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Needle Phobia

ABSTRACT

Venipuncture is generally associated with some degree of pain, discomfort, and/or apprehension. Yet most patients accept it with tolerance, even nonchalance. A few, not only pediatric patients, exhibit a higher degree of anxiety and face the procedure with tears, tension, and a variety of bargaining techniques (ie, stick on the count of 3; use only this vein). But for 1 group of people, venipuncture is associated with such fear that avoidance of the procedure is practiced. The end results are detrimental to the patient and may have an impact on society as well. These are patients the American Psychiatric Association classifies as needle phobic. What can a nurse with no training in psychiatry do to assist these patients? To form an appropriate professional response, it's beneficial for practitioners to recognize the different pathways that lead to needle phobia and the issues related to the disorder.

Key words: bacteriocidal sodium chloride, cryotherapy, electroosmosis, infrared, iontophoresis, needle phobia, topical anesthesia, transdermal anesthesia, ultrasound, vasovagal response

RECOGNIZING THE PROBLEM

It would probably be fair to say most Americans do not seek an opportunity to be stuck with a needle. There are exceptions, but for most Americans, venipunctures are associated with necessary medical procedures and do not have pleasurable connotations. Venipunctures and the injection of medication are often accompanied with some pain and/or discomfort, and anticipation of this may result in apprehension or anxiety preceding the event. For a subset of the population, however, the encounter with a needle produces fear and great anxiety. These are people who are diagnosed as having needle phobia.

A phobia is the persistent, irrational fear of a specific object, activity, or situation that leads to a compelling desire to avoid it. A fear of needles has been present in humans for decades, possibly even centuries or millennia. But the fear was not classified as a phobia until 1994. Research pioneered by James Hamilton, MD, warranted the inclusion of needle phobia as a diagnosis in the fourth edition of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*.[1] With the ability to make a diagnosis, it was finally possible to offer treatment options and provide sufferers with the potential of finding relief.

No specific term relates to the fear of venipuncture. However, various terms are used to describe the fear of injections, sharp objects, or pain. Applicable terminology includes aichmophobia, an intense or morbid fear of sharp or pointed objects; belonephobia, an abnormal fear of sharp pointed objects, especially needles; enetophobia, a fear of pins (and vaccines); trypanophobia, a fear of injections; and algophobia, an intense or morbid fear of pain.

Hamilton[2] estimated that 10% of the population suffers from needle phobia. More recently, the percentage has been estimated at closer to 20%, and possibly more. A 2012 survey by Taddio et al[3] estimated that 24% of the population is affected. An online survey by Target/Harris International[4] closely matched Taddio and colleagues' study, with 23% of respondents reporting needle phobia. The limitation of the findings of Taddio and Target are that these are based on survey results, not solid research.

A Gallup[5] survey ranked fear of needles against other common fears. The survey was initially conducted by Geoffrey Brewer in 1998 and then repeated in 2001. In each survey, 1016 people were asked to identify what they feared, based on a list of fears that was read to them. The results (Figure 1) show that fear of needles ranked sixth of the 13 fears considered, half as common as the fear of public speaking. There is no clear distinction on this or other existing surveys regarding which sex or age groups are most affected.

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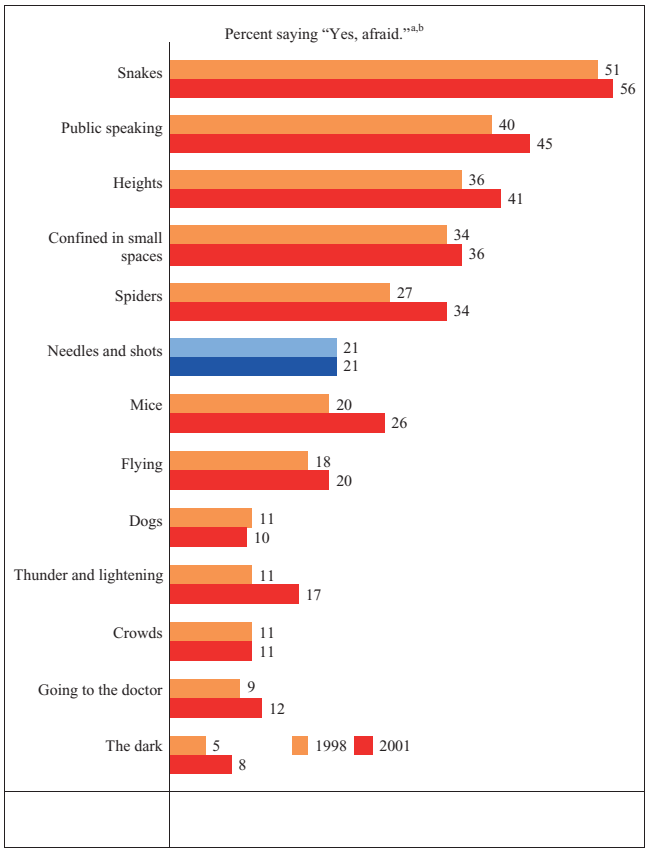

