

# Music in the Operating Room

KASSANDRA BAHR, CST, CSFA, DBA

Music in the surgical environment may be effective in establishing a productive work environment (placing the surgeon and/or staff in an ideal state of mind), and it may help put the patient at ease and in a relaxed mental state. This systematic literature review aims to provide a conceptual and data-driven exploration of the effect of music on pre- and post-operative patients as well as the musical effectiveness of the work performed by surgeons and staff in the operating room.

This article also proposes to review the benefits of music, the role of music in surgical education, and the sources of potential distractions in the operating room (OR). Beneficial effects of music, as measured by the subjective perception of the OR staff (surgeons, nurses, anesthesia providers, surgical technologists) will be discussed.

## MUSIC IN THE OPERATING ROOM – DISTRACTION OR IMPROVED PERFORMANCE?

The World Health Organization defines noise as an unwanted sound – noise pollution in the environment is generally considered a stressor, increasing mental confusion, causing hearing loss and the contribution of cerebral cardiovascular disease.<sup>1</sup> Unfortunately, healthcare workers have been exposed to increased noise pollution during the last several decades. Music played in the operating room increases decibel levels, and it may be a source of distraction to communication.

## LEARNING OBJECTIVES

- ▲ Read about whether or not music in the operating room is beneficial to a patient
- ▲ Evaluate if music played during a procedure can impact the OR team
- ▲ Compare and contrast the pros and cons of playing music during a surgical procedure
- ▲ Learn about whether music played during an operation benefits a patient's heart rate
- ▲ Analyze the effects and general sources of noises in the OR

In studies evaluated within the research, surveys measured perception and attitude of the OR staff on playing music in the surgical environment. The majority of surgical procedures within the United States had music playing during surgery.<sup>2</sup> Within the study participants, the majority expressed positive comments about music, and in nearly half of the staff surveyed, concentration was subjectively improved, according to surgeons, surgical technologists and anesthesia providers. In addition, participants in the study felt team work improved with music – also music was perceived to reduce stress.

Varying opinions have been expressed on whether music is considered distracting – specifically in critical situations when a problem or critical event occurred during the procedure. There were several studies which indicated feedback from participants who observed a reduction in communication related to auditory speed perception when music was played in the operating room. In one study where observational data was gathered and video recordings were utilized, 37 surgical procedures noted a 52% increase in repeated request rate when music was played.<sup>3</sup> A small percentage of anesthesiologists reported that music in the operating room is associated with communication difficulty, and the anesthesia provider may have challenges in offering a stable level of sedation for the patient.

#### ATTITUDE AND STATE OF MIND OF HEALTHCARE PERSONNEL IN TRAINING

Within the operating room, there are often surgical trainees (residents, medical students, circulating nurses, surgical technologists) who may all be especially vulnerable to distractions. The literature shows that surgical educators and these trainees face consistent pressure to improve efficiency and performance metrics. More research needs to be conducted to determine if some benefit exists in music played for trainee surgeons; there is some evidence of benefit of music for fully trained surgeons.

The research revealed several randomized studies where the effect of music on surgical trainees showed music reduced anxiety in novice-trainee surgeons performing specific tasks such as vascular anastomosis. Items measured to determine the positive effect included video-based evaluation, counted hand-tracking/movements, and time to completion of the task. Additionally, participants in the survey were asked about their opinion on music played while completing the task; the majority reported they enjoyed the music.

Additional randomized studies examined the effect of listening to preferred music on task performance. Da Vinci SI simulators were utilized in studies for 45 medical students, randomized to three training module simulators (one with preferred music, one without music, one with non-preferred music).<sup>4</sup> An interesting result of the study showed that when the medical students performed simulations, first with the preferred music, followed by the non-preferred music, no change in performance was noted. However, when medical students first completed the tasks with the non-preferred music and then followed the same tasks with the preferred music, their performance improved (as measured by time and accuracy on the robot simulator).

