

September 2024

VJAS VOICE

Medical Sciences

SEPTEMBER 19, 2024

VJAS VOICE

Fall 2024 Edition



WELCOME TO THE VOICE

By Sriyutha Morishetty, Editor-in-Chief

Hello! I am so excited to present to you the first edition of the 2024-25 VJAS Voice. As Editor-in-Chief, my goal is for The Voice to be representative of the people VJAS serves. If you're interested in getting involved with The Voice, please reach out to me!

Email: 25smorishetty@gsgis.k12.va.us

Keeping in track with last year, each edition will have its own miniature theme based on a popular STEM topic students enjoy researching. We hope this interests students who may be searching for inspiration, hesitant about starting a project in a new category, or just excited to learn more about their favorite scientific topic. We appreciate reader feedback, so if you have suggestions for any VJAS categories you would like to see in the Voice or if you are interested in writing an article for the Voice, be sure to reach out!

This issue's topic will be Medical Sciences!

SEPTEMBER 2024

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“FROM CARING COMES COURAGE.” - Lao Tzu



The President's Welcome

By Rania Lateef

I am delighted to extend a warm welcome to all of you and I am hoping we all have a year filled with academic productivity, scientific advancements, and inspiring research experiences.

This year is a special one for me – I am a senior. As I reflected during my senior sunrise, I will have many “last time I do this” moments. As I experience each one, I want to make sure I use each opportunity to the fullest. It also made me realize I wish I could go back in time and redo some of the moments over the years. So, I want to tell my fellow students – don’t waste a moment while you have it. Discover your interests, explore your passions, and dare to find something new to do.

If you have done it before or if you have never participated, I want to highlight the tremendous value of joining the Virginia Junior Academy of Science (VJAS). Being a part of VJAS is more than just an opportunity to present your research—it’s a chance to join a vibrant community of young scientists who are passionate about making a difference. This year, we are thrilled to announce that VJAS will be returning to an in-person format at Ferrum College. This return to an in-person setting offers a unique opportunity to engage face-to-face with your peers, mentors, and leading scientists from across the state. The interactions and connections you will make at Ferrum College will be invaluable, providing you with insights, feedback, and inspiration that can only come from being part of a dynamic, in-person community. However, we also recognize that this may not be feasible or affordable for everyone. So, we will also offer a virtual opportunity to participate.

As we look forward to the coming months, I also want to encourage you to maintain a balance between academic rigor and personal well-being. Engage deeply with your studies, but also take care of your mental and physical health. Remember that learning is a journey, and it’s important to enjoy the process while striving for excellence.

Let’s make this year one of innovation, exploration, and academic excellence. Wishing you all a successful and inspiring year ahead!

MEET YOUR 2024-25 STUDENT OFFICERS



PRESIDENT Rania Lateef

Rania Lateef is a Senior at Colgan High School and Governor's School at Innovation Park in Manassas, Virginia. She has been a VJAS member since 7th grade and served as Editor-in-Chief of the VJAS and Co-President. In her second term, she's excited to expand VJAS's presence and outreach among all student scientists in Virginia. Rania's interest in scientific research stems from her passion for public health, psychology, and gender studies. In her free time, she enjoys traveling and spending time with friends and her family, which includes her three brothers. A fun fact about Rania: in her free time, she likes to scrapbook!

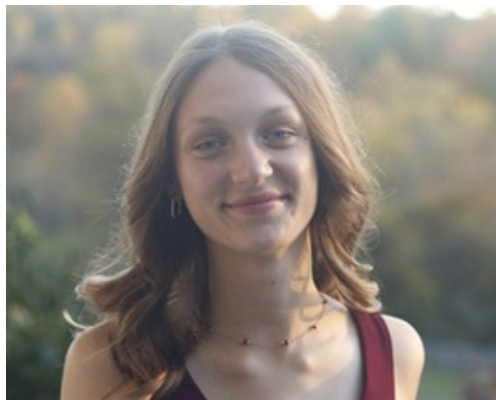
VICE PRESIDENT Kriesh Tivare

Kriesh Tivare is a Junior at Langley High School in Northern Virginia. In the future, he'd like to pursue a career that aligns with his interests in microbiology and biotechnology. In his free time, he enjoys fishing, biking, listening to music, spending time with family, and spending time outside. A fun fact about Kriesh: he's an only child!