[a]Survey question administered: "Everyone has fears about different things. But some are more afraid of certain things than others. I'm going to read a list of some of these fears. For each one, please tell me whether you are afraid of it, or not. How about [potential sources of fear in random order]?"
[b]Survey +3% margin of error; administered February 19-21, 2001; sample size 1016.

Figure 1 American fears. Data from Brewer.[5]

DEFINING THE PROBLEM

There are several perspectives from which needle phobia can be viewed: that of the patient, the professional, and society.

Individuals who suffer from needle phobia generally are aware of the negative impact of their emotional response. Anxiety and agitation may be extreme, and sufferers are at a loss to control this response. They may experience a sense of failure and/or embarrassment because they know their actions are abnormal and not socially acceptable. The phobia may prevent them from seeking medical attention, either because of fear of the actual procedure, fear of embarrassment, or both.

The professional caring for the patient is faced with an individual who appears to be acting out. The extreme response that is displayed is regarded as irrational, and the professional may be judgmental and view it with disgust. Exasperated with a situation that is impinging on a busy schedule, the professional may find it difficult to provide compassionate care. The ethical manner of dealing with the situation is to find and implement a solution that will help reduce the fear and anxiety, despite the fact that this will take additional time.

The associated social concern correlates with patients' avoidance tendencies. Sufferers are unlikely to get voluntary vaccines, such as the flu shot, and may even refuse mandated vaccines, such as MMR (mumps, measles, rubella). As recently as 2013, minor epidemics of measles and whooping cough related to refusal of receiving vaccination were reported in some areas of the United States.

WHO IS PHOBIC?

Phobias do not have a single cause or precipitating factors. During his studies, Hamilton recognized 5 subgroups of needle phobia with very diverse foundations.[2]

Inherited Vasovagal Response

Fifty percent of needle phobics are categorized as having an inherited negative response to needles. These sufferers may deny a fear of needles, yet they experience changes in heart rate and blood pressure when confronted with a needle and may even pass out. Hamilton theorized that the response is stimulated from a gene that evolved over millions of years. Four million years ago, the majority of severe injuries were the result of puncturing wounds from fangs, claws, teeth and, later, sharp sticks, stone axes, and other instruments. Hamilton postulated that, when confronted with these objects, an autonomic response began to develop and this response became incorporated into our DNA. He believed the gene exists in everyone, but is generally repressed. However, the gene is dominant in a subgroup, and the autonomic response is stimulated as soon as the potential for injury is perceived.

The resulting vasovagal syncope is classified as neurocardiogenic and is part of the neural mediated reflux syncope syndrome (Figure 2). The response is physiological; no correlation to a psychological mediator has been identified. The stimulus promotes vein dilation, especially in the legs, and as much as 300 to 800 mL of blood may be displaced, causing sufferers to faint. The best treatment for this syndrome is prevention: patients who self-report a tendency to pass out when confronted with a needle should be in a supine or semirecumbent position for venipuncture.

Can vasovagal syncope be fatal? Hamilton found 23 cases in which death was likely related directly to the autonomic response.[2] If the vagal response affects the sinoatrial and/or atrioventricular nodes, fatal heart arrhythmias can occur. Most often, however, injuries are a result of morbid or mortal wounds sustained when the patient falls.

