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Critical survey and panel review of sustained acoustic medicine in the treatment of sports-related musculoskeletal injuries by professional sports athletic trainers

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Abstract

Background: The purpose of our study was two-fold. First, it was to discover American professional sports athletic trainers' (PSAT) use and opinions regarding the treatment with a small, portable ultrasound Sustained Acoustic Medicine (SAM) device on their athletes. Second, it was to discover the effectiveness of SAM treatment in their professional sports players (PSP).

Methods: There were two ways of collecting data from the PSATs. The first was by written survey. Questions included qualitative and quantitative feedback on SAM device use, clinical applications, and acceptance among PSP. The second part involved a panel discussion of four PSATs, who shared their personal experiences with SAM. Questions focused on the use of the technology, confidence level, manner of application, and communication with PSPs regarding the application of the SAM and recommended treatment protocols.

Results: The survey found that SAM is wearable, easy to use, comfortable, and that it can be used as a "go-to" device outside of the athletic training facility. PSATs reported an 87% satisfaction and increased confidence in the ability of SAM to accelerate the healing process. Thus, SAM was considered a recommended treatment for professional athletes to use as an adjunct therapy. PSATs agreed that SAM is one of the recommended choices as an adjunct therapy in multiple musculoskeletal injuries.

Conclusions: The survey and panel discussion concluded that SAM treatment is easy to use with no adverse effects and can be used at multiple stages of the healing process.

Level of Evidence: Level IV.

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Keywords

continuous low-intensity ultrasound; sports-related injuries; sustained acoustic medicine; round table panel; critical survey; acute inflammation; chronic inflammation

INTRODUCTION

Professional sports in the United States generates over $40 billion in revenue, with a projection that American football revenue alone will exceed $25 billion by the year 2025.[1] It is a driving source of revenue for the American economy.[2] Professional sports teams need to keep their players in the best of physical condition to play to the best of their abilities. Most professional sports are physical and require contact with a high level of physical conditioning and fitness.[3] To attain that level of fitness, professional athletes, must go through extensive training regimes. Professional sports teams make sure their players stay healthy from preseason through the season to the postseason.

To keep players healthy, teams retain a team of medical staff ranging from athletic trainers, physicians, dietitians, and mental health professionals. Although the medical staff ensures the physical and psychological health of the player, the rigor of the sport exposes players to continuous physical challenges. The recovery from physical injuries is complex and dependent on the impact of trauma, location of the injury, as well as genetic and physical variability of the professional athlete.[4-10]

Athletic trainers usually are the first to respond and conduct the initial assessment of an acute injury and triage the patient's care until the athlete can return to play and are also heavily involved in resolving chronic injury. They work closely with players, physical therapists, and physicians to resolve pain in its acute stages and ensure the prevention of sustained inflammation and chronic pain, which can lead to further deterioration of injured tissue and delayed recovery time. Recent advancement in technology has ensured better treatment of on-field injury diagnosis and treatment. Some of the tools that are used to treat injuries are electrical muscle stimulation, transcutaneous electrical stimulation (TENS), light therapy (laser), and massage. An emerging treatment device that is used by athletic trainers and other clinicians is sustained acoustic medicine (SAM). It uses a long duration treatment (1 to 4 hr) of a low intensity (0.132 W/cm^2) pulsed current to expedite musculoskeletal healing of injuries. SAM is regularly used by PSATs in professional sports.

Injury healing is a complex process that progresses through multiple concurrent biological pathways. Designing a useful and timely rehabilitation regime by an athletic trainer can be a challenge. The human body begins the process of injury assessment for healing and cellular remodeling within minutes after an injury, and depending on the injury, it can take months to years for the process to be complete.[9,11-17] The healing process is evaluated by accessing the inflammation at the injury site, and the after-injury pain progression through measures such as visual analog scales (VAS) for pain or numerical rating scales (NRS) for pain. The improvement in mobility and functionality is determined by using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and Global Rating of

Change (GROC) score. These indices help trainers and clinicians evaluate the rate of full recovery and determine the time to return to play.