EDITOR-IN-CHIEF Sriyutha Morishetty

Sriyutha is a Senior at Maggie L. Walker Governor's School for Government and International Studies in Richmond, VA. She serves as the Editor-in-Chief of her school's publication, The Jabberwock, and she's also interned for the Richmond Magazine. She enjoys reading the news, doing crosswords, and hanging out with friends. She's been involved with VJAS since 6th grade, and her research interests lie mainly in economics. For the Voice this year, we welcome and accept any VJAS student researcher to write about an interest of theirs or to simply help out with articles! Just contact Sriyutha at 25smorishetty@gsgis.k12.va.us, and she can get you started.



CO-SECRETARY Sage Lahmers

Sage attends Blacksburg High School in Montgomery County, Virginia. Her research interests lie in environmental science. In her free time, she loves to travel and spend time in nature. She especially enjoys going on hikes and spending time with her animals. A fun fact about Sage: she can't do a cartwheel or whistle!



CO-SECRETARY Shriya Bandla

Shriya goes to the Center for Medical Sciences at Godwin High School. She is the recipient of The Barbara James Service Award for her work with various health related non-profits. She is also a state and international finalist for HOSA. Shriya has competed in multiple science fairs since middle school including the Metro Richmond Science Fair, Virginia State Science and Engineering Fair, and Virginia Junior Academy of Science. In her free time, she also enjoys playing tennis on her school's Varsity Tennis team. A fun fact about Shriya: she's left-handed!

CO-COMMUNICATIONS LIASON Amina Khan

Amina is a Senior at Jefferson Forest High & Central Virginia Governor's School. She has a strong love for research regarding environmental health, biology, and botany, but an even deeper love traveling. She runs track and also played softball her sophomore year. In her free time, she enjoys going on walks or drives (especially at night). A fun fact about Amina: she loves to read (when she's not being forced to)!



CO-COMMUNICATIONS LIASON Madeline Levorson

Madeline attends Thomas Jefferson High School For Science and Technology in Northern Virginia. Her research interests lie in microbiology. In her free time, she loves playing games with her friends and baking. She also loves hiking and sewing! A fun fact about Madeline: she loves to travel and has been to three continents!





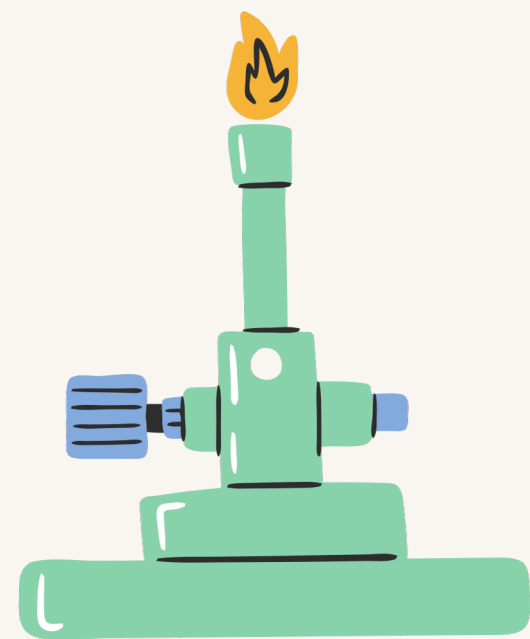
VIRGINIA JUNIOR ACADEMY OF SCIENCE

STEMINAR

SCIENCE. TECHNOLOGY. ENGINEERING. MATHEMATICS

Virginia Junior Academy of Science (VJAS) Student officers will host their next STEMinar on Saturday, December 7th , 2024. STEMinars are virtual sessions featuring VJAS student researchers, mentors, and judges, and they are designed for both students and teachers alike. You can register through our website or using this link, and stay tuned for more information closer to the date!

December 7th | 5PM



BEST WAY TO SEEK ADVICE & MEET EXPERIENCED RESEARCHERS: STEM-INAR INFORMATION

By Amina Khan

VJAS serves to be a beneficial platform in favor of student success on so many different levels. The organization offers many welcoming opportunities to interact with the scientific community, with STEMinars being a popular one. STEMinars are virtual meetings hosted by VJAS showcasing different mentors, special guests experienced in the fields of research, and advice/assistance for research projects. There are also live panels of discussion held throughout the meeting, and room for Q&A at the end.

