant in close proximity to a deploying air bag can sustain severe injuries or death, and the proximity of an occupant's upper extremity to the deploying air bag or module cover can result in traumatic amputation of fingers, hands and forearms, pulverizing compound fractures of the forearms and fractures of the upper arms, regardless of the vehicle's speed (William Spafford Smock, MD, 1/14/04).

Many makes and models of cars have the horn activation button located in the air bag module cover. There is no printed warning about the risk associated with the driver's hand or forearm placed on the hub of the steering wheel or the dashboard. Passengers also sustain severe injuries when they place their hands on the dashboard to brace themselves during an accident.

Activated air bags can also inflict severe eye injuries, including blindness. A research report in the *Journal of Ophthalmic Surgery and Lasers* (Parker & Waichmann, 1/14/04) describes the spectrum of air bag related eye injuries seen during a two-year period by an ophthalmic-trauma team at UCLA. The damage ranged in severity from bruises in the socket to a critically ruptured eyeball, resulting in blindness. These patients later developed angle-recession glaucoma, or pressure in the eye due to trauma in the eye's drainage system. The researchers found the predominant injuries were bruising of the socket (hyphema). In general, the number of eye injuries from airbags is rising (Parker & Waichman, 1/14/04).

The Michigan Ear Institute conducted research that further outlines otologic injuries resulting from air bag deployment. The most common complaints were hearing loss and tinnitus through noise production when the bag deploys. Few patients in the study reported disequilibrium and some had a tympanic membrane rupture requiring surgery. The study suggests that ear positioning toward the air bag was an important factor with regards to hearing loss, aural fullness and TM perforation. An ear facing a blast experiences a TM pressure which is approximately double that of an ear not facing the blast. Air trapping within the external auditory canal from air bag "slap" may also help to explain this phenomena (Dennis Bojrab, MD, 9/98).

Spinal and head injuries are also experienced with air bag deployment. The coup, contra-coup experienced in whiplash, is often exacerbated by the extreme force and speed of the air bag, putting an inordinate amount of strain to the cervical spine. Some of these injuries, particularly to children and women, have proved fatal.

**Case Scenario Three:** On the evening of November 25, 1999, at approximately 8:42 p.m., five-year-old McKenzie

Graham was riding with her mother, Shayla Plemmons, in Ms. Plemmons' 1997 Hyundai Sonata GL. Ms. Plemmons was in the right hand lane headed southbound on Glenstone Avenue at the Independence Street intersection in Springfield, Missouri. A vehicle driven by Rebecca Stronzewski made an improper left turn across Ms. Plemmons' path resulting in Ms. Plemmons' vehicle striking Ms. Stronzewski's vehicle at a relatively low speed. Plaintiff's experts had determined the speed to be 3-5 mph. McKenzie was a passenger in the right front seat and had just unfastened her seatbelt to retrieve a toy. On impact, the passenger side airbag of the Hyundai deployed, striking McKenzie beneath the chin and immediately causing fatal injuries to her throat, neck, cervical spine and base of the brain. Neither Ms. Plemmons nor Ms. Stronzewski was injured in the collision. (Graham v. Hyundai Motor American Corporation, et al., Circuit Court of Greene County, Missouri.)

If you have been unlucky enough to experience air bag deployment, you probably noticed the "smoke-like dust" that fills your car's interior during the deflation of the air bag. When crash sensors in the front bumper determine that the car is decelerating so fast that it is about to crash, an ignition device sets off a chemical called sodium azide. Within 1/40 of a second, the sodium azide produces nitrogen gas that expands the air bag in the dash or steering wheel. The air bag then rips through its cover at up to 200 mph and over 1000 pounds of pressure and fully inflates within 1/50 of a second. By 3/20 of a second, the bag is deflated and limp. To aid in a smooth release, the air bag is coated with either talc or cornstarch. When the bag deflates, this dust is released into the immediate atmosphere. Many people have complained that these dust particles have produced minor throat and/or eye irritation, some of which became a chronic sensitivity requiring medications and inhalers. The technical name for this is Reactive Airway Dysfunction Syndrome and can be a serious and life-threatening condition, which is compensable from the car manufacturers according to *The Plescia's Airbag Site* (see references at the end of this article).

## Air Bag Malfunctions

In his article *Air Bag Malfunctions on the Rise*, Michael Leshner discusses further problems that can and have been encountered. Some malfunctioning air bags don't deploy at all, leaving occupants without the benefit of protection they expect from the air bag.

NHTSA has received some 18 complaints about the air bags in the Ford Focus, that the deployed air bags caused other parts of the vehicle to catch fire or cause burns to the occupants. Typically, the gas in a deploying air bag comes from a chemical reaction that inflates the bag in less than a tenth of a second. The chemicals that launch a bag are heated to 350 degrees Fahrenheit. There have been several reports of burns or irritations from air bags in the Ford Focus and in other models as well (NHTSA, 1/20/04).

Another problem reported are air bags that deploy unexpectedly. Drivers report reaching forward to change the radio station while simultaneously hitting a pot hole, resulting in unexpected air bag deployment (Leshner, 1/22/04).

## Lawsuits

One of the most successful lawsuits involves an unexpected air bag deployment (*Washington University Law Quarterly*, 1197). In Kampen v. Chrysler Corp., Civ. A. No. 96-1676, 1996 WL 599448 (E.D. La. Oct.17, 1996), a driver's-side air bag spontaneously deployed causing personal injuries.

In *Graham v. Hyundai* ("Case Scenario Three"), parties settled for an undisclosed amount: "Plaintiff plead that defendant Hyundai Motor American Corp. failed to use ordinary and reasonable care in designing the air bag restraint system in the 1997 Hyundai Sonata and created a defective product by designing the air bag system with a deployment threshold that was too low and/or without adequate safeguards to prevent deployment in a collision of this severity. The evidence would have been that air bags provide no benefit until approximately 18 mph and that at speeds of this accident (3-5 mph), the deployment of the air bag is actually very dangerous."

**Case Scenario Four:** On April 5, 1998, Kendra Byassee, age 9, was a front passenger in a 1995 Mercury Cougar operated by her mother, Wendy Byassee. Kendra was wearing the available three-point restraint belt. Traveling on KY 1371 in Carlisle County, Kentucky, at approximately 7:36 p.m., the vehicle hit a deer that ran onto the road from a wooded area. The speed, as determined by the NHTSA, was 3 to 5 mph. During the collision sequence, both of the front air bags deployed. Kendra received fatal neck injuries as a result of the deployment of the front passenger side air bag. Wendy Byassee was not injured in the collision. The plaintiff alleged that the passenger-side air bag in the subject vehicle should never have deployed in this low-energy collision because the speed was lower than Ford Motor Company's deployment threshold for this vehicle. It was further alleged the Ford-designed deployment threshold was too low, that the bag was too big and too aggressive, and failed to have a tether. Furthermore, plaintiffs allege that the Mercury was defective in that it did not give adequate warning of the danger of children riding in the front seat of the subject vehicle. The case settled for a confidential amount on November 29, 1999 ([www.palmerlaw.com](http://www.palmerlaw.com)).

Obviously, air bag litigation is on the rise, given the sheer number of vehicles with air bags on the road today. There are a number of theories of recovery triggered by various suits when people are injured or killed by the air bag itself (*Hot Topics in Automotive Product Liability*, C. Enrico Schaefer):

1. Higher deployment thresholds: most airbags are set to deploy in crashes between 8 and 12 mph. This is far too

low. Numerous studies have shown that an air bag is not needed unless a crash occurs at speeds of at least 18 mph.

2. Less aggressive air bags: serious injuries occur when air bags, which can inflate at speeds up to 200 mph, hit occupants prior to full inflation. Air bags are supposed to be fully inflated before the passenger falls into it during a crash. Serious injuries can occur when air bags hit occupants prior to full inflation.
3. Tethers: internal straps holding the air bag back from intruding towards the occupant compartment can decrease the chance of injury. Tethers are an easy adjustment for manufacturers to install, but many vehicles do not have them, since they are not required by law.
4. Adjustable inflators: the inflator is the component of the air bag that inflates the bag. In the 1970s, the General Motors fleet with air bags had adjustable inflators, so in minor collisions the air bag inflated less quickly than it did in more severe collisions.
5. Better sensors: many sensors are too sensitive or unable to distinguish between a minor bump, as going over a curb, and significant event, e.g. a head-on collision. Sensors work in many ways: mechanically, electrically, or a combination of the two. Bad sensors can delay the firing of an air bag or the air bag deploys prematurely.
6. Suppression systems: occupants close to the deployment site are most likely to be killed or sustain serious injuries. "Smart" air bags are designed to alter the deployment if occupants are in the way of the deploying air bag. In these instances, the bag redirects forces to the side rather than directly into the occupant. Some companies are exploring uses of infrared technology to detect people who are "out of position."
7. Punchout: late deployment can cause the air bag door to make contact with the occupant, causing injury.
8. Failure to deploy: air bags should have deployed but did not.

