SHORT COMMUNICATION

A New Outlook on Non acute and Subacute Nosebleed Treatment: Changing the Landscape of Medical Care in Nosebleed Management

ABSTRACT

Objective: To evaluate the efficacy of Nampons (™) and Nampons (™) Kids in comparison with standard care products including 4-ply tissue and 8-ply cotton gauze.

Study Design and Setting: The material technology of epistaxis devices was analyzed including tissue, gauze, Nampons (™) and Nampons (™) Kids. All products were analyzed microscopically at 4x magnification and evaluated their *In-Vitro* Hemostatic Capacity.

Results: The Nampons and Nampons Kids did not show any residual blood on the petri dish, comparing to tissue and gauze. The microscopic evaluation revealed that density of the material has a direct correlation to blood diffusion and contact efficiency.

Conclusion: The Nampons and Nampons Kids are the effective, safe, reliable, and accessible management option in non-acute and subacute nosebleed treatment.

Key Words: *Nampons, Non acute Nosebleed, Subacute Nosebleed*

Nosebleeds account for one of the most common presenting problems to ear, nose, and throat (ENT) physicians, family practitioners, emergency room specialists, and other medical specialties. Even though nosebleeds likely affect 10-12% of all patients at some time, only 10% cases require medical attention [1]. Most nosebleeds are self-limited without intervention. Those patients with nosebleeds who do require management are known to cause treatment challenges. Most medical treatment begins with compression, followed by medications such as decongestants, including topical oxymetazoline. Cauterization can be difficult for patients and healthcare providers, either by electrical stimulation or chemical means such as silver nitrate. Nasal packing is often effective, simple, and easy to administer but can be fraught with possible complications and adverse effects, including rebleeding. “Nosebleed, also known as epistaxis, is a common problem that occurs at some point in at least 60% of people in the United States. While the majority of nosebleeds are limited in severity and duration, about 6% of people who experience nosebleeds seek medical attention [2].”

Causes of Nosebleed

The most common reasons people attribute to having a nosebleed include dry air or manipulation of the nose, such as nose-picking. Many other causes can be categorized as follows:

- Trauma (manipulation, major trauma)

The nose is at the center of our faces, and unfortunately, the recipient of a range of potential trauma. We all rub, scratch, and pick our noses at various times for various reasons. These seemingly minor assaults on our noses are generally unnoticed. Still, the lining inside the nose can be sensitive, particularly in the front, where there is an intricate network of small blood vessels that can be easily damaged. Being struck in the nose by a foreign object can be even more traumatic and cause more severe bleeding due to disruption of not only blood vessels but cartilage and bone as well.

- Structural (deviated nasal septum, polyps)

The inside of the nasal cavity is more complex than most people realize. The nose is divided by a wall called a septum. The septum is composed of bone and cartilage and has a natural curvature or S-shape. The nose's lateral or side walls filter and humidify the air and consist of folds called turbinates. Higher in the nasal cavity is the gateway to the sinuses. Overgrowth of the lining of the nose is usually known as polyps. There are many causes of blockage in the nasal cavity, including deviation of the septum itself, swelling or inflammation of the nasal lining, overgrowth of the lining or polyps or growths, and nasal or sinus drainage. These can
narrow the nasal airway, causing dryness and potential bleeding.

- Inflammation/infection (sinusitis)

Inflammation and infection generally coexist. There are two main reasons for nosebleeds in these cases. First, the inflammation causes the nasal lining to become fragile, exposing the blood vessels to damage. Second, inflammation and infection can cause nasal airway swelling and narrowing. Narrow airways increase the velocity of the airflow, thereby causing dryness, crusting, further irritation, and increased manipulation of the nose.

- Environmental (allergies, dryness)

Any foreign materials, including those which are nonvisible such as odors, can cause significant nasal irritation. Nasal irritation can cause inflammation, and trauma. Allergic reactions are a common source of irritation to the nose, which can lead to nosebleeds.