Associative Fear

Sufferers in this subgroup have a learned response associated with needles that usually includes anticipatory anxiety. This group is likely to suffer from "white coat" syndrome. It's likely that these sufferers either have

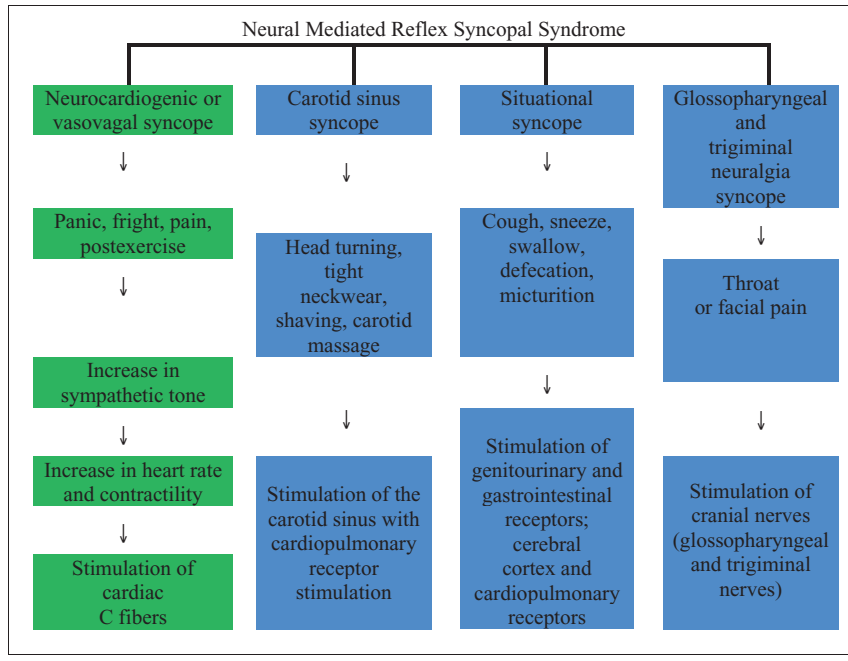

Figure 2 Neural mediated reflex syncopal syndrome.

experienced a traumatic event with a needle or have a parent or sibling who has enforced the fear because of his or her own negative experience. The sufferer's anxiety may be extreme, and this population is prone to panic attacks. They suffer insomnia just thinking about an upcoming event and may be preoccupied about the eventuality of a venipuncture. Hamilton estimates that 30% of all those who have needle phobia fit into this category.[2]

Resistive Fear

Approximately 20% of sufferers fall into the subgroup of resistive fear. For these individuals, the needle is only part of the fear. Greater anxiety is from the potential of being controlled or restrained as a part of the procedure. These sufferers likely have had a traumatic experience associated with needles, including previous use of restraints, deceptions, threats, or trickery. These patients are most likely to be combative, even violent. Their response is to fight. Blood pressure, as well as heart rate, may be very high as soon as the procedure is introduced.

Hyperalgesia

Patients with hyperalgesia do not necessarily fear the actual needle; they fear the touch. This is secondary to an inherited sensitivity to pain. For this group of sufferers, the pain is unbearable and they do not understand how anyone can tolerate such procedures. Characteristics include anxiety, and heart rate and blood pressure increase at the time of needle penetration. Treatment with topical anesthetics may be particularly useful for these individuals.

Vicarious

The subgroup of vicarious needle phobia is considered rare, and Hamilton[2] does not offer an estimate of the number of people who are affected. The sufferer may experience a vasovagal response that is prompted from watching another person being injected. Although the individual knows the needle is intended for someone else, he or she has phobic images of the procedure being done on him or her. Hamilton does not speculate whether the individuals in this subgroup also fit into another subgroup when they are on the receiving end of the needle.

Overall, the most common symptoms experienced by someone who is needle phobic are dry mouth, sweating, shortness of breath, nausea, and dizziness. In a study by Wright et al,[6] approximately 20% of those who expressed a fear of needles also reported syncope with procedures.

