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A COMPLETE HEALTH JOURNAL

Double Helical

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DOUBLE HELICAL

A COMPLETE HEALTH MAGAZINE

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Beyond the Headlines

Dear Readers,

In recent times, the medical fraternity and the wider public have been jolted by two profoundly distressing incidents that have not only shaken our collective trust but also underscored the imperative for introspection and reform within the system. The first of these incidents pertains to the ongoing investigation into the Pune Porsche crash, a case where Dr Ajay Taware, the head of the hospital's forensic medicine department, stands accused of perpetrating a grievous act of tampering by allegedly switching the blood samples of the minor involved.

Similarly disconcerting is the tragic incident that unfolded at a baby care hospital in Delhi, resulting in the loss of seven precious newborn lives and inflicting severe burns upon five others. As authorities continue to piece together the events leading up to this devastating fire, a complex web of intersecting interests and vested powers has come to light, shedding glaring light on the rampant nexus of politics, power, and profit. While arrests have been made in connection with this tragedy, the quest for accountability and justice remains ongoing, as we collectively strive to address the systemic failures and oversights that may have precipitated such a catastrophic event.

However, amidst these sombre developments, it is imperative that we resist the temptation to succumb to sweeping generalisations or condemnations of the medical profession as a whole. While acknowledging the egregious moral and administrative lapses that have occurred in these isolated instances, we must not lose sight of the countless dedicated healthcare professionals who tirelessly uphold the highest standards of ethics and professionalism in their practice.

It is true that doctors can be accused of medical negligence, which represents a departure from the universally recognised standard of reasonable medical care, wherein practitioners are duty-bound to prioritise the well-being and best interests of their patients above all else. Although doctors cannot always save their patients' lives, they are expected to use their special knowledge and skill appropriately, keeping the patient's best interest in mind. Doctors should conduct necessary investigations and obtain the patient's informed consent before any major treatment or surgical procedure unless it is an emergency. Failure to fulfill these obligations results in tortious liability. A tort is a civil wrong, as opposed to a contractual obligation, and attracts judicial intervention by awarding damages. Therefore, a patient's right to receive medical attention is a civil right, shaped by informed consent, fee payment, and treatment provision, yet retaining essential elements of tort.

Turning our attention to the contents of our latest issue, the cover story delves into the domain of vaccines, exploring the nuanced debates and considerations surrounding their efficacy, safety, and deployment. In an era marked by unprecedented scientific advancement and technological innovation, the discourse surrounding vaccines has never been more pertinent or polarising. Yet, amidst the cacophony of voices and opinions, it is crucial that we foster an environment of informed dialogue and critical thinking, wherein individuals are empowered to weigh the potential risks and benefits of vaccination based on credible scientific evidence rather than anecdotal conjecture or unfounded scepticism.

Additionally, this issue features an in-depth exploration of hypertension, a silent yet insidious health condition that afflicts millions worldwide. Despite its often asymptomatic nature, hypertension poses a significant threat to individual well-being, contributing to a myriad of life-threatening complications including heart disease, stroke, and kidney failure. Through a comprehensive examination of the latest research and treatment modalities, we aim to shed light on the importance of early detection, prevention, and management of this prevalent yet often overlooked condition.

Furthermore, our coverage extends to the pressing issue of antibiotic resistance (AR), a global health crisis with far-reaching implications for public health and safety. As bacteria continue to evolve and adapt in response to the overuse and misuse of antibiotics, the efficacy of these life-saving medications is increasingly being called into question. In order to effectively combat this burgeoning threat, it is imperative that we adopt a multifaceted approach that encompasses not only the development of novel therapeutics and treatment modalities but also enhanced surveillance, stewardship, and public awareness efforts.

In closing, we invite you to embark on a journey of discovery and enlightenment as you go through the diverse array of articles and features contained within the pages of our May issue. From cutting-edge research to thought-provoking commentary, we are confident that you will find much to stimulate your intellect and nourish your curiosity.

Happy Reading

Thanks and regards

Amresh K Tiwary,
Editor-in-Chief

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Advancing Healthcare Through Collaboration

CAHOCON 2024, the three-day annual conference of the Consortium of Accredited Healthcare Organisations (CAHO), recently held at the Biswa Bangla Convention Centre in Kolkata, was a significant event in the healthcare sector. The conference was backed by the Department of Health and Family Welfare, Government of West Bengal, and supported by several prestigious organisations, including Joint Commission International (JCI), the International Society for Quality in Health Care (ISQua), and the Asian Society for Quality in Health Care (ASQua). The focus of the conference was to make healthcare more efficient, effective, economical, and equitable.

THE CONFERENCE AT A GLANCE

- **Fifteen Pre-Conference Workshops (CAHOCON):** Held on April 5 across various major hospitals in Kolkata, these workshops drew 1,034 attendees, setting the stage for the main conference event.
- **Main Conference (CAHOCON):** On April 6 and 7, over 1,500 attendees participated in key discussions and panels that advanced the conference's goals of improving healthcare efficiency, effectiveness, economy, and equity.
- **Pre-Conference Workshops for CAHOLABCON:** Held on April 4, these workshops were designed for laboratory professionals, drawing more than 300 attendees across nine workshops.
- **Main Conference (CAHOLABCON):** On April 5, over 400 attendees gathered to discuss advancements and challenges in laboratory services.

DISTINGUISHED GUESTS

- **Inaugural Chief Guest:** Dr. C. V. Ananda Bose, the Honourable Governor of West Bengal, inaugurated the event, underscoring the importance of healthcare innovations in regional governance.
- **Valedictory Chief Guest:** Sri Narayan Swaroop Nigam, Indian Administrative Service (IAS), Principal Secretary of the Department of Health and Family Welfare, West Bengal, addressed the concluding session, emphasising the state's ongoing commitment to improving healthcare services.
- **LABCON Chief Guest**: Mr. N. Venkateswaran, Chief Executive Officer of the National Accreditation Board for Testing and Calibration Laboratories (NABL), provided insights into the critical role of laboratory services in healthcare.

Conference Highlights

CAHOCON 2024 concluded successfully after two days of intensive discussions, expert panels, and collaborative learning sessions. The conference gathered numerous healthcare professionals, including administrators, clinicians, quality control experts, and policymakers, to explore ways to enhance healthcare delivery across various dimensions. The focus remained on making healthcare efficient, effective, economical, and equitable, with numerous insightful presentations and debates contributing to the overarching goal of improving healthcare standards nationwide.

Opening Day: The conference commenced with the CAHO anthem and remarks from distinguished guests. Sessions on "Accreditation Standards" and the introduction of JCI's 8th Edition Standards emphasised continuous improvement in healthcare accreditation.

SESSION HIGHLIGHTS:

- **The Apollo Journey:** A detailed account of making Indian healthcare effective and efficient.
- **Clinical Grand Rounds:** Focused on applying the 'Four Es' (efficient,

effective, economical, and equitable) to specialised areas such as cancer care and liver transplants, demonstrating the integration of these principles into clinical excellence.

• **Grand Debate on Hospital Grading:** Sparked a constructive debate on the implications of grading hospitals, weighing the benefits and challenges, and fostering diverse perspectives.

Innovations and Technologies: A significant portion of the conference highlighted the role of technology in healthcare, including advancements in diagnostics and patient safety powered by artificial intelligence (AI).

Patient Engagement: Sessions dedicated to listening to patients' voices and understanding their crucial role in healthcare enhancement were particularly impactful, promoting a patient-centric approach in healthcare practices.

PANEL DISCUSSIONS

Several panel discussions covered themes ranging from challenges in achieving the 4Es, leaders in accreditation, and empowering patients. These panels brought together experts to share best practices and innovative ideas, ensuring a comprehensive approach to tackling current healthcare challenges.

SPECIAL SESSIONS

• Awards and Recognitions: Recognised excellence in various healthcare domains, including fire and life safety, and environmental sustainability.

• Certification Ceremonies: Hosted ceremonies for various healthcare professionals, contributing to ongoing professional development and recognition.

TAKEAWAYS

CAHOCON 2024 successfully brought together a wide range of healthcare professionals and stakeholders to discuss and devise solutions for a more equitable healthcare system. The involvement of high-profile government officials underscored the significant attention and resources being dedicated to healthcare improvements in West Bengal. The event provided a comprehensive platform for sharing knowledge, networking, and collaborative opportunities in the healthcare field.

The conference underlined the critical need for continued collaboration and innovation in healthcare. Discussions pointed towards the necessity of integrating technological advancements with human-centric care models. Future conferences will aim to build on the insights gained during this event to further drive national and international healthcare standards.

World Day for Safety and Health at Workplace

The World Health Organization (WHO) marks the World Day for Safety and Health at Work on 28 April every year to promote the prevention of occupational accidents and diseases globally.

The WHO's sister organisation, the International Labour Organization (ILO), began to observe World Day in 2003 to raise the political profile of occupational health and safety, and to fulfil the integral 'advocacy' component of their Global Strategy on Occupational Safety and Health.

Given that nearly 60% of the global population is engaged in work, the fundamental right of all workers to a safe and healthy environment is one of great importance. Consider how much of our lives are spent in our own workplaces, and it becomes apparent how workplace health and safety takes on the dimensions of a public health concern.

Occupational health encompasses the physical, mental, and social well-being of workers, while preventing workplace-related hazards.

Hazards can lead to occupational diseases that erode workers' ability to participate in the workforce, and result in increased rates of long-term illness. The WHO's and ILO estimated that work-related diseases and injuries resulted in 1.88 million deaths in 2016.

The WHO South-East Asia Region (SEAR) faces a disproportionately high burden of work-related mortality, with 36.5 deaths per 100,000 of the working population. Occupational risks also rank as the third-largest environmental risk factor for disease estimates in the region.

Informal workers in the region face significant challenges due to poor working conditions and limited social protection.

They are disproportionately vulnerable to economic shocks and lack adequate workplace protections, exacerbating the impact of workplace injuries.

The impact of climate change on occupational health has also recently emerged as a concern. Climate-related hazards, particularly extreme weather events, limit work output and duration, and pose risks to workers' health and safety.

Health and safety also goes beyond physical concerns. The COVID-19 pandemic highlighted the urgent need to address mental health issues in the workplace. A safe and healthy working environment supports mental health, and good mental health of course enables people to work productively. Issues such as depression and anxiety are pervasive in workplaces, impacting productivity and performance. When left untreated, the economic cost is estimated at US$1 trillion annually.

Effective organisational policies, early detection of health issues, health screening, and preventive care contribute to a safety net and increase health awareness for workers.

Ensuring better occupational health and safety rests on partnerships and collaboration.

The Regional Plan of Action for the WHO Global Strategy on Health, Environment, and Climate Change (2020-2030) emphasises collaboration between health and labour ministries to comprehensively address occupational health.

Collaboration between these health and employment sectors is crucial for protecting vulnerable segments of society. Non-contributory social protection systems are also essential for safeguarding informal workers from the economic consequences of workplace injuries.

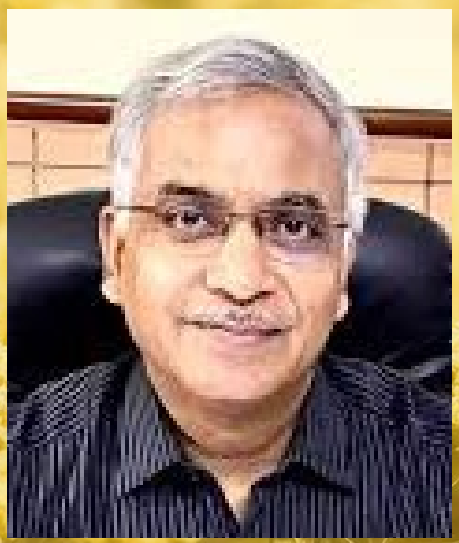
Occupational health must be prioritised in order to achieve sustainable growth, inclusive development, and resilience to climate change vulnerabilities - as outlined in the Sustainable Development Goals.

The need for creating positive healthy workplaces is self-evident. The returns of such endeavours positively impact businesses, organisations and societies collectively, and people individually.

HEATWAVE HAZARDS

Global warming has fuelled heat-related illnesses. Immediate action and increased awareness are crucial to mitigating the life-threatening risks posed by extreme hot weather conditions.

BY DR SUNEELA GARG & DR ARVIND GARG



Rising global temperatures, driven by increasing global warming, elevate both ambient temperature and humidity levels. This escalation significantly heightens the risk of heat-related illnesses, which are serious medical conditions arising from the body's inability to cope with excessive heat. These illnesses include heat cramps, heat exhaustion, heat syncope (fainting or a temporary loss of consciousness and muscle strength), and heat stroke.

UNDERSTANDING HEAT ILLNESS

Heat illness refers to a spectrum of conditions caused by the body's failure to manage heat load effectively. This failure can lead to a range of symptoms and severities, from mild discomfort to life-threatening emergencies.

As per reports, with each degree of warming, atmospheric water vapour increases by approximately 6 to 7%, potentially pushing heat stress exposure beyond human tolerance in many areas. Human body temperature is maintained within a narrow range of 36.5–37.5°C (97.7–99.5°F) by balancing heat production from environmental exposure and metabolic processes with heat dissipation mechanisms.

Body temperature regulation involves complex physiological and behavioural mechanisms. When core body temperature rises, the autonomic nervous system, via the preoptic nucleus of the anterior hypothalamus, triggers increased sweating and cutaneous vasodilation to dissipate body heat. These mechanisms are crucial in maintaining thermal equilibrium, especially under conditions of extreme heat stress.

IMPACT OF HEAT-RELATED ILLNESS

> **Heat-related illnesses encompass a spectrum of conditions, ranging from mild heat cramps to the severe, life-threatening heat stroke, each with distinct symptoms and causes.**

Humans must maintain their internal body temperature within a very narrow range around 98.6°F (37°C). Heat-related illness occurs when the body cannot shed excess heat quickly enough, losing its "heat balance." This imbalance can lead to a cascade of physiological events.

When the body starts to overheat,

Practical measures such as staying hydrated, wearing appropriate clothing, and scheduling activities during cooler times of the day are essential strategies to prevent heat-related illnesses.

blood vessels dilate, and the heart beats faster and harder. This increases blood flow to the skin's surface from the body's internal "core," releasing heat into the cooler environment. If this process does not cool the body quickly enough, or if the outside air is warmer than the skin, the brain triggers sweating to cool the body. Sweat glands draw water from the bloodstream to produce sweat, which evaporates and releases heat.

