the drugs taken today, then the day before, then the day before that.
- If you add a drug, try to stop one.

By now my bias for caution with all drugs is showing. My experience tells me it is justified. There is one drug that can be the safest; it is known to all good family physicians, and I will end with a rule for that.

Each physician is a drug. With each encounter his or her actions can do the following:
- Produce side effects.
- Exhibit a duration of action.
- Induce toxicity.
- Be indicated.
- Be contraindicated.
- Be given in an overdose.
- Be given in an underdose.
- Be given at the right interval.
- Be given at the wrong interval.
- Most of all, produce a wonderful and lasting placebo effect.

Learn the pharmacology of being a physician.

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Man's Best Friend?

The case report in this issue of the *JABFP* describing fulminant sepsis from a dog bite[1] serves to remind us of the family physician's responsibilities regarding the management and prevention of dog bites. A largely preventable epidemic looms before us. Approximately 35 percent of American households owned a dog in 1994, and the US dog population exceeded 52 million.[2] The Centers for Disease Control and Prevention (CDC) estimates that as many as 4.5 million bites occur annually, almost 800,000 of which are serious enough to require medical attention. Bites to children represent more than 50 percent of the total number cases. Twenty-six percent of dog bites in children compared with 12 percent in adults require medical care.[3] Not only do dog bite injuries lead to serious infections, disability, and deformity, but deaths can occur as well. Between 1989 and 1994, 109 bite-related fatalities were reported, 57 percent of which were in children younger than 10 years old.[4] A State Farm insurance underwriter reported that the number of claims from dog bites increases 1 to 2 percent each year, and in 1996 the State Farm payout for dog bite claims went up 25 percent. In 1995 State Farm paid $70 million on 11,000 claims and estimates that the total annual insurance cost for dog bites is about $2 billion.[5]

In a review of 109 fatal dog attacks, among the many breeds involved, the breeds most frequently implicated were pit bulls, rottweilers, and German shepherds. Dog-bite-related fatalities (18 deaths per year in the 6-year study) remained relatively constant compared with the rate from the previous decade.[4] The primary difficulty in determining which breeds are most dangerous has to do with the floating numerator (ie, numerator floating without its denominator). It is important that we know not only the percentage of bites from a given breed but also the total number of that breed in the general canine population and the amount of time the dog spends around humans. Such denominator data are unavailable. Dogs spend a lot of time with children and in the home and around their owners, which accounts for the largest number of bites occurring in these settings.[6] It should come as no surprise that most adults are bitten at home by their own dogs. Most bites occur from dogs known by the victim, either the family pet or a neighborhood dog. Unneutered male dogs are responsible for a substantial number of bites.[7]

To evaluate preventive efforts, we must continue to collect and provide accurate data to public health and law enforcement offices, as required by local or state ordinances. Information should include breed, sex, spay or neuter status, relation of animal to victim, circumstances of bite, time and location of the incident, history of previous aggression, nature of restraint, vaccination and health status of the animal (if known), and current

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location of the animal (if known).[4,8]

Proper management of dog bites requires an understanding of which canine oral bacteria cause infections. The most common aerobic isolates have been α-hemolytic streptococci and *Staphylococcus aureus*. Anaerobic pathogens, which are found in up to 41 percent of wounds, include *Bacteroides* and *Fusobacterium*. *Pasteurella multocida* can be found in 25 percent of dog bite infections compared with approximately 70 percent of cat bite wounds.[9]

Since Butler's 1977 report regarding a new disease in man caused by an unidentified gram-negative bacillus,[10] the isolated organism *Capnocytophaga canimorsus* has been subsequently cultured and found responsible for an increasing number of serious problems associated with dog bites or close contact with dog saliva. Most persons who contacted *C canimorsus* had a history of asplenia, alcoholism, or hematologic malignancy, although previously healthy individuals have become infected. It appears that the dog is a reservoir of this organism. Although an uncommon sequela of dog bites, *C canimorsus* infections can result in fever, malaise, myalgia, vomiting, diarrhea, abdominal pain, dyspnea, confusion, headache, and skin rash. Disseminated intravascular coagulation develops in many patients. Attention should be drawn to this organism in cases of febrile illness after dog bites or contact with dogs. Immunocompromised persons should be warned about possible serious sequelae of dog bites and should avoid direct exposure to these animals. The laboratory should be instructed to culture for *C canimorsus*. Cultures require prolonged incubation, and the organism can be easily overlooked. The organism might be identified more easily on peripheral blood smear.[10-13]