The objective of this study was to assess the first-hand utilization and real-world effectiveness of SAM in the treatment and rehabilitation of professional sports athletes. Our hypothesis was that SAM would improve the treatment of soft-tissue injuries in clinical practice.

MATERIALS AND METHODS

Ethical Review and Study Design

Institutional review board approval was not required for this study because it did not involve human subjects or patient data. To assess the real-world use of SAM as an emerging treatment option, an independent survey and discussion panel were conducted to determine the effectiveness of SAM with professional sports athletic trainers (PSATs). The discussion panel was led by Professor Thomas Best and Professor David Draper. The survey also discussed the emerging trends and best practices of SAM use in the treatment and rehabilitation of professional sports athletes.

Participant Selection

Professional sports athletic trainers regularly use SAM. We performed a panel discussion and mail-in survey of this group regarding their use and results regarding the use of SAM in treating injuries. Participants were selected based off of random assignment.

Data Collection

Survey and Round Table Discussion—To evaluate the overall impact of SAM on the rehabilitation of athletes and sports injuries, the information was collected in two parts. In the first part, the athletic trainers were asked to fill out surveys with specific questions about SAM treatment, application sites, preference of application, use of SAM in the various phases of rehabilitation and injury, the impact on return to sports, and effect of SAM application on the decision-making process in treating an injury. In the second part, an open panel discussion of the authors reviewed questions developed by Dr. Best and Dr. Draper. Questions included interaction between the healthcare provider and professional athletes regarding the use of SAM application in pain management, tissue healing, and other clinical benefits. Questions also reviewed how athletes responded to SAM application and the rate of compliance with treatment protocols outside of the athletic training facility.

Statistical Analysis

A sample size calculation was not done because participation was voluntary from a group of professional sports athletic trainers. Data was expressed in percentages and analyzed with standard t-test.

RESULTS

Survey

How Athletes Respond to SAM Treatment—Athletic trainers were asked how professional sports athletes responded to SAM treatment during rehabilitation after injury. Questions included information regarding how comfortable the athletes were with the therapy, whether they were able to follow the instructions, the follow-up rate, whether there was completion of the rehabilitation regime, and whether SAM was an additional motivational factor in the rehabilitation process. The survey reported that 75% of professional sports players completed the recommended SAM treatment regimen, 69% found SAM treatment easy to use and apply themselves, 87% reported increased satisfaction with their recovery, 75% of athletes used SAM at home versus in the athletic training facility, and 62% of athletes followed the in-home SAM program, which led to 69% increased motivation during the rehabilitation period with the addition of SAM treatment. Athletic trainers observed an improvement in the players' response and the rate of recovery when SAM was implemented into the treatment regimen (Table 1).

Application Sites for SAM Treatment—All of the Athletic trainers surveyed (100%) reported they preferred to use SAM to expedite soft-tissue healing in lateral ankle sprains, tendinitis muscle contusion, muscle strains, muscle spasm, and patellar tendinitis. All confirmed positive results with the application of SAM in accelerating the healing process of soft-tissue injuries. Athletic trainers followed recommended placement protocols for SAM, which included the use of one ultrasound transducer directly over the target lesion and another transducer proximal or within 2 inches. In a joint-related or spinal-related injury, the preferred SAM application was on medial and lateral surfaces of the joint or bilaterally spaced a few inches from the centerline of the spine to target the vertebral column.

Preference of SAM Treatment Compared With Other Therapies—Daily home-use of SAM treatment was one of the topmost adjunct therapies in the rehabilitation process along with rest, ice, compression, elevation, and stabilization (RICES), physical therapy, laser therapy, and shockwave. PSATs preferred SAM over other therapies that were limited to use within training facilities because the SAM device is wearable and provides the ability to be used at home and during travel when athletes are away from training centers. PSATs considered the use of cold and compression to reduce swelling immediately after injury and then the application of SAM to provide healing and pain relief benefit.