## Possible Remedies

The government recognizes the danger from air bags, particularly to those in high-risk groups. NHTSA has given car manufacturers until September 1, 2007, to improve these systems; from all accounts, they will be highly complex. For instance, Cadillac has introduced a passenger sensing system that has 38 separate sensors, and BMW will try to have a system that will sense a driver who leans over for whatever reason; the shift in weight would deactivate the air bag.

Air bag on-off switches have been the subject of much controversy. Proponents of the on-off switch state that until auto manufacturers come up with a solution to the air bag injury problem that can be proven, an air bag switch is the only way to have a choice and can be the best way to protect those in the most vulnerable categories (the elderly, the small statured, children and infants). Opponents hold the position that by allowing an on-off switch, human error will prove itself again in people forgetting to reactivate the switch after

turning it to the “off” position and will therefore be at higher risk than ever.

## Role of the LNC

Legal nurse consultants who review these types of personal injury or product liability cases related to air bags should be aware of the particular specifications of the air bag in the vehicle in question. The following checklist should guide the LNC's review.

1. Does the air bag system include any of the above-mentioned safety features, i.e. tethers, adjustable inflators or a suppression system?
2. What is the speed at which the air bag will actually deploy?
3. What were the injured parties' height, weight and where they were seated in the automobile at the time of the collision?
4. Were the occupants utilizing the seat belts?
5. Was the driver sitting the recommended 10 inches away from the steering wheel?
6. What was the speed of the collision? (Refer to police report)
7. What are the specifications of the air bag for the make/model of car? (Refer to the car's instruction booklet; may be requested or on-line)

Compare the vehicle's air bag deployment specifications (rate of speed) against the speed reported in the police report; should the bag have deployed? Review all of the injuries and note whether they might be caused by the air bag deployment. Erythema, scratches and bruises across the upper two-thirds of the body are to be expected and typically will not be sole basis for a suit. Courts will look at whether the injured party would have been better off with or without the air bag. In non-life threatening injuries, it is easy to see that the argument will most likely be a resounding “better with than without.”

The LNC can provide a valuable service to attorneys who are thinking about possible litigation in arena, by pointing out all the different variables that need to be considered in this type of lawsuit. This can be costly since multiple experts must be retained.

Experts needed for a motor vehicle accident claim are reconstruction experts and biomechanical experts. The reconstruction expert will examine the collision. A biomechanic expert who is well versed in air bag deployment will explain the mechanism involved and the force to the body. Medical experts will also be needed and, depending on the injury, may include:

1. Neurologists to explain head, neck and spine injuries.
2. ENTs to address broken noses and eye injuries (especially if the victim was wearing glasses).
3. Audiologists to explain auditory disturbances.

4. Pulmonologists to address issues relating to Reactive Airway Dysfunction Syndrome and exactly what that means for the patient's recovery (ie; future need for nebulizers or multi-dose inhalers (MDIs) from inhaling the powdery residue from the air bag.

The LNC can review the medical records for damages, obtain other necessary healthcare provider records or police and paramedic reports, and create any necessary chronologies to aid the attorney. The LNC will need to be able to educate the attorney as to the seriousness of injuries sustained and may need to locate a Life Care Planner and an economist in preparation of the lawsuit. LNCs can participate in defense medical examinations/independent medical examinations (DME/IME). The attorney-client may request the LNC to retrieve manufacturer's instruction booklets and prepare a report concerning the specifications at which the air bag was designed to deploy versus the actual estimated speed and type of accident that occurred.

The attorney-client may also ask for help from the LNC in preparing any demonstrative evidence to further appeal to the jury if the case goes to trial. The LNC would be expected to search medical records for pre-existing conditions and how the motor vehicle accident could have exacerbated those conditions. Was the driver under the influence of any drug or alcohol that may have contributed to the accident? By checking the side-effects of any medications that the driver may have been taking at the time of the accident, a contributory negligence defense may occur. If so, the LNC may be asked to separate injuries sustained at impact from any injuries caused by medication.

## Conclusions

The purpose of this article was to educate the LNC about the dangers and potential injuries of air bag deployment. Several resources have been provided; however, there are many more resources in the medical and on-line literature. Part of being a successful LNC is anticipating litigation possibilities, having some introduction to the issues, being resourceful, networking and knowing where to go for additional information. Activated air bags can inflict minor scratches, severe injuries, and even death. This article provides the LNC with information to assist with litigation related to air bag injuries.

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# Elder Neglect and Abuse: The Mandatory Reporter

Tammy J. Murphy, RN

## KEY WORDS

Elder Abuse, Elder Neglect, Mandatory Reporter

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*Elder neglect and abuse is defined by state law and varies from one state to another. Massachusetts General Law, for example, defines elder abuse as "an act or omission which results in serious physical or emotional injury to an elderly person or financial exploitation of an elderly person; provided, however, that no person shall be considered to be abused or neglected for the sole reason that such person is being furnished or relies upon treatment in accordance with the tenets and teachings of a church or religious denomination by a duly accredited practitioner thereof." Any and all suspicion of elderly neglect and abuse must be reported. It is your duty as a healthcare worker to report these cases, and it is the job of Adult Protective Services to investigate the report and act on their conclusion.*

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**Case One:** An 80-year-old female arrives from a long-term facility and is admitted to the emergency department with a chief complaint of fever and decreased level of consciousness. The standard septic work up is done by the assigned emergency department nurse. This nurse detects a strong odor of urine emitting from the patient. Upon examining the clear drainage bag from the patient's already-inserted foley catheter, the nurse had noted very

concentrated urine with a large amount of sediment. The present foley catheter is removed in order to obtain a sterile urine specimen to complete the septic work up. Upon removing the catheter, the nurse notes that the foley catheter is black and breaking down from the tip of the catheter past where the balloon was inflated. Subsequently, the patient dies from sepsis three days later. The long-term facility is contacted prior to the death of this patient and asked when

**Table 1. Resources for Finding State Laws on Elderly Neglect and Abuse**

- U.S. House of Representatives  
<http://law.house.gov/>
- American Law Sources On-Line (ALSO)  
<http://www.lawsources.com/also/>
- Findlaw  
<http://www.findlaw.com/cascode/state.html>

this patient's foley catheter was last changed. They state that it was three days prior to the emergency department visit.

**Case Two:** A 60-year-old male arrives to the emergency department with a history of diabetes. This patient had signed out, against medical advice, after a two-month admission at another local facility for a left above-the-knee stump revision. Prior to the patient signing out, he had complained of coccyx pain and voiced some concern to staff about the coccyx graft site, which was well healed at that point. With the patient continually complaining about his coccyx area, two days before he signed out against medical advice, a surgeon evaluated this area and wanted to take the patient to the operating room for debriedment of his coccyx area for a decubitus ulcer. The patient refused and then signed himself out and went home to be cared for by a friend. It was noted at this emergency department visit that the 18cm x 14cm necrotic stage-four ulcer on this patient's back had a loop of bowel protruding from his wound.

Both of these cases were reported to the appropriate agencies as elder neglect and abuse. In case one, the family actually flew up from another state and personally thanked the nurse who reported this long term facility.

### Definition of Elder Neglect and Abuse

Elder neglect and abuse is defined by state law and varies from one state to another. Massachusetts General Law, for example, defines elder abuse as "an act or omission which results in serious physical or emotional injury to an elderly person or financial exploitation of an elderly person; provided, however, that no person shall be considered to be abused or neglected for the sole reason that such person is being furnished or relies upon treatment in accordance with the tenets and teachings of a church or religious denomination by a duly accredited practitioner thereof" (M.G.L. - Chapter 19A: Section14). In Massachusetts, an elderly person is a person who is sixty years of age or older (M.G.L. - Chapter 19A: Section14).

A second definition is described as an act or omission which results in serious physical or emotional injury of an elder. Acts or omissions include any and all of the following: physical abuse, emotional abuse, sexual abuse, neglect or financial exploitation (OCES, 2002). Definition and legal

terminology vary from state to state in regards to types of domestic and elder abuse. See Table 1 for useful resources.

### Three Basic Categories of Elder Abuse and Neglect

(1) Domestic Elder Abuse refers to many forms of maltreatment of an older person by someone who has a special relationship with the elder. This may include the spouse, child, sibling, friend or caregiver in the older person's home or in the home of the care giver.

(2) Institutional Abuse refers to any of the domestic elder abuse criteria but occurs in residential facilities for older persons. These would include, but are not limited to, nursing homes, foster homes, group homes, board and care facilities. Perpetrators of institutional abuse are usually people who have a legal or contractual obligation to provide the elder with care and protection. This would include paid care givers, staff and professionals.