During an hour of heavy work in hot weather, the body can sweat out up to one quart of water. Shifting blood to the outer body layers (the "shell") reduces blood flow to the brain, muscles, and other organs (the "core"). Prolonged sweating can deplete the body of water and salts, leading to dehydration. Muscle cramps can occur as a result of the loss of essential salts needed for muscle function. The physiological strain from heat illness can cause dehydration, weakness, fatigue, and confusion.

As dehydration worsens, the body can no longer regulate its temperature within the normal range. Sweating stops, and severe heat illness can occur. In the case of heat stroke, the person's body temperature rises rapidly, potentially damaging the brain, muscles, and vital organs, and can lead to death.

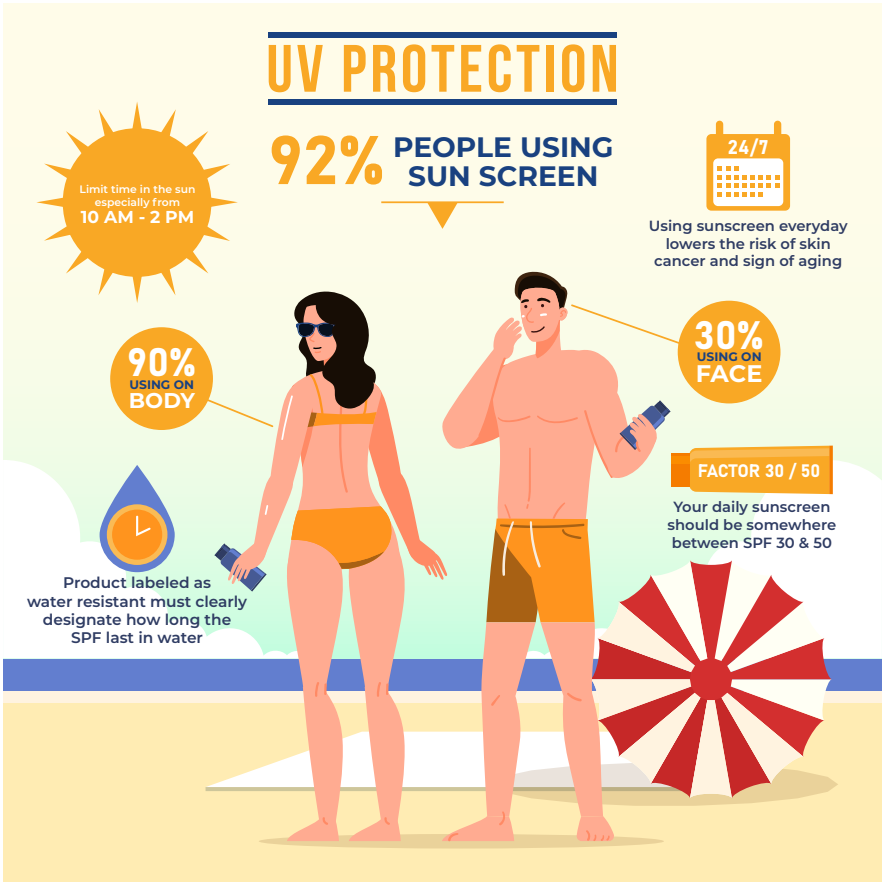
TYPES OF HEAT-RELATED ILLNESSES

1.HEAT CRAMPS:

o Symptoms: Painful muscle cramps and spasms, particularly in the legs, often accompanied by flushed, moist skin.

o Cause: Intense exercise and sweating in high heat without adequate fluid replacement.

o Management: Rest in a cool place, drink water or electrolyte solutions, and gently stretch and



massage the affected muscles.

2. HEAT EXHAUSTION:

• Symptoms: Muscle cramps, pale and moist skin, fever over 100.4°F (38°C), nausea, vomiting, diarrhoea, headache, fatigue, weakness, anxiety, and faintness.

• Cause: Extreme heat and excessive sweating without sufficient fluid and salt replacement.

o Progression: If untreated, can lead to heat stroke.

• Management: Move to a cooler environment, hydrate with water or sports drinks, and apply cool, wet cloths to the skin. Rest and monitor for progression of symptoms.

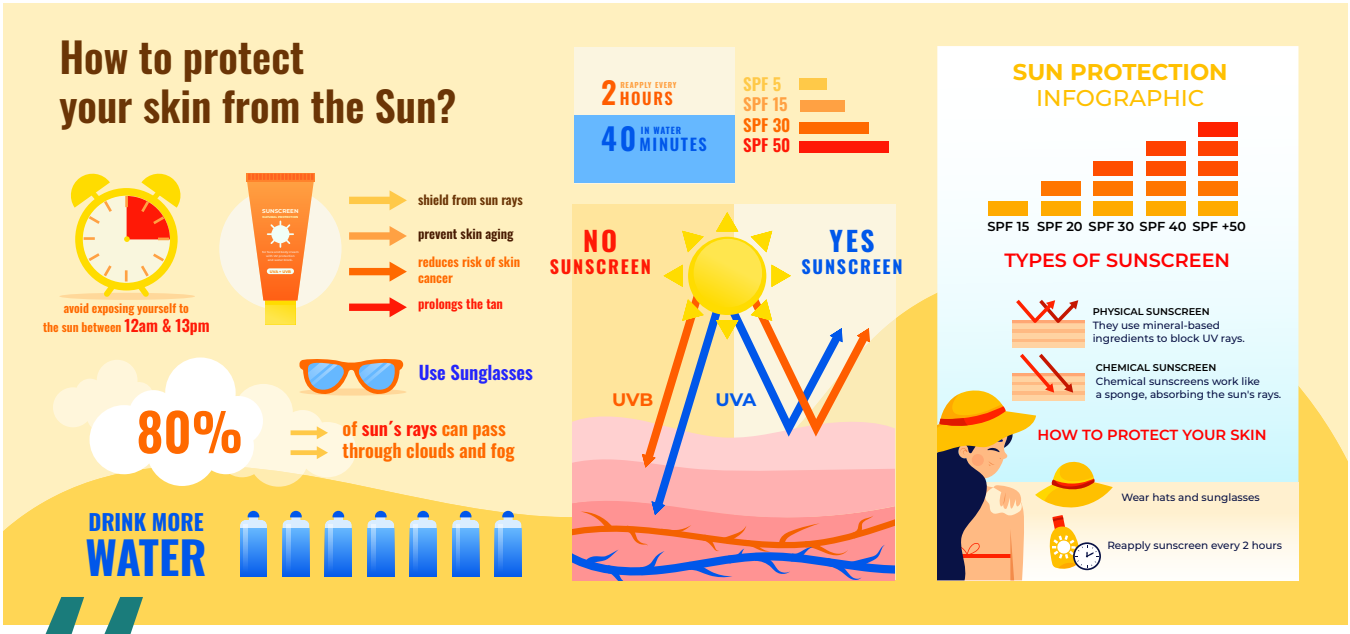
3. HEAT SYNCOPE:

• Symptoms: Sudden dizziness or fainting, typically occurring after standing for a long time or suddenly rising from a sitting or lying position.

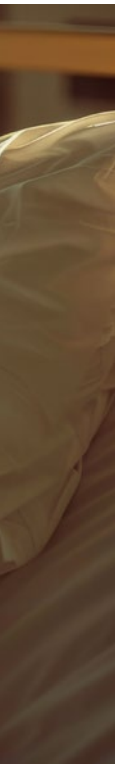
• Cause: Dehydration and lack of acclimatisation to hot environments.

• Management: Lie down in a cool

Heat-related illnesses result from the body's failure to manage excessive heat, affecting physiological mechanisms and leading to conditions like heat cramps, heat exhaustion, and heat stroke.



Climate change and increasing global temperatures are significantly raising the risk of heat stress exposure, pushing many regions beyond human tolerance levels.



place, elevate the legs, and hydrate with fluids.

4. HEAT STROKE:

• Symptoms: High fever (usually over 104°F or 40°C), rapid heart rate, warm and dry skin, nausea, vomiting, headache, fatigue, confusion, agitation, lethargy, seizures, coma, and potential death.

• Cause: Overwhelming heat load exceeds the body's cooling mechanisms.

• Emergency Response: Immediate medical attention is required. Move to a cool place, call emergency services, remove excess clothing, use cool cloths, and take cool drinks containing salt and sugar. Intravenous (IV) fluids should be administered, if necessary.

PREVENTION OF HEAT-RELATED ILLNESSES

• Hydration: Drink plenty of fluids during outdoor activities, especially on hot days. Water and sports drinks are recommended, while alcohol and caffeine should be avoided as they can cause dehydration.

• Appropriate Clothing: Wear light-coloured, lightweight, loose-fitting clothing to facilitate heat dissipation.

• Activity Scheduling: Schedule vigorous activities for cooler times of the day and take frequent rest periods in shady or cool areas to prevent overheating.

• Sun Protection: Use hats, sunglasses, and umbrellas to protect from direct sunlight. Apply sunscreen with at least SPF 15 to exposed skin.

• Acclimatisation: Gradually increase outdoor activity time to allow the body to adjust to the heat, thereby improving tolerance and reducing the risk of heat-related illnesses.

• Cooling Techniques: Encourage frequent drink breaks and use spray bottles to stay cool. Wetting down the body can help lower body temperature.

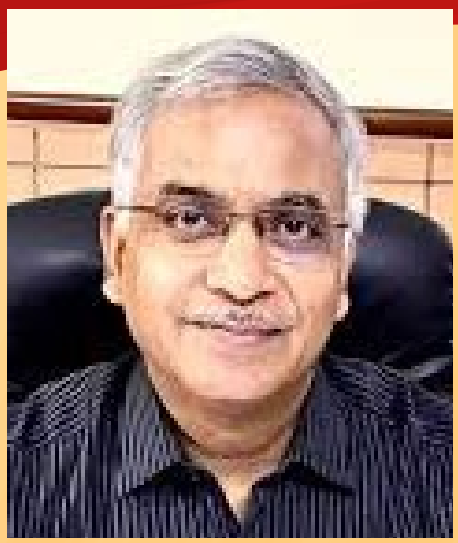
• Indoor Activities: Stay indoors as much as possible during very hot and humid days to minimise heat exposure.

• Exercise Precautions: Warm up and cool down before and after exercise to prevent sudden stress on the body.

• Medical Advice: Consult a doctor for advice on preventing heat-related illnesses, especially if you or your child have any medical conditions or are taking medications. Specific guidelines may be necessary to manage heat exposure effectively.

(The authors are Chair of the Programme Advisory Committee at NIHFW and Head of Paediatrics at Apollo Hospitals, Noida.)

EMBRACING EQUITABLE CARE



Thalassaemia, an inherited blood disorder, affects haemoglobin production and can cause severe anaemia and organ damage. Ensuring accessible and equitable treatment is crucial for improving the quality of life for those affected..

BY DR SUNEELA GARG AND DR ARVIND GARG

The central focus of World Thalassaemia Day revolves around the theme of "Empowering Lives, Embracing Progress: Equitable and Accessible Thalassaemia Treatment for All." This theme underlines the importance of ensuring that every individual, regardless of their socioeconomic status or geographical location, has access to effective and equitable treatment for Thalassaemia, thereby improving their quality of life and enabling them to contribute meaningfully to society.

Regular check-ups and preventive measures, such as vaccinations and good hygiene practices, are essential for Thalassaemia patients to manage their health and prevent infections. Continuous monitoring helps in timely intervention and treatment adjustments.

UNDERSTANDING THALASSAEMIA

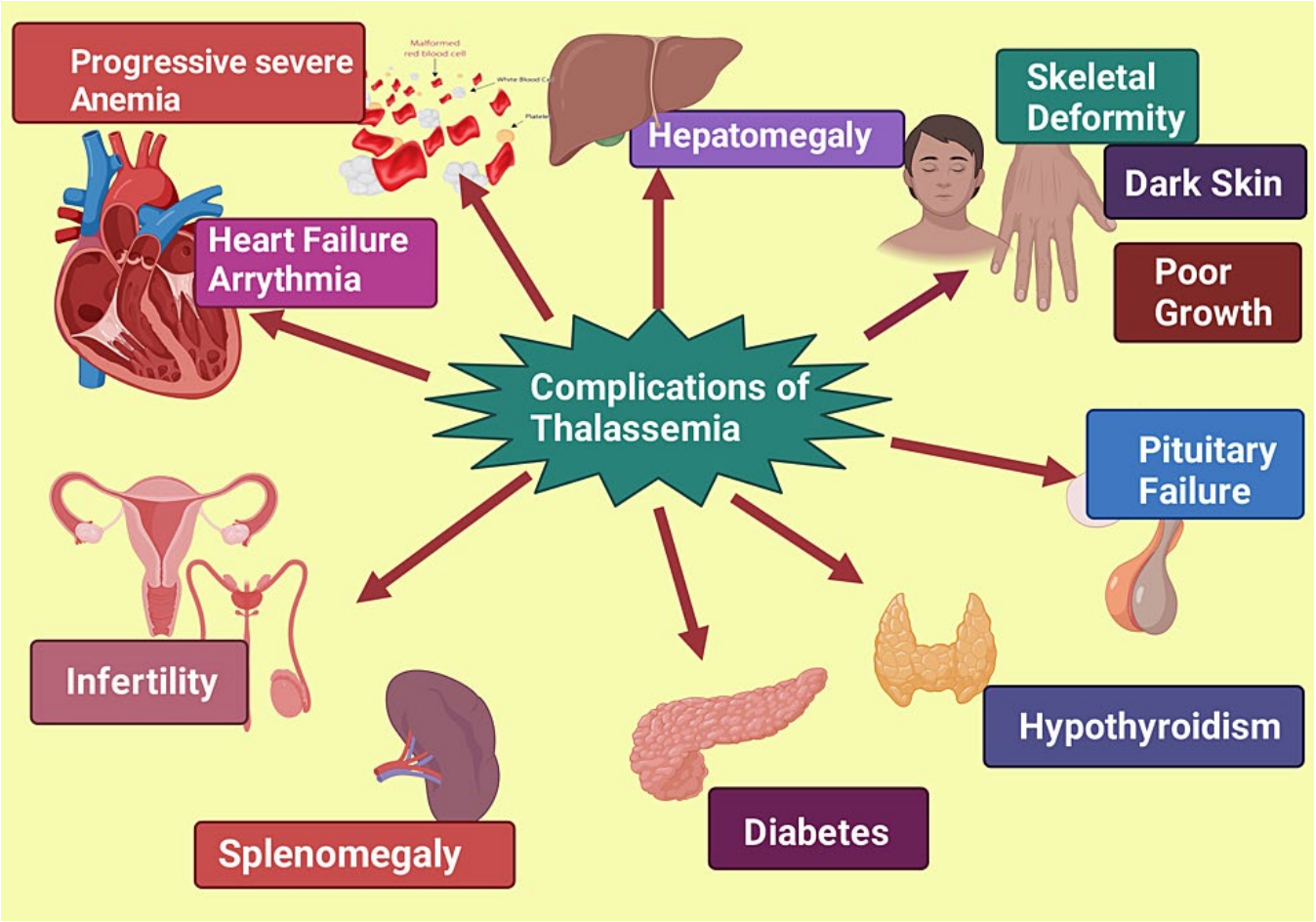
Thalassaemia is an inherited blood disorder that is passed from parents to their children through genes. It is caused by the body's inability to produce enough of a protein called haemoglobin, which is a crucial component of red blood cells. Haemoglobin's primary role is to carry oxygen to all the cells in the body, providing them with the energy they need to function properly. When there isn't enough haemoglobin, the body's red blood cells do not function correctly and have a shorter lifespan. As a result, there are fewer healthy red blood cells travelling in the bloodstream, leading to a reduced supply of oxygen to the body's tissues. This condition, known as anaemia, can cause individuals to feel tired, weak, and short of breath. Anaemia in people with Thalassaemia can range from mild to severe, with severe anaemia potentially causing significant organ damage and even leading to death.

