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Special Report: Viagra in the ED

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September 1999

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Viagra side effects range from headaches to heart attack

Viagra is popular, so learn about these possible dangers

The impotence drug Viagra has become a household word, but it can be dangerous for many patients, stresses **Odette Comeau-Luis**, RN, MS, CCRN, coordinator of the Emergency Cardiac Care Center at Loma Linda (CA) University Medical Center and Children's Hospital. "There are side effects and interactions to consider when treating patients who are taking Viagra."

Sildenafil citrate (Viagra), manufactured by Pfizer in New York City, has become a widely prescribed pharmacological treatment option for erectile dysfunction. Serious cardiovascular side effects including myocardial infarction, sudden death, ventricular arrhythmia, cerebrovascular hemorrhage, transient ischemic attack, and hypertension have been reported with Viagra. **(See related story on addressing risks at triage, p. 136.)**

"Many of these events were reported to occur during or shortly after sexual activity, and few were reported to have occurred hours or days after Viagra use and sexual activity," notes **Clyde Miyagawa**, PharmD, clinical pharmacy specialist in critical care at University Hospital in Cincinnati. Other potential adverse effects include headache (16%), dyspepsia (7%), and flushing (10%).

Document addresses effect on heart

Because of reports of side effects, an Expert Consensus Document, *Use of Sildenafil (Viagra) in Patients with Cardiovascular Disease*, was developed by the Bethesda, MD-based American College of Cardiology and the Washington, DC-based American Heart Association. **(See ordering information in Source Box; also see excerpt, both on p. 133.)**

Here are some things you should know about Viagra's potential side effects:

• **There have been reports of cardiovascular side effects with the use of Viagra in the normal, healthy population.** Those have been minor effects, however, and include vasodilatory effects such as headache, flushing, and small decreases in systolic and diastolic blood pressure, says Comeau-Luis. There have been no reports of effects on heart rate or cardiac index, she adds.

• **Patients may experience visual disturbances.** Mild, transient dose-related impairment of color discrimination (blue/green) can occur with high doses of Viagra, with peak effects near the time of peak plasma levels, notes

EXECUTIVE SUMMARY

Viagra is widely prescribed for erectile dysfunction, but the drug has many potential side effects and interactions.

- Possible serious cardiovascular side effects include myocardial infarction, sudden death, ventricular arrhythmia, cerebrovascular hemorrhage, transient ischemic attack, and hypertension.
- Other potential adverse effects include headache (16%), dyspepsia (7%), and flushing (10%).
- Patients at risk for adverse effects include individuals receiving any form of nitrate therapy, patients with active coronary ischemia, and patients on multidrug antihypertensive therapy regimens.

Miyagawa. "This finding is consistent with the inhibition of PDE_6, which is involved in phototransduction in the retina."

• **Patients seeking treatment for erectile dysfunction may actually have coronary artery disease.** "The arterial system is affected in both," explains Comeau-Luis. "The coronary artery disease may be diagnosed or undiagnosed."

It has even been suggested that the risk factors for atherosclerotic heart disease, including smoking, hypertension, high total cholesterol, low high-density lipoprotein cholesterol, and diabetes are also risk factors for erectile dysfunction, Comeau-Luis adds.

Sexual dysfunction in men after the diagnosis of myocardial infarction is common. While most may be due to the fear that exertion may precipitate another myocardial infarction, as much as 10% to 15% is due to organic causes, notes Comeau-Luis.

Are patients using nitrates?

• **Know which patients are at risk.** There are many populations in whom the use of Viagra may be hazardous. "Concurrent use of nitrates with Viagra can lead to large and sudden drops in systemic blood pressure," warns **Christine Clare**, RN, MN, CEN, CNA, nurse manager for express care/industrial medicine and employee health at Loma Linda. **(See story on risks of nitrate therapy and Viagra, p. 135.)**

Other patients at risk include the following, according to Comeau-Luis:

— individuals receiving any form of nitrate therapy;

— patients with active coronary ischemia;

— patients with congestive heart failure, borderline low blood pressure, and low blood volume status;

— patients with complicated, multidrug, antihypertensive therapy regimens;

— patients taking medications that may affect the metabolic clearance of Viagra.

• **Patients with impaired renal or hepatic function may have a reduced clearance of Viagra**, notes Comeau-Luis. "Plasma levels of Viagra will increase in these patients. In patients with renal impairment, it may be twice that of those without renal impairment," she explains. "Therefore, the duration of effect will be prolonged, and the effect may be enhanced at any given dose of medication."

Patients with compromised renal and liver function will be predisposed to adverse effects if their dose is not modified, warns Miyagawa.

Red flag: anti-hypertensive meds

• **Caution is needed for patients taking anti-hypertensive medications.** "This may be a teaching point for a patient with multiple anti-hypertensive medications," says Comeau-Luis. "This could also be a consideration if a patient presents with unexplained hypotension who is on multiple antihypertensives, and has been on them for a long time and has never had problems before."

Patients taking multiple medications for hypotension must be cautioned about the possibility of hypotension induced by Viagra, notes Comeau-Luis.