Factors Considered for SAM Application to an Injury Site—The factors taken into consideration for SAM application are the site of injury, level of inflammation, level of function, strength, and range of motion of the athlete after trauma. The PSATs were comfortable using SAM at any point in the healing process of the athlete. No adverse events have been reported in the literature or the clinical environment, and the treatment may be used at multiple sites along with other rehabilitation therapies. They found that SAM reduced initial inflammation and reduced the level of pain while it increased range of motion for the athlete.

Panel Discussion

The following discussion was held in open question and answer manner (Table 2):

Question: What common sports injuries do you effectively treat with SAM?

Response: Common successfully treated injuries included high-ankle sprain, distal knee medial collateral ligament injuries, Achilles tendinopathy, calf and hamstring muscle tears, tendinopathy of the upper and lower extremities, deep-tissue contusions, capsule irritation, navicular stress fractures, bone injuries, and joint arthritis. The PSATs expressed that targeting deep damaged cells with SAM treatment increases range-of-motion and allows them to treat reinjuries, soft-tissue conditions, and return-to-play issues. The PSATs expressed that SAM was used consistently by high-profile players as a take-home treatment of 4 to 8 hr per day.

Question: How do you use SAM for acute injuries versus recovery issues? How you apply SAM for these different types of injuries?

Response: SAM is currently used for both acute trauma and recovery after training and competition. Realtime digital monitoring and analytic data are broadly used in the athletic-training room to monitor players who are at risk for over-use injury. For recovery, SAM is proactively integrated into the daily rehabilitation regimen and for sonophoresis delivery of non-steroidal antiinflammatory drugs (NSAIDS) every week through-out the season. When using SAM for phonophoresis, diclofenac and dexamethasone were considered the primary active ingredients to be used with the device.

Question: Acute or chronic injuries? Are there any injuries or soft-tissue injuries you stay away from SAM with?

Response: The panel was noticeably split on how soon that they use SAM for the treatment of acute injuries. They either used treatment as soon as the swelling was relatively low or after the first 48 hr. The group concurred that if they are treating a concentrated trauma-related injury, they use a targeted SAM placement over the injury site. If they are using SAM for general recovery, they use SAM proactively on regions of high loading and repetition.

Question: How do you handle high-ankle sprains?

Response: The panel agreed that they use SAM for ankle injuries. They pointed out that ankle sprains can be hard to target. The fact that SAM uses two convex ultrasound lenses allows the device to cover a large treatment field and treat these types of acute injuries.

Question: Tell us about your use of SAM on hamstring injuries. Is it different for a 180-lb, defensive back, and a 300 lb. offensive lineman? What about localized hamstring injuries versus diffuse hamstring injuries? What about superficial hamstring injuries versus deep hamstring injuries?

Response: In general, the panel was more likely to use SAM to treat hamstrings on leaner “skill” players. Some of the panel members shared that they take advantage

of the divergent lenses by placing SAM strategically during treatments to increase the depth and width of the acoustic field, which stimulates cell proliferation and expedites the removal of cellular waste in an acoustic field the size of a grapefruit. The panel also discussed how SAM treatment increases tissue temperature by 4 degrees Celsius in the first hour, up to 5.2 cm deep into the targeted area.

Question: Compliance of treatment use. Do players get 4 hr of SAM treatment or more?

Response: The panel stressed to their athletes that they treat a minimum of 2 hr during daily rehab. When treating an injury, they stress the importance of using SAM with intentional movement. SAM is extremely conducive to movement-based therapy as athletes can wear the device when they are participating in stretching and light training activities. Some athletes wear SAM the entire day or for weeks at a time, when possible, to continuously enhance the body's healing process. The panel expressed that athletes are very aware of nutrition, biologics, and treatments like SAM, and are embracing technology to succeed in recovery.