TYPES OF THALASSAEMIA

When discussing the different types of Thalassaemia, two main factors are considered: the specific part of haemoglobin that is affected (either "alpha" or "beta") and the severity of the condition, which is described using terms such as trait, carrier, intermedia, or major.

ALPHA AND BETA THALASSAEMIA: Haemoglobin is composed of two different parts, known as alpha and beta. If the body does not produce enough of the alpha part, the condition is called alpha Thalassaemia. Conversely, if the body does not produce enough of the beta part, it is called beta Thalassaemia. The deficiency in either of these parts means that there are not enough building blocks to produce normal amounts of haemoglobin, leading to the symptoms associated with Thalassaemia.

SEVERITY OF THALASSAEMIA: The severity of Thalassaemia is indicated by terms such as trait, minor, intermedia, or major. For example, a person with Thalassaemia trait may exhibit no symptoms or only mild anaemia, while someone with Thalassaemia major may experience



severe symptoms and require regular blood transfusions. The type and severity of Thalassaemia that a person has depends on the specific genetic traits they inherit from their parents. For instance, if a person inherits a beta Thalassaemia trait from both parents, they will have beta Thalassaemia major. If a person inherits an alpha Thalassaemia trait from one parent and normal alpha parts from the other, they will have alpha Thalassaemia trait (also called alpha Thalassaemia minor). Individuals with a Thalassaemia trait may not have any symptoms but can still pass the trait on to their children, increasing their risk of developing Thalassaemia.

TREATMENT OPTIONS FOR THALASSAEMIA

Effective management of Thalassaemia involves several key treatment options aimed at addressing the various symptoms and complications associated with the disorder.

REGULAR BLOOD TRANSFUSIONS: Individuals with the most severe form of the condition, such as beta Thalassaemia major, may require blood transfusions as frequently as once a month. These transfusions are essential for replacing the deficient red blood cells in Thalassaemia patients, thereby improving oxygen delivery to tissues and organs. While blood transfusions are generally safe, they can lead to an accumulation of iron in the body, necessitating the use of

> **Beyond medical treatment, genetic counselling and emotional support play vital roles in helping Thalassaemia patients and their families cope with the disorder and make informed decisions about family planning.**

medication to remove the excess iron.

CHELATION THERAPY: Chelation therapy is a treatment used to remove excess iron from the body, which can accumulate due to frequent blood transfusions. High levels of iron can be toxic and lead to organ damage, making chelation therapy a critical component of Thalassaemia treatment. This therapy involves the use of medications that bind to excess iron in the body, allowing it to be excreted and preventing damage to vital organs.

IRON-RICH DIET: Although managing iron levels is a concern for Thalassaemia patients, consuming iron-rich foods can still be beneficial to maintain adequate haemoglobin levels. It is essential for patients to consult with healthcare providers to receive personalised dietary recommendations that balance the need for sufficient haemoglobin production with the risk of iron overload.

FOLIC ACID SUPPLEMENTATION: Folic acid is a vital nutrient that aids in the production of red blood cells.

> **Thalassaemia is a genetic disorder that impacts haemoglobin production, leading to anaemia and other severe health issues. Different types and severities of Thalassaemia determine the specific symptoms and treatment needs of patients.**

Thalassaemia patients often have an increased need for folic acid due to the rapid turnover of red blood cells. Supplementation with folic acid can help support red blood cell production and improve overall health outcomes for individuals with Thalassaemia.

AVOIDANCE OF IRON SUPPLEMENTS: Unlike individuals with iron-deficiency anaemia, those with Thalassaemia should avoid taking iron supplements unless specifically prescribed by a healthcare provider. Excess iron can exacerbate complications related to iron overload, making it crucial for Thalassaemia patients to manage their iron levels carefully.

REGULAR MONITORING: Regular check-ups with healthcare providers are essential for monitoring haemoglobin levels, iron levels, and overall health status. These check-ups enable timely interventions and adjustments to treatment plans as needed, ensuring that patients receive the most effective care possible.

HYDRATION: Maintaining adequate hydration is important for everyone, but it is particularly crucial for Thalassaemia patients. Staying hydrated helps maintain blood volume and prevents complications related to dehydration, such as increased blood viscosity, which can affect blood flow and oxygen delivery.

AVOIDANCE OF INFECTIONS: Individuals with Thalassaemia are often more susceptible to infections due to their weakened immune system. Practising good hygiene, staying up-to-date with vaccinations, and avoiding contact with sick individuals can help prevent infections and protect the health of Thalassaemia patients.

GENETIC COUNSELLING: Since Thalassaemia is a genetic disorder, genetic counselling can be an invaluable resource for individuals and families affected by the condition. Genetic counsellors can help individuals understand their risk of passing Thalassaemia to their

BLOOD MATTERS

BLOOD RELATED CONDITIONS

Normal Artery

Atherosclerosis

Leukemia (Blood Cancer)

BLOOD COMPONENTS

WHITE BLOOD CELLS
1%

PLATELETS
<1%

WHITE BLOOD CELLS
45%

BLOOD PLASMA
55%

children, provide information about family planning options, and support informed decision-making.

EMOTIONAL SUPPORT: Living with a chronic condition like Thalassaemia can be emotionally challenging. It is important for patients to seek emotional support from family, friends, support groups, or mental health professionals. Emotional support can improve overall well-being, help patients cope with the challenges of managing Thalassaemia, and encourage adherence to treatment plans.

TAKEAWAYS

By focusing on equitable and accessible Thalassaemia treatment for all, World Thalassaemia Day highlights the need for comprehensive care strategies that address the medical, dietary, emotional, and genetic aspects of the disorder. Ensuring that every individual has access to these essential treatments can significantly improve the quality of life for those living with Thalassaemia, empowering them to lead healthier and more fulfilling lives.

(The authors are Chair of the Program Advisory Committee at the National Institute of Health and Family Welfare and Head of Paediatrics at Apollo Hospitals, Noida.)


FULLY VACCINATED
SAVE LIVES

VACCINE

FAITH, FEAR, AND FACTS

Vaccines, hailed as powerful tools in combating infectious diseases, also stir heated debates like no other medical intervention. While they save countless lives, their deployment requires a nuanced approach involving careful consideration of risks and benefits.

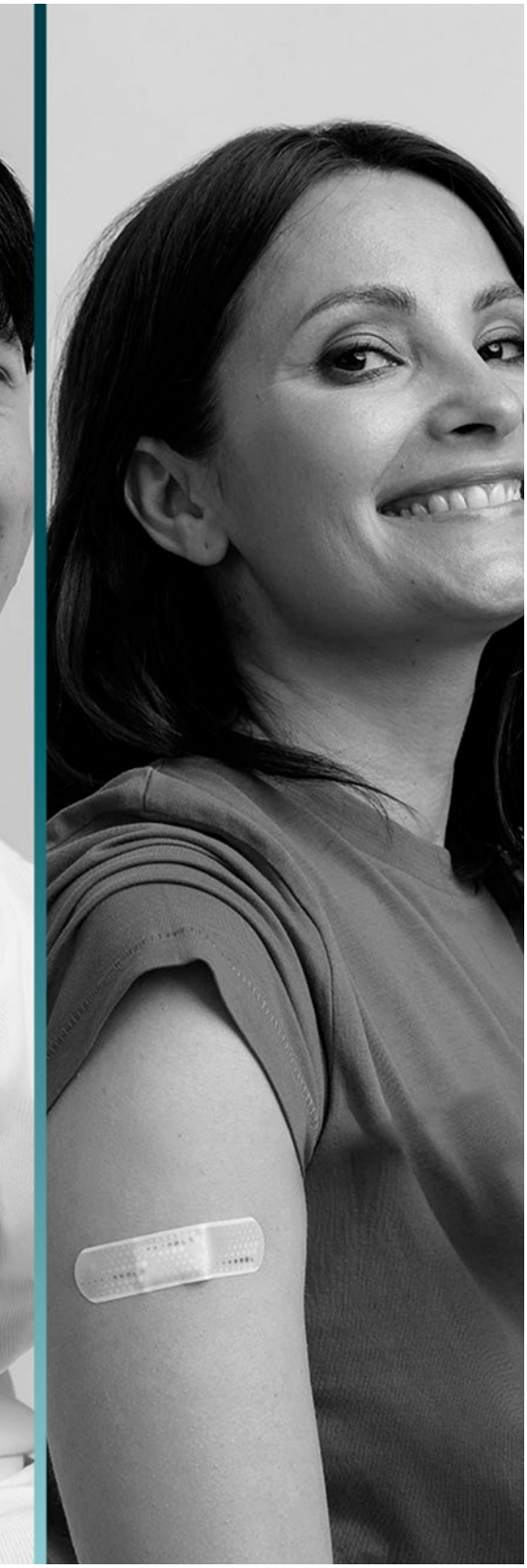
BY DR AMITAV BANERJEE

No other intervention in medicine generates as much heated debate as that centred on vaccines. If powerful tools are double-edged, vaccines prove the point conclusively. Vaccines have both helped and harmed, depending on how thoughtfully these potent instruments were deployed.

When vaccines prevent disease or death, the outcome is often a non-event, unnoticed at the micro-level. Such non-events are difficult to appreciate. However, when vaccines cause adverse effects, as all medical interventions can, the outcome is stark and, in the case of death, very tragic. These tragic events are never forgotten, while the benefits—the non-events—often go unrecognised by the general public. To borrow a phrase from Julius Caesar, "The evil that men do lives after them; the good is often interred with their bones." This sentiment applies to both humans and vaccines.

Recent thoughtless vaccination strategies, such as the hurried vaccine "nudges" against COVID-19, have caused concerning adverse events like myocarditis, leading to a growing distrust of vaccines, even those which may have some benefit at the population level.

> **In the debate on vaccination, serious scientific research must take precedence over celebrity endorsements. Credible voices are crucial in guiding public health decisions.**



While vaccines prevent disease and save lives, the benefits often go unnoticed, whereas adverse effects create a hue and cry. The dual nature of vaccines and the importance of informed deployment should not be overlooked.

Perspectives are shaped by personal experiences. Health workers in underprivileged regions may witness numerous vaccine-preventable child deaths, while affluent communities might not encounter these deaths, regardless of vaccination status.

When asked about my views on vaccines, my response varies based on the inquirer's stance. For strong vaccine advocates, I cite adverse events, including deaths, to challenge their unwavering "faith" in vaccines. Science begins to decay when it approaches the realm of faith. For those labelled as "anti-vaxxers," I emphasise the benefits of selected vaccines in specific contexts. In both cases, I promote "vaccine hesitancy," a term currently considered taboo. My goal is to agitate both firm believers in vaccines and "anti-vaxxers" alike, fostering a sense of vaccine hesitancy.

I fail to understand the concerns about "vaccine hesitancy" expressed by many professional bodies, including the World Health Organisation (WHO). Just as every child is taught to look both ways before crossing the street, should we call this "pedestrian hesitancy?" Certainly not. The term "vaccine hesitancy" is similarly oxymoronic.

India's roads have one of the highest densities of vehicles, with the number of cars rising exponentially post-liberalisation, driving away the old warhorses: the Ambassadors from Kolkata and the Fiats from Mumbai. Poorly maintained roads and weak enforcement of traffic rules compound road safety issues. Motorists often disregard pedestrians, creating "traffic anarchy." Pedestrians need "pedestrian hesitancy" as a survival skill.

A similar scenario of anarchy is emerging with the launch of newer vaccines. Post-liberalisation, vaccine manufacturing has shifted to private hands. Like the old Ambassadors and Fiats, public sector units manufacturing vaccines, such as the Central Research Institute Kasauli, The Pasteur Institute in Coonoor, and the BCG vaccine laboratory in Chennai, were shut down due to failing quality control, paving the way for private players.

Following this, we saw an influx of newer and newer vaccines being added to the Universal Immunisation Program (UIP). Under this program, the government procures vaccines in bulk and distributes them free of charge to beneficiaries. This public-private partnership ensures guaranteed profits for manufacturers, mostly private entities. India, with its large population, naturally became a favoured market for vaccines. The goal of the manufacturers became to lobby intensely with government officials and scientists to include their vaccines in the UIP.

What about the politicians? They are exemplifying Rudolf Virchow's famous statement, "Medicine is a social science and politics nothing but medicine at a larger scale," uttered almost two centuries ago. Providing

life-saving vaccines free of cost to the public is seen by the masses as a commendable welfare measure and garners votes. It pays to play to the gallery.

What about the scientists? What about evidence-based medicine? Scientists are human and have their biases and, increasingly, various conflicts of interest and compulsions. Few can be truly detached and objective, or afford to be. Most leading scientists and those advancing in their careers depend heavily on research grants from pharmaceutical companies. Many genuinely believe that vaccines can do no harm, which is true in most cases. However, even one healthy person dying from a vaccine is one too many and must be taken seriously. Scientists worth their salt cannot ignore such instances or brush them under the carpet by calling them coincidental, soothing their conscience but killing their soul. Due to our poor health infrastructure, our Adverse Events Following Immunisation (AEFI) monitoring is inadequate.

> **From underprivileged regions to affluent communities, the role of vaccines varies. Personalised risk-benefit analysis and cautious approaches are essential in vaccine administration.**

As vaccines flood the UIP due to these dynamics, common citizens, like the poor pedestrian, must cultivate "vaccine hesitancy," weighing the risks and benefits customised to individual indications and the prevalence of a particular disease in a community. One size does not fit all.