Join us in this interactive meeting as the first STEMinar of this school year will take place on December 5th, 2024 . We would love to hear from you too, so if there are any questions you would like to have answered, just fill out this form [here](https://docs.google.com/forms/d/e/1FAIpQLSeu_ZTjwekPJ5OUHJCHA8VyXFmLHa6YxGPtc1ZOW-9BTt2m3w/viewform?usp=sf_link)!

https://docs.google.com/forms/d/e/1FAIpQLSeu_ZTjwekPJ5OUHJCHA8VyXFmLHa6YxGPtc1ZOW-9BTt2m3w/viewform?usp=sf_link

SHOWCASE & SHOW-OFF YOUR WORK! STUDENT PHOTO SUBMISSIONS & RESEARCH HIGHLIGHTS

By Kriesh Tivare

Calling all scientists! Interested in showcasing your hard work? Whether you've built an intricate model, conducted an experiment, or designed an innovative solution, now's your chance to have your work showcased in the VJAS Voice.

Students can submit their work to be displayed on the VJAS Voice, website, and our social media platforms! You can submit pictures of your project, interesting results representing your work, pictures of you and your awards, or anything else you can come up with related to STEM that represents you and your work.

To have your work showcased, please fill out [this release form](#) and submit your work [here](#).

Expanded Links:

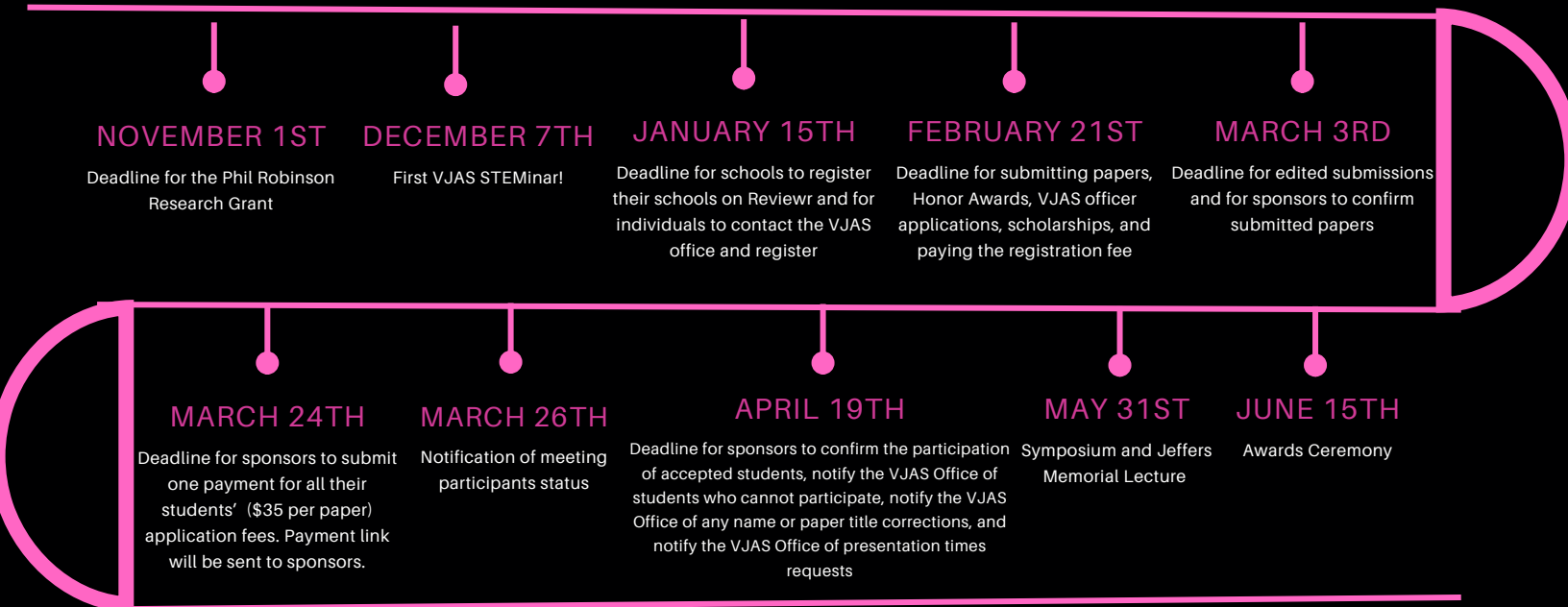
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What's Going On Again?