• **Non-prescription use of Viagra can be dangerous.** Due to the action of Viagra, there is a large underground market, reports Clare. "Due to this fact, many individuals may use the medication without a physician prescription and will be wary to disclose this fact."

• **Side effects can take place during, immediately after, or days after use of Viagra.** Many of the side effects/complications occurred during or shortly after

COMING IN FUTURE MONTHS

- Update on prescription drug reactions
- Address cultural diversity in your ED
- Unique cardiac presentations of the elderly
- Know legal risks of delegating nursing tasks

SOURCES

For more information about Viagra, contact:

- **Christine Clare**, RN, MN, CEN, CNA, Loma Linda University Medical Center and Children's Hospital, 11234 Anderson St., P.O. Box 2000, Loma Linda, CA 92354. Telephone: (909) 558-4000, ext. 43448. Fax: (909) 478-4416. E-mail: CClare@ahs.llumc.edu.
- **Odette Comeau-Luis**, RN, MS, CCRN, The Emergency Cardiac Care Center, Loma Linda University Medical Center and Children's Hospital, 11234 Anderson St., A-126, Loma Linda, CA 92354 Telephone: (909) 558-4000, ext. 42302. Fax: (909) 558-4641. E-mail: OComeau-Luis @ahs.llumc.edu.
- **Clyde Miyagawa**, PharmD, University Hospital, Department of Pharmacy Services, ML 0740, 234 Goodman St., Cincinnati, OH 45267. Telephone: (513) 584-7675. E-mail: MiyagaCI @Healthall.com.

The American College of Cardiology/American Heart Association Expert Consensus Document, *Use of Sildenafil (Viagra) in Patients with Cardiovascular Disease* is available for $5.00 per copy. (The document is partially excerpted beginning on this page.) To obtain a copy, contact:

- **American College of Cardiology**, Educational Services, 9111 Old Georgetown Road, Bethesda, MD 30814. Telephone: (800) 253-4636 or (301) 987-5400, ext. 694. Fax: (301) 897-9745. Web site: www.acc.org.

sexual activity, reports Comeau-Luis. "A few reported shortly after the use of Viagra but without sexual activity, and some occur hours to days after use of Viagra and sexual activity."

• **Know side effects associated with Viagra.** Flushing, dyspepsia, and headache are the most common side effects, says Clare. "In both the pre-hospital and ED setting, patients have been severely hypotensive. This had been a result of a nitrate, primarily nitroglycerin, being administered to a patient who had taken Viagra."

Some patients also have complained of dizziness and lightheadedness, and some have had syncopal or near syncopal episodes. "The cardiac neurological complications can be life threatening, and deaths have occurred," says Clare. ■

Expert Consensus Document from the American College of Cardiology and the American Heart Association on Use of Sildenafil (Viagra) in Patients with Cardiovascular Disease

The pharmaceutical preparation sildenafil citrate (Viagra) is being widely prescribed as a treatment for male erectile dysfunction, a common problem that in the United States affects between 10 million and 30 million men. The introduction of sildenafil has been a valuable contribution to the treatment of erectile dysfunction, which is a relatively common occurrence in patients with cardiovascular disease. This article is written to appropriately caution and not to unduly alarm physicians in their use of sildenafil in patients with heart disease.

Reported cardiovascular side effects in the normal healthy population are typically minor and associated with vasodilatation (i.e., headache, flushing, and small decreases in systolic and diastolic blood pressures). However, although their incidence is small, serious cardiovascular events, including significant hypotension, can occur in certain populations at risk. Most at risk are individuals who are concurrently taking organic nitrates. Organic nitrate preparations are commonly prescribed to manage the symptoms of angina pectoris. The co-administration of nitrates and Viagra significantly increases the risk of potentially life-threatening hypotension. Therefore, Viagra should not be prescribed to patients receiving any form of nitrate therapy.

Although definitive evidence is currently lacking, it is possible that a precipitous reduction in blood pressure with nitrate use may occur over the initial 24 hours after a dose of Viagra. Thus, for patients who experience an acute cardiac ischemic event and who have taken Viagra within the past 24 hours, administration of nitrates should be avoided. In the event that nitrates are given, especially within this critical time interval, it is essential to have the capability to support the patient with fluid resuscitation and adrenergic agonists if needed. In patients with recurring angina after Viagra use, other non-nitrate anti-anginal agents, such as beta-blockers, should be considered.

Other patients in whom the use of Viagra is potentially hazardous include those with active coronary ischemia; those with congestive heart failure and borderline low blood volume and low blood pressure status; those with complicated, multidrug, antihypertensive therapy regimens; and those taking medications that may affect the metabolic clearance of Viagra. With respect to patients following complicated multidrug, antihypertensive programs, the randomized studies included a large number of hypertensive patients.

However, most patients were controlled with one antihypertensive agent, and only a small number were controlled with three antihypertensive agents. Until adequate studies are done in these subgroups of patients, sildenafil should be prescribed with caution.