Question: What about the utilization of SAM on anterior cruciate ligament (ACL) injuries?

Response: The panel agreed that SAM always makes sense for an ACL injury, which is a common injury in contact and running sports. The ability to use SAM for 4 to 8 hr daily to help accelerate tissue remodeling and flush out inflammatory mediators is helpful in the healing process.

Question: Do you use SAM for stress fractures?

Response: The panel uses SAM in a variety of stress fractures since the ultrasonic intensity is low enough that it does not create bone pain for the patient. The panel has found success in the treatment of anterior tibial stress fractures, metatarsal and navicular stress fractures, rib fractures, and bone bruises. A biological repair response noticeable on radiographic reports is generally found within 2 to 3 wk of daily 4-hour treatment.

Question: Have you tried SAM for an injury that you do not have a "go-to" treatment for?

Response: The panel agreed that SAM is multifunctional and that they use it with virtually all musculoskeletal injuries and conditions.

Question: Any patients in whom SAM did not work to help facilitate healing?

Response: The panel stated, "SAM therapy works" and that there have been only a few occasions where patients did not respond to treatment and required surgical intervention. They agreed that educating players is important for consistent daily treatment. Typically, SAM is placed into a treatment plan for the player, which is monitored with objective measures of recovery.

Question: What other treatment methods facilitate daily healing of the tissue?

Response: The panel agreed that there are many medical technologies to promote healing, but SAM is the only medical technology that promotes healing for hours each day. They also agreed that SAM significantly accelerates the healing process with its extended treatment duration.

Question: What is the deciding factor on sonophoresis with SAM?

Response: The panel expressed past success and continued interest in using SAM for sonophoresis. In a recent study, SAM is shown to drive diclofenac 3.8 times deeper than topical application alone. The PSATs use a variety of “driving agents” and target players with chronic painful injuries. Sonophoresis was considered by the panel to be an excellent approach to reduce systemic NSAID use, but there were practical limitations in training patients in daily administration. The panel provided interest in having SAM patches prepared with diclofenac or dexamethasone for treatment by the athletes at home.

Question: What future opportunities and improvements would you like to see?

Response: The panel requested more educational materials for patients and suggested adding a “flex-mold” applicator for conditions that are difficult to place with the current SAM coupling patch.

Summary Q&A session

The panel of PSATS concluded that they use SAM broadly for multiple soft-tissue injuries, including high-ankle sprain, deep-tissue contusion, hamstring, and Achilles tendons injuries, to increase the range of motion and reduce time to return to play. SAM is applied in multiple phases of healing within the first 12 to 48 hr of injury to enhance the rate of healing as a first-line adjunct therapy because it treats deep-tissue injuries by inducing cellular movement, increasing nutrient supply, and diathermy. Further, the depth of injury is one of the deciding factors in SAM application. The panel had a consensus on the use of SAM as a sonophoresis device to improve the delivery of NSAIDs and showed interest in its potential use in anterior stress fractures. Ultrasound is effective for fracture healing and enhances bone remodeling, and the panel has used SAM to increase bone healing of stress fractures. SAM is one of the “go to”treatments in injuries to expedite recovery and return to the field. All panel members agreed that players have a positive response to SAM application and are very excited to use it once they get to know its effectiveness as a passive treatment outside of the training athletic training facility.

DISCUSSION

SAM promotes natural healing. It uses a noninvasive, easy-to-use, wearable, portable, and localized medical device that only targets the injury site. It enhances tissue regeneration and decreases pain. The SAM treatment algorithm uses 3 MHz, 0.132W/cm^2, 1.3W with a total energy of 18,720 J, with a delivery duration between 1 and 4 hr. The mechanical stimulation ability of SAM enables it to activate cellular and molecular pathways and allows it to regenerate a new matrix. At the tissue level, the thermal and energy deposition abilities of SAM allow an increase in blood flow and oxygen supply as well as removal of tissue debris,

which leads to faster healing. The therapy is noninvasive and localized; thus, it targets the injured tissue with no systemic or long-term effects. This high-energy deposition alleviates pain and improves function in injuries relating to tendinopathy, joint damage, and muscle damage.