Timeline for Students & Sponsors

For Students & Sponsors: Things to keep an eye out for.



A RECAP: THE JUNE SENIOR COMMITTEE MEETING

By Shriya Bandla

The June 2024 Committee Meeting marked the start of an exciting year filled with innovation, exploration, and new opportunities. The session began with a comprehensive recap of the previous symposium, showcasing notable achievements: 200 students from underrepresented groups in STEM applied to the Virginia Junior Academy of Science (VJAS) with no application fee, 38 new schools joined the VJAS network, and 379 students were accepted into the 2023-24 symposium.

The discussion transitioned to exploring ways to further improve the symposium experience for future students. There was also a focus on the need to actively encourage more middle school students to participate in the VJAS. Additionally, plans were made to continue VJAS Voice publication, with upcoming editions focusing on Medicine, Earth Science, Technology, and Mathematics. Finally, the date for the next VJAS Committee Meeting was set for January 19, 2025.

Reminder: Follow VJAS on social media!
@vjas.symposium

Reminder: The Symposium is on May 31st!

BEGINNINGS CAN BE HARD. HERE'S HOW TO START YOUR VJAS PROJECT

By Amina Khan

As research season rolls around, students begin to dive deeper into a variety of intriguing fields. Some may know exactly what type of research they would like to conduct, while others are just figuring it out. Either one is perfectly okay, but VJAS is here to help through the process of it all!

1. Figure out what interests you.

What is it that you love? A year-long research project can be a burden to handle when it is about a concept unappealing to you. Find topics that you personally like and relate it to the different concepts of STEM! If you can't find something that works, just take a look into your local community; think of a couple of issues that could be resolved with a science solution. There are also other options, like asking a science teacher/mentor to help assist you with stimulating new ideas, or you could read a few science books or journals. Whichever option you find inspiration from, note some of your favorite ideas, and narrow it down to whichever will be most ideal in terms of interest, topic, and resources.

2. Research concepts that makeup the question

Understanding the foundational topics that create the entirety of your question is essential to conducting a proper study. It is important to know the background of what you are researching as it will help expand your knowledge and strengthen the quality of your project.

3. Writing one portion at a time

The length of the research paper can be extremely overwhelming and it causes students to stress an extensive amount. To prevent this, split the paper up into different sections, and set strict deadlines to abide by. Allow peers and teachers to check over each part at the end of the deadline to correct grammar mistakes, punctuation errors, and ensure sentences flow together well. Essentially, this will help complete the paper in a timely and attainable manner.

4. Working efficiently on data collection

Data collection is fundamentally one of the most important parts of the entire study. When there is time given to work on collecting data, utilize that time wisely and to your best ability, so that the possibility for missing such a crucial aspect of your study is minimized.

5. Practicing presentation skills

Lastly, as the daunting tasks of writing and conducting your study decrease, it is important to practice, and keep practicing how you will convey this research study to judges, and other viewers. Try presenting to a single friend at first, then a couple more, and then a larger audience. Consistency helps create confidence, and confidence is exactly what is needed to properly explain your research!

UNVEILING POTENTIAL: THE CRUCIAL ROLE OF MENTORING AT THE VIRGINIA JUNIOR ACADEMY OF SCIENCE

By Sage Lahmers

At the Virginia Junior Academy of Science (VJAS), young researchers from across the state converge to explore their passions and present groundbreaking discoveries. At the core of this dynamic environment lies an essential element that elevates their journey – mentoring.

Mentoring student researchers at VJAS is not merely an act of guidance; it is a commitment to fostering growth and innovation within the scientific community. The rewards extend beyond the completion of research projects, enriching both mentors and mentees in profound ways.