Viagra acts as a selective inhibitor of cyclic GUANYLIC ACID, resulting in smooth muscle relaxation, vasodilatation, and enhanced penile erection. Although the cardiovascular effects of sildenafil reported in available randomized, controlled clinical trials were relatively minor, heart disease patients represented only a small fraction of studied patients and patients with heart failure, patients with myocardial infarction or stroke within six months, or patients with uncontrolled hypertension were not included in these studies. Thus, there are possible problems in the use of Viagra in these patients that have not been adequately studied.

Given the increasing reports of deaths in which the use of Viagra may be implicated, clinicians need to exercise caution when advising their patients with heart disease about taking this medication. Specific recommendations regarding sildenafil and the cardiac patient are summarized in the following table:

Summary Table of Clinical Recommendations

A. Use of Viagra clearly contraindicated

1. Concurrent use of nitrates

B. Cardiovascular effects of Viagra may be potentially hazardous (use dependent on individual clinical assessment)

1. Patients with active coronary ischemia who are not taking nitrates (e.g., positive exercise test for ischemia)

2. Patients with congestive heart failure and borderline low blood pressure and borderline low-volume status

3. Patients on a complicated, multidrug, anti-hypertensive program

4. Patients taking drugs that can prolong the half-life of Viagra

Recommendations for Sildenafil and the cardiac patient

A. Prescribing Sildnafil to patients at clinical risk

1. Sildnafil is absolutely contraindicated in patients undergoing any long-acting nitrate drug therapy or using short-acting nitrates because of the risk of developing potentially life-threatening hypotension.

2. If a patient has stable coronary disease, is not taking a long-acting nitrate, has short-acting nitrate use as the only contraindication to sildenafil, and does not appear to need the nitrate on a consistent basis, the physician and the patient should carefully weigh the risks and benefits of sildenafil treatment. If the patient requires nitrates for mild or moderate exercise limitation, sildenafil should probably not be used.

3. All patients taking organic nitrates, even if they have not asked for Viagra, should be informed about the nitrate-sildnafil hypotensive interaction. There is a substantial potential for patients to obtain Viagra from another physician, a friend, or through the "black market," circumventing health care providers who could offer appropriate caution.

Because sildenafil also potentiates the hypotensive effect of an inhaled form of nitrate such as amyl nitrate or poppers, the concurrent recreational use of poppers and sildenafil could result in sudden and marked hypotensive response that could be serious or fatal. This interaction may be more pronounced in patients taking protease inhibitors concurrently (e.g., indinavir, ritonavir, nelfinavier, and saquinavir).

4. Similarly, patients must be warned of the contraindication of taking sildenafil in the 24-hour time interval after taking a nitrate preparation, including sublingual nitroglycerin. The administration of sildenafil to a patient who has taken a nitrate in any form in the preceding 24 hours is contraindicated.

5. Although firm data are lacking, pre-Viagra treadmill tests to assess for the presence of stress-induced ischemia in patients with overt and covert coronary artery disease can guide the patient and physician relative to the risk of cardiac ischemia during sexual intercourse. We wish to stress that the physical and emotional stresses of sexual intercourse can be excessive in some people, particularly those who have not performed this activity in some time and who are not in good physical condition. These stresses themselves may produce acute ischemia or precipitate myocardial infarction. Such patients should be advised to use common sense and to moderate their physical exertion and their emotional expectations before they begin their experience with taking Viagra.

6. If patients are taking a combination of antihypertensive medications, they should be cautioned about the possibility of sildenafil-induced hypotension. Because both venous and arterial vasodilation occur with sildenafil, initial monitoring of the blood pressure with the institution of Viagra use would identify patients with an undesired hypotensive blood pressure response. This is an area of particular concern for the patient with congestive heart failure who has a borderline low blood volume and a low blood pressure status as well as for the patient who is following a complicated, multidrug, antihypertensive therapy regimen. ■

Source: American College of Cardiology, Bethesda, MD, and American Heart Association, Dallas.

Nitrate therapy, Viagra don't mix

Viagra is absolutely contraindicated in individuals receiving any form of nitrate therapy, emphasizes **Odette Comeau-Luis**, RN, MS, CCRN, coordinator of the Emergency Cardiac Care Center at Loma Linda (CA) University Medical Center and Children's Hospital.

This includes all forms of nitrates: short-acting tablets or sprays, long-acting nitrates, nitroglycerin patches, pastes, and amyl nitrite or nitrate (also known as the recreational drug "poppers"), says Comeau-Luis.

Nitrates vasodilate along the same pathway that Viagra does, and so there is a marked potentiation of the vasodilatory effects when both medications are presents, notes Comeau-Luis.

Viagra potentiates the vasodilatory effect of circulating nitric oxide (nitrate mechanism of action), resulting in a significant and potential fatal fall in blood pressure, warns **Clyde Miyagawa**, PharmD, clinical pharmacy specialist in critical care at the University Hospital in Cincinnati. "Case reports have been reported of patients with cardiovascular disease taking nitrates who then take Viagra and have developed severe hypotension with consequent myocardial ischemic events."

Here are some management tips regarding Viagra and nitrate therapy, according to Comeau-Luis:

• **The use of Viagra in the chest pain patient should be assessed prior to the administration of nitrates.**

• **Patients taking nitrates should be informed about the interaction between nitrates and Viagra, even if they have not asked for it**, cautions Comeau-Luis. "There is the potential for obtaining Viagra from a friend or through the 'black market' or other source."