(3) Self Neglect is characterized as the behavior of an elderly person that threatens his or her own safety. Self neglect manifests itself in the elderly as refusal or failure to provide themselves with adequate food, water, clothing, shelter, medications, personal hygiene and safety. This excludes a situation in which a mentally competent elder understands the consequences of their decision and makes these decisions consciously and voluntarily.

According to the National Elder Abuse Center, more than two-thirds of elder abuse perpetrators are family members of the victim. These family members are usually the care givers. Spouses make up a large percentage of abusers. This usually starts with domestic violence earlier in the relationship, where the abuser exhibits control and power over the abused.

### Reporting Elder Neglect or Abuse

Most states have Adult Protective Services (APS). This is an agency that is responsible for investigating cases and providing support to the victim and family. In some states, APS can be found in conjunction with Social Services. Refer to Table 2 at the end of this article to see how to report in your state. If the table has no number listed for your area, contact Eldercare Locator at 800/677-1116.

In Massachusetts, Elderly Protective Services and Elder at Risk programs are in place or reporting through the Executive Office of Elder Affairs. This organization assists elderly at risk for neglect and abuse, as well as elders who have been abused. This program assists older persons in reaching their maximum level of independence and functioning while respecting their right to self determination (OCES.)

### Elder Abuse Laws and Mandated Reporters

Federal laws on child abuse and domestic violence fund services and shelters for victims. There is no comparable federal law on elder abuse. The Federal Older Americans Act (42 U.S.C. (3001 etseq., as amended) does provide defini-

tions of elder abuse and authorizes the use of federal funds for the National Center on Elder Abuse and for certain elder abuse awareness, training and coordination of activities in state and local communities, but does not fund adult protective services or shelters for abused or older persons.

Massachusetts Elder Reporting Act (M.G.L. Chapter 604) went into effect July 1, 1983. This law established legal reporting requirements and a protective services system in Massachusetts for victims of certain types of abuse and neglect. The law was further expanded in 1990 to include financial exploitation of elders. (EOEA)

Mandated Reporters in Massachusetts M.G.L. Chapter 111, Section 72G states: "A physician, medical intern or resident, physician assistant, registered nurse, licensed practical nurse, nurse aide, orderly, home health aide, hospice worker, homemaker, administrator, responsible person, medical examiner, dentist, optometrist, optician, chiropractor, podiatrist, coroner, police officer, speech pathologist, audiologist, social worker, pharmacist, physical or occupational therapist or health officer, paid for caring for the patient or resident, who has reasonable cause to believe that the patient or resident has been abused, mistreated or neglected or has property misappropriated, shall immediately report such abuse, mistreatment or neglect or misappropriation of patient or resident property to the department electronically transmitted report, facsimile or oral communication and, if by oral communication, by making a written report within 48 hours after such oral communication. Any such person required to make such oral and written reports who fail to do so will be punished by a fine of not more than \$1,000. Any person making such oral and written report shall not be liable in any civil or criminal action by reason of such report if such report was made in good faith. No Facility, home health agency or hospice program shall discharge, or in any manner discriminate or retaliate against any person who, in good faith, makes such report or testifies or is about to testify in any proceeding about the abuse, mistreatment or neglect of a patient or resident or the misappropriation of a patient's or resident's property."

Old Colony Elder Services defines Mandatory reporters as: "Any physician, medical, intern, dentist, nurse, family counselor, probation officer, social worker, police officer, firefighter, emergency medical technician, licensed psychologist, physical or occupational therapist, podiatrist, executive director of a licensed home health agency or homemaker service agency, or home care case manager, who has reasonable cause to believe that the elderly person is suffering from or has died as a result of a reportable condition."

## Summary and Conclusion

On October 8, 1998, the Assistant Secretaries for Aging and Children and Families released a study confirming that, in 1996, at least half a million older persons in domestic settings were abused, neglected and/or exploited, or experienced self-neglect. The study also found that, for every

reported incident of elder abuse, approximately five go unreported (AOA.gov/report).

Any and all suspicion of elderly neglect and abuse must be reported. It is the duty of the healthcare worker or any other mandated reporter, according to your state statute, to report any suspicion of neglect or abuse toward the elderly. All too often, healthcare workers are fearful to report, mostly based upon the concern that they "might be wrong." It is your duty as a healthcare worker to report these cases, and it is the job of Adult Protective Services to investigate the report and act on their conclusion. Another concern is that the reporter is concerned about the repercussion it may have on the victim or themselves. With the listed resources provided in the article, most of these uncertainties can be answered making reporting a supportive and positive intervention.

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Tammy Murphy, RN, has been an independent Legal Nurse Consultant for four years. She has 15 years' experience in emergency nursing and continues to practice in this field as well as in a walk-in clinic setting. Tammy also has clinical experience in oral surgery, pain management, and home care. Prior to becoming a Registered Nurse, she worked as an Emergency Medical Technician for six years. Her independent legal nurse consulting practice focuses on personal injury, medical malpractice, workers compensation, expert witnessing, and independent medical examinations (both plaintiff and defense). She is currently working on expanding her practice in criminal cases. She is a strong advocate for her peers to be alert for any signs of abuse whether it is elder, domestic or child, and continually educates on the importance and duty of reporting any suspicion of abuse. Murphy is a member of the American Association of Legal Nurse Consultants, the Southern New England Chapter of American Association of Legal Nurse Consultants (Secretary), Emergency Nurses Association, and Massachusetts Nurses Association.

**Table 2. Reporting Elder Abuse and Neglect**

<b>State</b>	<b>Domestic Elder Abuse Hotlines</b> (for situations if the Elder lives in private home)	<b>Institutional Elder Abuse Hotlines</b> (for situations if the Elder lives in an institutional setting like a nursing home)	<b>State</b>	<b>Domestic Elder Abuse Hotlines</b> (for situations if the Elder lives in private home)	<b>Institutional Elder Abuse Hotlines</b> (for situations if the Elder lives in an institutional setting like a nursing home)
Alabama	800-458-7214		Missouri	800-392-0210	800-392-0210
Alaska	800-478-9996 907-269-3666	800-730-6393 907-334-4483	Montana	800-332-2272	
Arizona	877-767-2385	877-767-2385	Nebraska	800-652-1999	800-652-1999
Arkansas	800-482-8049	800-582-4887	Nevada	800-992-5757	800-992-5757
California		800-231-4024	<i>Comments: Reno Area 702-784-8090</i>		
<i>Comments: Domestic-contact county social services. Numbers on web site @ <a href="http://dss.cabwnet.gov/getser/cfstable.html">dss.cabwnet.gov/getser/cfstable.html</a></i>			New Hampshire	800-949-0470	800-442-5640
Colorado	800-773-1366	800-238-1376	New Jersey	800-792-8820	800-792-8820
Connecticut	888-385-4225	860-424-5241	New Mexico	800-797-3260	800-797-3260
Delaware	800-223-9074	800-223-9074	New York	800-342-9871	800-220-7184
Dist. of Columbia	202-727-2345	202-434-2140	North Carolina	800-662-7030	800-662-7030
Florida	800-962-2873	800-962-2873	North Dakota	800-451-8693	800-451-8693
Georgia	800-677-1116	404-657-5726 404-657-4076	Ohio	800-653-3748	800-282-1206
Hawaii	808-832-5115	Same	Oklahoma	800-522-3511	800-522-3511
Idaho	208-334-2220		Oregon	800-232-3020	800-232-3020
Illinois	800-252-8966	800-252-4343	Pennsylvania	800-490-8505	800-254-5164
<i>Comments: After hours report domestic abuse at 800-279-0400</i>			Rhode Island	401-222-2858x321	401-222-2858x321
Indiana	800-992-6978	800-992-6978	South Dakota	605-773-3656	605-773-3656
Iowa	800-362-2178	515-281-4115	Tennessee	888-277-8366	888-277-8366
Kansas	800-922-5330	800-842-0078	Texas	512-834-3784 800-252-5400	512-438-2633 800-458-9858
Kentucky	800-752-6200	800-372-2991	Utah	800-371-7897	800-371-7897
Louisiana	800-259-4990	800-259-4990	Vermont	800-564-1612	800-564-1612
Maine	800-624-8404	800-624-8404	Virginia	888-832-3858	888-832-3858
Maryland	800-91-PREVENT	800-91-PREVENT	<i>Comments: Elder Information 800-552-3402</i>		
Massachusetts	800-922-2275	800-462-5540	Washington	866-EndHarm	800-562-6078
Michigan	800-996-6228	800-882-6006	<i>Comments: <a href="http://www.aasa.dshs.wa.gov">www.aasa.dshs.wa.gov</a></i>		
Minnesota	800-333-2433	800-333-2433	West Virginia	800-352-6513	800-352-6513
Mississippi	800-222-8000	800-227-7308	Wisconsin	608-266-2536	800-815-0015
			Wyoming	307-777-6137	307-777-7123



# Misdiagnosis of Women with Heart Disease: Implications for the Legal Nurse Consultant

Kathleen C. Ashton, PhD APRN BC and Holly Hillman, MSN RN

## KEY WORDS

Heart Disease, Misdiagnosis, Women's Health Issues

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*Heart disease has been the leading cause of death in American women for about a hundred years. Yet women fare little better today than a century ago in terms of getting the appropriate diagnostic workup and management when presenting with symptoms of heart disease (Iezzoni, Ash, Schwartz, & Mackierman, 1997). In recognition of this disparity in diagnosis and management of coronary heart disease (CHD) between men and women, the Agency for Healthcare Research and Quality is sponsoring research to investigate the sex-based differences in diagnosis and management (Women and Heart Disease, AHRQ, 2004). This article will explore the current research on women and heart disease and give direction to the legal nurse consultant faced with situations involving women seeking diagnosis and management of their heart disease.*

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When questioned about their most important health risk, most women will name breast cancer, with only about 30% correctly identifying heart disease as their leading health risk (Knight, 2002). A woman's risk of death from heart disease is 1 in 2, while her risk of dying from breast cancer is 1 in 25. Healthcare providers are somewhat more aware of the role heart disease plays but frequently misdiagnose in the presence of some powerful imposters. Many providers simply do not consider a woman at risk for what many still believe to be a "man's disease." This must change if we are to obtain the best care for women who suffer from heart disease.