Answering correctly whether vaccines are safe and efficacious is difficult. Even motor vehicles are not safe, killing over 500 people on Indian roads every day. Caution is needed

Politicians view free vaccination programs as vote-winning welfare measures, while scientists navigate biases and conflicts of interest. These dynamics significantly influence vaccine policies.

when handling both vehicles and vaccines.

As a country develops, most morbidity from communicable diseases decreases due to improved living standards. In less privileged regions, however, vaccines play a crucial role in overcoming crises of deprivation. The role of vaccines is nuanced, and taken out of context, the issue becomes polarised.

Film stars and celebrities, some even faking death like Poonam Pandey to promote a vaccine, should be seen as large hoardings on the roads, distracting pedestrians and practitioners alike. I have witnessed vaccine-preventable deaths that haunt me, and I have met parents whose child was maimed or died after immunisation. There are no easy answers. We certainly need more serious scientists conducting serious research to resolve these issues, rather than frivolous celebrities and movie stars promoting vaccines like Coca-Cola.

The author, a professor at D Y Patil Medical College, Pune, served as an epidemiologist in the armed forces for over two decades. He was recently ranked in Stanford University's list of the world's top 2% scientists. He has penned the book, Covid-19 Pandemic: A Third Eye.)

RISKS AND REWARDS

The swift development and distribution of COVID-19 vaccines have been instrumental in combating the pandemic. Yet, concerns about adverse effects, spanning from mild symptoms to severe health complications, have ignited considerable debate. Establishing a scientific basis is crucial for comprehending the relationship between the vaccine and its adverse effects.

BY PROF RAMESH K. GOYAL

In recent times, there have been numerous reports highlighting serious adverse effects associated with the COVID-19 vaccine. It has become common to link many instances of death due to cardiovascular complications around the world to the COVID-19 vaccine. Today when there is unrestricted access to medical reports and publications, public awareness regarding the effects of COVID-19 vaccines has significantly increased. Many individuals, unaware of the intricacies of regulatory bodies such as the Food and Drug Administration (FDA) in the United States or the Central Drugs Standard Control Organisation (CDSCO) in India, often criticise these agencies and the government for perceived lapses.

However, regulatory bodies like the FDA and CDSCO have stringent obligations when it comes to authorising the use of any vaccine or drug. Even after a vaccine is authorised for marketing, healthcare providers are required to report any death following COVID-19 vaccination to the Vaccine Adverse Event Reporting System (VAERS), regardless of whether it is clear that the vaccine was the cause.

ROLE OF VACCINES IN CONTROLLING EPIDEMICs

Historically, vaccines have been the ultimate solution for controlling epidemics and pandemics. However, introducing a vaccine to the public involves extensive processes, checks, and balances conducted by regulatory bodies. In the medical field, it is often said that "emergency knows no rule," but it is also acknowledged that adverse effects from drugs, including vaccines, especially those due to idiosyncrasies, can be unpredictable and severe.

One of the biggest challenges in treating viral diseases is the mutations that can hinder efforts to quickly end a pandemic. While developing antiviral drugs is crucial, it may not be the sole solution. Understanding the pathophysiology of the virus and developing strategies to manage the consequences of infection have been key in saving lives long before the discovery of chemotherapeutic agents.

COVID-19 vaccines have been linked to various adverse effects, from localised pain to more severe reactions like myocarditis and pericarditis, particularly in younger males. Ongoing safety monitoring helps track and manage these incidents.

MANDATORY REPORTING OF ADVERSE EFFECTS IN CLINICAL TRIALS

Globally, before any new drug or vaccine is released to the market, it must undergo three phases of clinical trials. Regulatory agencies establish guidelines for these phases to ensure the safety of volunteers.

Phase 1: This initial phase focuses on safety and involves 20-100 healthy volunteers. Scientists begin to determine the appropriate dose size and assess both efficacy and safety.

Phase 2: If no serious side effects are found in Phase 1, Phase 2 involves several hundred volunteers. This phase provides additional information on common short-term side effects and how the dose size relates to the immune response.

Phase 3: Hundreds or thousands of volunteers participate in this phase. In the case of vaccines, the vaccinated subjects are compared with those who might have received a placebo or another vaccine to identify common side effects.

These phases are crucial in ensuring that any new drug or vaccine is both safe and effective before it is made available to the public.

REGULATORY OVERSIGHT

Clinical trials are conducted only after receiving approval from regulatory agencies. These agencies review the trials to ensure they adhere to the highest scientific and ethical standards. The results of these trials are essential part of the FDA evaluation process.

In addition to clinical trial results, a high-power committee comprising scientists, medical professionals, legal experts, social scientists, and subject specialists meticulously evaluates information. This includes studies on the physical, chemical, and biological properties of the vaccine, as well as details about its manufacturing process. The goal is to ensure the vaccine can be produced consistently safe, pure, and potent.

The trials and all related data must demonstrate that the vaccine's benefits outweigh its potential risks (side effects) for the people who will be recommended to receive it. Only when a vaccine's benefits are found to outweigh its potential risks does the FDA grant a license, allowing it to be used by the public.

Countries worldwide, including India and those following WHO guidelines, have rapidly adopted EUA for COVID-19 vaccines, enabling swift public health responses to the pandemic.

POST-MARKETING SURVEILLANCE

Once a vaccine or drug is licensed and released into the market, it enters the post-marketing surveillance phase. For vaccines, this is managed through the VAERS. It is a national system used by scientists at the FDA and the Centers for Disease Control and Prevention (CDC) to collect reports of adverse events (possible side effects) that occur after vaccination.

REPORTING ADVERSE EVENTS

Healthcare professionals, vaccine manufacturers, vaccine recipients, and family members of those who have received a vaccine are encouraged to submit reports to VAERS if they experience any adverse events after vaccination. In India, a similar system is in place through the Pharmacovigilance Programme of India (PvPI) at the Indian Pharmacopoeia Commission in Faridabad.

Scientists continuously monitor VAERS reports to identify potential adverse events, including serious ones, which are reviewed by medical professionals daily. VAERS data provide crucial signals of potential adverse events, helping to detect unexpected patterns or higher-than-expected occurrence rates. Follow-up studies are conducted to investigate these signals further.

Beyond VAERS, there are other

systems such as the Vaccine Safety Datalink (VSD), which help to determine if side effects identified through VAERS are actually related to the vaccination.

The FDA also uses the Post-Licensure Rapid Immunization Safety Monitoring (PRISM) system, the largest vaccine safety surveillance system in the US. PRISM actively monitors and analyses data from a representative subset of the general population. By linking data from health plans with state and city immunisation registries, PRISM accesses information for over 190 million people, enabling the FDA to identify and analyse rare health outcomes that would otherwise be difficult to assess.

UNDERSTANDING SIDE EFFECTS AND ADVERSE EVENTS

Adverse events reported to VAERS are not necessarily side effects caused by vaccination. An adverse event is a health problem that happens after vaccination and may or may not be caused by the vaccine. A side effect, by definition, has been shown to be linked to a vaccine through scientific studies.

During clinical trials, various methods are used to track, categorize, and assess any side effects at each stage. An adverse event, whether expected or spontaneous, is initially graded on a scale of 1 to 5, with grade 1 being mild and non-bothersome, and grade 5 being fatal.

Serious Adverse Events: These are adverse events that cause death, persistent incapacity, induce congenital disabilities, or result in other serious injuries. They are distinguished from adverse reactions that occur during clinical trials but may not be related to the therapy being investigated.

Suspected Unexpected Adverse Events: These are adverse events that

Clinical trials for vaccines, including those for COVID-19, involve multiple phases to ensure safety and efficacy. Each phase gathers critical data on potential side effects and the overall immune response.

are extremely atypical for the medication or therapy applied but may still be related to the trial, thus raising suspicion of involvement.

Understanding these categories and the rigorous processes in place helps ensure that the benefits of vaccines and drugs outweigh their risks, providing a robust framework for public health safety.

COMMON ADVERSE EVENTS AND REPORTING MECHANISMS

Adverse events following vaccination can include localised pain, fatigue, headaches, and other typical ailments. Many of these events are considered preventable according to some meta-studies. Commonly reported adverse events also stem from infections acquired in clinical or hospital settings, surgical errors, and mistakes in medication administration.

IDENTIFICATION OF ADVERSE EVENTS IN CLINICAL TRIALS

By the time a therapy reaches broad-scale human trials, rigorous safety experiments have been conducted, identifying probable adverse events related to the drug's mechanism of action. However, some adverse events might still be discovered at this stage, especially through meta-studies of clinical trials in specific sub-sets of the population. These adverse events can sometimes be overestimated due to the regression to the mean effect, where random noise causes extreme examples to appear as overestimates of the true effect.

POTENTIAL FOR MISSED SIDE EFFECTS DURING CLINICAL TRIALS

The relatively short duration of clinical trials means that long-term side effects might be missed. Some medications have been withdrawn from the market post-release due to long-term adverse effects not identified during the trials. For example, valdecoxib was withdrawn in 2005 due to cardiovascular events and severe skin reactions, and efalizumab was withdrawn in 2009 due to its association with progressive multifocal leukoencephalopathy.

CASE STUDIES OF EUA IMPLEMENTATION

The COVID-19 pandemic posed unprecedented challenges due to several pressing issues:

•Unknown Characteristics: Initially, the characteristics of the virus were not fully understood.

•Unknown Pathophysiology: The disease's pathophysiology was unclear.

•Clinical Confusion: There was confusion over the clinical consequences and their correlation with the disease's pathophysiology.

•Drug Repurposing: Treatment relied on repurposing existing drugs and symptomatic management.

•Rapid Transmission: The virus spread at an exceptional speed.

•Genomic Variation: The virus exhibited significant genomic variation and mutations.

•High Morbidity and Mortality: The pandemic resulted in rapid morbidity and mortality.

Given these circumstances, the Emergency Use Authorisation (EUA), became a critical regulatory mechanism to address the crisis. The EUA allows the use of vaccines and medicines to prevent or mitigate life-threatening conditions when no standard treatment is available, and there is insufficient time to complete the usual clinical trial process.

India's CORBEVAX: India's first indigenously developed receptor binding domain (RBD) protein sub-unit vaccine for COVID-19, CORBEVAX, developed by Biological E Limited, received EUA from the Drug Controller General of India (DCGI).

Pfizer/BioNTech COVID-19 Vaccine: The World Health Organization (WHO) listed the Comirnaty COVID-19 mRNA vaccine for emergency use, making it the first vaccine to receive emergency validation post-outbreak. This enabled countries to expedite regulatory approvals, allowing for rapid import and administration of the vaccine. It also facilitated procurement by UNICEF and the Pan-American

Health Organization for distribution to countries in need.

The Pfizer-BioNTech vaccine has been authorised for emergency use by the FDA for individuals aged six months through 11 years to prevent COVID-19. This authorisation is in place under EUA and remains effective until the circumstances justifying the authorisation change.

The WHO convened regulatory experts worldwide to review data on the Pfizer/BioNTech vaccine's safety, efficacy, and quality as part of a risk-versus-benefit analysis. Dr Mariângela Simão, WHO Assistant-Director General for Access to Medicines and Health Products, emphasises the importance of global efforts to ensure sufficient vaccine supply for priority populations.

SAFETY INFORMATION FOR PFIZER-BIONTECH COVID-19 VACCINE:

•Allergic Reactions: Individuals with a history of severe allergic reactions to any ingredients in the Pfizer-BioNTech COVID-19 vaccine should not receive it. Severe allergic reactions usually occur within minutes to one hour after vaccination. Symptoms include difficulty breathing, swelling of the face and throat, fast heartbeat, rash, dizziness, and weakness. Immediate medical attention is required if these symptoms occur.

•Myocarditis and Pericarditis: These conditions have been reported, particularly in adolescent males aged 12 to 17 years, typically within a few days post-vaccination. Symptoms include chest pain, shortness of breath, and feelings of a fast or fluttering heartbeat. Medical attention should be sought immediately if these symptoms occur.

•Other Potential Side Effects: Common side effects include injection site pain, tiredness, headache, muscle pain, chills, joint pain, fever, injection site swelling/redness, nausea, feeling

unwell, swollen lymph nodes, decreased appetite, diarrhoea, vomiting, arm pain, fainting, dizziness, and irritability.

SPECIAL CONSIDERATIONS

•Monitoring Post-Vaccination: Recipients are usually asked to stay for monitoring after vaccination to manage potential immediate adverse reactions.

•People with Weakened Immune Systems: These individuals may have a reduced immune response to the vaccine.

•Pregnancy and Breastfeeding: Recipients should inform the vaccination provider if they are pregnant, breastfeeding, or have received another COVID-19 vaccine.

•Pre-existing Conditions: Individuals with allergies, a history of myocarditis or pericarditis, fever, bleeding disorders, or those on blood thinners or immunosuppressive medication should inform their vaccination provider.

REPORTING AND MONITORING SYSTEMS

•VAERS: This system is used to collect reports of adverse events following vaccination. This system helps in detecting potential adverse events.

•VSD: This system determines if side effects identified via VAERS are related to vaccination.

•PRISM: It is the largest vaccine safety surveillance system in the US, actively monitoring data from a representative subset of the population.

ADVERSE EFFECTS AND REPORTING SYSTEMS

While the known side effects of vaccines, such as localised pain, fatigue, headache, and other ailments, are well-documented, it's crucial to acknowledge that unexpected and serious side effects may also occur. If side effects become bothersome or persist, individuals are advised to contact their healthcare provider. Reports of vaccine side effects can be submitted to the FDA, CDC, or through the VAERS.

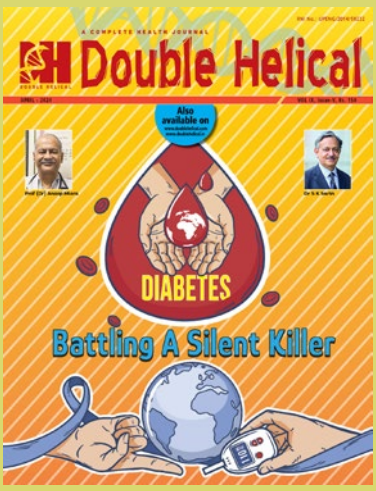
TAKEAWAYS

Globally, the norms for introducing a drug or vaccine are stringent, allowing minimal scope for adverse effects. However, during the COVID-19 pandemic, the urgency necessitated a balance between risks and benefits. EUA provided a framework to deploy vaccines quickly to combat the pandemic, underscoring the need for rapid yet safe medical responses in times of crisis.

Understanding the potential adverse events and the systems in place for reporting and monitoring these events is crucial. Despite rigorous clinical trials and safety protocols, some side effects and adverse events can emerge post-authorisation, necessitating ongoing vigilance and research to ensure public health safety.