• **Caution and education is warranted in patients who only occasionally take nitrates and wish to try Viagra.** The potential pitfall is the patient who develops chest pain after engaging in sexual activity and reaches for the nitroglycerin.

• **Patients must be informed of the 24-hour time window in which interactions may occur.**

It has been reported that when healthy volunteers were given Viagra followed by nitroglycerin one hour later, they experienced large decreases in systolic blood pressure (25mmHg to 51 mmHg) as well as diastolic blood pressure (up to 26 mmHg),[1] Comeau-Luis notes. Other symptoms included light-headedness, headache, and nausea.

Decreased blood pressure with the use of nitrates may occur within 24 hours after a dose of Viagra.[1]

Be sure you know the side effects of Viagra

The overall side effects of Viagra may be classified into four categories, according to **Odette Comeau-Luis**, RN, MS, CCRN, coordinator of the Emergency Cardiac Care Center at Loma Linda (CA) University Medical Center and Children's Hospital:

• **vasodilatory effects: headache, flushing, rhinitis, dizziness, and hypotension;**

• **gastrointestinal effects: dyspepsia and reflux;**

• **visual abnormalities: blue-green color-tinged vision, increased perception of light, and blurred vision;**

• **musculoskeletal effects: myalgias.**

The following are complications associated with Viagra, according to **Christine Clare**, RN, MN, CEN, CNA, nurse manager for express care/industrial medicine and employee health at Loma Linda:

• **myocardial infarction;**
• **sudden cardiac death;**
• **ventricular arrhythmia;**
• **cerebrovascular hemorrhage;**
• **transient ischemia attack;**
• **seizure;**
• **priapism** (a problem with the penis remaining erect too long);
• **hematuria** (abnormal presence of blood in the urine);
• **temporary vision loss;**
• **diplopia** (double vision);
• **ocular redness**;
• **increased intra-ocular pressure**;
• **macular edema** (swelling in the macula of the retina);
• **vitreous detachment;**
• **retinal vascular disease.** ■

In patients who may have inadvertently received nitrates after using Viagra and are hypotensive, some recommendations include (depending on clinical indication; may be used alone or in combination):

— **discontinue nitrate therapy;**
— **place the patient in Trendelenburg position;**
— **provide fluid resuscitation;**
— **provide intravenous-adrenergic agonist such as phenylephrine;**
— **provide an-and-adrenergic agonist (norepinephrine) for blood pressure support;**

— **provide intra-aortic balloon counterpulsation.**

The mechanism of action of nitrates is the release of endogenous nitric oxide, notes Miyagawa. "Therefore, other agents that result in nitric oxide release can also result in this interaction, [i.e., nitroprusside]," he says. "Nitrates and nitroprusside should be avoided in patients who have recently taken a dose of sildenafil."

The most common scenario in the ED is a patient who takes a dose of sildenafil, and during sexual intercourse develops some cardiovascular compromise, says Miyagawa. "The patient is taken to the ER to rule out an MI and placed on nitroglycerin [IV or sublingual] for chest pain. This combination then can cause a potentially fatal fall in blood pressure."

Nurses should ascertain from patient or family members if sildenafil is being used prior to starting nitroglycerin or nitroprusside, he stresses.

Reference

1. Cheitlin M, Hunter A, Brintis R, et al. Use of Sidenafil (Viagra) in patients with cardiovascular disease. *J Am Coll Cardiol* 1999; 33:273-82. ■

Address Viagra risks during triage

You may have difficulty addressing sexual issues and medications with patients, says **Christine Clare**, RN, MN, CEN, CNA, nurse manager for express care/industrial medicine and employee health at Loma Linda (CA) University Medical Center and Children's Hospital. "But this needs to be addressed matter-of-factly," she advises. "Realize that failure to obtain this information may lead to a life-threatening complication or delay in diagnosis and treatment."

Here are some tips to consider at triage:

• **Thoroughly question patients who present with a potential cardiac complaint: syncope, chest pain, shortness of breath, etc., or are hypotensive regarding their medication usage**, Clare recommends.

• **Ask specific questions regarding the use of Viagra, whether prescription or not.**

• **Any patient who has taken Viagra and presents with chest pain should not receive nitroglycerin.** "As this is our drug of choice, this assessment needs to be made rapidly to prevent potential myocardial ischemia/infarction," says Clare.

• **Patients may be reluctant to admit they take the drug.** "There is a patient accountability side of care," says **Robert Knies Jr.**, RN, MSN, CEN, clinical nurse specialist for emergency services at HealthSystem Minnesota in St. Louis Park. "They need to tell you all the information they can."

They might not want to tell you they have an impotence problem and take Viagra, he points out. "Then you run the risk of giving them nitroglycerin and having them bottom out horribly."

Trying to obtain the information can be tricky, Clare notes. "I have found that being direct is the best way."

Try the following, Clare suggests: "I know that this may be difficult, but it is very important to know whether or not you have taken Viagra or any other drug to enhance your sexual performance. This is necessary to give you proper treatment. If you have taken certain medications, and we give you nitroglycerin for your chest pain, it can result in severe complications."