The legal nurse consultant (LNC) may become involved with cases in which women did not receive appropriate care for symptoms of heart disease. Cases of misdiagnosis of women with heart disease abound, given the lack of recognition and appreciation for the unique presentation of women among healthcare providers. In reviewing such cases, the LNC can rely on several resources to give direction to attorneys and develop an expert opinion. A good place to start is standards of care.

## Standards of Care

The American Nurses Association publication, *Standards of Emergency Nursing Practice*, gives general guidance to the LNC in reviewing the actions of emergency department nurses. A more current publication is the *Scope of Practice for Emergency Nursing*, available at the Emergency Nurses Association Web site ([www.ena.org](http://www.ena.org)). Both documents lay the foundation for safe, competent emergency nursing practice. The nurse's role in the emergency setting encompasses triage, assessment and implementation of nursing care under what at times can be termed stressful circumstances. Competency in the nursing process is essential in observing and noting important symptoms and subtle clues that can help to establish accurate medical diagnoses and support effective management of the patient's care.

In addition, the American Heart Association recently launched its Red Dress Campaign ([www.americanheart.org/red](http://www.americanheart.org/red)) to increase awareness of the risk of heart disease for women. This national campaign seeks to educate providers and consumers concerning the devastating effects of CHD in women. In New Jersey, the Women's Heart Foundation is dedicated to promoting awareness of women's different presentation of CHD. Their Web site ([www.womensheart.org](http://www.womensheart.org)) provides many educational materials for the provider and consumer.

## Presentation Differences in the Emergency Setting

Chest pain is the second most common chief complaint in the emergency setting, responsible for some 4.6 million emergency department visits per year (Brilliant, 2003). Women are among those in the highest risk group, including the elderly, the young (10% of myocardial infarctions occur in those under age 45), and minorities. Chest pain can be the result of any of the following life threatening causes: myocardial infarction (MI), pulmonary embolism, pneumothorax, Boerhaave Syndrome (spontaneous esophageal rupture after vomiting), aortic dissection, pericardial effusion, pericarditis, or pneumonia. Chest pain may also result from some non-life threatening causes such as esophageal spasm, gastroesophageal reflux, rib fracture, chest injury, costochondritis, pleurisy, mitral valve prolapse, osteoarthritis of the neck, gas in the colon, peptic ulcer disease, cholecystitis, or shingles. The astute practitioner pays close attention to the history and accompanying manifestations as the differential diagnoses are explored.

McSweeney (1998) found that chest pain in women with MI often occurred as a late symptom and followed other symptoms such as shortness of breath and musculoskeletal discomfort. Other common major acute MI symptoms in women include dyspnea, arm pain, diaphoresis,

weakness, and fatigue (McSweeney, 2001). Women may experience vague sensations partly because their symptoms are not always as dramatic and sudden as those of men. Additionally, the typical symptoms identified as indicative of a cardiac event are those more common to men, so women do not always associate their less typical symptoms with a cardiac problem because they do not match what they have been told to notice. Women are more likely to complain of fatigue, shortness of breath, diaphoresis, and chest discomfort. Women often attribute their symptoms to stress and emotional difficulties, perhaps unaware of the close interactions among stress, depression, emotional upset and cardiac disease.

## Prodromal Symptoms

While women may fail to make the connection with their symptoms, it is even less acceptable when healthcare providers miss the clues. CHD remains the leading cause of death in the United States because healthcare professionals fail to recognize and treat prodromal symptoms (McSweeney, 2001, p.27). Men are more likely to present to the emergency department with “typical” symptoms of heart disease such as crushing chest pain and electrocardiogram changes, while women are more likely to see their primary care providers over a period of time because their symptoms are much more subtle or prodromal. Since this presentation is deemed “atypical,” meaning unlike the male pattern, women’s symptoms are more likely to be overlooked or not considered related to the heart. Men present first with attention-getting symptoms; women present over a period of time with vague complaints. This difference in presentation contributes to the delayed or mistaken diagnosis more commonly found in women.

Women themselves tend to deny their symptoms. Ashton (1999) found that women delayed from 1 to 4 hours longer than men in seeking care when experiencing symptoms of heart disease. Women are more likely to describe their symptoms as “chest discomfort” or “soreness” rather than pain. Communication differences between men and women also contribute to the difficulty in identifying and labeling symptoms accurately and securing appropriate diagnoses and treatment (Gilligan, 1982).

## Evaluation of the Patient

With a clear understanding of the issues surrounding the diagnosis of heart disease in women, the emergency department nurse can contribute to the accurate and timely diagnosis of the patient. Evaluation of the patient consists of three major areas. The clinical history is an important factor not only in diagnosis but also in treatment decisions such as thrombolytics. Accurate details will be better elicited with an understanding of gendered communication patterns. Secondly, diagnostics are essential for providing a basis for decisions. Vital signs and 12-lead electrocardiography (EKG) with continuous cardiac monitoring are the first actions instituted. Blood for laboratory analysis is drawn immediately. Routine laboratory studies include electrolytes,

blood urea nitrogen, creatinine, complete blood count, creatine kinase, and creatine kinase-muscle isoenzyme. If the isoenzyme is elevated, then troponin is measured. Coronary angiography and echocardiography assist with decision-making. The third important component is risk stratification. In addition to the information gathered in the history, assessments of ejection fraction, treadmill test with imaging, and pharmacologic stress imaging—either nuclear or echocardiographic—are used in risk stratification.

Certain factors hold more risk for women than for men. Diabetes, for example, conveys a greater risk for heart disease in a woman than in a man. Smoking, obesity, and oral contraceptives predispose a woman to a heightened risk of stroke. This knowledge must be used in assessing patients who present with a variety of symptoms and who may have numerous comorbidities.

Patient evaluation continues during the emergency department visit. It is here that the emergency department nurse must diligently follow up on findings and changes in condition. Questionable interpretations of EKG rhythms must be addressed, since it is the nurse who can frequently turn an evaluation in the right direction. Documentation of care rendered and physicians notified provides a paper trail of the nurse’s performance. When disposition of the patient is determined, it is the nurse who follows through on calling the coronary care unit with test results or discharging the patient with sufficient knowledge to safely manage her own care.

## Case Example

Based on information in this article, review the following case example and identify contributing factors, history, signs and symptoms, diagnostic studies, clinical data and critical thinking that should have determined the correct plan of care for this woman. Why did the physicians make the incorrect diagnosis? Did the client herself contribute to prolonging the situation?

A very obese Caucasian woman in her 40’s arrived at her local emergency room in the afternoon with a chief complaint of pain below her xiphoid process. Nursing documentation indicated the symptoms were present for three days, although she had a history of epigastric pain. There was no respiratory difficulty noted. Past medical history included non-insulin dependent Type 2 diabetes, gall bladder disease, hypertension, hypercholesterolemia, and gastroesophageal reflux disease. She had taken over-the-counter antacids and histamine-2 antagonists for five to six days prior to seeking treatment. Other prescribed medications included an ACE inhibitor, a calcium channel blocker, a sulfonylurea, an insulin sensitizer, and a lipid-lowering agent. Her last menstrual period was recorded as ten months ago. The one and only set of vital signs in over two hours in the Emergency Room included: temperature 98.8° F, pulse 88, respirations 16, and blood pressure 144/91. There was no assessment of pain using a pain scale; however, at discharge, the nurse documented the patient had some relief.