The efficacy of SAM has been reported in multiple clinical trials. Langer *et al.*,[18] in a clinical case series of 30 athletes, reported a 15% ($P < 0.05$) reduction in trapezium muscle spasm. In a separate study, the application of SAM improved VAS by a 52% reduction in pain after rotator cuff injury, a 40% reduction in pain in osteoarthritis (N=47), and a 50% decrease in VAS score in tendon pain relief (N=25) after 6 wk of treatment.[18-20] Lewis *et al.*[21] reported up to a 1-point increase in Global Rating of Change (GROC) score and a 25% reduction in chronic myofascial pain after SAM treatment.[21,22] A study by Best *et al.*[23] has shown a significant reduction in pain associated with tendinopathy after a 6-week SAM treatment. The patients (N=20) showed a 2.83 kg hand grip increase ($P = 0.02$).[23,24] In a recent study of joint pain by Draper *et al.*,[25] patients showed improvement of 1.96 points ($P < 0.001$) on Numerical Rating Scale (NRS) for pain and 505 points ($P = 0.02$) on the Western Ontario McMaster Osteoarthrosis Index (WOMAC) after using SAM for 6 wk. A double-blind placebo-controlled clinical trial by Petterson *et al.*[26] showed a reduction of pain by 2.61 ($P<0.001$) on the NRS scale relative to the placebo group after 4wk of SAM treatment. The GROC was also significantly higher in the treatment group (2.84) points compared with 0.46 points in the placebo group ($P<0.001$).[26] SAMcan also be used as add-on therapy. In a series of case reports, Draper *et al.*[27] reported SAM add-on therapy effectiveness in athletes with other traditional therapies. The study reported 100% satisfaction in the device usability, with an average alleviation of 3.33±0.82 ($P\leq0.05$) NRS pain; 87% of the athletes displayed improvement in functionality with 55% returning to sporting activities.[27]

SAM has effective sonophoresis abilities, Langer *et al.*[28] discovered a 3.4-fold increase of salicylic acid delivery in human skin tissue models. Stratton *et al.*[29] demonstrated that SAM significantly increased the penetration of hyaluronan in subjects. Recently, Masterson *et al.*[29] reported the effectiveness of SAM as a drug-delivery device as well. A 4-hour SAM treatment increased the delivery of diclofenac by 3.8 times ($P<0.001$) in a human skin model.

These previously discussed studies have demonstrated the effectiveness of SAM in healing musculoskeletal pathologies. This has resulted in pain reduction, improved mobility, and overall quality of life when using SAM in the real-world environment as an adjunctive therapy to treat athletic injuries and expedite the rate of healing as well as reduced reinjury.

Musculoskeletal injuries are a common and costly dilemma incurred by many professional athletes. Inflammation is the local response of the body to an injury or irritant. Inflammation has a dual function. First, it defends the body against foreign substances. Second, it disposes of dead and dying tissue so that tissue repair can take place.[30] There are two classifications of injury: acute and chronic. When the damage is acute, it often presents with redness, heat, swelling, pain, and functional loss. This is often treated with immediate application of RICES.[30] Previously inflammation has been considered to be destructive, and the prevailing

thought was that it should be eliminated. Recent studies have shown that inflammation is vital for recovery.[30] When the injury becomes chronic (secondary injury), it requires specialized care to prevent an ongoing cascade of inflammation.[30]

Athletic trainers play an essential role in keeping players healthy and work diligently to shorten the rehabilitation period after an injury. This survey and discussion panel evaluated the experience of professional athletic trainers with SAM technology. The purpose of the survey was to study the application of SAM in different conditions and levels of confidence in recommending the use of SAM in rehabilitation regimes. The survey inquired about the preference of panel members in using SAM as adjunctive therapy or as a standalone treatment. The survey analysis showed that athletes were able to follow the instructions of SAM use and had a high rate of injury recovery. One of the exciting features of SAM treatment is the wearable-active take-home therapy.