Ask questions in private, without the patient's significant other present. "Also, sometimes the male will not disclose the information, but their partner will," says Clare. "You also need to question the partner in private and explain why the information is so important." ■

SOURCE

For more information about addressing Viagra at triage, contact:

- **Robert C. Knies Jr.**, RN, MSN, CEN, Clinical Nurse Specialist for Emergency Services, HealthSystem Minnesota, 6500 Excelsior Blvd., St. Louis Park, MN 55426. Telephone: (612) 993-5413. E-mail: kniesr@hsmnet.com.

What to tell parents about car restraints

Next time a child comes in with an injury, ask the parents specific questions about car safety, urges **Barbara Foley**, RN, executive director of Emergency Nurses Care (EN CARE), the Alexandria, VA-based injury prevention affiliate of the Emergency Nurses Association.

EXECUTIVE SUMMARY

ED nurses must take advantage of "teachable moments" and educate parents about car restraints. Car crashes are the No. 1 cause of injury-related deaths to children above the age of 1 in most states.

- Car seats should face the rear until a child is both over 1 year of age and weighs at least 20 pounds
- Once a child weighs 20 pounds, he or she should be in a front-facing car seat until they weigh at least 40 pounds.
- Children should be in booster seat until they fit properly into an adult seat belt.

"ED nurses are the perfect candidates to help prevent these injuries," she says. "We are teachers by profession, and we need to educate our patients about child passenger safety. Car crashes are still the No. 1 killer of children in this country, and we need to know how to prevent those injuries and deaths."

First, educate yourself about car restraints, urges Foley.

"We'll ask parents if children are up-to-date on shots, but ED nurses usually don't ask questions they don't know the answer to. We won't ask parents about where they place their child's car seat if we don't know ourselves," she says. **(See Resource Box for how to obtain educational materials, right.)**

Look for 'teachable moments'

There are often "teachable moments" when caregivers are likely to listen to advice about car seats. "Even if the child comes to the ED for a broken arm or some other reason, it's a good time to talk about car seats," says **Susan Pollock**, MD, program manager of pediatric and adolescent injury prevention at the Kentucky Injury Prevention and Research Center in Lexington. "Unlike some things, we have a technological answer that does work for prevention. People just have to use it correctly."

Here are questions and answers to share with parents:

• **Question:** Do car seats need to be replaced after a minor accident?

Answer: Yes. "There are minor crashes where kids are OK because they were in car seats, but parents need to know the car seats should be replaced," says Pollock. California has just passed a law making it mandatory for insurance companies to pay for that replacement, she reports.

RESOURCE BOX

Safe Ride News is a publication that covers all aspects of child traffic safety. A one-year subscription costs $29 and includes the latest news in the field of child passenger and traffic safety, reproducible child safety fact sheets to distribute to parents, and an annual article index for research and references. Fact sheets are available in English and Spanish for $5.50 each. Topics include Car Safety for Growing Babies; Meeting the Toddler Car Seat Challenge; and Kids and Air Bags Don't Mix. For more information, contact:

- ***Safe Ride News* Publications**, 5223 N.E. 187th St., Lake Forest Park, WA 98155. Telephone: (206) 364-5696. E-mail: saferide@twbc.com. Web site: www.saferidenews.com.

One-Minute Car Seat Safety Check-up, a two-page checklist for maximum safety when using an infant car seat, convertible car seat, or booster car seat, is available. A pad of 100 copies costs $19.95, plus a $5.50 shipping and handling charge. The *1998 Family Shopping Guide to Car Seats* helps parents make informed decisions by comparing the features of more than 60 car seats. The guide is annually updated to include new products and revised specifications. For one to four packs, the cost is $34.95 plus a $7.50 shipping and handling charge. For more information, contact:

- **American Academy of Pediatrics**, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927. Telephone: (847) 228-5005.

A 1999 Child Passenger Safety Technical Training workshop is being held in Des Moines, IA, Sept. 9-12, 1999. The four-day training uses certified trainers and a national standardized curriculum developed by the National Highway Traffic Safety Administration. The workshop is sponsored by Emergency Nurses Care (EN CARE), the injury prevention affiliate of the Emergency Nurses Association. The curriculum provides nurses with information to work at one of two levels in child passenger safety (technician or instructor), and to become resources to parents, child care providers, and others in their communities. The workshops are free. For more information, contact:

- **Janet Lassman**, RN, Project Coordinator, EN CARE, 205 S. Whiting St., Suite 403, Alexandria, VA 22304. Telephone: (703) 370-4050. E-mail: encare@aol.com.

SOURCES

For more information about child passenger safety, contact:

- **Barbara Foley**, RN, EN CARE, 205 S. Whiting St., Suite 403, Alexandria, VA 22304. Telephone: (703) 370-4050. Fax: (703) 370-4005. E-mail: encare@aol.com.
- **Susan Pollock**, MD, Kentucky Injury Prevention and Research Center, 333 Waller Ave., Suite 202, Lexington KY 40504. Telephone: (606) 257-4954. Fax: (606) 257-3909.

Question: How long do car seats need to face the rear?