Multiple studies across the scholarly journals examined the effect of and attitude towards noise in the OR. In studies where stress-inducing effects of noise were evaluated, nearly 60% stated noise levels were detrimental to efficient communication in the OR.<sup>5</sup> Anesthesia providers specifically stated a negative impact of noise in their clinical reasoning.

The results show overwhelming positive effects for patients who listen to music of their choice perioperatively; these patients reported less stress, anxiety and reduced pain levels.

#### CONSCIENCE SEDATION AND ANESTHESIOLOGIST REPORT/ FEEDBACK: THE EFFECTS OF MUSIC ON PATIENTS; ANXIETY – PREVENTION AND CONTROL

Multiple studies over the last 20-plus years have examined the effect of music on surgical patients. From 101 articles reviewed, the data showed patients exhibit lower anxiety levels prior to and during surgery when music is played. An added benefit for patients includes a significant reduction in sedation requirements and analgesics. The results show overwhelming positive effects for patients who listen to music of their choice perioperatively; these patients reported less stress, anxiety and reduced pain levels. Musical resources have the power to improve the patient's condition and recovery with no added expense, and the music

may be customized to each patient. Several studies showed anesthesia providers reported they administered less medication when music was played for patients in procedures where sedation or regional anesthesia was given. Patients in these cases brought their favorite music – played during the procedure where sedation was administered. The anesthesia provider noted in the randomized study of the 60 patients where preferred music was playing that less propofol was given,<sup>6</sup> and following the procedure, patients reported less pain and anxiety. Patient vital signs were monitored in another study, and those who listened to classical music prior to their procedures showed stable respiratory rates, heart rates and normal blood pressure when compared to a control group who listened to no music prior to their procedure.

In the current health environment where opioid use is closely monitored and of concern for doctors and their patients, a meta-analysis in the aforementioned Fu et al study investigated how listening to music during the procedure might influence the patient's pain medication requirement and length of stay. Healthcare professionals, patients and their families continue to face concerns about the opioid epidemic in the United States; medications used after surgery are known to increase the risk for addiction. The meta-analysis showed in procedures where instrumental or relaxing music was played for patients, the post-operative opioid dose was significantly less. In addition, sedatives used during the procedure were significantly reduced. A consistent theme found across the study results and randomized trials showed music as an inexpensive agent with significant positive effects to patients. Vital signs such as heart rate and blood pressure were improved, and the patient's overall experience and comfort were positively impacted.

#### **EPIDEMIOLOGIC METHODS – HEART RATE**

For surgeons and clinical staff, music during surgery was found to reduce blood pressure and heart rate, while also increasing the accuracy of surgical tasks. Multiple studies have been completed to demonstrate the effects of music on surgeons, specifically cardiovascular reactivity. In one study, 100 surgeons were given a basic math task, whereby they were asked to verbally count up by 12s from a 4-digit number for 2 minutes; after 5 minutes, the surgeons were to count up by 15s. This test was repeated under various musical conditions: no music, surgeon's choice, or classical-

Pachelbel's Canon. The researchers monitored autonomic physiological responses, including pulse rate, blood pressure, and skin conduction; the autonomic responses were lowest in the trials with surgeon's musical choice, followed by classical-Pachelbel's Canon, the highest responses with no music.<sup>7</sup>

Music implemented through headphones for patients during surgery would provide the patient with their preferred music and also reduce the noise pollution. Many theorize the music played during surgery would have a calming effect on the patient's vital signs (blood pressure, heart rate, respiration).

#### **MUSIC THERAPY - TYPES, EFFECT AND USE OF MUSIC**

Persoon et al published a study where distracting stimuli were tracked in 82 typical urology procedures; distractions were classified as anything that caused general diversion from the main task.<sup>8</sup> Surgeons and staff in this study agreed the most frustrating distractions were unnecessary conversation and door opening. The interesting commonality in this study for both the study and control group is that neither group found music as a distraction. In fact, the common theme among the surgeon group specifically showed the urologists found the music to be a stress-reliever, especially if they chose the music genre.

Patient outcome is affected by the surgeon's performance and well-being; the effect of music on the surgeon's mental attitude and mood may generate positive physiological responses. An interesting hypothetical question that arises is does one specific genre of music generate more benefits or adverse reactions than another?