PSATs use SAM at multiple treatment sites along with other rehabilitation therapies. The essential factor of selecting SAM is that it has shown no adverse effects, and it is a noninvasive stimulation relative to other treatments such as shockwave, laser therapy, and electric stimulation, all of which can cause tissue damage if not appropriately regulated. With the use of SAM, the diathermic studies have shown that there is no tissue damage after 4 hr of stimulation and tissue increase by a few degrees. This increases the blood flow and rate of oxygenation without damaging the healthy tissue, thus allowing players to use it for a longer time, and it is a safe therapy that players are comfortable using as a take-home device.

The transducer size and its targeted stimulation also help PSATs to target only the injured tissue instead of using more systemic therapies. The flexible design of the transducer helps to attach to the surface of the skin and stimulate hard-to-reach tissue such as ankle and wrist. The panel also confirmed that they use SAM at different stages of the healing process, and it has helped in regulating inflammation, decreasing the pain, and reducing rehabilitation time.

The discussion panel was an open question and answer session with PSATs to get their feedback on the application of the SAM device. To the authors' knowledge, it was the first discussion panel to assess the implementation of a medical device with athletic trainers and share their experience in athletic training rooms. The interaction of medical experts with PSATs and the discussion of how players responded to the application of SAM in the rehabilitation process was unique. They discussed how players responded to the use of SAM in both athletic training facilities and home.

The panel interaction revealed multiple factors that PSATS take into consideration when using different modalities for rehabilitation such as injury site, size of the player, the position of the player on the field, players response to the injury, players personality, players' compliance, and analytic approaches and expectations that are used by the teams. The first factor the PSATs have to take into account is the player's response to the injury. This helped to keep them motivated during the rehabilitation process of rehabilitation. The healing process starts right after the occurrence of the injury. Athletic trainers apply different approaches on how to use SAM during the acute phase of injury. During the discussion

panel, PSATs discussed that their application of SAM depends on the location of the injury, level of inflammation, and personal response of the player. Most of the PSATs did agree that they do support the application of SAM in the postacute inflammation phase.

The application of SAM in different musculoskeletal sites was a robust discussion point of the panel. The unique design of SAM allows PSATs to treat high-ankle sprains as well as large skeletal muscles like a hamstring. The applicators' flexibility is novel to SAM, and it is not available in other technologies. The SAM transducer design allows it to be used for long durations in hard-to-reach anatomic locations to expedite the healing process. The wearable and easy-to-use feature of SAM allowed players to use SAM as passive therapy for long durations outside of the training facility. Once the players were educated about SAM functionality and instructed about its usage, players were excited about the passive therapy features of SAM and showed a high rate of compliance.

Ultrasound therapy has been used for fracture healing and drug delivery.[31] In the panel discussion, medical experts inquired if PSATs had applied SAM to treat fractures. The SAM application has been limited in fracture healing. Some PSATs recommended its application to players in case of stress fractures, and currently it is being used by college athletic trainers. Drug delivery using ultrasound, also known as sonophoresis, has been a well-studied field. Recently SAM has been shown to have encouraging results in the application of NSAIDs.[30] The panel said they communicated with the players regarding restraining from using oral NSAIDs and using a more localized and targeted approach to treat an injury with NSAIDs and highly recommended SAM as a sonophoresis device.