- Systemic (coagulopathies, alcoholism)

Our bodies have an intricate system to help us heal and stop bleeding, known as clotting or coagulation. The first component is primary hemostasis, which includes the process of converting blood from a liquid to a gel, forming a blood clot. The body forms a natural bandage that allows platelet activation, adhesion, and aggregation. Secondary hemostasis occurs at the same time as clot formation and involves clotting factors in the blood. There are many possible disruptions in clotting, known as coagulopathies, including, for example, vitamin K deficiency. Drinking alcohol may increase the risk of blood clots, liver damage where clotting factors are formed, and disruption of platelet production.

- Medications (blood thinners)

Blood thinners, by definition, disrupt blood clotting. These drugs, including daily aspirin for cardiovascular prevention, may increase bruising and bleeding, making patients more susceptible to nosebleeds. Stopping nosebleeds can be challenging without cessation of blood thinners [3, 4].

Nosebleed Evaluation

Where?

The first step in stopping a nosebleed is determining where the bleeding originates. Blood has a way of getting everywhere, even with only small quantities. A drop of blood in a bucket of water may turn the entire bucket red. Some people have difficulty deciding whether the nosebleed is right, left, or both sides.

Isolating the bleeding site is done by calming the person down, gently wiping the nose, and removing excess blood.

Why?

In many instances, the reason for the nosebleed is apparent, such as trauma, but in others, it may be more elusive.

A complete medical history and physical examination should be done, including identifying any underlying causes, such as blood thinner use or elevated blood pressure.

When?

When did the nosebleed start?

Are the nosebleeds recurrent?

What?

What makes the nosebleeds stop if they are stopping?

What do you or your family think is causing the nosebleeds?

How?

How many times have you had nosebleeds in the past?

Do you have a bleeding or clotting disorder?

How many times have you been treated for allergies or sinus issues [3]?

Key Challenges

- Nosebleeds can present significant concern, particularly in parents of young children or in the elderly
- Nosebleeds are either anterior or posterior. Most should be treated as anterior unless there are extenuating circumstances.
- Most nosebleeds may not be reported, so prevention is difficult, and acute episodes may represent the worsening of an ongoing problem.
- Nosebleeds that need medical attention are usually a result of acute trauma or represent recurrent bleeding.
- Anterior nasal packing is often ineffective due to multiple reasons ranging from difficulty in usage and failure to stop the nosebleed to patient intolerance [3, 4].

There are different management strategies has been adapted for Non acute and Subacute Nosebleed. A prospective, randomized, controlled clinical trial was conducted in 2010 by using Ankaferd blood stopper in patients with acute anterior epistaxis. This method was found as easy, rapid, effective, and safe alternative to phenylephrine [4]. Another study from Iran, evaluated the efficacy of topical tranexamic acid with nasal tampon in epistaxis management by conducting a randomized control trial [5].

In this study we evaluated Nampons for non-acute and subacute nosebleed management. Nampons are discreet and effective for controlling anterior nosebleeds. They are trusted by hospitals, doctors, and first responders. It is an FDA-registered technology containing a hypoallergenic clotting agent that has been proven effective for over 50 years. Nampons works by soft compression of the bleeding site in the nasal cavity and clotting agent delivery. Nampons are easy to insert and remove without discomfort, minimizing rebleeding because of their non-stick characteristics. They are designed to be used by anyone, not just those with sufficient medical training. Nampons (™) offers a new outlook on nosebleed treatment by providing fast, efficient relief and avoiding discomfort, breakthrough bleeding, or other untoward patient problems. Nampons combines compression with unique clotting-promoting characteristics and non-stick formulation to solve many common medical management issues when dealing with nosebleeds.

The Material Technology of Epistaxis Devices

Anterior nasal packing requires a specialized product to incorporate effectiveness, ease of use, and clotting characteristics. Nampons offers a unique combination of technology to achieve these goals.