The literature revealed several surveys about the impact of music on operating room personnel. The most commonly reported type of appropriate music in the operating room is the classical type. In one study, 350 healthcare professionals (surgeons, nurses, surgical technologists, anesthesiologists) were questioned about the type of music played in the operating room. The results showed that 80.1% stated music helps them work efficiently and stay calm.<sup>9</sup> Another similar study showed that among clinical staff who listened to music, 68% stated music of their chosen genre increased concentration and focus.<sup>10</sup> Interestingly, in both studies, the respondents did not classify music as a distraction or communication hinderance in the operating room. Another factor tracked in the study found increased speed and accuracy among surgeons who selected their preferred music com-

pared to no music. The research overwhelmingly shows operating room staff found music to be favorable; this may be extrapolated as a positive effect that improves technical performance and relaxation (physiological response).

Some may theorize music may be used as a cue for creating awareness during appropriate situations in the OR; lowering or turning off the music entirely during critical moments draws the attention of entire surgical team. Across the literature reviewed, this practice is standard during the time out portion of the procedure. Furthermore, because surgery may have specific phases with higher demands for all members in the OR involved, music may be prohibited to reduce the likelihood of diverting staff's attention or encouraging irrelevant conversation or distraction.

Patient outcome is affected by the surgeon's performance and well-being; the effect of music on the surgeon's mental attitude and mood may generate positive physiological responses.

#### **TASK PERFORMANCE – ANALYSIS OF EFFECTS AND GENERAL SOURCES OF DISTRACTION IN THE OPERATING ROOM**

To be fully transparent and inclusive of all sides of the musical effect in the operating room, it should be noted that some researchers have argued the noise of music increases the stress level of the clinical team and degrades communication. Specifically, in neurologic and orthopedic surgeries – where there exists significant equipment noise such as drills, power saws, and suction – the likelihood of repeated communication is much higher (thereby increasing stress levels and possibly adding time to the procedure). Anesthesiologists were questioned, and out of 205 surveys, nearly 71% noted music was routinely played in the operating room,<sup>11</sup> and from this same study, 26% of anesthesiologists felt communication and attentiveness were compromised. It is interesting to point out that nearly 70% of participants indicated the most distracting music was the genre they

did not like; clearly, the music choice in the operating room may be relevant to performance.

An important consideration for the effects of music in the operating room includes the examination of other types of noise and their effect on the surgeon and clinical staff. The research revealed data in several studies which analyzed distractions in the OR. McDermott et al noted the effects of distractions on the stress, workload and teamwork of the surgical staff.<sup>12</sup> To fully disclose all possible effects of music in the operating room, an examination of the research found a study where 15 medical interns performed a laparoscopic appendectomy with a virtual reality simulator. Conditions applied in the simulator included exposure to music and conversation. The simulator results suggest preclinical laparoscope training to reduce irritation for the surgeon, distraction for the clinical staff, and increased safety for the patient.

The nature and complexity of the work in the operating room indicate an underlying focus and effort to provide high quality surgical care. Significant and efficient communication in the operating room contributes to the safety of patient an optimal environment for the surgeon and staff. Music is one aspect of the noise in the operating room, where advanced surgical technology and mechanical sounds may produce noise levels at an unhealthy and hazardous level, increase stress among staff, or impair communication and concentration.

According to the World Health Organization, noise levels in the operating room should not exceed 30 dBA.<sup>13</sup> Prevalence of high noise levels in the OR are likely to exceed these recommended decibel levels – specifically during orthopedic and neurosurgery, where peak levels exceed 95 dBA for significant portions of the procedure.

Excessive noise (of any type) may contribute to communication error when the noise causes impaired understanding of orders and requests. Noise types or stimuli may include cell phones, beepers, radios, speakers, unnecessary conversation among the OR staff and from staff entering the room. There may be a negative impact of noise on clinical reasoning for students or medical residents.