Cultivating Innovation and Critical Thinking

Mentoring at VJAS provides a unique opportunity to cultivate innovation. These students bring fresh perspectives and boundless curiosity, challenging conventions and expanding the boundaries of knowledge. Mentors play a crucial role in refining their ideas, encouraging critical thinking, and guiding them through the complexities of scientific inquiry.

Empowering Future Leaders

Beyond academic achievement, mentoring at VJAS empowers students to become confident leaders in their fields. Witnessing their evolution from eager learners to poised presenters is a source of immense pride for mentors, who play a pivotal role in shaping their mentees' academic and professional trajectories.

Building Meaningful Connections

Mentoring fosters lasting relationships based on mutual respect and shared enthusiasm for scientific discovery. These connections often extend beyond the classroom, evolving into lifelong bonds that transcend academic achievements and enrich both mentors' and mentees' personal and professional lives.

Supporting Diversity and Inclusion

VJAS embraces diversity and inclusivity, welcoming students from diverse backgrounds and perspectives. Mentors contribute to creating an environment where every voice is heard and valued, providing guidance that extends beyond scientific inquiry to include personal growth and resilience.

Celebrating Milestones

Mentoring at VJAS is a celebration of milestones – from breakthrough discoveries to personal triumphs. Mentors witness firsthand the transformative impact of their guidance, nurturing students' confidence and inspiring them to pursue their passions with determination and resilience.

In essence, mentoring student researchers at the Virginia Junior Academy of Science is an investment in the future – a commitment to nurturing talent, fostering innovation, and building a community grounded in curiosity and collaboration. By sharing their expertise and passion, mentors not only shape the scientists of tomorrow but also contribute to a legacy of discovery and excellence that defines the spirit of VJAS.

So, why should you mentor student researchers at VJAS? Because in doing so, you are not only guiding the next generation of scientific leaders but also enriching your own journey as a mentor and contributing to a legacy of curiosity, discovery, and achievement that knows no bounds. If this sounds interesting to you, reach out to VJAS or your local high/middle school to meet some outstanding student researchers.

WANT TO LEARN SOMETHING NEW?

HOW MULTI-DRUG RESISTANT BACTERIA ARE A THREAT IN OUR MODERN DAY WORLD

By Madeline Lahmers

In 2019, the Center for Disease Control (CDC) issued the 2019 Antibiotic Resistance Threats Report which reported on 5 urgent threats for antibiotic resistance. Carbapenem-resistant *Acinetobacter*, Drug-resistant *Candida Auris*, *Clostridioides difficile* (*C. difficile*), Carbapenem-resistant Enterobacteriaceae (CRE), Drug-Resistant *Neisseria Gonorrhoeae* were all urgent threats in 2019 but are they still as urgent 5 years later?

More than 28 million antimicrobial-resistant (AR) infections occur in the U.S. each year. Of those infected more than 35,000 people die as a result. Though some novel strategies are being developed to combat these antimicrobial-resistant infections, these numbers have changed but many of the pathogens infecting us have not. From 2019-2022 the rate of Carbapenem-resistant Enterobacterales (CRE), Carbapenem-resistant *Acinetobacter*, VRE, ESBL and MDR, all hospital-onset infections, have increased.

Some ways to combat the spread of AR infections worldwide are to prevent infections from occurring in the first place by safety practices like hand washing, slowing the development of bacterial resistance by utilizing infection prevention, and by controlling access to antibiotics, antifungals, and vaccines. Through these methods we can decrease the number of AR infections worldwide.

At home we can prevent AR's by using safe food handling practices, taking care of ourselves and our pets, limiting the use of antifungals and antibiotics, preventing sexually transmitted diseases, and getting vaccinated.

Prevention of these AR infections is very important because getting an antimicrobial resistant infection can be fatal. Antimicrobial-resistant infections often require second- and third-line treatments that can harm patients with serious side effects and need more time for recovery. However, in some cases there are no treatments for antimicrobial resistant infections.

CHECK-UPS THROUGH A SCREEN: THE RISE AND REALITY OF TELEMEDICINE

By Gurpaj Tur

Imagine a world where you could consult with doctors from the comfort of your home and receive proper medical care without ever stepping foot in a clinic. This is the possibility for our future with Telemedicine. Through telecommunication technology, Telemedicine offers an efficient way for patients to receive medical services. However, this new digital revolution in the medical industry brings numerous challenges and opportunities that could forever change how we perceive healthcare.