Traditional materials, cotton and cotton-blend absorbency dressings (i.e., cotton balls and non-resorbable gauze), are the original and continue to be the standard of care for packing wounds. The sports industry first utilized nasal tamponades (NT) made from traditionally feminine products to control the bleeding of the anterior epistaxis without disrupting the continuation of a game.

For epistaxis devices, there are a variety of materials to choose from: cotton and cotton blends, sophisticated composites of sponge-formed hemostatics, and bioresorbable materials. Still, as the need for more efficient methods of epistaxis managed care devices expands, new materials are being developed. Table 1 shows standard care solutions that are commonly used [6-8].

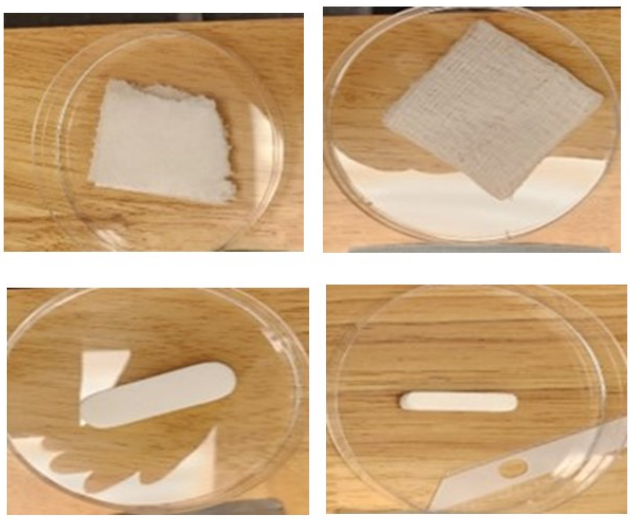
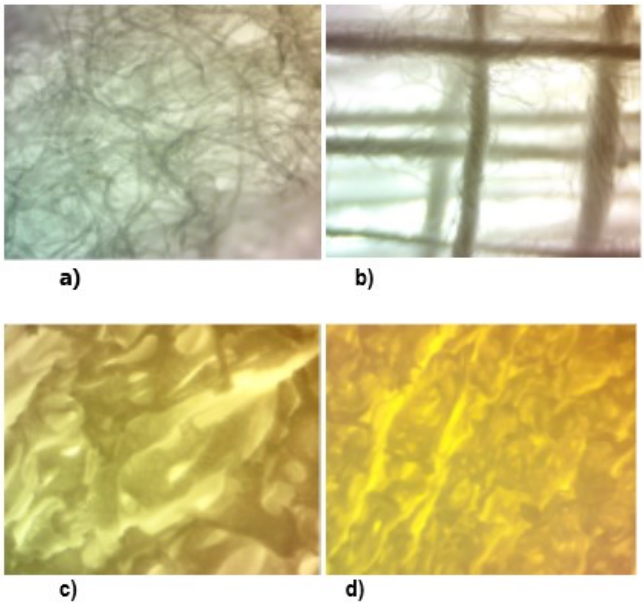


Figure 1: Photographs of Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids at 4x magnification.

Traditional or standard-of-care methods of hemostasis, such as gauze or tissue compression, are unsuitable for treating mild to moderate nasal bleeding. These materials lack the hemostatic mechanism, have a higher degradation rate while in use, and do not reduce the plasma clotting time for most nosebleeds. It is essential to have suitable forms of material that improve hemostatic performance to reduce prolonged nosebleeds [6-8].



Photographs of a.) 4-ply tissue, b.) 8-ply cotton gauze, c.) Nampons, and d.) Nampons Kids at a 4x magnification on an electron microscope.

Figure 2: Photographs of Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids at 4x magnification

In this study, we evaluated *In-Vitro* Hemostatic Capacity of Nampons. Nampon was evaluated against standard care products including tissues and gauze for nosebleed. The evaluation was analyzed microscopically by using 4x magnification.