The physician documented in the history and physical

that the patient had a dull aching sensation in the epigastric region for two to three years, but it had become more persistent in the previous four days and occasionally radiated to both of her shoulders. She had vomited once, right before the examination, and then stated she felt better. She indicated that when she swallowed food or fluids, she felt they stopped in the epigastric region. She had occasional shortness of breath when the pain was severe, but there was no diaphoresis. In addition to the previously documented medical history, she had a surgical history of a cholecystectomy and a family history of two brothers who had bypass surgery in their 50's and her father who had a myocardial infarction in his 50's or 60's. She denied use of alcohol or tobacco; she had been dieting for the past year and had lost 40 pounds.

An electrocardiogram was interpreted as a normal sinus rhythm of 76, with nonspecific ST abnormalities, and no significant changes compared to an electrocardiogram of four and a half years prior. A lipid profile revealed: cholesterol 190 (normal 50-200 mg/dL), triglycerides 140 (20-160 mg/dL), HDL 52 (>35 mg/dL), LDL 110 (65-175 mg/dL), VLDL 28 (5-35 mg/dL), and cholesterol/HDL ratio 3.7 (4.4 normal risk of cardiac artery disease for women, 3.3 half risk). Blood chemistries included: ALT(SGPT) 17 (normal 0-55 U/L), AST (SGOT) 14 (0-45 U/L) and alkaline phosphatase 49 (35-120 U/L).

Discharge instructions included a bland diet, Zantac® 150 mg. twice a day, and she was told to see her primary care physician in three days and to return if there were worsening or new symptoms. The dictated report also documented that the Emergency Room physician briefly spoke with her primary care physician and informed him of the discharge instructions. Additionally, the Emergency Room physician stated that he informed the patient that he could not completely rule out a cardiac cause of her discomfort and that she should return if the symptoms recurred, worsened or if she had chest discomfort, nausea, or diaphoresis. Her condition at discharge was documented as good.

Two days later, she returned to the Emergency Room shortly after midnight with a chief complaint of chest pain for three days. The nurses' notes indicated that the pain had increased that night and was sharp. She also vomited in the evening. She had seen her primary physician earlier that day for the same problem and was treated for gastroesophageal reflux disease. Baseline vital signs were: temperature 97.2° F., pulse 63, respirations 18, and blood pressure 123/64. Again, no pain scale was used to assess the pain. A second set of vital signs was recorded two hours later, and a third set five and a half hours after that, with values similar to baseline for both sets.

A saline lock was started an hour-and-a-half after her arrival to the Emergency Room, and she was then given 50 mg. of Zantac® intravenously. She had relief of the pain and was sleeping a half an hour later. In another two and a half hours, she was complaining of pain, received 50 mg. of Demerol® IV, vomited after receiving the narcotic, and was then medicated with 12.5 mg. Phenergan® IV. Two hours

later, the pain was worsening, and she was given 8 mg. of morphine IV push and again vomited green liquid after the narcotic was administered. Within 15 to 30 minutes she was resting and stated she had some relief of the pain. The Emergency Room physician who dictated the Emergency Room note recorded that she had vomited bitter material without blood four times that evening prior to coming to the hospital. She described the pain as a dull ache, not burning, that was constant and radiated to the back. A complete blood count was normal, glucose 147 (normal 70-110 mg/dL), alkaline phosphatase 46 and amylase 88 (normal 0-125 U/L). An x-ray of the kidneys, ureters, and bladder showed no free air or air-fluid layering pattern. The impression/diagnosis was epigastric pain, rule out gastritis, ulcer, or pancreatitis. This physician anticipated that after she was re-evaluated, the woman would be discharged and would follow up with her primary care physician.

An addendum to this report by the physician who took over on the next shift included the following information: workup for epigastric abdominal pain, heme positive stool, initial relief after IV Zantac® and Phenergan®; later-developed increasing pain which was relieved with Demerol® and Phenergan®, but pain increased again in the epigastric region radiating to her back; severe epigastric tenderness with palpation and voluntary guarding; and no generalized abdominal or lower abdominal pain. X-ray of the abdomen revealed large amount of stool with no free air or evidence of obstruction; chest x-ray was unremarkable. The second Emergency Room physician spoke to her primary care physician, who requested a surgical consult. She was evaluated by the on-call general surgeon an hour later, and then admitted as an in-patient in another 45 minutes.

The surgical discharge summary relates the sequence of events as previously stated; however, additional information that was not documented in the Emergency Room reports included that she complained of left upper quadrant pain radiating to the back, she had vomited five or six times, and she had not had a bowel movement for several days. Although she had not had a menstrual period for ten months, that was not unusual for her. She had no menopausal symptoms. Physical examination revealed some epigastric and left lower quadrant tenderness. The impression was reflux esophagitis, and she was scheduled for an endoscopy the next day. Repeat blood chemistry later that morning after admission revealed a glucose level of 146 and AST (SGOT) of 56.

Once she was transferred to the in-patient unit, the nursing admission assessment was begun a half hour later, with the major nursing diagnosis of Alteration in Comfort. This nursing diagnosis was also hand-written on the 24 Hour Assessment Form, with the first intervention written: Assess pain level and medicate for pain prn as ordered. There was also a printed plan of care for abdominal pain with the first intervention to assess pain level prn and document location, severity, and characteristics. Other than a set of vital signs on the nursing admission assessment form, there was

only one other set recorded on the graphic record at 4:00 p.m. A pain scale level was not recorded on either form. Intake and output measurements were recorded on the respective form for day, evening, and night shifts. Glucose monitoring values were recorded for the evening and night shifts. She received 50 mg. of Demerol® IM once each on the day, evening, and night shifts, and 10 mg. of Compazine® IM once each on the evening and night shifts approximately 1 to 2 hours after the Demerol®, yet the effectiveness was not recorded on the PRN medication record for any of these medications. The nursing progress notes had two brief entries prior to noon for the day shift and four minimal entries for the evening shift: complained of nausea and vomited, to CT scan, medicated with Demerol®, and vomited after the Compazine®. The next entry was the following morning, 12 hours after the last entry on the evening shift. The nurse documented that the patient complained of right upper quadrant pain and rated it as 7 on a scale of 1 to 10, with 1 being the lowest and 10 the highest. She also documented that she explained to the patient that she could not give her anything because she was going to the operating room soon. This was the only use of assessing the level of pain with a numeric scale during the patient's entire hospitalization.

A routine pre-operative electrocardiogram was done the evening prior to surgery but was not read by a physician. According to the perioperative nursing record documentation, upon the patient's arrival to the holding area, her electrocardiogram was reviewed by the anesthesiologist, who discovered the abnormal changes. She was given a nitroglycerin tablet sublingually, oxygen via a nasal cannula, connected to a monitor, and transferred to the Intensive Care Unit, where she was started on a nitroglycerin drip at 10 micrograms.

The cardiologist's consultation report stated that she had epigastric discomfort and pleuritic chest pain through the night but did not report it to the nurse. The diagnosis was acute inferiolateral myocardial infarction with probable superimposed pericarditis.

The interpretation of the echocardiogram was extensive inferioseptal, inferior and lateral wall motion abnormalities with borderline left ventricular systolic function. Blood chemistry was: glucose 156, AST (SGOT) 318, LDH 915 (normal 80-190 U/L), and cardiac profile creatine phosphokinase (CPK) 2413 (normal 0-250 U/L), troponin I >50.0 (normal 0.0-1.5 ng/mL), myoglobin 389 (normal 9-110 ng/mL).

She was transferred to a medical center later that morning for an urgent cardiac catheterization. She expired there ten days later as a result of the extensive acute inferior lateral wall myocardial infarction and associated severe left ventricular dysfunction.

## Summary

This client had a strong family history of two brothers having cardiac bypass surgery and her father who had a myocardial infarction. Her past medical history of non-insulin

dependent diabetes, obesity, hypertension, and hypercholesterolemia were risk factors, but she was prescribed medications for these diseases and had lost 40 pounds by dieting in the past year. However, it was her history of epigastric pain and gastroesophageal reflux disease that lead the physicians to the alternate diagnosis.

The client possibly contributed to the complications by delaying seeking treatment for five to six days, instead self-medicating with antacids and anti-ulcer agents. Once she presented in the Emergency Room, her description of chest pain was not typical of myocardial chest pain experienced by men. It had persisted for the previous three days. The Emergency Room physician did not recognize the significance when he elicited from her that it was a dull aching sensation in the epigastric region, although she had the feeling for several years, but now it occasionally radiated to both of her shoulders. She also had one episode of vomiting and occasional shortness of breath with severe pain. These vague symptoms are also associated with gastroesophageal reflux disease, yet are the symptoms commonly experienced by women having a cardiac event. The client herself may not have been aware that these symptoms are significant in cardiac problems for women or may have not been forceful in communicating the symptoms to the Emergency Room staff.

Although the lipid profile and blood chemistries were within normal limits, should the Emergency Room physician have discharged her to home to see her primary physician in three days despite the nonspecific ST changes in her EKG and his statement that he could not rule out a cardiac cause for her pain? Questions arise why he did not admit her for further observation and monitoring with additional studies such as creatine kinase, and creatine kinase-muscle isoenzyme. Since he also spoke with her primary physician, should the primary physician have followed up with additional studies or seen her sooner?