The author is Adviser to ITM SLS Baroda University and ITMBU Medical Hospital, Vadodara, and former Vice Chancellor of Delhi Pharmaceutical Sciences & Research University, New Delhi.

Your Guide to Healthy Living



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BEYOND THE JAB

A landmark study has confirmed that COVID-19 vaccines considerably reduce the long-term health risks associated with SARS-CoV-2 infection. While there are some adverse effects like Guillain-Barré Syndrome and myocarditis, the overall benefits of vaccination are significant.

BY BHOOMIKA M. PATEL

A study conducted by scientists from the Centers for Disease Control and Prevention (CDC) in the United States and their partners provides a comprehensive overview of COVID-19 vaccination and its impact on health outcomes. Referencing Lam et al., "Persistence in Risk and Effect of COVID-19 Vaccination on Long-Term Health Consequences after SARS-CoV-2 Infection" (Nature Communications 2024:15, Article No. 1716), the research highlights the long-term health effects following SARS-CoV-2 infection and evaluates the effectiveness of vaccination in mitigating these effects.

Patients infected with SARS-CoV-2, the virus causing COVID-19, may face a range of health issues affecting multiple organs. These health problems can be acute (developing within 30 days of infection) or post-acute (persisting or developing beyond the initial 30 days). The term "Post-COVID-19 condition" encompasses these long-term complications.

IMPACT OF VACCINATION

The global initiative to develop and distribute vaccines was crucial in reducing the risk of COVID-19 infection, severity, and hospitalisation. Initially, a two-dose regimen of vaccines like BioNTech and CoronaVac was recommended. However, with the emergence of the Omicron variant, some countries introduced third and fourth booster doses to maintain immunity.

STUDY DESIGN AND POPULATION

A comprehensive, retrospective study was conducted in Hong Kong, analysing a large cohort of 1,175,277 patients with COVID-19 and comparing them with non-infected

"Data from Hong Kong reveals that fully vaccinated individuals face significantly lower risks of severe health outcomes and mortality one year post-infection.

controls. The study utilised a public healthcare database to track vaccination records and health outcomes.

KEY FINDINGS ON MORTALITY AND HEALTH RISKS

• **REDUCTION IN MORTALITY:** Over one year, a progressive reduction in all-cause mortality was observed among COVID-19 patients compared to controls.

• **IMPACT OF VACCINATION STATUS:** Patients fully vaccinated or with booster doses had lower risks of major cardiovascular diseases and all-cause mortality within 30-90 days post-infection compared to unvaccinated or partially vaccinated patients.

• **LONG-TERM HEALTH CONSEQUENCES:** Fully vaccinated patients and those with booster doses did not show significant health risks beyond 91 and 271 days post-infection, respectively. Conversely, unvaccinated and partially vaccinated patients continued to face elevated risks for up to a year.

New research underscores the crucial role of COVID-19 vaccines in reducing long-term health complications and mortality rates among infected patients.

REAL-WORLD EVIDENCE

The study provides strong real-world evidence supporting the effectiveness of COVID-19 vaccines in reducing long-term health risks associated with SARS-CoV-2 infection.

ADVERSE EFFECTS OF COVID-19 VACCINATION

GUILLAIN-BARRÉ SYNDROME (GBS)

•**DESCRIPTION:** Guillain-Barré Syndrome is a rare condition where the immune system attacks nerve cells, leading to muscle weakness and sometimes paralysis. It is more common in individuals aged 50 and above.

•**RISK ANALYSIS:** Data from the

While myocarditis and thrombosis with thrombocytopenia syndrome (TTS) are rare post-vaccination events, the benefits of mRNA vaccines far outweigh these risks.

Vaccine Safety Datalink (VSD) indicated that the risk of Guillain-Barré Syndrome was significantly higher (21 times within the first 21 days) after receiving the Johnson & Johnson/Janssen COVID-19 vaccine compared to the Pfizer-BioNTech or Moderna (messenger RNA) vaccines. This elevated risk persisted, though at a lower rate (11 times), for up to 42 days post-vaccination.

MYOCARDITIS AND PERICARDITIS

•Description: Myocarditis is the inflammation of the heart muscle, and pericarditis is the inflammation of the heart's outer lining. Both conditions were rare but observed after COVID-19 vaccination.

•**PATIENT OUTCOMES:** Most cases occurred after receiving messenger RNA vaccines (Pfizer-BioNTech or Moderna). Affected patients generally responded well to treatment and rest, recovering quickly.

EVALUATING THE BENEFITS AND RISKS OF MRNA COVID-19 VACCINATION

Evidence to date indicates that the benefits of messenger RNA (mRNA) COVID-19 vaccines, such as those developed by Pfizer-BioNTech and Moderna, significantly outweigh the associated risks, including the risk of myocarditis. The CDC and the Food and Drug Administration (FDA) continue to monitor and evaluate reports of myocarditis and pericarditis following COVID-19 vaccination to ensure public safety.

MYOCARDITIS AND PERICARDITIS

•**INCIDENCE AND DEMOGRAPHICS:** Data from the Vaccine Safety Datalink (VSD) and the Vaccine Adverse Event Reporting System (VAERS) show that the highest rates of myocarditis after COVID-19 vaccination occur among males in their late teens and early twenties. These cases typically arise after the second dose of the vaccine.

•**CLINICAL CONSIDERATIONS:** Myocarditis, an inflammation of the heart muscle, and pericarditis, an inflammation of the outer lining of the heart, are generally rare but have been observed post-vaccination. Most patients respond well to treatment and rest, recovering quickly.

THROMBOSIS WITH THROMBOCYTOPENIA SYNDROME (TTS)

•Incidence and Risk: Thrombosis with thrombocytopenia syndrome (TTS) has been rarely observed following the Johnson & Johnson/Janssen COVID-19 vaccination, occurring in about four cases per million doses administered. TTS is a severe condition that causes blood clots in large blood vessels and low platelet levels.

> **The CDC and FDA continue to track and evaluate the safety of COVID-19 vaccines, ensuring public health guidance is based on the latest evidence and real-world data.**

•REGULATORY RESPONSE: A review of reports established a causal relationship between the J&J/Janssen vaccine and TTS, leading to the Advisory Committee on Immunisation Practices (ACIP) recommending the preferential use of mRNA vaccines over the J&J/Janssen vaccine. Consequently, the J&J/Janssen vaccine is no longer available in the US. The CDC has provided detailed information on TTS cases to healthcare providers and the public to ensure informed decision-making.

ANAPHYLAXIS

•INCIDENCE AND MANAGEMENT: Anaphylaxis, a severe allergic reaction, has been reported at a rate of about five cases per million COVID-19 vaccine doses administered. While rare, anaphylaxis can occur after any vaccination. Healthcare providers are trained to promptly and effectively treat this reaction.

OTHER RARE SIDE EFFECTS

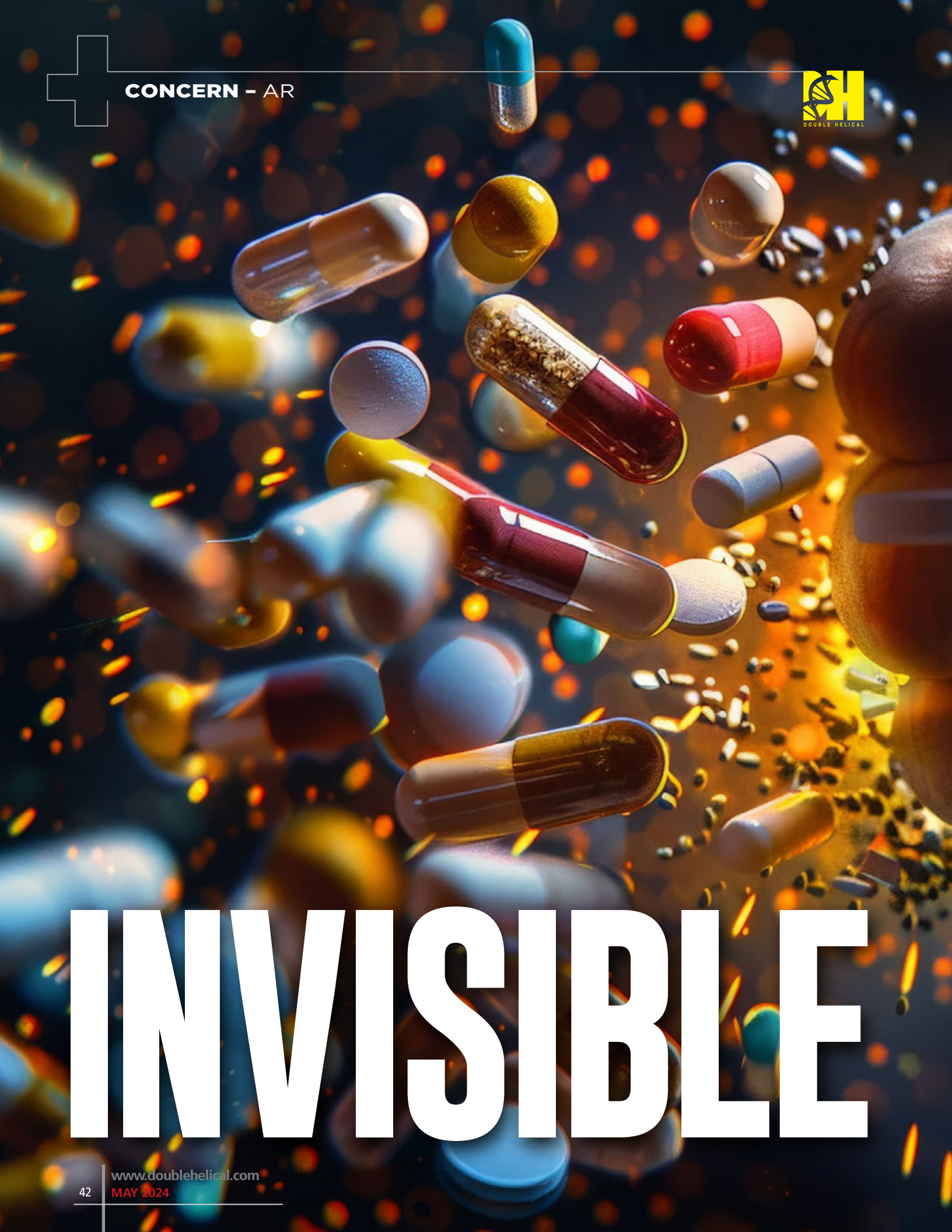
•ACUTE DISSEMINATED ENCEPHALOMYELITIS AND TRANSVERSE: An Australian study found the risk of acute disseminated encephalomyelitis (a rare, inflammatory condition affecting the brain and spinal cord, often following an infection or vaccination) to be extremely low, at 0.78 cases per million doses, and transverse myelitis (an inflammatory disorder causing damage to the spinal cord, leading to symptoms such as muscle weakness and paralysis) at 1.82 cases per million doses.

EXPERT INSIGHTS

Nigel Buttery, a senior research analyst with the Murdoch Children's Research Institute in Australia, noted that rare side effects often become apparent only after a vaccine has been administered to millions of people. This is because clinical trials are not large enough to detect such rare events.

Overall, the comprehensive monitoring and evaluation by health authorities like the CDC and FDA ensure that the benefits of COVID-19 vaccination are clearly communicated and outweigh the risks. Ongoing studies and reviews provide critical information to healthcare providers and the public, supporting informed decision-making and maintaining public health safety.

(The author is Associate Dean at the School of Medicolegal Sciences, National Forensic Science University, Gandhinagar)



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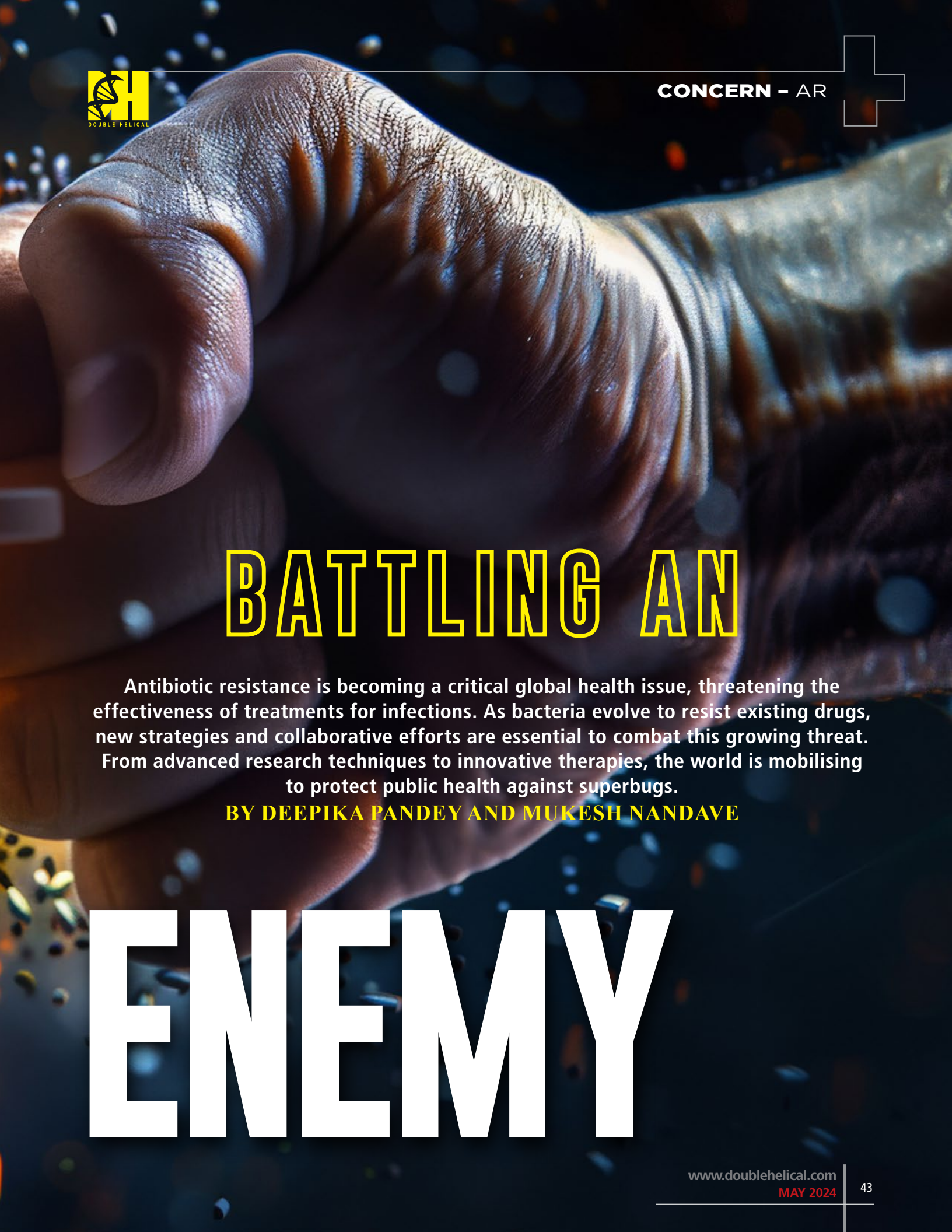


BATTLING AN ENEMY

Antibiotic resistance is becoming a critical global health issue, threatening the effectiveness of treatments for infections. As bacteria evolve to resist existing drugs, new strategies and collaborative efforts are essential to combat this growing threat. From advanced research techniques to innovative therapies, the world is mobilising to protect public health against superbugs.