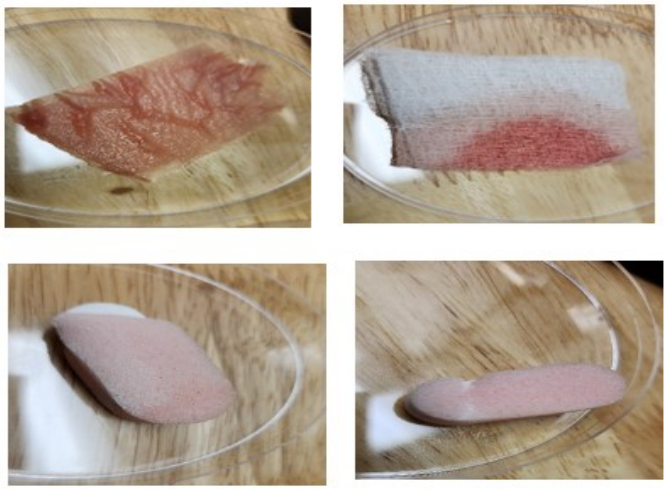
Tissue (a.) and gauze (b.) are not tightly packed materials developed to absorb blood and block the wound well to reduce the amount of bleeding, presented in Figure 1 and 2. Nampons products (see c.) and d.) have oxidized cellulose hemostatic sponges that are made of densely packed and compressed polyvinyl alcohol material that are none for being porous and highly absorbable.

Table 1: Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids

Device Name	Indication	Severity	Material Type	Hemostat
Sterile Gauze	Absorbent wound dressing	Mild bleeding	Rayon/Polyester or Cotton	N/A
Tissue (varied ply)	Multiple-use	N/A	Pulpwood trees	N/A
Nampons (™) and Nampons (™) Kids	For use as a nasal packing to treat epistaxis.	Mild to Moderate bleeding	polyvinyl alcohol (PVA)	oxidized cellulose

In-Vitro Hemostatic Capacity

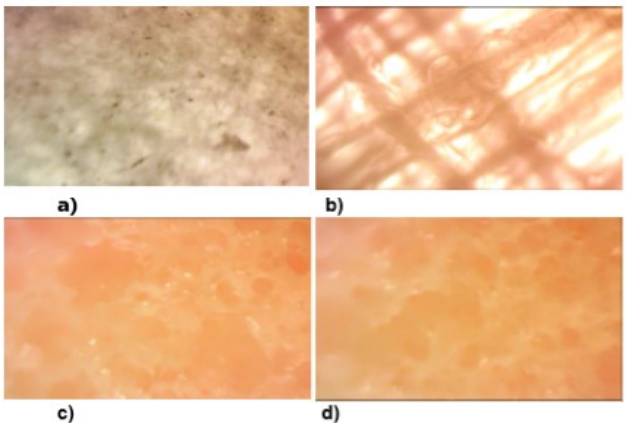
To demonstrate the in-vitro hemostatic capacity of Standard of Care (i.e. tissue and gauze), Nampons, and Nampons kids, the materials of each of these hemostatic methods were evaluated by visual analysis by adding 10 mL of porcine blood and adding it to each material to compare the absorbance and photographing the difference in contact efficiency and blood diffusion.



Photographs of the in-vitro hemostatic recovery assessment of (from left to right) Nampons Kids, 4-ply tissue, 8-ply gauze, and Nampons, while adding 10mLs of porcine blood.

Figure 3: Photographs of Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids at 4x magnification during in-vitro hemostatic capacity.

The Nampons Kids and Nampons did not have any pooled or residual blood on the petri dish, like the tissue or gauze, as seen in Figure 3.



Photographs of a.) 4-ply tissue, b.) 8-ply cotton gauze, c.) Nampons, and d.) Nampons Kids at a 4x magnification on an electron microscope while adding 10mLs of porcine blood.