Answer: Until a child is both over 1-year old and 20 pounds.

A lot of people are not getting the correct message, Pollock says. "The reason is not just because the child doesn't have strong neck muscles yet," she says. "That's a misconception that it's OK to turn the seat around, because the child can hold their head up."

At 40 pounds, use booster seat

Question: When can a child be moved to a booster seat?

Answer: Once a child reaches 40 pounds, it's safe to move them to a booster seat. "People often move kids to booster seats too early," she explains.

The purpose of a booster seat is to position the child so the seatbelt fits properly.

"Belts improperly positioned can cause injury too," says Pollock. "When children are restrained at the waist, they can get paralysis and thoracic spine injuries. We continue to see kids paralyzed because the shoulder part of the seatbelt is behind their back because it doesn't fit properly."

Booster seats are a missing link in car safety for many parents, notes Foley. "Most state laws say that children need to be in a car seat until 4 or 5 years of age, so parents think the child can go into an adult belt after that," she explains. "But they actually need go into a booster seat until the adult belt fits them properly."

Question: Should children ever be positioned in front of an air bag?

Answer: No. "If you have an air bag, don't put a child in the front because in pre-crash braking, they are thrown into the air bag as it deploys and can't reach the floor with their legs," Pollock advises. "Air bags are excellent for protecting large adults, but kids shouldn't be sitting in front of an air bag."

Back seat is safest

All children in car seats 12 and under will be safest in the back seat because of air bags, says Foley.

"It's supposedly well-known, but most of the air bag injuries and deaths we're seeing are still caused

Warning: Air bag can kill child in front seat

Many new cars have air bags for the right front seat. Air bags work with lap/shoulder belts to protect teens and adults. To check if your vehicle has air bags, look for a warning label on the sun visor or the letters "SRS" or "SIR" embossed on the dashboard. The owner's manual also will tell you.

An inflating passenger air bag can kill a baby in a rear-facing safety seat. An air bag can also be hazardous for children ages 12 and under who ride facing forward. This is especially true if they are not properly buckled up in a safety seat, booster seat, or lap and shoulder belt.

In a crash, the air bag inflates very quickly. It would hit a rear-facing safety seat hard enough to kill the baby. Infants must ride in the back seat, facing the rear. Even in the back seat, do not turn your baby to face forward until he or she is about one year of age and weighs at least 20 pounds. Look for a seat that meets the higher rear-facing weight limit for heavier babies not yet one year of age.

If there is no room in back and you have no alternative, a child over age one who is forward facing may have to ride in front. Make sure the child is correctly buckled up for his or her age and size and that the vehicle seat is moved as far back as possible. Fasten the harness snugly, and make sure a child using a lap and shoulder belt does not lean toward the dashboard. Read your vehicle owner's guide about the air bags in your car.

Source: National Highway Traffic Safety Administration, Washington, DC. ■

Share these tips on car seats with parents

"People don't always have sympathy for parents who don't know how to use car seats, but it's complicated," says **Susan Pollock**, MD, program manager of pediatric and adolescent injury prevention at the Kentucky Injury Prevention and Research Center in Lexington. "It's not that easy to do it right, and there are hundreds of different car seats to choose from."

Here are some tips to share with parents:

• **The baby has to be fastened in the seat, and the seat has to be fastened in the car.** "Parents often don't buckle the car seat into the vehicle. They just put car seat on back set and don't attach it to the vehicle as well," notes Pollock.

• **The chest clip needs to be at the armpit level, and straps need to fit snugly enough so can only put one finger between baby and clip.** If it isn't tight, it won't restrain the child, she states.

• **Chest clips need to be at armpit level at all times, because it keeps the straps on the child.** "If it's located down by the abdomen, an infant will fly right out of the car during a crash, so this is very important," says Pollock. ■

by kids improperly positioned," she notes. "Had the children been in the back seat, there would have been no problem." **(See information on air bag safety, p. 138.)**

Question: How do you know an adult seat belt fits your child?

Answer: If child is all the way back in the seat and their legs are out straight, he or she needs to be in a booster seat.

"They tend to scoot down to bend their legs so the seatbelt will go into their abdomen," says Foley. "If the shoulder harness touches their neck, they need a booster seat instead."

Question: Which car seat should I buy?

Answer: There are 400 types, which is extremely confusing to parents, says Foley.

"The best one is to fit your child and the auto you drive. Some car seats don't fit some automobiles, and some car seats don't fit infants." **(For tips on car seats, see box, above.)** ■

Nurses: Bring color-coded equipment to your ED

When a child comes to your ED with severe trauma, color-coding systems can help ensure correct dosages and equipment sizes. Now that same concept has been expanded to treatment sheets, acute sheets, and discharge information.

"Drug dosages tend to be looked up in emergencies, and the calculations of dosages and infusions are done during the actual resuscitation," says **James Broselow**, MD, FACEP, a co-developer of the system and an emergency physician at Catawba Memorial Hospital in Hickory, NC. He explains that the new products are designed to reduce errors by using a color-coded system.