A factor to consider is the complexity of the surgical procedure and the variance in noise levels for some surgeries may be higher (consider drills in orthopedic or neurosurgical cases). Studies show that volume of noise in the operating room may reach deafening levels – even approaching the level of a jet engine.<sup>14</sup>

Further studies and research should explore the finding of higher noise levels during surgery associated with an increased rate of surgical site infections. While higher decibel noise levels may not cause the SSIs, there may be a link between reduced communication efficiency and postoperative complication rate. Medical research indicates patients have an active and receptive auditory cortex during general anesthesia.<sup>15</sup> Therefore, further research may help explain the detrimental effects of high noise levels within the operating room for patients under general anesthesia.

## CONCLUSION

As the complexity and duration of surgical procedures increases in the present and future operating rooms, surgeons, medical trainees, anesthesiologists, nurses and surgical technologists are faced with the challenge of balancing the creation of a pleasant work environment and the establishment of safe, distraction free workspace. Music in the operating room may contribute to a calmer, happier surgical team, and music has also been shown to improve patient vital signs, healing and recovery during and after surgery. Much of the research about music in the operating room mentions the concern about the musical addition of sounds to an already noise-polluted environment. The difference here is that music is an optional addition, while most of the other mechanical, technological and conversational noise are necessary.

## AUTHOR ACKNOWLEDGEMENTS

I would like to thank the surgeons, anesthesia providers, nurses and surgical technologists at Miami Valley Hospital for their guidance, advice and education for this article and in my profession as a Certified Surgical Technologist and Certified Surgical First Assistant.



## ABOUT THE AUTHOR

Kassandra Bahr has been a CST and CSFA for over 16 years since obtaining her associate degree of science in surgical technology. She has been a member of the neurosurgery team at Miami Valley Hospital, the region's only Level

1 Trauma Center. While employed at the hospital, Kassandra completed her masters and doctorate degrees in business and healthcare administration, and she now splits her time between work as an online professor in the graduate

program at Ohio University and serving on PhD committee at Walden University.

## REFERENCES

1. World Health Organization. Burden of disease from environmental noise. WHO, Regional Office for Europe; 2011. JRC, European Commission; 2011. [https://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0008/136466/e94888.pdf](https://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf).
2. Padmakumar AD, Cohen O, Churton A, Groves JB. *Effect of noise on tasks in operating theatres: a survey of the perceptions of healthcare staff*. Br J Oral Maxillofac Surg. 2017;55:164e167.
3. Weldon SM, Korkiakangas T. Music and communication in the operating theatre. J Adv Nurs. 2015;71:2763e2774.
4. Yamasaki A, Mise Y, Mise Y, et al. *Musical preference correlates closely to professional roles and specialties in operating room: a multicenter cross-sectional cohort study with 672 participants*. Surgery. 2016;159:1260e1268.
5. Shapiro RA, Berland T. *Noise in the operating room*. N Engl J Med. 1972;287:1236e1238.
6. Fu VX, Oomens P, Klimek M, Verhofstad MHJ, Jeekel J. *The effect of peri-operative music on medication requirement and hospital length of stay*. Ann Surg 2019;272(6):961–72. doi:10.1097/SLA.0000000000003506, World Health Organization. Guidelines for Community Noise, <https://www.who.int/docstore/peh/noise/Comnoise-1.pdf>; 1999 [Accessed December 30, 2020].
7. Allen K. *Effects of music on cardiovascular reactivity among surgeons*. JAMA 1994;272(11):882. doi:10.1001/jama.1994.03520110062030.
8. Persoon MC, Broos HJHP, Witjes JA, Hendrikx AJM, Scherpbier AJJM. *The effect of distractions in the operating room during endourological procedures*. Surg Endosc 2010;25(2):437–43. doi:10.1007/s00464-010-1186-8.
9. Fu VX, Oomens P, Kleinrensink VEE, et al. *The effect of preferred music on mental workload*. Surg Endosc 2020. doi:10.1007/s00464-020-07987-6.
10. Shover A, Holloway J, Dauphine C, et al. *A randomized prospective blinded study evaluating the effect of music*. J Surg Educ 2020. doi:10.1016/j.jsurg.2020.08.020.
11. Keller S, Tschan F, Semmer NK, et al. *Noise in the operating room distracts members of the surgical team*. An observational study. World J Surg. 2018;42:3880e3887.
12. Mcdermott J, Sevdalis N, Undre S, Giddie J, Diner L, Smith G. *Impact of intraoperative distractions on patient safety: a prospective descriptive study using validated instruments*. World J Surg 2013;38(4):751–8. doi:10.1007/s00268-013-2315-z.
13. Katz JD. *Noise in the operating room*. Anesthesiology 2014;121(4):894–8. doi: 10.1097/aln.0000000000000319.
14. Moorthy K, Munz Y, Undre S, Darzi A. *Objective evaluation of the effect of noise*. Surgery 2004;136(1):25–30. doi:10.1016/j.surg.2003.12.011.
15. Dueck MH, Petzke F, Gerbershagen HJ, et al. *Propofol attenuates responses of the auditory cortex to acoustic stimulation in a dose-dependent manner: a fMRI study*. Acta Anaesthesiol Scand. 2005;49:784e791.