There was a further delay in treatment when she returned to the Emergency Room two days later, reporting the same symptoms of vomiting; however, the pain had increased and was now sharp. Again, the Emergency Room physician documented her pain as a constant dull ache, radiating to the back. Although she received narcotics and other medications to ease her pain, she was not frequently assessed nor was there complete documentation regarding her pain. Fortunately, the on-coming Emergency Room physician persisted in evaluating the client, resulting in the surgical consultation and admission.

Assessment and documentation from the nurses on the in-patient unit were also lacking. There was a gap of twelve hours between the evening shift entry and the next morning; however, the cardiologist's report indicated the client had epigastric and chest pain through the night but did not report it to the nurse. Even though the first intervention on the standardized plan of care was to assess and document location, severity, and characteristics and administer medication as necessary, the only nurse who thoroughly



assessed the client, using a numeric pain scale, was assigned to the client the morning of her surgery.

It was soon after that when the anesthesiologist read the EKG from the previous evening and made the correct diagnosis, and the appropriate interventions were quickly begun. Unfortunately, it was only after her transfer to a large medical center that the cardiac catheterization was done, revealing the extensive and fatal damage.

This case occurred more than four years ago. Unfortunately for this client, the Joint Commission on Accreditation of Healthcare Organization's (JCAHO) approved pain assessment and management standards in 1999, with scoring for compliance beginning in 2001 (Joint Commission Focuses On Pain Management, 1999). Even so, there are other methods to assess pain such as the PQRST technique. This mnemonic stands for precipitating factors, palliative measures and pattern of pain (P), quality and quantity of pain (Q), region or location of pain and radiation to other areas of the body (R), severity of pain (S), and timing, when the pain began and how long it lasts (T) (LeMone and Burke, 1996, p.88).

Although the client was not properly assessed by the nurses and physicians, which could have led to the correct diagnosis, the thrust of the plaintiff's case was that the hospital did not have a policy for electrocardiogram interpretation after hours by qualified personnel. The deposition by the EKG technician stated that she was newly trained and was not experienced in recognizing abnormal rhythms.

This woman's experience is repeated with less dire outcomes in many settings each day. Providers fail to accurately assess pain using a pain scale and miss many subtle clues to the real cause of a woman's complaints. Frequently, heart disease is very low in the diagnostic differential. Heart disease must be recognized as an equal opportunity killer of both men and women. Nurses play a most important role in recognizing and educating others about the signs and symptoms of heart disease in women. In many cases, nurses can be the catalyst for early recognition and management of this disease and thereby save women's lives.

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## Book Review

### *Nurse Practitioner's Business Practice and Legal Guide, Second Edition* Carolyn Buppert, CRNP, JD—Jones and Bartlett Publishers

Reviewed by Nancy Jaskowak Cresse, MS APRN-BC

Once in a while, a book comes along that changes the order of resources used in researching an nurse practitioner-related case as a legal nurse consultant, or in initiating practice as a nurse practitioner. In a country with a wide range of variation in nurse practitioner scope of practice, legislative edicts, and managed care standards, the value of the legal nurse consultant's opinion is directly related to the state-specific and case-specific information used. This second edition of *Nurse Practitioner's Business and Legal Guide* has hit the mark.

As a practicing NP and attorney, author Carolyn Buppert has cut through the confusing statutory regulations and provided clear legislative statements and standards,

state-by-state. She also exposes vague or outdated language in specific statutes that does not clearly identify the NP as "provider" and that would benefit from legislative revision.

Organized for clarity and very user-friendly, the book outlines state-specific definitions and scope of practice of the nurse practitioner. Several chapters cover state and federal regulations on a myriad of topics, including Medicare, Medicaid, prescribing controlled substances, care in nursing homes, hospital admitting privileges, the role of the primary care provider or collaborating physician, documentation, and confidentiality.

A chapter on malpractice and one on risk management guide both the NP and the LNC in identifying and

*(continued next page)*

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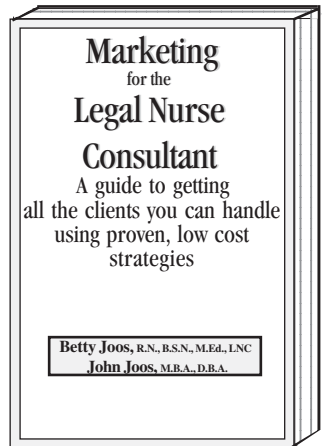
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## Q: What are the queries involved in the HIV Oral Testing and its Technology?

*Beatrice McCarthey-Schnoblen, RNC MSA, Greater Detroit Chapter/American Association of Legal Nurse Consultants*

**A:** A highly accurate alternative to blood testing is the HIV Oral Antibody Test. In June of 1996, the FDA approved the oral HIV antibody test, and it is 99.9% accurate.

The technology uses a sample of oral mucosal transudate, not saliva. The sample is obtained by using a specially treated pad that is placed between the gum and lower cheek, which is gently rubbed back and forth until it is wet and then left in place for two to five minutes. The pad is then placed in a vial with a preservative and sent to a clinical laboratory where it is tested for the presence of HIV antibodies, the same way blood samples are tested. A single sample is sufficient for the initial screening and for confirmatory testing. Results are ready in 3-7 days. Analysis of the oral sample is done with an enzyme linked immuosorbent assay (ELISA), a highly sensitive screening test that detects HIV antibodies.

Advantages of using HIV Oral Testing include the following:

- The procedure is painless;
- It requires no needles;
- There is no visible sign that testing was administered;
- The technique is safe for healthcare workers;
- Healthcare cost are minimal; and
- Individuals are more willing to give an oral sample than a blood sample.

Testing, together with effective counseling, empowers individuals to make better personal choices and lead healthier lives. Without reinforcement, one may continue high-risk behaviors or remain unaware of the treatment and/or counseling options that are available. The HIV Oral Antibody Test can be used for clients thirteen years and older.

It is important to get HIV Oral Testing at a facility that provides pre and post-test counseling; this has been proven to be effective in helping the clients understand the tests and the ramifications of the results. HIV Oral Testing is not performed

in the absence of informed consent or pre-test counseling, which includes discussion on the purpose of testing, the meaning of reactive and non-reactive results, the measures taken to protect confidentiality, and the need to notify persons at risk. Guidelines for pre- and post-testing have been published by the Public Health Services and Centers for Disease Control.

I just got tested. What about you?

### Suggested Readings

- Novello, M.D., M.P.H., Antonia Coello. Surgeon General's Report to the American Public on Aids. 2001.
- Relative Risks of Sexual Behaviors (1999). Retrieved from <http://www.cdc.gov/nchstp/hiv-aidsinfo.htm>.
- Michigan Department of Community Health (MDCH), 1999. Human Immunodeficiency virus antibody test, pre-counseling and informed consent.

Beatrice McCarthey-Schnoblen, RN BS RNC MSA, is Board Certified in Medical-Surgical Nursing from the American Nurses Credentialing Center, 1999. She has practiced as an Independent Nurse Consultant since 1996. In addition, she works as a medical record reviewer for a private organization on medical malpractice defense and peer review cases. She is an active member AALNC/ Greater Detroit Chapter, and Chi Eta Phi Sorority, Inc., Lambda Chi Chapter (professional nursing organization). She has more than 20 years of nursing experience in medical-surgical, recovery, and ambulatory care.

This column slated for the Fall 2003 issue was inadvertently omitted, and the JLNC is pleased to include it for our readers in the Spring 2004 issue.

### Book Review *(continued from previous page)*

minimizing successful litigation. The table of contents and detailed cross-referenced index serve to make this resource an easy-to-use reference.

This book also addresses health policy, managed care organizations, the NP as employee versus practice-owner, measurement and enhancement of NP performance, and compliance. Of particular value is the chapter on contracts

and collaborative agreements; this section is extremely informative and very thorough.

The author demonstrates good use of applicable case law and examples in the areas of risk, negligence, and ethics in practice. A must-have, this book is an invaluable reference to any LNC resource library.

*Pages: 478*

## The Basic Life Support Ambulance Trip Record

*M. Thomas Quail, MS Ed RN NREMT*

Ambulance companies, regardless if they are owned privately or by a municipality, are required to generate a pre-hospital patient care report, also known as the Basic Life Support (BLS) trip record. The trip record might look like any other medical record to the untrained eye; however, when reviewing trip records or conducting an investigation, the experienced legal nurse consultant (LNC) is aware there are many variations, formats, styles, and sources of trip records available. The LNC must know where to locate important pre-hospital information, in order to save valuable time and resources. The LNC needs to fully understand:

- How the emergency medical service (EMS) system functions as an entity in delivering pre-hospital patient care.
- Regulatory requirements.
- Incident command structure and specific environmental factors that incite various agencies to respond to specific incidents.
- Jargon that EMS personnel utilize and are required to document on the trip record.