BY DEEPIKA PANDEY AND MUKESH NANDAVE

Antibiotic resistance (AR) is one of the most pressing issues we face today. It threatens our ability to treat infections, impacts public health, disrupts food security, and hinders global development. This problem started not long after the first antibiotic was discovered. When bacteria become resistant to antibiotics, it becomes harder to treat infections in both people and animals. This leads to higher medical costs, longer hospital stays, and more deaths.

The World Health Organization (WHO) estimates that AR could cause about 10 million deaths each year. Even though we know how serious AR is, we still struggle to develop new antibiotics, and the ones we desperately need are not being created fast enough.

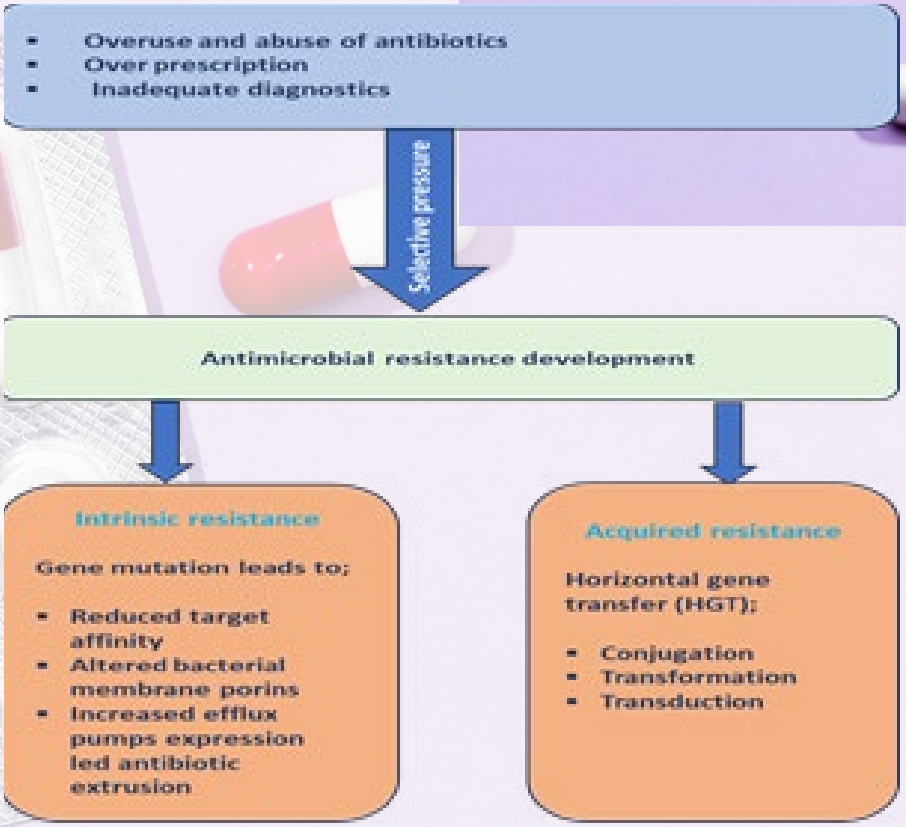
Phage therapy and immuno-antibiotics are emerging as promising alternatives to traditional antibiotics. These novel treatments target bacteria in unique ways, offering hope in the fight against resistant infections.

WHY AR IS SUCH A BIG PROBLEM

The more we use antibiotics, the more we push bacteria to become resistant. Our modern lifestyle, with dense populations and rapid travel, makes it easier for resistant bacteria to spread. Bacteria have clever ways to survive antibiotics. They can change their genetic makeup through mutations or by picking up resistance genes from other bacteria.

Here's how bacteria become resistant:

1.Reduced Affinity: Bacteria can alter themselves so that antibiotics can't easily bind to them.
2.Antibiotic Inactivation: Bacteria produce enzymes that break down antibiotics, rendering them ineffective.
3.Membrane Changes: Bacteria can change their cell membranes to prevent antibiotics from entering.
4.Efflux Pumps: Bacteria can develop pumps that actively expel



antibiotics from their cells, preventing the drugs from working.

These mechanisms make it increasingly difficult to treat infections, emphasising the need for new antibiotics and better management of existing ones to combat AR effectively.

Antibiotic Resistance: An Emerging Challenge

Developing new technologies has helped us find new ways to fight antibiotic resistance. For example, we can now study biological systems, such as metabolic pathways and immune responses, to develop novel strategies against resistant bacteria.

Advanced computational tools like BLAST and HMMER are crucial in identifying antibiotic resistance genes. These technologies help researchers pinpoint mutations and develop strategies to counteract resistance.

How Bacteria Respond to Stress and Develop Resistance

Bacteria face many stressful conditions like acidity, heat, cold, hunger, and oxidative stress. These stresses trigger bacterial responses that help them survive and adapt. Unfortunately, these responses can also make bacteria resistant to antibiotics. For instance, Gram-negative bacteria become resistant by reducing membrane permeability, altering target sites, producing enzymes that destroy antibiotics, increasing efflux pump activity, and changing metabolic pathways. These stress responses make it harder for antibiotics to work effectively.

The SOS Response: A Key Player in Resistance

The SOS response is a well-known bacterial reaction to DNA damage caused by stressors such as high pressure, acid, oxidants, and antibiotics. This response involves reactive oxygen species (ROS) that damage DNA. Two key genes, LexA (a repressor) and RecA (an inducer), regulate the SOS response. When DNA is damaged, the RecA-ATP complex accumulates and triggers the self-cleavage of LexA, leading to the expression of SOS genes. This process helps bacteria repair their DNA but also contributes to antibiotic resistance by promoting biofilm formation and genetic changes.

Heat and Cold Stress: Their Role in Resistance

Bacteria respond to sudden temperature changes through heat shock response (HSR) and cold shock response (CSR). During HSR, bacteria produce heat shock proteins (HSPs) that help refold damaged proteins and degrade faulty ones. HSPs like ClpLA and ClpXP are associated with antibiotic resistance. HSR also

increases genetic recombination and horizontal gene transfer, contributing to multidrug resistance in Gram-negative bacteria.

During CSR, cold shock proteins (CSPs) help bacteria initiate protein synthesis under cold conditions. CSPs like CspD promote biofilm formation and the development of persister cells, which are highly resistant to antibiotics. Additionally, low temperatures can alter the expression of porins and membrane fusion proteins, further enhancing resistance in bacteria like Moraxella catarrhalis.

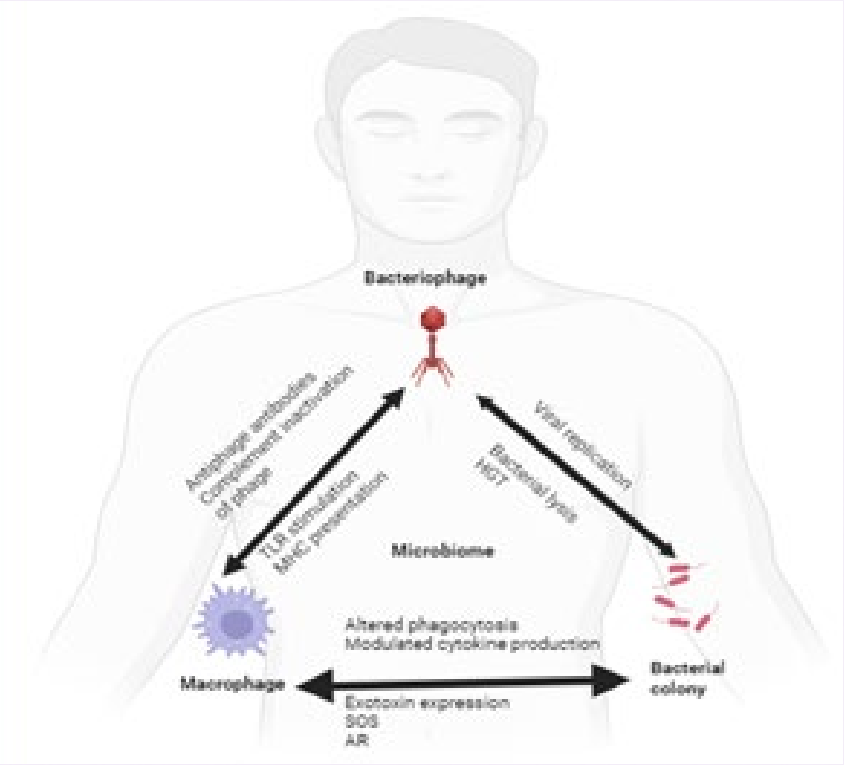
Our Microbiome: Maintaining Health Balance

Our microbiome, the community of microbes living in and on our bodies, plays a crucial role in our overall health. It forms an interconnected network involving bacteria, bacteriophages (viruses that infect bacteria), and human cells. Disrupting this balance, such as through exposure to external phages, can affect the stability of our microbiome, impacting our immune and metabolic health.

By understanding these processes and developing new strategies, we can better combat antibiotic resistance and protect public health.

Microbial dysbiosis, or immune dysregulation, may have significant consequences for our immunologic and metabolic health. Tri-Kingdom interaction in our microbiome accountable for maintaining immune system and metabolic health.

Antibiotic resistance is becoming a bigger problem because of the overuse and misuse of antibiotics, as well as poor infection control and prevention. Everyone has a role to play in addressing this issue, including individuals, medical professionals, veterinarians, governments, and non-governmental organisations.



Protecting the Future from Antibiotic Resistance Threats

> **Combating antibiotic resistance requires a unified approach. Governments, industries, health professionals, and individuals must work together to implement effective policies, invest in research, and promote responsible antibiotic use.**

How Individuals Can Help Prevent Antibiotic Resistance

- **Use Antibiotics Responsibly:** Only take antibiotics when prescribed by a certified health professional.
- **Practice Good Hygiene:** Regular hand washing and other hygiene practices can help prevent infections and reduce the need for antibiotics.

How Policymakers Can Encourage Responsible Antibiotic Use

- **Develop National Action Plans:** Create and strengthen policies to prevent the overuse of antibiotics and control infections.
- **Improve Surveillance and Awareness:** Monitor antibiotic-resistant infections and educate the public about the dangers of antibiotic resistance.

The Role of Health Professionals

- **Prevent Hospital-Acquired Infections**: Develop comprehensive

plans and educate medical staff and patients about infection prevention and control (IPC) practices.

• **Raise Awareness:** Spread knowledge about antibiotic resistance and the importance of preventing infections.

How the Industry Can Innovate to Prevent Antibiotic Resistance

• **Invest in Research:** Focus on developing new medicines, vaccines, diagnostics, and other technologies to prevent infections.

• **Prioritise Antibiotic** Resistance: Allocate funds and resources to address this critical issue.

Ensuring Responsible Use of Antibiotics in Agriculture

• **Vaccinate Animals**: Use vaccines to prevent diseases and give antibiotics only under veterinary supervision.

• **Avoid Using Antibiotics for Growth Promotion:** Do not use antibiotics to promote growth or prevent diseases in healthy animals.

• **Practice Good Food Production:** Follow best practices in producing and processing foods from animals and plants.

The Global Action Plan by WHO Against Antibiotic Resistance

The World Health Organization (WHO) has made fighting antibiotic resistance a top priority. In May 2015, the World Health Assembly approved a global action plan with five key goals:

1. Increase Knowledge and Awareness: Educate the public and professionals about antimicrobial resistance.

2. Improve Research and Surveillance: Enhance the monitoring and research of antibiotic resistance.

3. Reduce Infection Rates: Implement measures to lower the likelihood of infections.

Preventing infections through good hygiene, vaccination, and judicious antibiotic use is vital. By taking proactive measures, we can reduce the spread of resistant bacteria and safeguard the effectiveness of existing treatments.

4. Optimise Antibiotic Use: Promote the best possible use of antibiotics.

5. Ensure Sustainable Investment: Secure long-term funding and resources to combat antibiotic resistance.

By taking these actions, we can work together to slow the spread of antibiotic resistance and protect public health.

Call for Action in Research and Development

The rise of drug-resistant bacteria highlights the urgent need to understand how antimicrobial resistance (AMR) works, such as identifying specific genes responsible for resistance. The WHO has emphasised the theme, "Combat drug resistance: no action today means no cure tomorrow," which has spurred increased research activities. Promising strategies have been developed to restore effective treatments against infections caused by resistant bacteria.

Rapid Identification and Quantification of Resistance

To tackle AMR effectively, it's crucial to quickly identify and measure resistance. Antimicrobial Susceptibility Testing (AST) helps assess both the phenotypic and

genotypic aspects of AMR. Unlike traditional methods like disc diffusion and broth dilution assays, new AST methods use molecular-based techniques (DNA and RNA-based) to detect resistance genes and their alterations. These advanced methods require sophisticated bioinformatics and large databases of resistance markers.

Broad-Spectrum Genomics AST

In diagnostics, there's a shift from focusing on specific genes to using genomic techniques for identifying bacterial species and antibiotic resistance. Whole-genome sequencing (WGS) allows us to trace all AMR-related genes, providing a comprehensive view of resistance factors in a bacterial cell. Given the rapid increase in bacterial resistance compared to new drug development, it's crucial for governments, industries, and research organisations to collaborate and promote innovation in AMR combat tools.

Novel Solutions Outside Traditional Development Pathways

The WHO's 2020 pipeline report includes a comprehensive evaluation of non-traditional antibacterial drugs. It lists 27 emerging treatments, such as bacteriophages, antibodies, and therapies that enhance the patient's immune system to combat bacteria.