THERAPIES/SOLUTIONS

Not everyone who dislikes needles, blood, and pain can be classified as suffering from a phobia. The intensiveness of intervention depends on the severity of the patient's fear. Psychiatric intervention is usually recommended if the fear is threatening to the safety of the patient, the caretaker, or the public. For most sufferers, nonpsychiatric interventions will provide sufficient relief in the here and now. Nonpsychiatric methods are not intended to be curative. However, they may be of use when the procedure is imminent and the sufferer needs support to face it.

Psychiatric Intervention

When a patient's fear results in avoidance of procedures, psychiatric intervention may be indicated. In the most severe situations, an individual may refuse medical care even for life-threatening conditions considered treatable. Among this group, symptom control is poor and premature death is not unusual. This is the group most likely to refuse required immunizations, which becomes a public health risk. In some situations, when faced with an unavoidable procedure, this sufferer may become violent, risking harm to the health care worker. Treatment is aimed at helping the patient cope. It will not provide a quick fix of the problem.

Four types of psychotherapy may be used[7]:

1. Psychiatric therapy traditionally analyzes the problem.
2. Perceptive therapy rehearses the planned procedure and reviews the equipment that will be used.
3. Desensitization introduces the procedure through imagery.
4. Habituation exposes the patient in increasing increments of time to simulations or pictures and movies of the procedures. This is the least likely of the 4 to be beneficial.

Nonpsychiatric Intervention

Response control

Response control provides the sufferer with escape from the situation through hypnosis or medicine-induced sleep.[7] It may be recommended if the patient's reaction is severe enough that he or she poses a danger to himself or others. The use of hypnosis is limited to the availability of an experienced professional, unless the patient has learned techniques for self-hypnosis. Control through medication is the more common avenue for response control.

Several classes of medication have been found to be beneficial. Benzodiazepines, such as diazepam, lorazepam, and triazolam, have rapid onset and short duration of activity. These medications have an amnesic effect that prevents patients from reliving the moment of discomfort. Benzodiazepam-like sedative hypnotics are similar, but have a more rapid onset with oral medications acting within 15 to 20 minutes. These include medications such as zolpidem and zaleplon.[7] Another medication option is melatonin-receptor agonists, such as ramelteon. Melatonin is a naturally occurring substance secreted in response to light-dark cycles. Generally, the brain releases it in the highest levels as darkness approaches, causing sleepiness. Drugs that react with melatonin receptors promote sedation despite the absence of darkness.[8]

Even patients who do not suffer from a fear of needles may welcome options that reduce the discomfort. Quite a few alternatives that vary in complexity, ease of use, and cost may be considered.

Vein visualization

Technology to provide light to improve vein visualization became available in the 1980s. A bright light was housed in a structure that could be clamped to the limb while compressing tissue around the vein to help illuminate the dimensions of the vessel. One of the limitations was that the device only assisted in finding veins that were superficial and already visible. Veins in the upper arm and lateral/posterior forearm remained elusive.

Today, near-infrared[9] technology is used which enables the practitioner to view even deep veins. The concept of vein visualization has been endorsed by the Infusion Nurses Society and, in 2014, was included in the position paper *Recommendations for Improving Safety Practices With Short Peripheral Catheters*.[10]

Infrared light refers to a broad electromagnetic wavelength of light. Infrared technology can measure particle sizes beneath the skin, which makes it valuable to numerous medical fields. Near-infrared light uses a smaller region of this spectrum. The light photons are absorbed by hemoglobin but reflected by tissue so that vessels appear as dark bands but other structures are not apparent. Several models that can be used to scan the limb for veins and then be mounted over the chosen area to provide continuous visualization during the venipuncture are available.

Ultrasound uses sound or vibration to sense structures. Use of ultrasound for locating veins is a more sophisticated technique than infrared light, and it requires special training and special equipment. Ultrasound can pinpoint the location of the vein and provide information on size and depth of the vessel. Whenever vein visualization is difficult, the use of ultrasound may be beneficial.[11,12]

Topical anesthesia

It is common today that some type of topical anesthetic is selected to improve patient comfort. They come in the form of cryotherapy, creams, injectable medications, iontophoresis, and nerve conductors.

Placebo. The use of placebo has been assessed by the American Society for Pain Management Nursing and is considered poor practice.[13] The only justifiable use of placebos is for participants enrolled in a blinded clinical trial. These clinical trials must be approved by an institutional review board (or an equivalent), and participants must be clearly informed that they may receive a placebo before they consent to participate and may have the sham treatment administered.