# Music in the Operating Room

#466 OCTOBER 2022 1.5 CE CREDITS \$9

1. In one study where observational data was gathered and video recordings were utilized, 37 surgical procedures noted a \_\_\_\_\_.
  - A. 52% increase in repeated request rate
  - B. 37% increase in repeated request rate
  - C. Surgeon dropping more instruments
  - D. Medical students repeating surgery rotation
  
2. In studies where stress-inducing effects of noise were evaluated \_\_\_\_\_.
  - A. 20% stated noise levels were detrimental to efficient communication in the OR
  - B. 60% stated noise levels were detrimental to efficient communication in the OR
  - C. 12% stated noise levels were detrimental to efficient communication in the OR
  - D. 13% stated noise levels were detrimental to efficient communication in the OR
  
3. True or false: The data showed patients exhibit lower anxiety levels prior to and during surgery when music is played.
  - A. True
  - B. False
  
4. Several studies showed anesthesia providers reported they administered less medication when music played was for patients \_\_\_\_\_.
  - A. At very high levels
  - B. In cases less than 30 minutes
  - C. In procedures where sedation or regional anesthesia is given
  - D. Who only liked country music
  
5. The meta-analysis showed in procedures where instrumental or relaxing music was played for patients, the post-operative opioid dose was significantly \_\_\_\_\_.
  - A. More
  - B. About the same
  - C. Much higher
  - D. Less
  
6. The common theme among the urologist surgeon group specifically showed they found the music to be/have \_\_\_\_\_.
  - A. A reason to dance
  - B. A stress-reliever
  - C. Stressful
  - D. No effect on skills
  
7. Among clinical staff who listened to music \_\_\_\_\_.
  - A. 68% stated music of their choice increased concentration
  - B. 3% stated music should be chosen by the attending surgeon
  - C. 12% said the team should vote on the music
  - D. 99% stated music of their choice increased concentration
  
8. According to the World Health Organization, noise levels in the operating room should not exceed \_\_\_\_\_.
  - A. 98 dBA
  - B. 30 dBA
  - C. 1 dBA
  - D. 120 dBA
  
9. Another factor tracked in the study found \_\_\_\_\_ among surgeons who selected their preferred music compared to no music.
  - A. Reduced speed and accuracy
  - B. More mistakes
  - C. Less mistakes
  - D. Increased speed and accuracy
  
10. True or false: While higher decibel noise levels may not cause the SSIs, there may be a link between reduced communication efficiency and postoperative complication rate.
  - A. True
  - B. False

## MUSIC IN THE OPERATING ROOM #466 OCTOBER 2022 1.5 CE CREDITS \$9

AST Member No. \_\_\_\_\_

My address has changed. The address below is the new address.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_

Check enclosed  Check Number \_\_\_\_\_

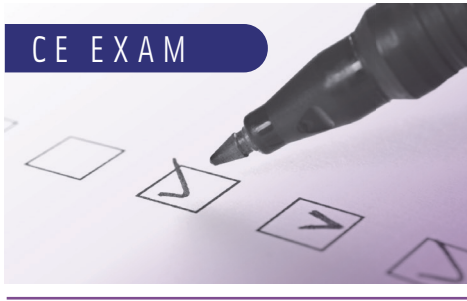
If you want to mail in your CEs, but still want to pay by credit card, give us at call at 800-637-7433.

	a	b	c	d
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>		
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>		

### Make It Easy - Take CE Exams Online

You must have a credit card to purchase test online. We accept Visa, MasterCard and American Express. Your credit card will only be charged once you pass the test and then your credits will be automatically recorded to your account.