The panel agreed that although there are other adjunct therapies, SAM is their "go-to" treatment for reducing pain, accelerating healing, and overall rehabilitation. Rehabilitation is a complex process that requires both mental motivation and physical healing. For an athletic trainer, it is essential to keep players mentally motivated during rehabilitation and enhance the rate of physical recovery. SAM, as a noninvasive, wearable, and easy-to-use technology that allows athletic trainers to expedite the healing process and reduce off-field time.

Limitations and Future Perspectives

The findings of this study were limited by the review of panelists and professional athletic trainers who were included in the analysis and may not reflect the opinion of all professional athletic trainers. Both survey and discussion panels conveyed the encouraging experience of athletic trainers with SAM. The panel was interested in more medical education materials to explain how SAM works to accelerate the healing and how they can use it more effectively and efficiently. They wanted to know more about the medical perspective of technology so they can educate the players who are prescribed treatment. The panel agreed that another medical discussion would be warranted in the future to learn about developing technology and how it can be applied in their practice.

CONCLUSIONS

Inflammation is the local response of the body to an injury or irritant. Inflammation defends the body against foreign substances and disposes of dead and dying tissue so that tissue

repair can take place.[30] Injury can be either acute, that presents with redness, heat, swelling, pain, and functional loss and often is treated with immediate application of RICES, or it can become chronic (secondary injury) that requires specialized care to prevent an ongoing cascade of inflammation. When this special treatment includes SAM, the athlete's return to competition occurs faster than when SAM is not used.

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TABLE 1.

Results from the professional sports athletic trainers' (PSAT) survey on the patients' (athletes) rate of response to sustained acoustic medicine (SAM) treatment for professional sports players

	Team 1	Team 2	Team 3	Team 4	Average %
Rate of completion of daily 4-hour SAM treatment	75	50	75	100	75.00 ± 20.41
Able to follow instructions of SAM treatment regimen	75	75	50	75	68.75 ± 12.50
Satisfaction with recovery with SAM treatment	75	100	75	100	87.50 ± 14.43
Prefer in-home SAM treatment	75	50	75	100	75.00 ± 20.41
Follow the in-home SAM treatment regimen	75	25	50	100	62.50 ± 32.27
Exhibits additional positive motivation in recovery with SAM	75	75	50	75	68.75 ± 12.50

TABLE 2.

Discussion panel

Question	Response
What common injuries do you treat with SAM?	“We use SAM for a lot of different conditions including reinjuries, soft-tissue injuries and for home use recovery. We had a few distal MCL’. 3 in a row, actually. They all had excellent results from using SAM.” “We use SAM for high-ankle sprains and post-tib tendons injuries. With these issues, we send players home after practice with SAM on them for home treatment. We practice on turf, so we get a lot of overuse issue. We used SAM for a contusion this year, 4 hr per day.”
SAM use for acute injuries versus recovery	“We use SAM for phono every week to help with recovery.” “We don’t use SAM in the acute therapy stage (first 48 hr). We utilize SAM after this period.”
How do you handle high-ankle sprains?	“We are a hybrid. If an acute injury doesn’t swell that much, then we will use SAM immediately.” “We use SAM for ankles and diffuse pain. We use SAM for muscle strain and sprains. (local injuries) Ankles sprains can be ‘global’ and hard to target the exact point of injury because the entire ankle ‘hurts.’”
What is the deciding factor on sonophoresis?	“We are aggressive with sonophoresis and treatment. We want player to feel better …. ” “We pick guys who are wearing SAM at home or all night. Guys who have chronic injuries.”
Compliance	“Some of our players will wear SAM the entire day. We always get multi-hour treatment in.” “Some guys wear SAM for an hour. Some guys wear SAM for 3 wk straight.”
“go-to” treatment for injury	“That’s the beauty of SAM, it’s not contraindicated. We try it with everything!” “100%, there is great ease of access.”
Any cases where SAM didn’t work?	“Only SAM accelerates the healing process.” “There are plenty of choices but SAM is the only one that promotes healing.”

Question and answer session with athletic trainers describing the application of sustained acoustic medicine (SAM).