Cryotherapy. Cryotherapy is a method of freezing or dramatically reducing the temperature of the skin. Rapid cooling decreases nerve conduction velocity to give the effect of numbing. Methods include raw ice, manufactured gel and chemical pads, and ethyl chloride sprays or mists. The benefits of ice and pads are ease of use, ease of storage, and relatively low cost. However, application may be associated with discomfort, stinging, and burning, and it is not always well tolerated. The melting effect of raw ice adds to its efficacy because it maintains the temperature throughout application; gel and chemical pads begin to warm as soon as they are applied. With either method, the time to effectiveness is varied, and the length of efficacy is about 1 to 3 minutes.

Ethyl chloride has a very high evaporation rate, which results in instantaneous skin cooling. Effectiveness[14] depends on the delivery system—stream may last slightly longer than mist—and the distance the product is held from the skin during application. Skin temperatures may reach 0°C (32°F). The duration of numbing is very brief—only 5 to 60 seconds. Application may be associated with discomfort, stinging, and burning, and it is not always well tolerated. Although the product is nonsterile, it has passed the microbial limit test in accordance with the US Pharmacopeial Convention and is acceptable for multipatient use on intact skin. Consideration should be given to the fact that the product is flammable.[15]

The gate-control theory of pain was proposed in 1965 by Ronald Melzack, a Canadian psychologist, and Patrick David Wall, a professor of medicine at Yale University.[16] The theory competed with at least 2 other theories of pain that had been scientifically accepted by this time. The gate-control model proposes that the body is always prepared for pain impulses, and therefore, the brain reacts immediately when an actual stimulation occurs. The response may be increased based on perceptual awareness, including memory. However, concurrent stimulation of nerve fibers that do not transmit pain can interfere with the pain signal and decrease or eliminate it. The Buzzy,[17] a device that entered the market in 2009, is based on this theory of pain. The device uses ice and a vibration simultaneously to provide momentary numbing at a site. Exactly how this combination closes the gate is not clear, but it appears to have a favorable response from users.

Transdermal analgesia. The stratum corneum, the outer protective layer of the epidermis, is made up of layers of cells that stack on top of one another in a building-block design. Lipids between the cells act as the mortar. These lipids repel the passage of most particles, giving the skin its waterproof quality. Transdermal analgesics have the capability of passing through the stratum corneum and reaching the nerve endings to provide an anesthetic effect. This may be achieved by passive diffusion, active diffusion, or intradermal injection.

As these anesthetics enter the blood stream, lipid membranes act as receptors and channel them toward the nerve endings. The ionic effect of the drug itself inhibits sodium, so it decreases the polarization and repolarization of excitable fibers. The rate at which the effect wears off is related to lipid solubility of the drug. Highly lipid-soluble local anesthetics generally have a longer duration of action because of decreased clearance by localized blood flow and increased protein binding. Selection of the anesthetic depends on the status of the nerve and the ionic concentration of the medication, as well as several other factors.[18]

Topical anesthetics are classified as either esters or amides. A list of medications in each category is provided in Table 1. Esters do not metabolize by an organ, such as the liver or skin; the medication itself degrades after administration. The degradation process forms a para-aminobenzoic acid that is highly antigenic. As a result, the risk for allergic reaction is significant. Amides are metabolized though the liver and are safe for most patients as long as the liver is functioning. These medications are rarely associated with allergy.[19]

Transdermal drugs[20] that are applied topically include EMLA (lidocaine 2.5%/prilocaine 2.5%) and ELA-Max (lidocaine 4%). These medications are capable of penetrating the stratum corneum without enhancers, but the journey is slow. Onset to anesthesia may be 30 to 60 minutes or more, but the effect may last 1 to 2 hours.

Enhancers are used when the medication alone is not capable of transcending the stratum corneum.[21] The enhancer has the ability to move through the layers of lipids, and the anesthetic passively follows.