The new products were recently tested at four North Carolina EDs: the pediatric ED at Duke School of Medicine in Durham, the pediatric ED at Wake Forest School of Medicine in Winston Salem, Womack Army Hospital at Fort Bragg, Fayetteville, and Northern Hospital of Surrey County in Mount Airy.

Products available in 2000

The items studied were color-coded acute and treatment care sheets for reference and color-coded discharge materials. The products are the only materials for pediatric patients based on color-coding and are scheduled to be commercially available in 2000, reports Broselow. Prices are not yet determined, since the products are still in the development phase.

The advantage to clinicians is a set of materials that are designed to simplify the emergent care of children, says **Susan McDaniel Hohenhaus**, RN, CEN, TNS, FNE, coordinator of emergency medical services for children at the North Carolina State Office of EMS in

EXECUTIVE SUMMARY

New color-coded equipment is available to ensure accurate pediatric dosages, including Rainbow color-coded tape, color-coded discharge materials, and reference sheets.

- The Broselow Rainbow tape now features a new pink zone for more accurate dosages.
- Color-coded forms are available for acute care, general treatment, and discharge information.
- The products were tested at four EDs and will become commercially available by 2000.

Raleigh, NC. "The benefit to children is it reduces the inappropriate use of equipment and hopefully will reduce medication errors."

The idea was to look at the tools of color-coding to see if they are easy and worthwhile for clinicians to use, says Hohenhaus. "The goal is to reduce medication errors, inappropriate use of equipment, improve provider comfort with acutely ill children, and to improve the ED experience for children," she explains. "This program overall has a tremendous opportunity to truly impact the emergent care of children."

Every child who came to the ED was measured using the tape and assigned a color based on length. A corresponding color sticker was placed on the chart, and in some cases an arm bracelet was used. The color was used for dosing medicines, procuring equipment, and giving discharge instructions.

Here is information about the new products:

• **Color-coded forms.**

Two groups of color-coded forms were developed as quick references for clinicians. Each color corresponds to a child's weight and length. For example, red stands for children with an average weight of 8.5 kilograms and 66.5 cm to 74 cm tall. The acute sheets include the following information:

— **medication dosing, equipment, and fluid administration;**

— **the medication dosages for rapid-sequence intubation, ventilator settings, and selected emergencies that require medications (overdose and anaphylaxis);**

— **fluid calculation for burns and cardiopulmonary resuscitation instructions.**

The treatment form includes sections on equipment, oral analgesics and anti-pyretics, fluids, oral antibiotics, reactive airway disease, croup, allergic reaction, IV antibiotics, and conscious sedation.

Broselow says the idea is to use the color-coded Rainbow tape, then go directly to these forms for a quick reference. To reduce the chance of making a calculation error, drugs are given not only by their milligram dosages, but also in cubic centimeters. The acute and treatment sheets include information based on length and weight.

Discharge sheets are age-adjusted

• **Discharge sheets.**

The color-coded discharge instructions include medical conditions most likely to occur in children, such as reactive airway disease, head injuries, diarrhea, and ear infections. **(See sample discharge instructions inserted in this issue.)** They also include common non-prescription medications and growth and development stepping stones.

Discharge instructions tend to be developed at individual EDs and are frequently not age-adjusted, says Broselow.

"They are often based on adult instructions. For example, a head trauma sheet appropriate for an adult might be given to the mother of a 6month-old who hit his head. Or an adult gastroenteritis sheet might be given to a parent who is breast-feeding an infant," he explains. "Injury prevention tips are included on discharge sheets, such as advising parents not to refer to medicine as candy, and never to give medicine in the dark. I am unaware of any systems which address incorporating injury prevention into every day emergency medicine."

• **Future plans.**

Future plans include discharge sheets in Spanish, color-coded videos, and CD-ROMs to demonstrate size-related interventions such as proper child restraint fitting and airway interventions in emergencies.

The color-coding concept will eventually be expanded to include over-the-counter medicines. "We are going to do studies to see if accuracy of dosages can be increased in the general public," reports Broselow.

Tape added for 3-6 months

• **Revised Rainbow tape.**

The color-coded Rainbow tape, used to calculate dosages in many EDs, now has one additional color: a pink zone that includes children from 6 kg to 7 kg, ages 3 months to 6 months.

"Any child below this weight needs individual calculation by weight, since there is too much room for error in very small infants," says Hohenhaus.

SOURCES

For more information on color coded equipment, contact:

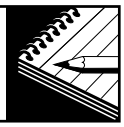
- **James Broselow**, MD, FACEP, 1315 Wessex Lane, Hickory, NC 28602. Telephone/Fax: (828) 294-2815. E-mail: rainbow@twave.net.
- **Susan McDaniel Hohenhaus**, RN, CEN, TNS, FNE, Coordinator, Emergency Medical Services for Children, Division Facility Services, Office of EMS, 2707 Mail Service Center, Raleigh, NC 27699-2707. Telephone: (919) 733-2285. Fax: (919) 733-7021 E-mail: Sue.Hohenhaus@ncmail.net.

The added pink zone reduces the possibility of adverse outcomes, according to Broselow. "We found that the zones were too wide to give all kids in that range the same dose of medicine," he explains. "If you are off by one zone, which represents 3 kg, and the other zone represents 4 kg, that's 1/4 of a difference, which is a pretty big error. Zones were made smaller so variation isn't too wide if you're off one zone."