Figure 4: Photographs of Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids at 4x magnification during in-vitro hemostatic capacity.

The Standard of Care Products for Nosebleed and Nampons (™) and Nampons(™) Kids at 4x magnification during in-vitro hemostatic capacity was presented in Figure 3. Figure 4 presented the digital images from the microscope, at a magnification of 4x, that the density of the material has a direct correlation to blood diffusion and contact efficiency. The tissue and gauze absorbed the blood that came in direct contact with each of the fibrous materials, the tissue displayed the blood proteins free floating around the fibrous material, and the gauze absorbed the blood into the structure material but did not absorb all of the blood on contact. The oxidized cellulose (OC) sponges (Nampons and Nampons Kids) exhibited the expected absorbent expansion properties you would expect from this highly absorbent, densely porous material, making OC sponges a preferred material for hemostasis for nosebleeds.

Most nosebleeds are anterior. Usually, the bleeding can be stopped using conservative measures, which include direct compression, elevation, and ice. Contrary to popular belief, leaning the person's head forward instead of backward is more effective since the blood will not go down the person's throat and cause choking or coughing. If the direct pressure is unsuccessful, cotton or gauze moistened with epinephrine at a ratio of 1:10,000 or phenylephrine (Neo-Synephrine) may be placed into the side of the nose where the bleeding comes from. This maneuver allows for vasoconstriction to promote hemostasis. In some cases, using phenylephrine spray inside the nose without cotton or gauze is sufficient [8, 9].

If the cause of the bleeding is excessive dryness, then air humidification or nasal saline sprays are beneficial. Oxymetazoline may be helpful, but patients should be cautioned about overuse because of the risks of rhinitis medicamentosa and tachyphylaxis or rapid heart rate. Another technique to be considered is the local application of bacitracin or petrolatum jelly to the front part of the nose to prevent drying [10].

If the nose bleeding can be localized to a specific site, it is common for physicians to use cauterization. Cauterization may be performed chemically with silver nitrate or electrically with electrocauterization. Technology has improved methods of visualization inside the nose with rigid endoscopy. Caution should be taken in random or overly aggressive cauterization by either method to avoid damage to the nose and possible worsening of the nosebleed [11].

Nasal packing is used if the above measures fail. There are two main categories of packing: anterior and posterior. Nasal packing can be defined as a temporary bandage that performs several functions including compression, absorption of blood, and hemostasis. In anterior epistasis, various packing or bandage materials are available. (Figure 1). Blind packing with loose gauze should be avoided. Isolation of the site and cause of anterior bleeding can be essential in stopping anterior nosebleeds [12-15].

Nampons™ is a unique product because of its direct-to-consumer accessibility, absorption characteristics, biocompatibility, and hypoallergenic pro-coagulant that facilitates hemostasis. Nampons™ are designed to be easily placed inside the nose by anyone and do not require being left in place for the standard 3-4 days

recommended for traditional nasal packing. Nampons™ is particularly effective in a variety of circumstances. It has a wide range of uses since it is easy to apply, safe, and well-tolerated in adults and children. It has also been used in difficult-to-treat conditions, such as in managing hereditary hemorrhagic telangiectasia (HHT), an inherited condition, and an incurable cause of nosebleeds.
This study evaluated that Nampons™ are a direct-to-customer product. These are made of medical-grade, compressed PVA that rapidly expands on contact with blood to provide gentle pressure on the nasal mucosa while absorbing 12x more blood than cotton products. Upon expansion, the foam will topically deliver micro-oxidized cellulose, a hypoallergenic pro-coagulant that facilitates hemostasis. Polyvinyl alcohol (PVA) has unique advantages in treating nosebleeds because of its biocompatibility, low tendency for protein adhesion, and low toxicity. PVA is routinely used in medical applications such as cartilage replacements, contact lenses, and eye drops. PVA is helpful in blood clotting and absorbs more liquid than polyurethane sponges.

No competing interest has been declared.

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