How does Telemedicine Work?

Firstly, we must begin to understand how Telemedicine works. Telemedicine uses digital technology to connect patients with healthcare providers through communication channels such as video conferencing, phone calls, text messaging, and specialized telemedicine apps. It operates in four simple steps.

Telemedicine begins with patient initiation, where the patient initiates contact through a telemedicine platform, a mobile app, or a website. Depending on the service, patients can schedule appointments, request consultations, or even engage in on-demand sessions. After a request for a physician has been made, the virtual consultation between the patient and provider begins. Here, the healthcare provider connects via a secure video or phone call. Sometimes, the provider may ask the patient to input vital signs or symptoms into the telemedicine platform before the consultation begins. This can include data from wearable devices, such as heart rate monitors or blood pressure cuffs, which can be synced with the telemedicine system. After these initial steps, the diagnosis process commences. Physicians will conduct a virtual examination by asking patients about their symptoms, medical history, and health status. If applicable, the physician may ask the patient to perform physical tests. Based on this information, the provider can diagnose the patient's condition and recommend a medical plan best fit for them. After the virtual contact has ended, patients can follow up with conditions through the monitoring process. Patients can regularly update their health data, and providers can review this information in real time, making adjustments to treatment plans as necessary.

While Telemedicine is a useful tool for handling a wide range of health concerns, certain situations still require in-person care. Telemedicine platforms are combined with other healthcare systems, allowing providers to recommend in-person procedures for their patients.

Benefits, Challenges, and The Future of Telemedicine

Telemedicine offers a convenient and efficient way to deliver healthcare services remotely. However, as with any new invention, Telemedicine brings opportunities and challenges that must be carefully considered to ensure its success. We will explore the benefits and challenges of Telemedicine and discuss its potential in healthcare.

One of the main benefits of Telemedicine is its increased accessibility to healthcare. Telemedicine has been used to reach across geographical borders, making healthcare accessible to all. For patients living in rural or remote areas, Telemedicine offers a lifeline by connecting them with specialists and primary care providers without needing long-distance travel. This primarily benefits those with chronic conditions, requiring them to travel weekly. Another advantage of Telemedicine is its cost-effectiveness in healthcare delivery. Telemedicine can reduce healthcare costs for both patients and providers. Telemedicine eliminates traveling and taking time off work, lowering overall patient costs. Telemedicine denounces the need for infrastructure for healthcare providers, such as waiting rooms and examination spaces, reducing operation costs.

However, with these benefits comes its own set of challenges. An instance of this is user privacy and security concerns. Using a digitalized platform for patient assessments raises the question of patient data safety. Ensuring that telemedicine platforms comply with HIPAA (Health Insurance Portability and Accountability Act) is needed to protect sensitive health information. As Telemedicine continues to grow, so does the concern of data thieves stealing patient data. An additional difficulty is providing the same level of care as in-person visits. Specific diagnostic tests, physical examinations, and procedures cannot be performed remotely, limiting the accuracy of diagnoses. This requires providers to carefully assess which individuals should be taken into in-person consultations and which could be done through Telemedicine.