Immuno-Antibiotics as an Alternative

Understanding how antibiotics interact with the immune system can lead to better treatments and slower development of resistance. For example, a study by Volk et al. found that combining □-lactam adjunctive therapy with standard antibiotics increased certain immune responses in patients with MRSA. While past attempts to develop a Staphylococcus aureus vaccine have failed, new therapies that combine immune response factors with traditional treatments show promise.

Recent innovations include dual-acting immuno-antibiotics (DAIAs), which target specific bacterial pathways like the MEP (methyl-D-erythritol phosphate) pathway of isoprenoid biosynthesis and riboflavin biosynthesis. These pathways are essential for bacteria but not found in humans, making them ideal targets for new antibiotics.

SOS Response Mechanism: A Critical Drug Target in Restraining AMR

The SOS response is a DNA repair process activated by DNA damage and oxidative stress. Emerging evidence suggests that targeting components of the SOS response, such as RecA and LexA, along with efflux pump inhibitors (EPIs), can prevent the development of antibiotic resistance. These inhibitors can enhance the effectiveness of bactericidal antibiotics, especially when used at sub-lethal concentrations.

By understanding and addressing these mechanisms and strategies, we can develop more effective ways to fight antibiotic resistance.

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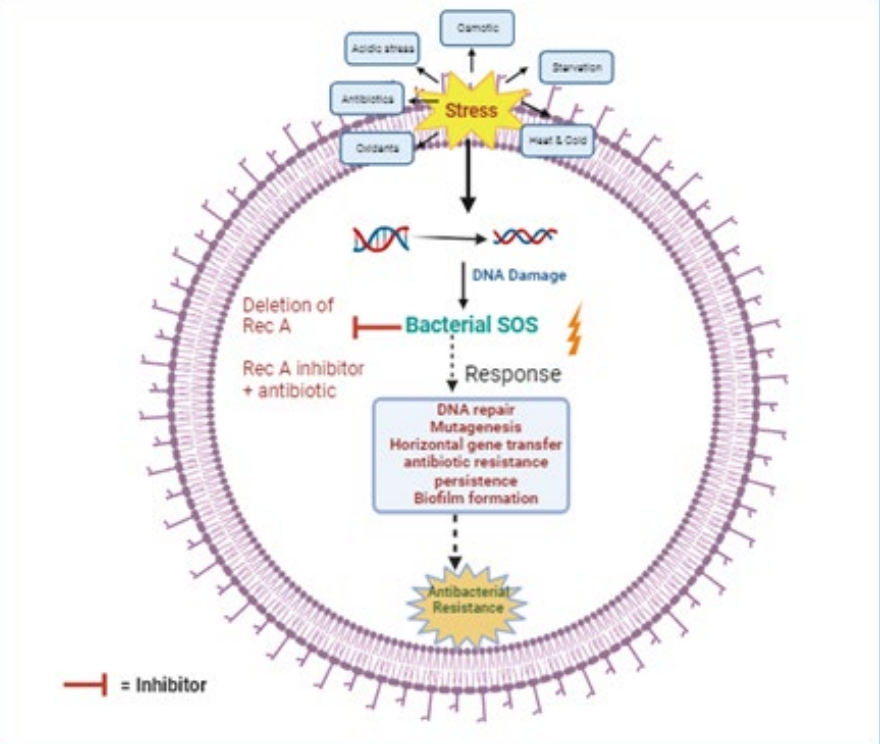
Bacteriophage Therapy: A Key Direction in Combating Antibiotic Resistance

Imbalances in our microbiome can lead to illness. Studies on how bacteriophages (viruses that infect bacteria) interact with the human immune system are in their early stages. Much of what we know comes from phage therapy, which uses lytic phages to treat bacterial infections, and phage vaccines, which involve engineered phages for biotechnology applications. Despite extensive research on other microbiome components, our understanding of the human phageome (the collection of bacteriophages in our bodies) remains limited.

Computational Resources in Managing Antibiotic Resistance

Advanced computational tools are crucial in the search for new drugs to manage antibiotic resistance. Numerous methods have been developed to identify AR genes,



mutations, and genomes, many of which rely on similarity-search tools like BLAST and HMMER.

Key Takeaways

Addressing AMR requires more than just discovering new antibiotics. It involves developing strategies to prevent the emergence of resistance and restore the effectiveness of existing antibiotics. Some of these new strategies include:

- **Preventing Resistance:** Implementing measures to limit or avoid the development of resistance to current antibiotics.
- **Innovative Approaches:** Encouraging the adoption of novel methods to combat resistance, such as bacteriophage therapy and immuno-antibiotics.
- **Global Effort:** A collaborative approach involving individuals, health professionals, policymakers, governments, and industries at both national and international levels.

Understanding the interactions between antibiotics and the immune system can lead to improved treatments and slower development of resistance. For example, dual-acting immuno-antibiotics (DAIAs) target specific bacterial pathways not found in humans, making them effective and safe. Targeting biochemical resistance pathways, including the inhibition of the SOS response and hydrogen sulfide production, presents new avenues for combating resistance.

Phage therapy, which uses bacteriophages to target and destroy antibiotic-resistant bacteria, is an emerging strategy. This approach, along with phage vaccines and engineered phages, offers a promising alternative to traditional antibiotics.

Combating antibiotic resistance requires a comprehensive strategy that involves:

- **Individuals:** Using antibiotics responsibly and maintaining good hygiene.
- **Health Professionals:** Implementing robust infection prevention and control practices.
- **Policymakers:** Developing and enforcing policies to regulate antibiotic use and promote research.
- **Governments and Industries:** Investing in the development of new drugs, diagnostics, and treatments.

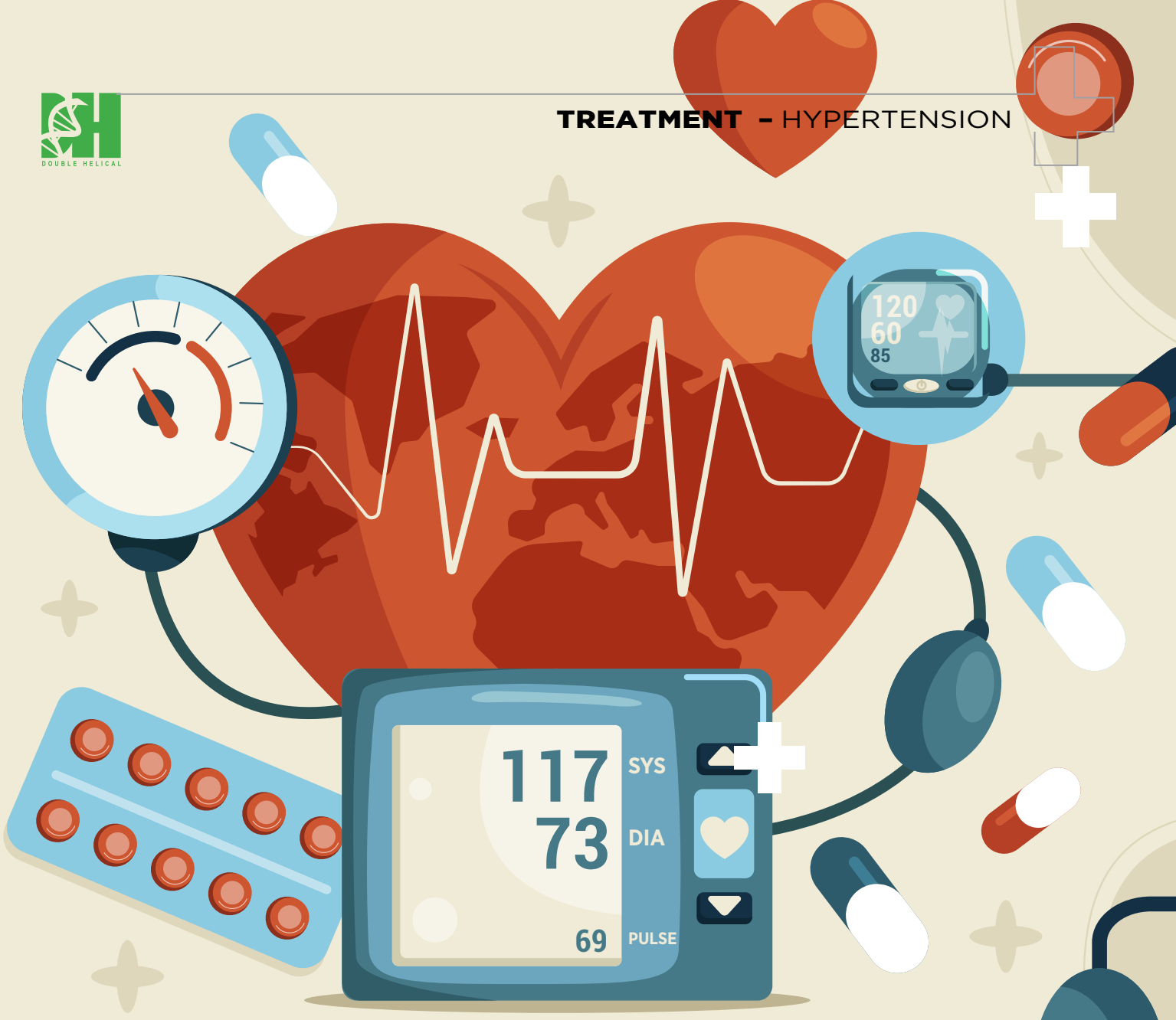
By adopting a multidisciplinary and collaborative approach, we can effectively address the global threat of antibiotic resistance. Prevention and innovation are key to ensuring the continued effectiveness of antibiotics and safeguarding public health.

(The authors are from the Department of Pharmacology, Delhi Pharmaceutical Sciences and Research University, New Delhi.)

In the battle against hypertension, awareness and action are paramount. Double Helical brings you effective strategies, innovative solutions, and expert insights aimed at preventing and managing this silent yet deadly condition.

BY TEAM DOUBLEHELICAL

BREAKING THE



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Hypertension, often referred to as the silent killer, occurs when the pressure in your blood vessels is too high, typically at 140/90 mmHg or higher. While common, it can lead to serious health complications if left untreated. Many individuals with high blood pressure may not experience any symptoms, making regular blood pressure checks crucial for early detection. Essentially, hypertension is synonymous with high blood pressure.

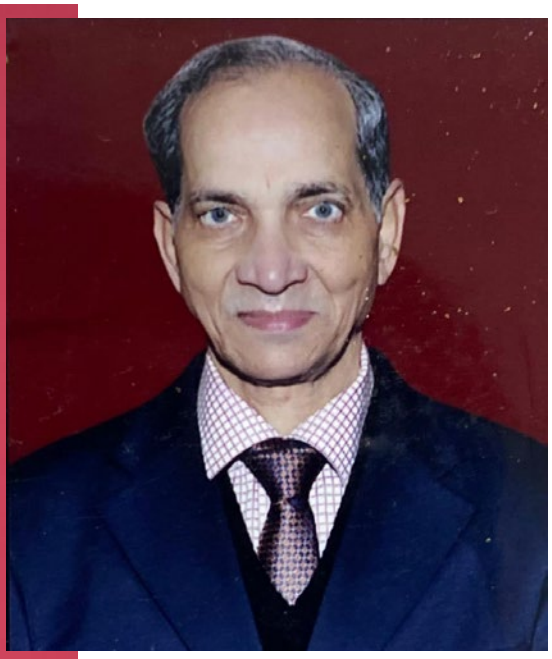
Dr Shridhar Dwivedi, Senior Consultant of Cardiology and Head of Academics at the National Heart Institute, New Delhi, highlights various factors that increase the risk of developing high blood pressure. These include older age, genetics, being overweight or obese, lack of physical activity, high-salt diets, and excessive alcohol consumption. Adopting a healthier lifestyle, such as improving dietary habits, quitting tobacco, and increasing physical activity, can help lower blood pressure for some individuals. However, others may require medication for effective management.

Blood pressure is measured using two numbers: the systolic number, which represents the pressure when the heart contracts or beats, and the diastolic number, which represents the pressure when the heart rests between beats. Hypertension is diagnosed when these readings consistently exceed 140 mmHg (systolic) and/or 90 mmHg (diastolic) on two separate occasions.

Modifiable risk factors for hypertension include unhealthy diets, physical inactivity, tobacco and alcohol use, and being overweight or obese. Non-modifiable risk factors include a family history of hypertension, age over 65 years, and co-existing diseases such as diabetes or kidney disease.

“Lifestyle changes like maintaining a heart-healthy diet, staying physically active, and managing stress are crucial for managing hypertension. These changes, coupled with proper medication, can significantly reduce the risk of complications associated with high blood pressure.

“The landscape of hypertension management is evolving with the integration of digital health innovations, including wearable trackers and smartphone-enabled monitoring technologies. These advancements empower individuals to take control of their health and make informed decisions in real-time.



Dr Shridhar Dwivedi

DETECTING HYPERTENSION: A VITAL STEP

Most individuals with hypertension do not experience symptoms. However, very high blood pressure levels can lead to symptoms such as headaches, blurred vision, chest pain, dizziness, difficulty breathing, nausea, vomiting, and abnormal heart rhythm. If you experience any of these symptoms along with high blood pressure readings, seeking immediate medical care is essential.

The only reliable method to detect hypertension is to have a healthcare professional measure your blood pressure. While individuals can measure their own blood pressure using automated devices, an evaluation by a healthcare professional is crucial for accurate assessment and management of hypertension. Regular blood pressure monitoring is quick, painless, and vital for identifying and managing this silent threat to health.