The stratum corneum can also be penetrated by adding a mild electrical charge to the medication. Iontophoresis[20,22] is used for rapid transfer of medications that are capable of ionization. The delivery device contains positive and negative electrodes. The electrical charge loops from 1 electrode, through interstitial tissue, and back to the alternate electrode, depositing the ionized medication under the skin. Efficacy occurs in about 10 minutes. Cost considerations include the cost of the reusable machine, the medication, and the conduction medium. Reactions are mild, with the most common being transient erythema and edema, blanching, itching, burning, and tingling sensation.

If the medication to be administered is not capable of ionizing, a similar procedure known as electroosmosis[20,22] may be employed. This process works by adding a solvent that has an electrical charge and is able to carry the drug in with it.

Intradermal administration bypasses the stratum corneum completely by administering the anesthetic through a needle. Lidocaine HCl is the most commonly used anesthetic for venipuncture. The effect is immediate, but this method of anesthesia is not without its

TABLE 1

Classifications of Topical Anesthetics

Ester		
• Metabolized via a degradation process		
• Forms a para-aminobenzoic acid that is highly antigenic		
• Most common risk of allergic reaction		
Benzocaine	Cyclomethycaine Dimethocaine/larocaine	Proparacaine
Chloroprocaine	Piperocaine	Propoxycaine
Cocaine	**Procaine/novocaine**	**Tetracaine**
Amides		
• Metabolized by the liver		
• Rare allergic reaction		
Articaine	Levobupivacaine	Phenocaine
Bupivacaine	**Lidocaine**	**Prilocaine**
Cinchocaine/dibucaine	Mepivacaine	Ropivacaine
Etidocaine		Trimecaine

Drugs in bold are commonly used for numbing.

disadvantages. Administration may be associated with some discomfort, and the delivery method involves a second injection.

Two alternative intradermal methods eliminate the use of a needle. The J-tip method uses a CO_2 cartridge to deliver the medication under pressure through the stratum corneum. Alternatively, a helium-powered injection has shown some promise. Onset of anesthesia is quick, about 1 to 3 minutes, but efficacy is brief, only about 3 to 10 minutes.

Bacteriostatic sodium chloride has been shown to be effective as an anesthetic.[23,24] Safety and efficacy can be traced to 1918.[25] The benzyl alcohol in the preparation is responsible for the anesthetic effect. Benzyl alcohol is classified as an ester, indicating an above-average risk for allergic reaction. As with lidocaine, 2 injections are required to complete the venipuncture. But patients relate that the injection of sodium chloride is less painful than lidocaine, and the numbing effect is about equal. Bacteriostatic sodium chloride does not have a US Food and Drug Administration indication for this use. Facilities that choose to use it are advised to seek appropriate research to cover corporate policy and procedure.

Distraction

Not all techniques to reduce anxiety require expensive equipment and medications. Sometimes, simply allowing the patient to watch television, listen to the radio, or interact with family and friends can have a positive effect on the success of the procedure. Some patients will achieve the most benefit from idle conversation with the person performing the venipuncture. The use of imagery involving a safe or pleasant memory has been found to have value. Another benefit comes from allowing the patient to have some say in the timing of the venipuncture to prevent surprises.

Many patients do not wish to see the needle. Be discrete with the catheter, keeping it out of the patient's line of vision as much as possible.

Although humor can be a useful tool, be sensitive to how it is used. Do not make comments in jest that serve to question your skill as venipuncturist. Do not provide descriptions of how the venipuncture may feel. These benign comments are meant to make light of the situation but may have quite the opposite effect.

Keep in mind that a patient's perception of fear is similar to a perception of pain. Both elicit a personal response based on what is real to the patient. It is not appropriate for a practitioner to imply that a patient's fear of needles is illogical.

Making a frightening procedure less intimidating is a professional obligation. Techniques to reduce needle fear should be employed whenever possible, particularly those that do not require a prescriber's order. Taking an extra step can help prevent needle fear from becoming needle phobia.

The bigger challenge may be recognizing patients for whom the fear is pervasive. Just as we invite consults to assist with physical diagnoses, we need to consider consults for this psychological issue as well. Severe needle phobia may have an impact on the outcome of a patient's treatment, especially if the fear is preventing

the implementation of appropriate therapy. A plan of care involving the entire health care team should be devised and implemented. Prevention and treatment of needle phobia needs to be included as a routine part of care.

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