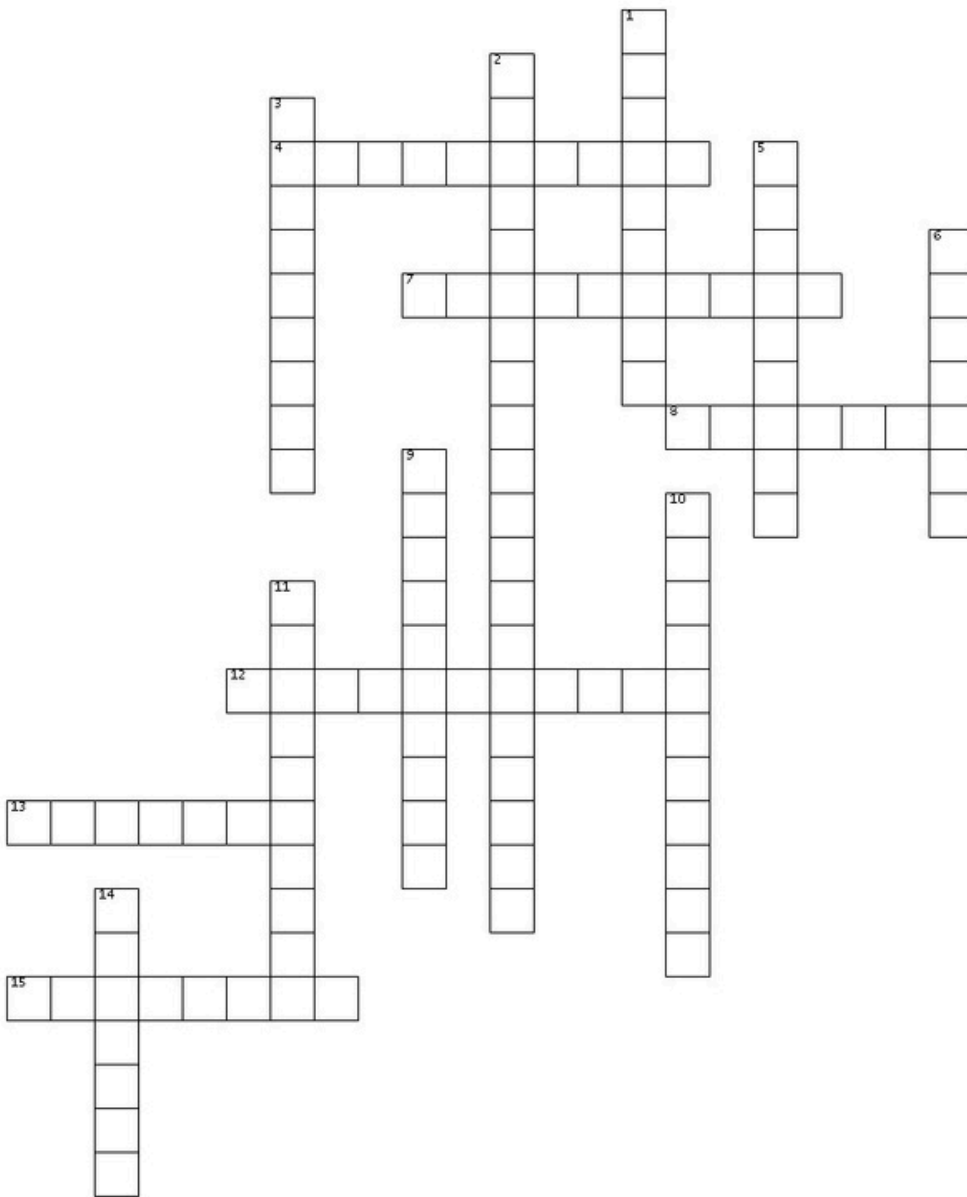
The Future of Telemedicine

As Telemedicine continues to grow, its potential to transform healthcare is unimaginable. However, achieving this potential requires considering the benefits and challenges presented by Telemedicine.

Telemedicine will be integrated into healthcare through a hybrid approach, where providers decide whether patients are appropriate for remote or in-person care. With technology advancing, Telemedicine could become a core part of our lives, offering a convenient and equal solution. Telemedicine will change healthcare today and pave the way for a more efficient, concentrated, patient-centered future.

CROSSWORD

Medical Sciences: VJAS Crossword Puzzle



ACROSS

4. Medication used to treat bacterial infections.
7. The branch of medicine dealing with heart disorders.
8. Hormone that regulates blood sugar, crucial for diabetics.
12. A tool doctors use to listen to your heartbeat.
13. A shot that protects against diseases.
15. Where you pick up your prescription medications.

DOWN

1. The branch of medicine that uses imaging techniques, like X-rays.
2. Your first stop for general health concerns.
3. The study of diseases, especially the structural and functional changes they cause.
5. The process of identifying a disease or condition.
6. A tool used to inject or withdraw fluid from the body.
9. Medication used to numb pain during surgery.
10. A fatty substance found in the blood, often linked to heart disease.
11. Substance that prevents the growth of disease-causing microorganisms.
14. A harmless pill, often used in clinical trials.