### Documentation and EMS Operation

Each trip record is similar to a puzzle that provides valuable information. Each piece of information must be collected to create a complete picture of the incident scene, patient's condition, treatment rendered, agencies involved, and expected or unexpected changes, both to the patient and the environment, prior to the patient's arrival to the receiving facility or destination.

The majority of trip records contain basic patient information, billing and insurance information, a location for treatment rendered, a location for the patient to sign if they refuse treatment, and a signature page for payment and release of medical information. Additional records and signatures are now required by ambulance services since the enactment of the Health Insurance Portability & Accountability Act (HIPPA).

During a records review, knowing where to locate the trip record is extremely valuable. Busy EMS systems often do not allow the necessary time that is required for the emergency medical technicians (EMTs) to complete a comprehensive trip record. Trip records are often completed later during the shift, when the EMT has returned to their headquarters. Information is frequently added and sometimes even altered.

Ambulance providers all agree that multiple copies of the trip record must exist. A carbonless paper (NCR) system is used, with three to six carbon copies for each trip record

generated. Each copy is color-coded for specific distribution to a designated department in the EMS system.

Trip record information begins with the initial emergency call. Small communities still use their local police department or regional dispatch system, while larger communities have individual dispatch centers within each emergency agency. The dispatcher provides the responding agencies with color codes or priority codes to describe the patient's condition and urgency of the call. Incident response codes have become important information that the EMTs need to document on the trip record, as these codes may later be crucial in a civil liability case when emergency vehicles are involved in a crash while responding to an incident.

### Regulatory

A number of states require, in regulations, that licensed ambulance services maintain specific dispatch and trip record information as part of their compliance. Massachusetts, for example, has such regulation defined in 105 CMR 170.000 of the Emergency Medical Service System, listed specifically under 170.345 Records. It states:

"The trip record must include: date; times; location of dispatch, pick-up and delivery; identification of vehicle; relevant patient information to include [the] patient[s] medical condition at the scene and in transit; names of EMTs and their level at which they are functioning; identification of any and all ambulance services and first responder agencies that responded to the call. In addition, upon arrival at the receiving facility the EMTs shall deliver a copy of the trip record which must be kept with the patient's medical records."

States that do not define in regulation a specific requirement for trip records may utilize their Medical Treatment Protocols or Agency Policy to define such trip record requirements.

The incident commander (IC) determines who and what agencies are required to assist at each incident. Agencies responding to incidents may include local, state, or county police or sheriff; volunteer and/or municipal fire departments; first responders; EMTs at each level of training (basic, cardiac, intermediate or paramedic); private ambulance services; and helicopter or fixed winged aircraft. In addition, specialized trained units may be contacted, such as tactical rescue EMS; diver rescue EMS; HAZMAT; or railroad police, to name a few. The LNC should be familiar with the documentation required by each agency who responded.





EMS terminology has changed over time. As new training curriculums are developed, certain terms continue to have the same meaning. Examples include:

- Primary Survey; Airway, Breathing, Circulation; ABC
- Secondary Survey; SS; Detailed physical exam; PE
- Focus History: a detailed assessment of the chief complaint, including a SAMPLE history
- Neurological Status: Alert and oriented to person, place and time; A & O x 3; AVPU
- PTA: Prior to arrival or UA: Upon arrival
- PD, FD, FF: Agencies of the Police or Fire Departments and personnel on scene
- “Code 4”: Specific 10-code designation that is particular to this agency
- Unit Designation (based on level of training): “B-210”; “I-3”; “Medic 4”; ALS 2
- Coordinated Medical Emergency Direction (CMED): Tape-recorded communication from agency to the receiving facility
- Trauma score; TS; Trauma index; TI

The trip record is a unique document with specific entities known throughout the pre-hospital EMS system. The trip record is an essential document when reviewing all records and can assist the LNC during a records review or investigation. Trip records are a small piece to a larger puzzle and allow the reviewer to develop a reasonable understanding of the events that occurred to the patient, from the moment the pre-hospital agency was contacted until the patient is discharged.

### Acknowledgements

The author would like to thank the following services for allowing the use of their trip records as part of this article:  
Central Massachusetts EMS Corp. Holden, MA

Town of Littleton Fire Department Littleton, MA  
Trinity EMS, Inc. Lowell, MA  
For an electronic version of the trip records, please e-mail a request to Tom.Quail@state.ma.us.

The Editorial Board of The Journal of Legal Nurse Consultants would like to thank Meriam L. Dennie, RN BSN MS CEN SANE-A PHRN NREMT-B, for her assistance with review and editing of this submission. Ms. Dennie is a Flight Nurse with LifeNet for Christiana Care Health Systems in Newark, Delaware.

M. Thomas Quail, MS Ed RN NREMT, has a background in Emergency Medicine that spans more than 30 years. He is a Registered Nurse of 20 years, an Emergency Medical Technician (EMT) of 30 years, and a Legal Nurse Consultant of two years. For the last four years, Tom has been the Clinical Coordinator for the Department of Public Health-Office of Emergency Medical Services in Boston. Previously, he was a Certified Specialist in Poison Information (CSPI) at the Regional Poison Control Center located at Children’s Hospital in Boston. Quail maintains his EMT by volunteering for the Town of Littleton, Massachusetts, Fire Department Ambulance Service. He lectures to nurses and EMTs in pre-hospital emergency care and has published articles, written abstracts, and presented posters in Pre-Hospital Emergency Medicine, Toxicology, and Forensic Science. He is a member of the Southern New England Chapter of Legal Nurse Consultants, American Academy of Clinical Toxicology, and the Massachusetts Association of Emergency Medical Technicians; an associate member of the American Association of Legal Nurse Consultants and Northeastern Association of Forensic Scientists; and a charter member of the National Association of Emergency Medical Technicians.

**Table 1. Mnemonics**

A-V-P-U	S-A-M-P-L-E	O-P-Q-R-S-T	D-C-A-P-B-T-L-S
Neurological Status	History	Assessment Medical or Trauma	Detailed Trauma Assessment Check for presence of:
Alert	Signs and symptoms of present illness/injury	Onset: when did the symptoms begin and what was the patient doing at the time?	Deformities
Responds to Verbal Stimuli	Allergies: medications and environmental	Provocation: activities that change the pain/complaint	Contusions
Responds to Painful Stimuli	Medications/Drugs prescribed, over the counter, and illicit	Quality: sharp, dull, throbbing, crushing, constant vs. intermittent	Abrasions
Unresponsive	Past Medical History Last Oral Intake Events Leading to the current illness/injury	Radiation: yes/no and to where? Severity: rate on a scale of 1 to 10 Time: how long has pain/complaint lasted?	Punctures/penetrations Burns Tenderness Lacerations Swelling

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# DNA: Innocence and Beyond, Part I

Lisa M. Schwind, RN, Esquire

DNA (Deoxyribonucleic Acid) is often referred to as the blueprint of life, as it stores information that is passed down securing future generations. As technology advances, the science of DNA and the role of the LNC will collide in both civil and criminal litigation. Understanding the science behind DNA will assist the LNC in educating the attorney client, as well as allowing the LNC to recommend testing or DNA evaluations to assist in the prosecution or defense of the attorney's case. Part I of this column focuses on the history and provides a basic understanding of the science behind and the usefulness of DNA testing and collection.

Since DNA typing was launched in the mid-1980s, it has revolutionized the ability to match perpetrators with crime scene evidence. British geneticist Dr. Alec Jeffreys is credited for the technology, which led to the first criminal case utilizing DNA in 1986. Colin Pitchfork was convicted in Great Britain for murder based on his genetic profile and the work of Jeffreys ([www.crimelibrary.com/criminal\\_mind/forensics/dna](http://www.crimelibrary.com/criminal_mind/forensics/dna)). The first case credited for the use of DNA technology in the U.S. occurred in 1987 with the case of Tommie Lee Andrews in Florida. The case that brought DNA into the living rooms of America, was the 1995 trial of Orenthal James (O.J.) Simpson. Nine years later, discussions of DNA are common on daytime soap operas, forensic documentaries, and around the water cooler.

Juries have come to expect DNA evidence in criminal trials, and it has grown in popularity in the civil sector as well. Juries are believed to view DNA evidence as dispositive, as they consider it infallible ([www.5mh.com.au/articles/2004](http://www.5mh.com.au/articles/2004)). Despite this belief, DNA is not a perfect science.

The earliest form of DNA testing, RFLP (Restrictive Fragment Length Polymorphism), required evidentiary samples the size of a quarter. Today's technology, STR (Short Tandem Repeats) testing, may be completed on samples weighing 2-5 nanograms, a size less than the head of a pin.