MANAGING HYPERTENSION: A COMPREHENSIVE APPROACH

Implementing lifestyle changes is key

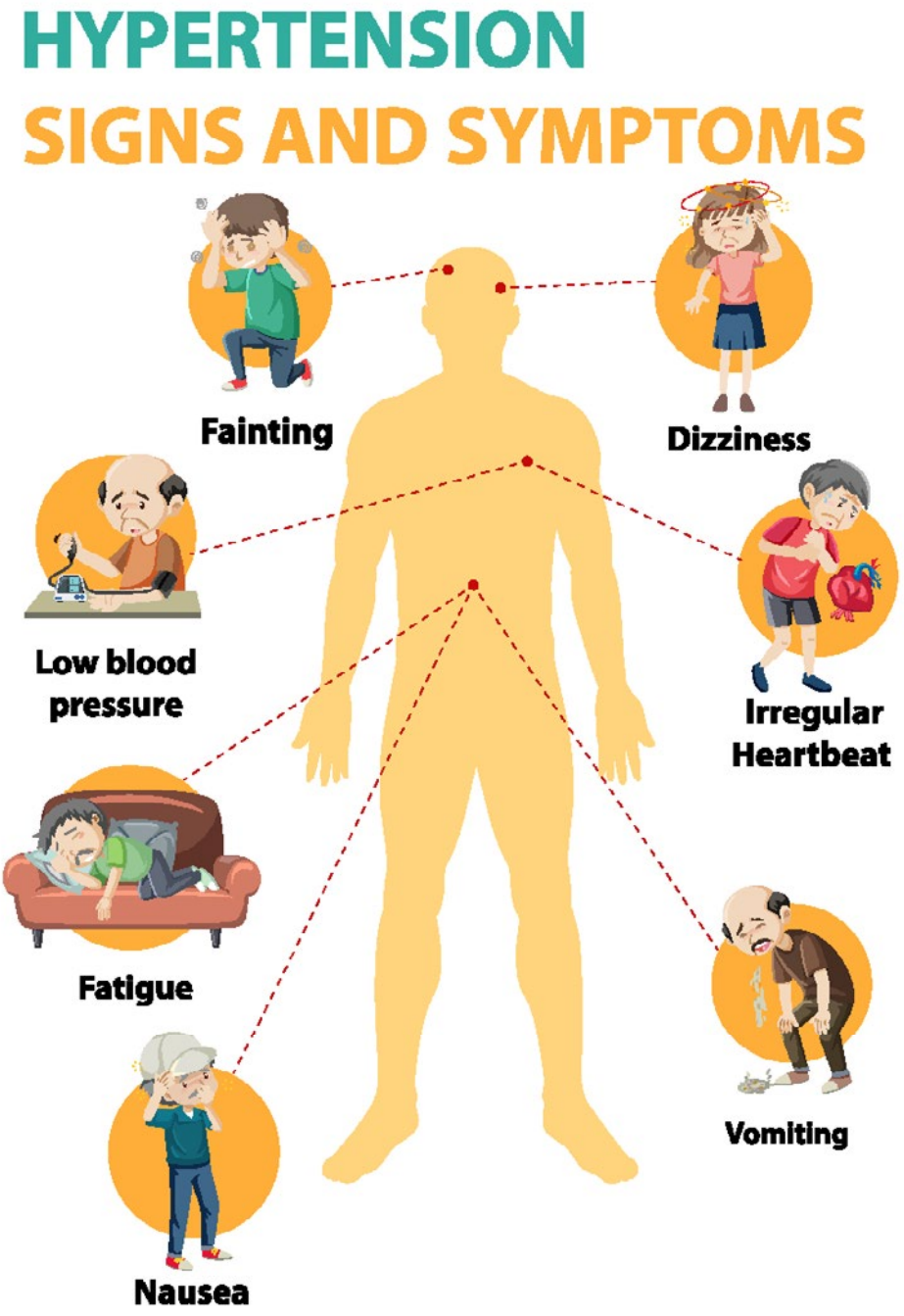
to managing high blood pressure effectively. These changes include adopting a healthy, low-salt diet, achieving weight loss if necessary, engaging in regular physical activity, and quitting alcohol and tobacco use. However, for individuals with high blood pressure, medication may also be necessary. Your doctor will tailor your treatment plan based on your individual health conditions, aiming for a blood pressure goal of less than 130/80 mmHg if you have cardiovascular disease, diabetes, chronic kidney disease, or are at high risk for cardiovascular disease. For most people, the goal is to maintain a blood pressure below 140/90 mmHg.

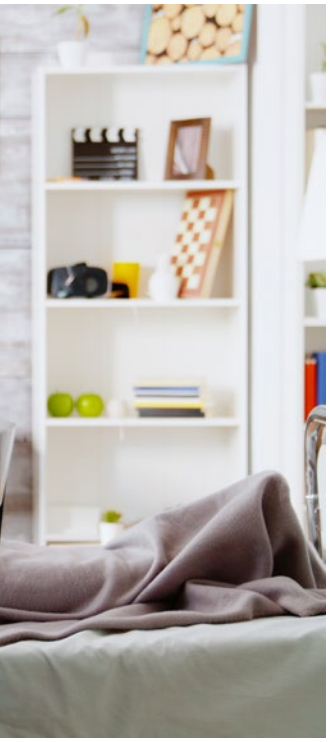
Several common medications are available to help manage high blood pressure. ACE inhibitors such as enalapril and lisinopril relax blood vessels and prevent kidney damage. Angiotensin-2 receptor blockers (ARBs) like losartan and telmisartan also relax blood vessels and prevent kidney damage. Calcium channel blockers including amlodipine and felodipine also work to relax blood vessels. Additionally, diuretics like hydrochlorothiazide and chlorthalidone help eliminate excess water from the body, thereby lowering blood pressure.

It's important to note that lifestyle changes remain crucial even if medication is required. These changes can significantly contribute to preventing and lowering high blood pressure.

WORLD HYPERTENSION DAY: A CALL TO ACTION

Prof.(Dr.) Suneela Garg, Chair Programme Advisory Committee NiHFW, New Delhi said, "Theme of World Hypertension Day 17th May 2024 is, let us confront this silent killer, and motivate all to Measure your Blood pressure Accurately,Control it ,Live longer . On May 17th, World Hypertension Day serves as a reminder to confront this silent killer and promote awareness about the importance of monitoring blood pressure. With approximately one billion people worldwide living with high blood pressure, including 220 million in India alone,





Hypertension, often dubbed the "silent killer," affects millions worldwide, with India alone hosting a staggering 220 million adult patients. With proactive measures like regular blood pressure monitoring and adherence to treatment, the adverse impacts of this condition can be mitigated.

hypertension stands as the number one risk factor for heart disease, stroke, renal complications, and premature death. Regular blood pressure checks and timely treatment are essential for prevention and management.

Efforts to strengthen healthcare systems, including effective leadership, capacity building, financing, and supply chain management, are crucial for the prevention, control, and management of hypertension.

PROMOTING HEALTH STRATEGIES

Health promotion strategies for hypertension focus on lifestyle modifications such as adopting a heart-healthy diet with reduced salt intake, weight management, regular physical activity, moderation of alcohol consumption, and stress management techniques like yoga and meditation. These strategies not only have the potential to save lives but also offer significant economic benefits and contribute to advancing progress towards Sustainable Development Goals (SDGs).

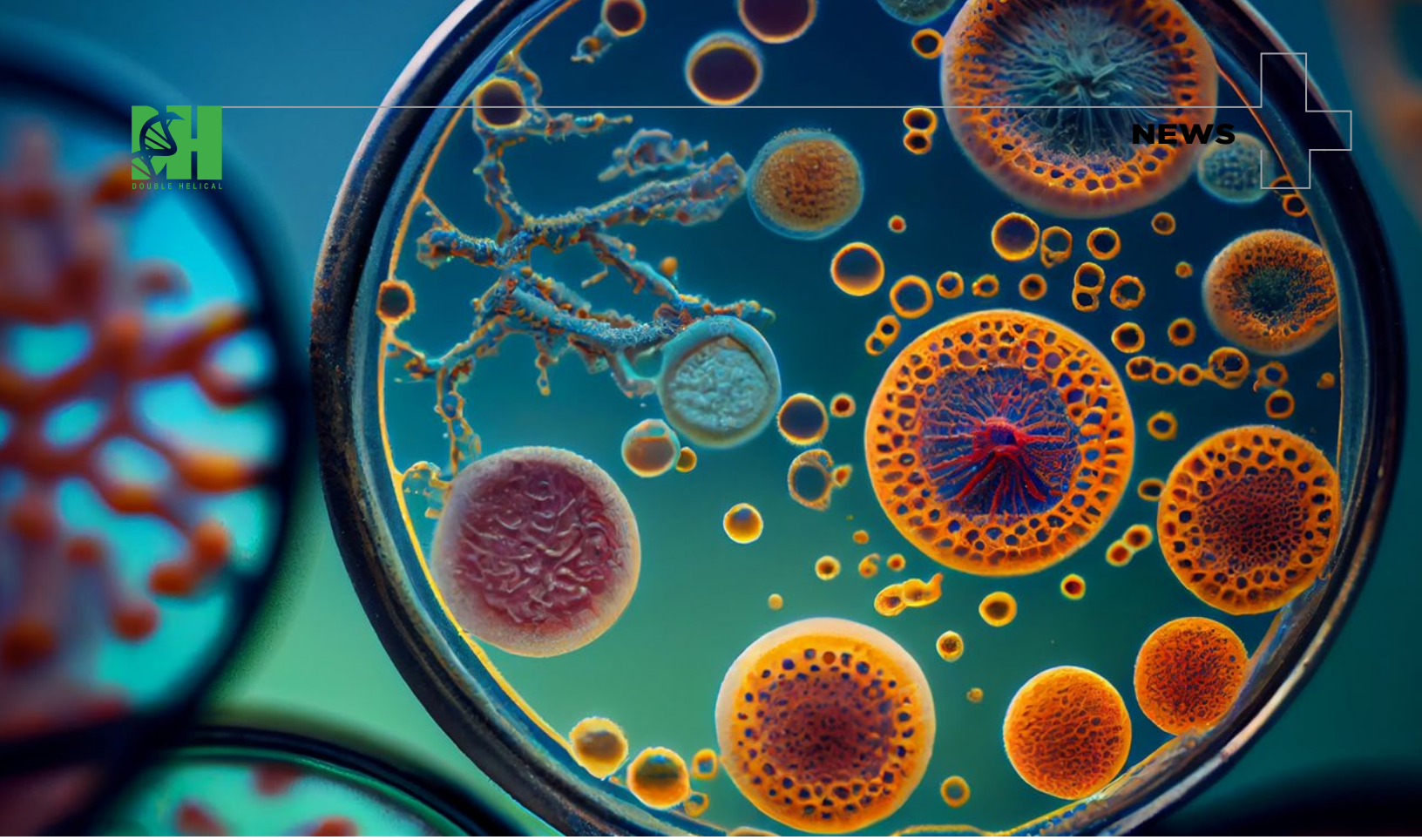
The India Hypertension Control Initiative (IHCI), a collaborative effort led by governmental and non-governmental entities, has demonstrated the efficacy of scalable public health programs in controlling hypertension. Through concerted efforts, substantial improvements in blood pressure control have been achieved, particularly in primary care settings.

ADVANCEMENTS IN DIGITAL HEALTH

Innovations in digital health, including cuffless blood pressure sensors, wireless smartphone-enabled upper arm blood pressure monitors, mobile applications, and remote monitoring technologies, offer promising avenues for improving hypertension management and monitoring. Wearable trackers are gaining interest among medical professionals and patients alike for their potential to provide valuable health insights.

FUTURE DIRECTIONs

Continued research into the causes of hypertension and the development of treatments to improve blood pressure management are essential for preventing early deaths from cardiovascular diseases. There is a pressing need for research aimed at improving adherence to long-term cardiovascular medications. Initiatives like the India Hypertension Control Initiative (IHCI), a multi-partner effort involving governmental and non-governmental organisations, demonstrate the potential for scalable public health programs to yield significant improvements in blood pressure control, particularly in primary care settings. Industry collaboration is vital for scaling up interventions to reach every corner of society.



Asia-Pacific Countries Commit to Tackling AMR Resistance

Health leaders from countries and areas in the World Health Organization (WHO) South-East Asia and Western Pacific Regions recently sounded the alarm and committed to working together to more effectively tackle antimicrobial resistance (AMR). They endorsed a joint position paper on AMR in the human health sector in the Asia-Pacific region at an event held on the sidelines of the World Health Assembly in Geneva, Switzerland.

Initiated by the Government of Japan and endorsed by a total of 26 Asia-Pacific countries—namely, Australia, Bangladesh, Bhutan, Cambodia, Democratic People's Republic of Korea, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Maldives, Mongolia, Nauru, Nepal, New Zealand, Palau, Papua New Guinea, Philippines, Republic of Korea, Singapore, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, and Vanuatu—the joint position paper expresses the determination of leaders from these regions to accelerate action on AMR in the human health sector over the next five years.

To foster collaboration and partnership with the rest of the world, the paper will be presented at the United Nations High-Level Meeting on Antimicrobial Resistance in New York in September 2024.

RISING THREAT

The misuse and overuse of antimicrobials—especially antibiotics—in humans, animals, and plants are driving the rise of drug-resistant infections. This makes common infections harder to treat and medical procedures and treatments, such as surgery and chemotherapy, much riskier. Other factors contributing

to the emergence and spread of drug-resistant infections include a lack of clean water, sanitation, and hygiene (WASH) and inadequate infection prevention and control. These factors promote the spread of microbes that are resistant to treatment in health facilities and communities.

AMR is a rising threat to health and development globally, particularly in the WHO South-East Asia and Western Pacific Regions, home to nearly half of the world's population. In 2019, AMR was the cause of an estimated 700,000 deaths in these two regions, representing more than half of the global deaths caused by AMR. Beyond the immediate threat to human health, AMR also threatens global and national economies. For instance, unless effectively addressed, countries and areas of the WHO Western Pacific Region are expected to face excess economic costs of up to US$148 billion due to AMR between 2020 and 2030.

Saima Wazed, WHO Regional Director for South-East Asia, described the agenda: "Health ministers at the World Health Assembly will discuss how to accelerate the response to AMR. By making this commitment now, and taking it to the United Nations General Assembly High-Level Meeting on AMR in September, countries from Asia and the Pacific are making clear that they recognise the urgency of action, and they are demonstrating commitment to drive change from our part of the world."

Commitment by World Leaders

World leaders are recognising the urgency of addressing antimicrobial resistance. "To address the urgent issue of AMR, which is referred to as a 'silent pandemic,' we have to further accelerate international cooperation and leadership in response to it," said Shiozaki Akihisa, Parliamentary Vice-Minister of Health, Labour and Welfare, Japan. Dr Saia Ma'u Piukala, WHO Regional Director for the Western Pacific, said, "The endorsement of this joint position paper by 26 countries and areas across the Asia-Pacific region shows their determination to lead global efforts to tackle this fundamental threat to health and economies."

In addition to endorsing the joint position paper on AMR in the human health sector in the Asia-Pacific region, the World Health Assembly will consider a resolution proposed by Thailand along with Australia, Brazil, Canada, Chile, China, Ecuador, Egypt, the European Union and its 27 Member States, Georgia, Indonesia, Japan, Kenya, Kuwait, Malaysia, Mexico, Norway, Oman, Panama, Philippines, Qatar, Saudi Arabia, South Africa, Switzerland, Thailand, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. Recognising the need for a One Health approach—involving human and veterinary medicine, agriculture, aquaculture, the environment, and other sectors—the draft resolution calls on WHO, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), and the World Organisation for Animal Health (WOAH) to continue working with member states on efforts to address AMR and to adopt the WHO strategic and operational priorities to address drug-resistant bacterial infections in the human health sector from 2025 to 2035.

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