Proper wound management is required to reduce the risk of developing wound infection, sepsis, osteomyelitis, tenosynovitis, and septic arthritis. The wound should be cleaned carefully and irrigated with normal saline under pressure using a 19-gauge needle and large syringe. A 20-gauge angiographic catheter can be attached and introduced into puncture wounds to facilitate irrigation. Any devitalized tissue should be carefully debrided, and the wound inspected in detail. Because dogs can develop a tremendous force when biting, x-ray studies might be necessary to determine underlying bone and joint injury. Cultures and Gram stain are useless on a fresh wound, but they should be obtained for obviously infected wounds and victims who are already febrile or immunocompromised.[14]

Table 1. Anticipatory Guidelines for Families.

Adult
Never leave infants or young children alone with any dog
Select canine breeds carefully
Neuter male dogs
Ensure dog's good health
Enroll in a basic obedience training class with regular involvement by family
Remedy aggressive or inappropriate behavior
Do not allow others to play aggressively with dogs
License pets and keep all inoculations current
Act responsibly if your dog bites someone
Child
Play calmly—never tease a dog or put your face near a dog's mouth when playing
Never disturb any dog when it is sleeping, feeding, injured, or with pups
Ask the dog's owner for permission to touch the dog
Pet a dog only after it sees and sniffs you
Never run past or turn your back on a dog; its instinct is to chase and attack
Never separate fighting animals
Do not look directly into a dog's eyes
If an unfamiliar dog approaches, stand still
Tell an adult if you are bitten by any animal

It is useful to separate animal bites into high versus low risk when attempting to decide whether to suture the wound or provide appropriate antibiotic coverage. High-risk wounds include all human and cat bites; hand and foot wounds; wounds surgically debrided; puncture wounds; wounds involving joints, ligaments, tendons, and bones; bites with treatment delay exceeding 12 hours; and bites in immunocompromised patients. Low-risk wounds include bites involving the extremities, face, and body. High-risk wounds should not be sutured but should receive antibiotic treatment. Low-risk wounds may be sutured and do not require antibiotic treatment unless infected. Appropriate tetanus and rabies prophylaxis should be provided based on history.[8,15]

Dog bites to the neck and face require special considerations. Most occur in children younger than 10 years, and severe brain injury and death are most common in this age group. Most deaths occur from hemorrhage from the great vessels of the neck. The nose, mouth, and parotid region is a primary target area for dog bites.[16] Carotid artery injury with delayed cerebral infarction has been reported.[17] After a detailed exploration looking for damaged tissue (salivary duct, facial nerve, blood

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vessels), many wounds may be closed primarily.[16]

Bites in older children and adults tend to occur on the extremities. Bites to the hand and foot are challenging to manage because these areas have multiple compartments that are difficult to clean. Hand and foot wounds should be treated vigorously and aggressively, with irrigation and debridement accomplished in a sterile environment. Opening loculated areas allows increased blood flow and better antibiotic penetration. These wounds should be left open.[18]

Given the great number of dog bites and the high proportion of victims who are children, it is clear that this potentially preventable public health problem deserves further attention by primary care providers. Anticipatory guidance should be offered to parents and older children (Table 1).[2,8] Prenatal and well-child care visits provide an excellent opportunity to discuss accident prevention, including dog bites. Along with anticipatory guidance, we should support public educational efforts about responsible dog ownership and dog bite prevention, stronger animal control laws, better resources for enforcement of these laws, and better reporting of bites.

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