• **Community education.**

At the Children's Museum in Durham, NC, there is a display of a community ED for children to explore, which includes the Broselow color-coded system. "Children and their caregivers are introduced to the color-coding system even prior to entering the medical setting. It gives us a chance to explain what the system can do," says Hohenhaus. ■

GUEST COLUMN



Tips in risk management: What you need to know

By **Sue Dill Calloway**, RN, MSN, JD
Nurse Attorney
Mount Carmel College of Nursing
Columbus, OH

[Editor's Note: This column is the first of a two-part series on the basics of risk management for nurses. This month, we discuss documentation, good public relations, policies and procedures, and departmental communications. Next month, we will discuss state laws, accreditation standards, the Nurse Practice Act, state laws, and the Standards of Emergency Nursing Practice.]

Most health care facilities have a designated person to perform risk management. However, every nurse should practice good risk management skills.

This issue is so important that we were recently requested by our state's board of nursing to put together some educational material on this topic that could assist nurses in this area. We ended up making a videotape that listed 40 tips in risk management that every nurse should know. **(For ordering information, see resource box, p. 142.)**

Knowledge of legal and risk management issues can help minimize legal liability and can help keep nurses and their employees out of the courtroom. Some of the recommendations discussed include the following:

• **Documentation.**

Whenever I'm asked to speak to a group of nurses and physicians on liability issues, I'm often asked what is the best way to keep out of the courtroom. There are two issues that immediately come to mind. The first issue is optimal documentation.

When patients are upset about the care rendered, they will often seek the services of an attorney. The attorney will request a copy of the medical records and send them to an expert to review. That expert sitting in his or her office or home reading the medical records is where the decision is made to sue or not to sue.

• **Good PR.**

The other recommendation that comes to mind is the importance of good public relations and communication. The literature had consistently held that patients will file a lawsuit when there has been bad public relations. Patients get upset if billing mistakes are not corrected, call lights are not answered in a timely manner, and they are not treated with dignity and respect.

• **Policies and procedures.**

Many plaintiff attorneys will subpoena the facility's policies and procedures. Every nurse should be familiar

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Editor: Staci Bonner.
Group Publisher: Brenda Mooney.
Managing Editor: Joy Daughtery Dickinson, (joy.daughtery@medec.com).
Associate Managing Editor: Suzanne Zunic, (suzanne.zunic@medec.com).
Production Editor: Nancy McCreary

Hours of operation: 8:30 a.m. - 4:30 p.m.

Editorial Questions

For questions or comments, call Joy Daughtery Dickinson at (912) 377-8044.

RESOURCE BOX

A videotape, *Legal and Risk Management Issues in Nursing*, addresses legal and risk management issues for nurses and lists 30 tips to help nurses stay out of the courtroom. Individual copies are available for $91, plus $5.23 sales tax, and shipping charge of $3.95. To order, contact:

- **Sue Dill Calloway**, RN, MSN, JD, Mount Carmel College of Nursing, 127 S. Davis Ave., Room 208, Columbus, OH 43222. Telephone: (614) 234-5007. Fax: (614) 234-2892. E-mail: sdill@mchs.com.

with them. The plaintiff's attorney will seek to use a policy to diminish the nurse's credibility if the plaintiff can establish that the nurse was not aware of a policy and did not follow his or her own institution's policy.

The polices should reflect the current standard of care. They should be reviewed periodically to make sure they are current. Policies should be clearly written and organized in a manner they can be easily located if the nurse needs to review the policy. New policies should be posted along with policies that are changed.

• **Departmental communications.**

Nurses should communicate optimally with other departments to avoid injuries. For example, consider that the nurse gives the patient morphine 5 mg IV and sends the patient to X-ray for an intravenous pyelography . The nurse needs to alert the radiology department of the medication so the employees can take appropriate precautions to avoid patient injuries such as falls. Critical lab values should be called to the nurse, who should communicate the results to the doctor.

Tell physicians about cancellations

Any canceled procedures also should be communicated to the physician. For example, a lawsuit was filed involving a case in which the computed tomography's (CT) scanner was broken and the part was not going to be available for 24 hours. The patient had an order for a CT scan of the head. The next morning, the patient died from a cerebral bleed. The doctor would have sent the patient to another facility for the CT scan if he had known the machine was down.

In summary, knowledge of legal and risk management issues can help reduce liability exposure for the nurse and his or her employee. Every nurse should practice effective risk management strategies to make the facility a safer place. ■

CE Objectives

After reading this issue of *ED Nursing*, the CE participant should be able to:

1. Identify clinical, regulatory, or social issues relating to ED nursing. (See in this issue: *Do you know the dangers of Viagra? Side effects range from headaches to heart attack,* and *Nitrate therapy and Viagra don't mix*.)
2. Describe how those issues affect nursing service delivery. *(*See *Address Viagra risks at triage.*)
3. Cite practical solutions to problems and integrate information into the ED nurse's daily practices, according to advice from nationally recognized experts. (See *Here's what to tell parents about car restraints.)* ■