## Types of DNA Tests

The most commonly utilized DNA for testing is known as nuclear DNA, named for the source of the testing component, the cell's nucleus. Nuclear DNA derives one-half of the genetic material from the mother and one-half the genetic material from the father of the DNA contributor (individual). The most common sources of DNA include white blood cells, sperm, bone, hair shaft, teeth, and epithelial cells. Other tissue may be utilized as well. Sources of epithelial cells include skin, hair root, urine, semen, mucus, saliva, vomit, and feces.

Nuclear DNA is tested using the STR testing methodology. STRs enable a sample to be amplified to almost any size. This is much like the process in which DNA copies itself in a cell. This process enables very tiny samples to be analyzed. STRs look at specific areas of nuclear DNA, which

are known to vary widely among persons. These areas of DNA vary in length between different persons. Forensic DNA STR analyses measure these differences. The entire genetic profile of a person is not identified for comparison in forensic uses. Only specific locations or loci within the genome are compared. Typically 13 to 15 of these loci are compared. This nuclear DNA is unique in all persons except for identical twins. A genetic profile utilizing these 13 to 15 STRs may be extremely useful for comparing an unknown or questioned item to a known reference profile. A match would establish the source of the questioned biological sample.

STR methodology is an improvement over older methods, as it takes less time to complete the process and is therefore less expensive; however, additional time is needed to complete extraction of the sample from the substrate (e.g. cloth) and for the statistical analysis to be completed. Generally, STR testing may be completed within hours, whereas the older RLFP technology could take up to a month for completion. STRs allow for great discrimination between individuals. Statistics commonly reach levels of 1 in 6 quadrillion—meaning only one in 6 quadrillion individuals possess a given DNA profile, thus making it individualized.

Other extra nuclear DNA also exists within the human mitochondria. Mitochondrial DNA is found in the very small components of a cell called the mitochondria. Many mitochondria may exist within one cell. As there are more copies of mtDNA per cell than in nuclear DNA, there is a greater chance at success in determining a profile. This is especially true in degraded samples, old bone, samples of minute quantity, and shed hairs. Testing of mtDNA is more time consuming than STR testing.

mtDNA differs from nuclear DNA in that it is inherited only from one's mother. The father does not contribute to the genetic profile, which lies within the mtDNA. This means that brothers and sisters sharing the same mother will have the same mtDNA. The sister's offspring, as well as the mother's brothers and sisters (assuming they share the same mother) will also share the same mtDNA. For this reason, the significance of a match is reduced. With no individuality to a mtDNA profile, the usefulness of this technology is limited to excluding a suspect. A key usage of mtDNA exists where the possible source of a biological sample is not available for comparison, but an appropriate family member's sample may be developed for reference. Due to high cost, longer laboratory utilization, and limitations regarding individualization of profiles, this type of DNA testing is reserved to cases where no other methods are appropriate.

The newest method of DNA testing, termed Y-Testing, involves DNA testing concentrated only on the Y chromosome. Thus, this testing is limited to samples of biological material originating from males. Similar to mtDNA, this

testing methodology is limited in usefulness. It identifies families, not individuals. Y-Testing may be useful in cases involving a missing male, with appropriate male relatives for reference comparison. It may differentiate between multiple male contributors in a mixed single sample. Mixed female/male samples of a single source (e.g. epithelial cells) may also be tested utilizing Y-Testing. This technology is new and has not yet reached approval for scientific reliability (i.e. Daubert/Frye) in all jurisdictions.

## Uses for DNA Tests

Much of the publicity surrounding DNA testing focuses on analysis of samples involved in criminal cases; however, the use of this testing methodology extends well beyond those more common applications. The evidentiary samples utilizing epithelial cells from the hands include swabs from surfaces such as the inside of a car, door handles, machinery, clothing, and hats may confirm that a person has been present at a certain place. Fingernail scrapings may be tested in cases involving assault or sexual harassment. Aside from swabs collected within an ordinary rape kit, urethral swabs, and swabs taken from the shaft of the penis, an alleged perpetrator's undershorts, or the inside edge of the fly from the alleged perpetrator's pants may yield epithelial cells from a sexual assault victim. A condom may yield both the suspect's DNA profile from ejaculate or epithelial cells within the interior, as well as the victim's epithelial cells on the exterior. A weapon may reflect a perpetrator's DNA on the handle, as well as the victim's blood on the opposite end. Epithelial cells in saliva may be retrieved from bite marks, partially eaten food items, envelopes, glasses, and toothbrushes. Vomitus from an intoxicated victim may also contain epithelial cells from the digestive tract and be used to establish location of an offense. Pods, seeds, and other plant matter may be used to establish that a body or vehicle had been present at a specific location.

The use of DNA testing in civil cases has been greatly underutilized. Agricultural uses include confirming the identity of genetically pure lines of crops and identifying hybrids. The utilization and testing of genetically engineered crops is of concern to growers, processors, and manufacturers ([www.mindfully.org](http://www.mindfully.org)). Testing may be completed to confirm if extensive inbreeding in chickens has occurred or to confirm the parentage of dogs, cats, and horses, thus insuring that contracts in purchasing and breeding have been fulfilled. The source of furs and other materials originating from animals may be confirmed. Environmental purposes extend to identifying the source of bacteria such as sewer discharge causing water pollution, chicken manure from farms, human waste and even seagull waste ([www.uswaternews.com/archives/arcquality/2de/us](http://www.uswaternews.com/archives/arcquality/2de/us)).

The use of DNA testing in establishing paternity extends beyond that of securing child support payments in a typical custody case. Family relationships may be confirmed for use in insurance, probate, and social security issues. Paternity may be established prior to birth. The establishment of paternity in cases of multiple partners may also

be determined.

DNA may be utilized in immigration cases to determine the issue if an applicant is a blood relative of a US citizen. Testing may be used to establish the relationship between mother and child in cases where mothers surrender children in foreign adoptions. In such cases, testing may confirm that the child belonged to the mother and was not kidnapped for the purpose of receiving payment, as may be tendered in a foreign adoption.

DNA testing may be used to confirm the source of blood and urine samples collected for drug screening where disputes exist in employment cases as well as tissue biopsies in medical malpractice cases. Given the sensitive nature of DNA testing, safeguards and protocols could be under scrutiny in DNA testing cases.

Microbes as the etiology of sexually transmitted diseases caused by bacterial and viral agents may be both verified and compared between individuals. This has both criminal and civil applications. Bacteria causing large-scale food poisoning and related cases may be compared between persons in cases involving cruise ships, hotels, and restaurants. The opportunities for testing are endless as creative practitioners realize the true potential of DNA testing.

Despite the wonder of DNA testing, concern exists for questionable testing results. Recent blood transfusions may render a DNA profile of the blood donor not the recipient. Individuals who have received bone marrow transplants will render two distinct DNA profiles—one from their blood and another from all other possible DNA sources. Individuals who have undergone transgender realignment surgery will reflect a DNA profile of the opposite gender from which they appear anatomically. Although DNA has been heralded as absolute proof in many cases, both civil and criminal, the LNC must be cognizant that having DNA profiles match a case is not THE answer. These results do not answer how long the biological sample was present, how the biological sample got there, and when the biological stain was deposited.

Stay tuned for Part II of this series, and learn the basics of reviewing a DNA case and how to apply DNA findings to case specific issues.

## Further Reading

- “The Evaluation of Forensic DNA Evidence”, National Research Council, National Academy Press 1996. (The “bible” of DNA)
- “Forensic DNA Typing & Technology behind STR markers”, Butler, Academic Press 2001.
- “An Introduction to Forensic DNA Analysis, 2nd ED” Rudin and Inman, CRC Press 2002.

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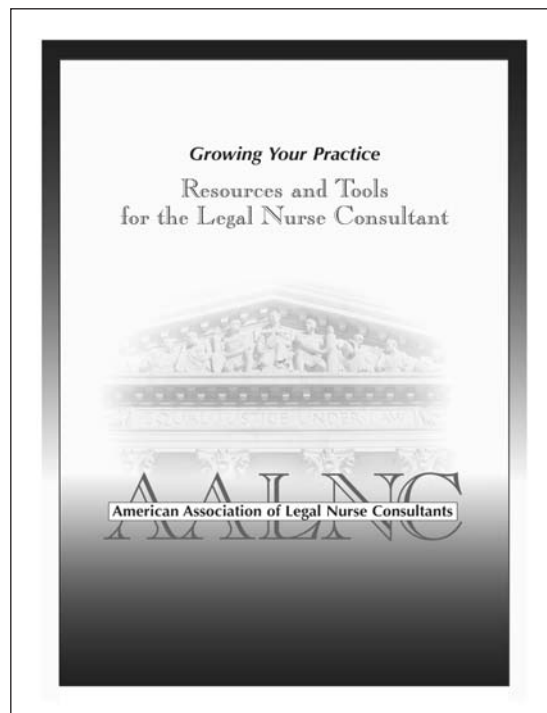
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