Log on to your account on the AST homepage to take advantage of this benefit.



### Earn CE Credits at Home

You will be awarded continuing education (CE) credits toward your recertification after reading the designated article and completing the test with a score of 70% or better. If you do not pass the test, it will be returned along with your payment.

Send the original answer sheet from the journal and make a copy for your records. If possible use a credit card (debit or credit) for payment. It is a faster option for processing of credits and offers more flexibility for correct payment. When submitting multiple tests, you do not need to submit a separate check for each journal test. You may submit multiple journal tests with one check or money order.

**Members this test is also available online at [www.ast.org](http://www.ast.org).** No stamps or checks and it posts to your record automatically!

**Members: \$6 per credit**  
(per credit not per test)

**Nonmembers: \$10 per credit**  
(per credit not per test plus the \$400 nonmember fee per submission)

After your credits are processed, AST will send you a letter acknowledging the number of credits that were accepted. Members can also check your CE credit status online with your login information at [www.ast.org](http://www.ast.org).

### 3 WAYS TO SUBMIT YOUR CE CREDITS

**Mail to:** AST, Member Services, 6 West Dry Creek Circle Ste 200, Littleton, CO 80120-8031

**Fax CE credits to:** 303-694-9169

**E-mail scanned CE credits in PDF format to:**  
[memserv@ast.org](mailto:memserv@ast.org)

For questions please contact Member Services - [memserv@ast.org](mailto:memserv@ast.org) or 800-637-7433, option 3.  
Business hours: Mon-Fri, 8:00a.m. - 4:30 p.m., MT

# WRITE FOR US!

We are always looking for CE authors and surgical procedures that haven't been written about or the latest advancements on a commonplace surgery. You don't have to be a writer to contribute to the Journal. We'll help you every step of the way, AND you'll earn CE credits by writing a CE article that gets published! Here are some guidelines to kick start your way on becoming an author:

- 1 An article submitted for a CE must have a unique thesis or angle and be relevant to the surgical technology profession.
- 2 The article must have a clear message and be accurate, thorough and concise.
- 3 It must be in a format that maintains the Journal's integrity of style.
- 4 It must be an original topic (one that hasn't been published in the Journal recently.)

## How to Get Started

The process for writing a CE can be painless. We are here to assist you every step of the way and make sure that you are proud of your article.

- Write to [communications@ast.org](mailto:communications@ast.org), and state your interest in writing, and what topic you would like to author.
- Submit an outline of your proposed topic for review. Once the outline is returned to you for approval, begin writing your manuscript. Getting your outline approved will save you time and effort of writing a manuscript that may be rejected.
- Submit your manuscript, as well as any art to illustrate your authored topic. You will be notified upon receipt of receiving the manuscript and as well as any changes, additions or concerns.

## Things to Remember:

- **Length:** Continuing education articles should run a minimum of 2,000 words and a maximum of 5,000 words.
- **References:** Every article concludes with a list of ALL references cited in the text. All articles that include facts, history, anatomy or other specific or scientific information must cite sources.
- **Copyright:** When in doubt about copyright, ask the AST editor for clarification.
- **Author's Responsibility:** All articles submitted for publication should be free from plagiarism, should properly document sources and should have attained written documentation of copyright release when necessary. *AST may refuse to publish material that they believe is unauthorized use of copyrighted material or a manuscript without complete documentation.*

**Don't delay! Become an author today.**  
**Write to us at [communications@ast.org](mailto:communications@ast.org)**